Australia – Measures Affecting the Importation of Apples from New Zealand

(WT/DS367)

First Written Submission of New Zealand

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ABBREVIATIONS

ACERA	Australian Centre of Excellence for Risk Analysis
ALCM	Apple leafcurling midge
ALOP	Appropriate level of sanitary or phytosanitary protection
APAL	Apple & Pear Australia Limited
AQIS	Australian Quarantine Inspection Service
BA	Biosecurity Australia
DAFF	Department of Agriculture, Fisheries and Forestry, Australia
DSB	Dispute Settlement Body
DSU	*Understanding on Rules and Procedures Governing the Settlement of Disputes*
ESG	Eminent Scientists Group
IFP	Integrated fruit production
IRA	Import risk analysis
IVA	Independent verification agency
MAF	New Zealand Ministry of Agriculture and Forestry
MAFBNZ	MAF Biosecurity New Zealand
SOP	Standard operating procedure
SPS Agreement	*Agreement on the Application of Sanitary and Phytosanitary Measures*

I. EXECUTIVE SUMMARY

1.1 The Australian market has been closed to New Zealand fresh apples since 1921. In 1999 New Zealand made its fourth request for the admission of New Zealand apples. Almost eight years later, in December 2006, a risk analysis process that had been intertwined with a political process was finally completed. The resulting SPS measures imposed in respect of fire blight, European canker and apple leafcurling midge on the importation of New Zealand apples effectively exclude that product from the Australian market.

1.2 Australia's measures for the importation of New Zealand apples are inconsistent with its obligations under Article 2.2 of the *SPS Agreement*.

1.3 In respect of fire blight, the measures are based on the contention that mature, symptomless apples provide a pathway for transmitting fire blight. Such a view is not supported by scientific evidence and it was rejected by the Panel and the Appellate Body in *Japan – Apples*. Moreover, billions of apples have been traded internationally over several decades, without a single case of the introduction, establishment or spread of fire blight via apples. Since there is no rational or objective relationship between the Australian measures and scientific evidence, none of the measures relating to fire blight is consistent with Australia's obligations under Article 2.2.

1.4 In respect of European canker, the measures are also based on the contention that mature, symptomless apples provide a pathway for transmitting European canker. This, too, is not supported by sufficient scientific evidence that mature, symptomless apples can be a vector for the disease. Moreover, even if the disease entered Australia, there is no scientific evidence that European canker could then establish and spread under the climatic conditions of Australia. Since there is no rational or objective relationship between the Australian measures and scientific evidence, none of the measures relating to European canker is consistent with Australia's obligations under Article 2.2.

1.5 In respect of apple leafcurling midge, the measures are based on assumptions, about the transfer of the pest through apples, that are not supported by sufficient scientific evidence. Assumptions about the infestation of apples with viable apple leafcurling midge cocoons, about the potential for live ALCM to emerge, mate and infest apple trees leading to the establishment of the disease in Australia, rest on conjecture, not scientific evidence. Since there is no rational or objective relationship between the Australian measures and scientific evidence, none of the measures relating to apple leafcurling midge is consistent with Australia's obligations under Article 2.2.

1.6 Equally, the general measures imposed by Australia for the importation of New Zealand apples are maintained without sufficient scientific evidence and hence are contrary to Australia's obligations under Article 2.2 of the *SPS Agreement*.

1.7 Australia's measures for the importation of apples are inconsistent with its obligations under Article 5.1 of the *SPS Agreement*.

1.8 The Australian IRA does not constitute a risk assessment within the meaning of Article 5.1 and Annex A of the *SPS Agreement* because it fails to evaluate the likelihood of entry, establishment and spread of the three pests as a result of the importation of New Zealand apples. Australia has employed a flawed "semi-quantitative" methodology under which events that would almost certainly not occur are assigned probabilities of occurrence that are unrelated to known data, a uniform distribution is used to model events that weights likelihood toward a higher level of occurrence, and an overestimated volume of potential trade is employed to produce an inflated probability of risk. By this process, vanishingly small possibilities are conjured into probabilities as justification for the imposition of SPS measures.

1.9 In respect of both fire blight and European canker, Australia analyses "importation steps" as if there were a continuous pathway for the transmittal of the disease, ignoring the fact that at critical points there is no evidence of a pathway and that the risk analysis should have reflected this. In respect of apple leafcurling midge, Australia overestimates the likelihood of entry at several importation steps and then bases likelihood of establishment and spread on a scenario that almost certainly would not occur.

1.10 Australia equally failed to evaluate the likelihood of entry, establishment and spread according to the SPS measures which might be applied. It determined without analysis that certain measures should be applied and failed to consider other, alternative measures that might have instead been applied.

1.11 Australia's measures for the importation of New Zealand apples are inconsistent with its obligations under Article 5.2 of the *SPS Agreement*.

1.12 Australia's IRA process failed to take into account available scientific evidence, ignoring the fact that, in the case of fire blight, the opposite conclusion was reached by the panel in *Japan – Apples* on the basis of the same scientific evidence. Australia's IRA also failed to take into account relevant processes and production methods, including the way in which apples are processed for export in New Zealand and the practices of Australian wholesalers and retailers; as well as relevant inspection, sampling and testing methods, including Australia's own entry inspection procedures. In addition, Australia failed to take into account the prevalence of relevant diseases or pests, including information about infestation levels of viable apple leafcurling midge cocoons; and relevant environmental conditions, including the climatic conditions in Australia which make establishment and spread of European canker something that will almost certainly not occur.

1.13 Australia's measures for the importation of New Zealand apples are inconsistent with its obligations under Articles 5.5 and 2.3 of the *SPS Agreement*.

1.14 Australia has established its own level of protection against risks to plant life or health in respect of two diseases affecting Japanese pears. In those cases, diseases with a degree of risk equivalent to or higher than that of New Zealand apples are subject to measures substantially less restrictive than those imposed on the importation of New Zealand apples, constituting arbitrary and unjustifiable distinctions in treatment of different situations resulting in discrimination or a disguised restriction on international trade.

1.15 Australia's measures for the importation of New Zealand apples are inconsistent with its obligations under Articles 5.6 of the *SPS Agreement*.

1.16 There are alternative measures that are reasonably available, and that are significantly less trade restrictive than those Australia has imposed in relation to New Zealand apples. In the case of fire blight, restricting trade to mature, symptomless apples would have been less trade restrictive and consistent with the ruling in *Japan – Apples*. Such a measure would have been equally appropriate in the case of European canker. In the case of apple leafcurling midge, inspection of a 600-unit sample would also have been less trade restrictive. Such alternative measures would achieve Australia's appropriate level of phytosanitary protection, taking into account technical and economic feasibility.

1.17 Australia's measures for the importation of New Zealand apples are inconsistent with its obligations under Article 8 and Annex C(1)(a) of the *SPS Agreement*.

1.18 A delay by Australia of almost eight years to complete its approval procedures for access to New Zealand apples is clearly "undue" delay. In the case of fire blight, there was no new science contrary to the conclusions in *Japan – Apples* requiring consideration, and in the case of European canker and apple leafcurling midge the science was accessible and uncontroversial. Instead, Australia adopted an approval process that was intertwined with a political process, which resulted in Australia's market remaining effectively closed to New Zealand apples. Measures resulting from such a delayed process have not been imposed in accordance with the *SPS Agreement*.

1.19 Accordingly, New Zealand requests the Panel to find that Australia's measures are inconsistent with its obligations under the *SPS Agreement*, and to recommend that Australia bring its measures into conformity with that Agreement.

II. INTRODUCTION

2.1 This dispute arises out of Australia's continued refusal to grant access for apples produced in New Zealand into the Australian domestic market. The Australian market has been closed to New Zealand apples since 1921. Beginning in 1986, New Zealand requested access to that market and renewed that request in 1989, 1995 and 1999. At the beginning, access was peremptorily denied. More recently, access has been granted but subject to conditions that still effectively continue to close Australia's market to New Zealand apples.

2.2 In short, New Zealand apples have been excluded from Australia's market for over 85 years. Notwithstanding 20 years of efforts by New Zealand to bring about a change to this situation, including, in more recent years, by calling on Australia to live up to its obligations under the *Agreement on the Application of Sanitary and Phytosanitary Measures* (*SPS Agreement*), the Australian market has remained effectively closed.

2.3 In the earlier phases of this dispute Australia's rejection of access for New Zealand apples was solely based on its concern about the possibility of the entry of fire blight, a disease that exists in New Zealand but up until 1997 apparently had not been observed in Australia. By 2000, Australia had expanded the scope of its objections to the importation of apples from New Zealand to alleged risks from pests or diseases other than fire blight, including in particular European canker and apple leafcurling midge.

2.4 In February 2004, a few months after the adoption of the Panel and Appellate Body reports in *Japan – Apples*,[1] a revised draft "import risk analysis" was issued by Australia as part of a series of responses to New Zealand's 1999 request. However, instead of acknowledging the central finding in *Japan – Apples* that there was no scientific basis for the conclusion that apple fruit serve as a pathway for the entry, establishment or spread of fire blight, the 2004 draft proceeded as if the decision in *Japan – Apples* did not exist. It concluded that apple fruit could provide a pathway, ignoring the contrary conclusion of the DSB that was directly applicable to the circumstances of New

[1] Panel Report, *Japan – Measures Affecting the Importation of Apples*, WT/DS245/R, adopted 10 December 2003, upheld by Appellate Body Report, WT/DS245/AB/R, DSR 2003:IX, 4481.

Zealand apples. The draft IRA 2004 again provided for measures to be imposed on the importation of apples that effectively denied real access. Similarly, restrictive measures on importation were provided in respect of European canker and apple leafcurling midge that equally denied access to New Zealand apples. All of these measures had the effect of continuing to close Australia's market to New Zealand apples.

2.5 A further revised draft IRA appeared in 2005 but the outcome was essentially the same.[2] New Zealand's efforts to have Australia focus on the actual science relating to the pests or diseases in question and to adopt measures that were less trade restrictive but would still meet Australia's "appropriate level of protection" were of no avail. In November 2006, a Final IRA (the IRA) was issued, offering no greater opportunities for access for New Zealand apples than had existed in the past.

2.6 In March 2007, the "access" provided for under the IRA was confirmed when the Australian Director of Animal and Plant Quarantine determined that the importation of apples from New Zealand can be permitted "subject to the *Quarantine Act 1908*, and the application of phytosanitary measures as specified in the *Final import risk analysis report for apples from New Zealand*, November 2006."

2.7 The IRA required New Zealand to prepare a documented standard operating procedure (SOP) or manual that describes the phytosanitary procedures for each of the pests of quarantine concern and the responsibilities of the parties. The SOP would be based on a work plan to be developed between Australia and New Zealand. The export of New Zealand apples cannot take place until the work plan and SOP are approved by Australia. Despite its concerns about the content of the IRA, New Zealand engaged in good faith in preparing the SOP and work plan. However, the SOP and work plan have not been agreed.

2.8 The conditions imposed under the IRA, and their adoption by the Australian government in March 2007, has meant that the long years New Zealand has spent in

[2] To avoid confusion, New Zealand will from this point onwards refer to the various IRA documents issued during its fourth request for access as the Draft IRA 2000, the Revised Draft IRA 2004, and the Revised Draft IRA 2005. The Final IRA 2006 will be referred to as the IRA.

discussions with Australia in order to gain meaningful access for New Zealand apples to Australia's market and to have Australia live up to its obligations under the *SPS Agreement* have essentially been wasted. In essence, the IRA produced little more than a predetermined outcome. Expressed in a document that has the aura of scientific exactitude, the IRA can, on closer analysis, be seen for what it is – the result of what was in many respects no more than a political process.

2.9 Throughout the many years of preparation of the IRA – from 1999 to 2006 – there was a related and linked political process in Australia concerning New Zealand's request for market access for apples. There were Senate hearings on the matter; the issue figured in federal elections; there was close collaboration between the "import risk analysis" process and the domestic industry. Indeed, the "expert" panel that was to conduct a science-based risk analysis included a panellist from the domestic industry.

2.10 In light of this, it is perhaps not surprising that the IRA produced the results that it did. However, as a Member of the WTO and as a Party to the *SPS Agreement*, Australia cannot determine its phytosanitary measures on the basis of domestic political interests alone. It must comply with its obligations under the *SPS Agreement*.

2.11 Australia has an obligation under the *SPS Agreement* to ensure that its SPS measures are not maintained without sufficient scientific evidence, that they be based on scientific principles, and applied only to the extent necessary to protect human, animal or plant life and health (Article 2.2); that its SPS measures are based on a risk assessment that evaluates "the likelihood of entry, establishment or spread of a pest or disease" (Article 5.1 and paragraph 4 of Annex A), taking account of "available scientific evidence" and the other matters in Article 5.2. Australia must avoid arbitrary or unjustifiable distinctions that would "result in discrimination or a disguised restriction on international trade" (Article 5.5 and the related Article 2.3); and when adopting SPS measures it must adopt measures that are not more trade restrictive than required to achieve Australia's appropriate level of sanitary or phytosanitary protection (Article 5.6). Finally, the *SPS Agreement* does not permit Members to drag out processes to determine risk interminably. Such processes must be completed "without undue delay" (Article 8 and Annex C (1)(a)). As New Zealand will point out in this submission, Australia is in violation of all of these obligations in respect of the measures at issue.

2.12 In respect of fire blight, this dispute is in substance no different from the dispute brought to WTO dispute settlement in 2002 by the United States against Japan (*Japan - Apples*). It was determined there that there was no scientific evidence to support the contention that apple fruit was a pathway for the entry, establishment and spread of fire blight. The science has not changed since; indeed, subsequent scientific research has provided further confirmation of New Zealand's position.

2.13 Equally, the IRA's supposition that European canker or apple leafcurling midge would be introduced into Australia by trade in apples is not supported by scientific evidence. In the case of European canker, the IRA seeks to extrapolate from research relating to the disease in Europe and North America, and apply that research to circumstances in New Zealand and Australia. However, Australia fails to consider or demonstrate whether the climatic conditions for the entry, establishment or spread of European canker in Australia are comparable to the conditions in the countries in which the research was done. In the case of apple leafcurling midge, the IRA relies on pure conjecture – a conjunction of events whose occurrence is beyond even a remote possibility. None of this is science-based risk assessment, as the *SPS Agreement* requires.

2.14 As New Zealand will point out in this submission, Australia has failed to comply with its obligations under that Agreement and it must remove the non-compliant measures that constitute a barrier to the importation of New Zealand apples into Australia.

2.15 This submission will be divided in the following way: Part III deals with the Factual Background, consisting of the chronology of the dispute (Section A), apple production in New Zealand (Section B), the product at issue (Section C), the pests at issue (Section D), and the measures at issue (Section E). Part IV deals with the legal analysis.

III. FACTUAL BACKGROUND

A. HISTORY OF THE DISPUTE[3]

3.1 In 1921 Australia banned New Zealand apples following the introduction and establishment of the disease fire blight in Auckland in 1919. Over the last 22 years since the first formal request was made in 1986, New Zealand has continually tried to obtain access for apples to the Australian market. Until 1995, there was no mechanism to resolve this matter other than negotiations. Following the entry into force of the WTO agreements, New Zealand continued to try to resolve this matter with its longstanding trading partner without recourse to WTO dispute settlement. Ultimately, resort to such dispute settlement became the only option available.

1. First request: 1986 - 1988

3.2 New Zealand's first formal request for access for New Zealand apples to Australia was made in 1986 and was denied nearly three years later in 1988. Australia's refusal to grant access was based on its claim that there was potential for latent and symptomless infection of host plants in or near orchards free from fire blight.[4]

2. Second request: 1989 - 1990

3.3 In an effort to find a pragmatic way forward and notwithstanding New Zealand's view that measures for fire blight were not technically justified, New Zealand revised its proposal and resubmitted it in 1989. At this time, in an effort to get some access into the Australian market New Zealand proposed that there be stringent conditions on access of apple fruit, including sourcing of apples only from a low fire blight area, visual orchard inspections and testing of export fruit and post-harvest chlorine dipping of fruit. The relevant scientific authority in Australia, the Bureau of Rural Resources, considered that such measures would result in a "negligible" or insignificant risk for the introduction of

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[3] See Annex 1 for a timeline of the history of the New Zealand apples access issue.

[4] Australian Quarantine Inspection Service *Proposal for the import of apple fruit from fire blight free districts of New Zealand; A Discussion Paper*, October 1989, Canberra.

fire blight to Australia.[5] However, following consultation with stakeholders (including the Australian industry) this conclusion was altered and it was recommended that the New Zealand request be denied, on the basis that there were "gaps" in research on the effect of fire blight.[6] The Australian government formally rejected New Zealand's second request in November 1990.[7]

3. Third request: 1995 - 1998

3.4 The *SPS Agreement* came into force on 1 January 1995. New Zealand's third request, made in October 1995, detailed the considerable research that had been undertaken between 1992 and 1995 following discussions between scientists in New Zealand, the United States, Canada and Australia and made clear the relevant findings that apples sourced from trees with active fire blight were not a pathway for the disease, as long as they were free of trash. In accordance with the relevant scientific material, New Zealand proposed that Australia apply a requirement that all apples be free from trash.

3.5 Nearly two years after the third request was submitted, in early April 1997, the Australian Quarantine Inspection Service (AQIS) released a draft "pest risk analysis" which, notwithstanding the detailed and conclusive scientific research submitted by New Zealand, alleged that there were "significant areas of scientific uncertainty about certain steps in the possible pathway of [fire blight] disease establishment via trade in apples".[8] New Zealand responded pointing out that the draft "pest risk analysis" had failed to take

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[5] AQIS, *Proposal for the import of apple fruit; A Discussion Paper*, AQIS Bulletin 1(2) October 1989, p. iv.

[6] Australian Quarantine Inspection Service, *Assessment of New Zealand proposal to export apples to Australia; An AQIS position paper, 30 November 1990*, Department of Primary Industries and Energy, Canberra, p. 22.

[7] In a letter to the New Zealand authorities on 4 December 1990, AQIS advised that the Australian Minister for Resources had announced on 29 November 1990 that an AQIS assessment had concluded that the draft proposal "does not provide sufficient safeguards against the entry and establishment of fire blight in Australia." The AQIS assessment was subsequently issued on 30 November 1990. See Australian Quarantine Inspection Service *Letter from A Catley to R Ivess (Ministry of Agriculture and Fisheries)*, 4 December 1990, Department of Primary Industries and Energy, Canberra.

[8] Australian Quarantine Inspection Service *New Zealand request for the access of apples into Australia; Draft Pest Risk Analysis*, April 1997, Department of Primary Industries and Energy, Canberra, p. 19.

account of relevant scientific research provided to Australia. New Zealand referred to even more recent research that had concluded that the risk of the introduction of fire blight through trade in mature apples was once in 11,364 years.[9]

3.6 The detailed scientific evidence presented by New Zealand demonstrating that apples are not a pathway for fire blight had no effect on the Australian authorities. In its final report issued in December 1998, three years after the request was submitted, AQIS rejected New Zealand's third request and determined that the importation of apples from New Zealand free of trash not be permitted.[10] It alleged that the scientific research presented by New Zealand had not shown that there was no "complete and unarguable break in the chain of events that needs to occur for fire blight to enter and establish".[11] In other words, AQIS was not prepared to rely on science that showed there was a negligible likelihood of the disease being transferred by apples. Australia would only accept absolute certainty. Thus, New Zealand's third request was denied.

4. Fourth request: 1999 - 2008

3.7 New Zealand's fourth request was made in January 1999. By this time WTO panels and the Appellate Body had clarified the obligations under the *SPS Agreement*, including in a case involving Australia's own sanitary and phytosanitary measures, making Australia's position in respect of the importation of apples from New Zealand even more untenable. Consistent with the provisions of the *SPS Agreement*, New Zealand requested that AQIS "review available risk management options with a view to establishing phytosanitary measures that are the least trade restrictive in respect of New

[9] MAF Regulatory Authority *New Zealand response to Australia's draft pest risk analysis on access of New Zealand apples into Australia; April 1998*, Ministry of Agriculture and Forestry, Wellington, p. 7.

[10] Australian Quarantine Inspection Service, *Final import risk analysis of the New Zealand request for the access of apples (Malus pumila Miler var. domestica Schneider) into Australia*, December 1998, Canberra.

[11] *Ibid*, p. 23.

Zealand apple exports while ensuring the level of protection deemed appropriate by Australia is met."[12]

3.8 At a bilateral technical meeting on 4 February 1999, Australia advised New Zealand that "[w]ork undertaken on the previous IRA would be utilised in the new IRA where relevant." Australia made a commitment to complete this process in a timely manner and said it would endeavour to complete the IRA before the end of 1999."[13]

3.9 In spite of this initial response, Australia would take almost eight more years to complete its risk analysis process which ultimately would still not provide New Zealand with commercially meaningful access for apple fruit.

3.10 Australia's consideration of New Zealand's 1999 request was not just characterised by the length of time it took to complete. Two other factors emerge. First, throughout this period, the ground rules for consideration of the New Zealand request kept changing. Second, the process by which New Zealand's request was considered was interwoven with a parallel political process concerning the importation of New Zealand apples. Indeed, some of the conclusions that were reached under Australia's import risk analysis process can be understood only by reference to this political process.

(a) The risk analysis process begins

3.11 In February 1999, AQIS announced to industry stakeholders the existence of the New Zealand request and invited comments.[14] In April 1999, it announced that its review of the New Zealand process would follow its normal import risk analysis process in accordance with *The AQIS Import Risk Analysis Process Handbook*.[15] In June 1999,

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[12] MAF Regulatory Authority, *Letter from R J Ivess to B Stynes (Australian Quarantine Inspection Service), Access of New Zealand Apples into Australia: Import Proposal*, 8 February 1999, Ministry of Agriculture and Forestry, Wellington.

[13] Australia – New Zealand Plant Technical Discussions, Summary of Meeting, 4 February 1999.

[14] Australian Quarantine Inspection Service (1999) *Letter to stakeholders, Import risk analysis – apples from New Zealand, 1999/237, 25 February 1999*, Department of Agriculture, Fisheries and Forestry, Canberra.

[15] Australian Quarantine Inspection Service (1999) *Letter to stakeholders, Import risk analysis – apples from New Zealand, DG 37/99 T99/237, 15 April 1999*, Department of Agriculture, Fisheries and Forestry, Canberra.

AQIS made a further announcement that it was forming an in-house team of scientists to conduct the review and that it expected to release a draft IRA in November 1999.[16]

(b) Draft IRA 2000 – the first of several draft IRAs

3.12 In October 2000, Biosecurity Australia issued the first of its three draft IRAs.[17] The Draft IRA 2000 did not just cover fire blight; it now included additional diseases and pests including European canker and apple leafcurling midge, which also would require management measures. The Draft IRA 2000 concluded that the risk of fire blight spreading to Australia through the import of apples from New Zealand was "moderate" and proposed strict phytosanitary controls on any imports of apples. Consultations with stakeholders were arranged.

3.13 On 11 October 2000, the State Minister for Agriculture moved in the NSW State Parliament: "That this House… calls on the Federal Government to protect New South Wales jobs and immediately respond to reports that New Zealand apples will be allowed into Australia…".[18] At that same time, the Australian apple and pear industry announced that it would target 27 Federal seats in a political lobbying campaign designed to prevent New Zealand apples entering Australia.[19]

3.14 With a federal election looming later that year, the Prime Minister, John Howard, and his Deputy Prime Minister and National Party Leader, John Anderson, were reported to have pledged that they would never allow New Zealand apples into Australia.[20] In December 2000, the Maritime Union of Australia, the Transport Workers Union and the

[16] Australian Quarantine Inspection Service (1999) *Letter to stakeholders, Import risk analysis – apples from New Zealand, DG 43 99/237, 28 June 1999*, Department of Agriculture, Fisheries and Forestry, Canberra.

[17] Biosecurity Australia, *Plants Biosecurity Policy Memorandum 2000/18; Import risk analysis – Fresh apples from New Zealand*, 11 October 2000, Department of Agriculture, Fisheries and Forestry, Canberra.

[18] Parliament of New South Wales, *Legislative Assembly Hansard*, 11 October 2000, 3.26pm; New Zealand apple imports; Urgent motion.

[19] *Ibid.*

[20] Parliament of New South Wales *Legislative Assembly Hansard*, 6 March 2001, 3.50pm; New Zealand apple and pear importation; Urgent motion.

Australian Workers Union pledged that they would blockade the nation's ports to stop the Federal Government allowing New Zealand apples into the country.[21]

(c) Australian Senate Committee launches first inquiry

3.15 In November 2000, the Australian Senate decided to refer the issue of the importation of New Zealand apples to its Rural and Regional Affairs and Transport Legislation Committee. This Committee had broad terms of reference to inquire into the administration and management by Australia's quarantine agencies of "all aspects of the consideration and assessment of proposed importation to Australia of fresh apple fruit from New Zealand."[22]

3.16 The Committee held a series of 12 hearings from 6 February to 11 May 2001. It visited almost all the major apple growing regions of Australia (with the exception of those in New South Wales) and heard from apple and pear growers, industry body representatives, state agriculture department representatives and scientific experts. During the week beginning 14 May 2001, it visited New Zealand and held discussions with the New Zealand Government and also industry representatives and experts on fire blight. During this time, on March 14 2001, the Australian apple industry body organised "The Big Crunch Day" which included protests throughout Australia designed to stop New Zealand apple imports.[23]

3.17 During its inquiry, the Senate Committee received 63 written submissions (including two confidential ones), together with nine supplementary submissions. In particular it received major written submissions from Biosecurity Australia, the New

[21] Adrian Tame, "Blockade threat over NZ apples", *Sunday Herald Sun*, 10 December 2000, p. 12.

[22] Commonwealth of Australia, *The proposed importation of fresh apple fruit from New Zealand; Interim report, Senate Rural and Regional Affairs and Transport Legislation Committee*, *July 2001*, Canberra, p. v.

[23] Australian Apple and Pear Growers Association (2001) *The Big Crunch Day, March 14, 2001*, Australia. On the day of the industry organised anti-Fire blight campaign, the Australian Federal Minister for Agriculture, Fisheries and Forestry issued a press release assuring people attending the protest rallies that "Australia's quarantine authorities would continue the ban on New Zealand apples while scientific issues remain unresolved." See Commonwealth of Australia *Fireblight – NZ apple ban to continue; Media Release; Hon Warren Truss MP; Minister for Agriculture, Fisheries and Forestry*, AFFA01/46WT, 14 March 2001.

Zealand Government, the Apple and Pear Growers Association of Australia and associated state based organisations, all of the relevant Australian state government agriculture departments, Environment Australia, the Australian Department of Foreign Affairs and Trade, a number of scientific experts, and a large number of domestic apple growers. During the hearings, the Committee heard from 50 witnesses or groups of witnesses. In total, 467 pages of evidence were taken.

3.18 New Zealand's concern about the politicisation of the risk analysis process for New Zealand apples was expressed by New Zealand's High Commissioner to Australia in the Senate Committee's inquiry:

> …those who speak most strongly against the importation of New Zealand apples seem to do so from the starting point that they do not want to accept New Zealand apples under any conditions. In this respect, the opposition appears to us to be more politically based than science based.[24]

3.19 In July 2001, the Committee delivered its 251 page interim report which contained wide-ranging recommendations, including that there should be "guidelines" on consultation in the risk assessment process and the creation of a Risk Assessment Committee in which there would be direct involvement by domestic "stakeholders".[25] The Committee also recommended that there should be a quantitative risk assessment rather than "unsatisfactory" qualitative assessment, and that further research should be undertaken.[26]

(d) The IRA process changes

3.20 On 6 March 2001, the Secretary of the Australian Department of Agriculture, Fisheries and Forestry announced changes to the process for reviewing the New Zealand request. There was to be an inventory of issues raised during the four month consultation

[24] Commonwealth of Australia, *Official Committee Hansard; Senate Rural and Regional Affairs and Transport Legislation Committee; Reference: Import Risk Assessment on New Zealand Apples; Thursday,* 5 April 2001, Canberra, p. 408.

[25] *Ibid*, paras. 16.27 – 16.30 and recommendation 4 (p. 203).

[26] *Ibid*, paras. 16.44 – 16.49 and recommendation 6 (pp. 205-6).

period on the draft IRA, further consultations on that inventory, the development of a scientific review paper based on the issues in the inventory, workshops with stakeholders, and an external review of the final IRA when it was close to completion.[27]

3.21 In September 2001, Biosecurity Australia released new draft *Guidelines for Import Risk Analysis* which consisted of a technical manual on the methodologies available for the conduct of IRAs.[28] Apparently in response to the Senate Committee process, the draft *Guidelines* included a "semi-quantitative" method for evaluating risk, a method that was to feature prominently in the analysis of the New Zealand request.[29] On 8 October 2001, the process underwent a further change with the announcement by Biosecurity Australia that it would establish a "Risk Analysis Panel or RAP"[30] to complete the risk analysis process.[31] In doing this Biosecurity Australia again appears to have responded to the recommendations of the Senate Committee.[32]

3.22 In January 2002, Biosecurity Australia announced that in response to an appeal by a stakeholder it was including an apple grower on the "risk analysis panel", apparently so that the Panel would gain expertise on "industry processes and trading patterns".[33] The appointment was of particular significance since the panel was to operate by consensus. The Executive Manager of Biosecurity Australia acknowledged that making such an

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[27] *Ibid*, p. 200.

[28] Biosecurity Australia, *Plant Biosecurity Policy Memorandum 2001/26, Review of the Import risk analysis process*, 28 September 2001, Department of Agriculture, Fisheries and Forestry, Canberra.

[29] Biosecurity Australia, *Draft Guidelines for Import Risk Analysis*, September 2001, Department of Agriculture, Fisheries and Forestry, Canberra, p. 83.

[30] The RAP became the 'IRA team' in 2003 with the issuance of the revised *Import Risk Analysis Handbook*. See Biosecurity Australia (2003) *Import Risk Analysis Handbook*, Department of Agriculture, Fisheries and Forestry, Canberra, p. 12.

[31] Biosecurity Australia, *Plant Biosecurity Policy Memorandum 2001/22, Import risk analysis – apples from New Zealand,* 8 October 2001, Department of Agriculture, Fisheries and Forestry, Canberra.

[32] Commonwealth of Australia (2003) *The proposed importation of fresh apple fruit from New Zealand; Government response to the recommendation of the Senate Rural and Regional Affairs and Transport Legislative Committee's interim report, March 2003*, Canberra, p. 7.

[33] Biosecurity Australia, *Plant Biosecurity Policy Memorandum 2002/01, Import risk analysis – apples from New Zealand*, 10 January 2002, Department of Agriculture, Fisheries and Forestry, Canberra.

appointment could be seen to compromise the independence of the panel and that this could be "a potential issue."[34]

(e) The Risk Analysis Panel commences work

3.23 Against this background, the Risk Analysis Panel (RAP) held its first meeting in January 2002. Its plan was to: (a) identify the issues, raised in response to the draft IRA, on which it would focus most of its efforts; (b) produce a "scientific review paper" responding to all outstanding issues; (c) analyse the issues, taking into account the comments and advice received, and produce a revised draft IRA and distribute it for comment; and (d) continue the process as set out in the administrative framework for the IRA.[35] What New Zealand did not (and could not) know was that this next draft IRA was still two years away and that it would not be the last.

(f) The DSB finds no justification in Japan – Apples *for restrictions on apple imports for fire blight*

3.24 A few months later, in May 2002, the United States commenced proceedings in the WTO against Japan over SPS measures imposed by Japan on the importation of apples in respect of fire blight (*Japan – Apples*). Australia was a third party to the dispute. In June 2003, the WTO Panel found in favour of the United States complaint, concluding that there was not sufficient scientific evidence that mature, symptomless apple fruit are likely to serve as a pathway for the entry establishment or spread of fire blight. The Panel's findings were upheld by the Appellate Body on 26 November 2003 and the rulings of the Panel and Appellate Body were adopted by the DSB on 10 December 2003. On 30 July 2004 the United States commenced compliance proceedings against Japan under Article 21.5 of the DSU. The position of the United States was

[34] ABC National Rural News, *Apple grower added to risk panel, Thursday,* 10 January 2002.

[35] Biosecurity Australia, *Plant Biosecurity Policy Memorandum 2002/04, Import risk analysis – apples from New Zealand*, 8 February 2002, Department of Agriculture, Fisheries and Forestry, Canberra.

upheld by the Panel on 23 June 2005.[36] All of the determinations in this case were directly relevant to New Zealand's request for access in respect of apples to Australia.

(g) Australia issues second draft IRA

3.25 In February 2004, two years after the RAP was established, Biosecurity Australia issued a revised draft IRA.[37] Although the analysis was more detailed, and the IRA included for the first time a semi-quantitative rather than a qualitative methodology for assessing risk, Australia still maintained that there was a risk of fire blight from the importation of apples into Australia and a consequent need for strict SPS measures. However, the draft IRA ignored the conclusion of the Panel and Appellate Body in *Japan – Apples*, a matter to which New Zealand drew attention in its comments to Australia on the draft IRA.[38]

3.26 It was assumed by New Zealand that, in accordance with the IRA process it had stipulated, Australia would, after considering the comments received on the Revised Draft IRA 2004, move to issue a final IRA. However, in the lead up to another Australian federal election, the politics of quarantine and apples were to intervene and the ground rules would again be changed.

(h) The Australian Senate Committee launches a new inquiry

3.27 In March 2004, almost three years after the Senate Rural and Regional Affairs and Transport Legislation Committee commenced its initial inquiry, the Committee decided that, as a revised draft IRA had just been released, it should conclude its initial inquiry and commence a new one. The terms of reference for the new inquiry were "the administration of Biosecurity Australia with particular reference to the assessment,

[36] Panel Report, *Japan – Measures Affecting the Importation of Apples – Recourse to Article 21.5 of the DSU by the United States*, WT/DS245/RW, adopted 20 July 2005.

[37] Biosecurity Australia, *Plants Biosecurity Policy Memorandum 2004/03; Revised draft import risk analysis report for apples from New Zealand, 19 February 2004*, Department of Agriculture, Fisheries and Forestry, Canberra.

[38] MAF Biosecurity Authority, *Comments by the Government of New Zealand on importation of apples from New Zealand, Revised draft IRA report,* February 2004, Ministry of Agriculture and Forestry, Wellington.

methodology, conclusions and recommendations" contained in the Revised Draft IRA 2004 issued in February 2004.[39]

(i) The changes continue

3.28 In August 2004, Australia announced that it would once again be making changes to its IRA process, in part because of a need to address perceptions that trade considerations, rather than scientific analysis, were influencing the IRA process.[40] The first of these changes was to establish Biosecurity Australia as a separate business unit outside the agricultural market access area of the Department of Agriculture, Fisheries and Forestry. The second change was to establish an "Eminent Scientists Group" (ESG). However, the name of this group promised more than was to be delivered. Its function was not scientific, but rather to review the draft IRA report, prepared by the IRA team, to ensure that the IRA team had adequately considered all technical submissions received from stakeholders during the formal consultation period, and to recommend any action considered necessary to overcome any identified deficiencies.

3.29 In October 2004, following the Australian federal election, the Australian Minister of Agriculture announced that Biosecurity Australia would be established as a prescribed agency and would scientifically examine all IRAs currently under development (including the Revised Draft IRA 2004) and then re-issue them for public comment and consultation. The Minister acknowledged "[t]hese changes may slow down some of the final decisions."[41]

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[39] Commonwealth of Australia, *The proposed importation of fresh apple fruit from New Zealand – Final Report; March 2004*, Senate Rural and Regional Affairs and Transport Legislation Committee, Canberra, pp. 2-3.

[40] Biosecurity Australia, *Plant Biosecurity Policy Memorandum 2004/22, New arrangements to strengthen import risk analysis, 16 August 2004*, Department of Agriculture, Fisheries and Forestry, Canberra.

[41] Minister of Agriculture, Fisheries and Forestry *Media release, Science will decide NZ apple request, DAFF04/292WT – 13 October 2004*, Minister of Agriculture, Fisheries and Forestry, Canberra.

(j) The Australian Senate Committee reports

3.30 In March 2005, the Senate Committee issued its report on the importation of apples from New Zealand. The Committee had received 37 written submissions, including three supplementary submissions, and 23 witnesses appeared before the Committee during three public hearings. In its report, the Committee expressed concern about an approach that was based on permitting apples to be imported and took the view that producers needed to be confident that the conditions imposed would be actually met. The Committee also wanted more attention to be focused on the asserted economic consequences of a fire blight outbreak.[42]

(k) Another revised draft IRA

3.31 In December 2005, Biosecurity Australia issued its third draft IRA – the Revised Draft IRA 2005. Despite having already provided a combined comments period of eight months on the previous drafts, Australia elected to provide stakeholders with another four months to provide comments on its latest draft. The Revised Draft IRA 2005 again covered fire blight, European canker, apple leafcurling midge and leafrollers and included certain further pests that would require management measures if importation was to be made into Western Australia. It then set out an array of risk management measures for application were importation to be permitted.[43]

3.32 New Zealand again submitted extensive comments, questioning assumptions made in the analysis and querying the validity of conclusions drawn, pointing out that the measures being imposed were neither necessary nor the least trade restrictive measures available.[44]

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[42] Commonwealth of Australia, *Administration of Biosecurity Australia – Revised draft import risk analysis for apples from New Zealand,* March 2005, Senate Rural and Regional Affairs and Transport Legislation Committee, Canberra.

[43] Biosecurity Australia, *Biosecurity Australia Policy Memorandum 2005/20, Revised draft import risk analysis report for apples from New Zealand,* 1 December 2005, Biosecurity Australia, Canberra.

[44] MAF Biosecurity New Zealand, *Comments by the Government of New Zealand on Biosecurity Australia's revised draft import risk analysis report for apples from New Zealand, December 2005*, Ministry of Agriculture and Forestry, Wellington.

3.33 On 21 July 2006, Biosecurity Australia asked the ESG to review the draft final IRA. The ESG's assessment delivered in October 2006 was not even a page long, and simply stated that Biosecurity Australia's IRA team had properly considered the submissions received from stakeholders on the revised draft IRA report.[45] On 8 November 2006, Biosecurity Australia announced that the draft final IRA had been reviewed by the ESG and that it was now finalising the IRA report and policy recommendations, taking into account the ESG report.[46]

(l) A Final IRA issued after eight years

3.34 On 30 November 2006, almost eight years after New Zealand's fourth request, the Final IRA was released.[47] Notwithstanding the passage of all these years, in substance nothing had changed. As the New Zealand Minister of Agriculture wrote to his Australian counterpart, on 20 December 2006, the conditions for access "do not appear to have materially changed, and if anything appear to have been made more stringent."[48] Nevertheless, the IRA was confirmed in March 2007 when the Australian Director of Animal and Plant Quarantine determined that the importation of apples from New Zealand could be permitted "subject to the *Quarantine Act 1908*, and the application of phytosanitary measures as specified in the *Final import risk analysis report for apples from New Zealand*, November 2006."[49]

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[45] Eminent Scientists Group (2006) *Report of the Eminent Scientists Group on the import risk analysis of apples from New Zealand to the Director of Animal and Plant Quarantine, October 2006*, Eminent Scientists Group, p. 2.

[46] Biosecurity Australia (2006) *Biosecurity Australia Policy Memorandum 2006/34, Apple import risk analysis update, 8 November 2006*, Biosecurity Australia, Canberra.

[47] **Exhibit NZ-1:** Biosecurity Australia (2006) *Final import risk analysis report for apples from New Zealand, Part B*, Biosecurity Australia, Canberra (hereafter referred to as the "IRA"). See also Biosecurity Australia *Biosecurity Australia Policy Memorandum 2006/37; Release of final import risk analysis report for apples from New Zealand*, 30 November 2006, Biosecurity Australia, Canberra.

[48] Letter from Hon Jim Anderton to Hon Peter McGauran, 20 December 2006. Mr Anderton is the New Zealand Government Minister with responsibility for Agriculture and Biosecurity. Mr McGauran is the Australian Federal Minister for Agriculture, Fisheries and Forestry.

[49] **Exhibit NZ-2:** Biosecurity Australia (2007), *Biosecurity Australia Policy Memorandum 2007/07; Biosecurity Policy Determination – Importation of Apples from New Zealand*, 27 March 2007, Canberra.

(m) The Work Plan and SOP process

3.35 The IRA requires New Zealand to prepare a documented standard operating procedure (SOP) or manual that describes the phytosanitary procedures for each of the pests of quarantine concern and the responsibilities of the parties.[50] The SOP would be based on a work plan to be developed between Australia and New Zealand.

3.36 New Zealand engaged in good faith in this "SOP process", despite reiterating that it did not agree with the IRA, and with strong reservations as to the viability of trade under the unnecessary and unjustifiably restrictive Australian measures.

3.37 Discussions on the work plan and SOP took place between March and June 2007. By the end of July 2007 it became clear that there was to be no modification to the IRA measures via these discussions.

3.38 Subsequently, in January/February 2008, there was further discussion of a draft SOP. New Zealand again engaged in good faith, and without prejudice to the WTO proceedings which had already been initiated in this dispute. In April and June 2008, Australia proposed concluding the SOP, again subject to the unnecessary and unjustified requirements of the IRA. Bilateral agreement was not reached on the SOP and work plan, and no further related discussions have taken place.

5. WTO dispute proceedings initiated

3.39 On 31 August 2007, New Zealand requested consultations with Australia under Article 4 of the DSU with a view to resolving the dispute.[51] These consultations were held in Geneva on 4 October 2007. The United States and the European Communities attended as third parties. Unfortunately those consultations failed to resolve the matter and, at the meeting of the DSB on 6 December 2007, New Zealand requested the establishment of a panel under Article 6.1 of the DSU.[52] On 17 January 2008, New

[50] IRA, pp. 313-314.

[51] WT/DS367/1.

[52] WT/DS367/5.

Zealand renewed its request and, at the meeting of the DSU on 21 January 2008, a panel was established.[53]

3.40 On 3 March 2008, New Zealand requested the Director-General to determine the composition of the panel, pursuant to 8.7 of the DSU. On 12 March 2008, the Director-General accordingly composed the Panel.[54]

3.41 Chile, the European Communities, Japan, Pakistan, Chinese Taipei, and the United States have reserved their rights to participate in the Panel proceedings as third parties.

B. Apple Production in New Zealand

3.42 New Zealand is recognised as a very efficient producer and exporter of apples.[55] The main apple production areas of New Zealand are Hawkes Bay (61% of total New Zealand production), Nelson (29%) and Otago (4%), with all other areas in the country (e.g. Auckland, Bay of Plenty, Gisborne, Wairarapa and Waikato) together contributing only 6% to the country's total production.[56]

3.43 Apple harvest in New Zealand takes place in late summer and autumn (between February and early May). Leaf fall occurs during winter (June to August). New growth occurs in spring (September to November), with apple development occurring during summer (from December to March). Annex 2 provides an overview of the annual apple production process in New Zealand. New Zealand apples are primarily exported in autumn (March to May).

C. The Product at Issue

3.44 The product at issue in this dispute is apples imported from New Zealand into

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[53] WT/DSB/M/245, paras. 54-58.

[54] WT/DS367/6.

[55] **Exhibit NZ-4:** *World Apple Review* (2008) Belrose Inc, New Zealand, pp. 84 and 127.

[56] **Exhibit NZ-3:** Pipfruit New Zealand Incorporated (2007) *Pipfruit Industry Statistical Annuals,* March 2008, New Zealand p. 4.

Australia. In practice, New Zealand would export mature, symptomless apples to Australia.

3.45 The IRA requires, as a condition of entry, that all New Zealand apples must meet the "class 1 export quality fruit" standard in respect of the presence of wounds and maturity[57] and must be free of trash.[58] Such a standard would be consistent with practice in the export of apples from New Zealand, and in bringing this case New Zealand made no challenge to this type of requirement.

D. THE PESTS AT ISSUE[59]

1. Fire blight[60]

3.46 Fire blight is a plant disease caused by the bacterium *Erwinia amylovora*. The primary hosts include pears, apples, quince, and loquats.[61]

(a) Symptoms

3.47 Symptoms of infection of host plants depend on the parts infected. Infected flowers droop, wither and die, becoming dry and darkened in colour. Infected shoots and twigs wither, darken and die. As shoots and twigs wither, they bend downwards resembling a shepherd's crook. Infected leaves become curled and scorched. Infected

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[57] IRA, p. 315.

[58] IRA, p. 318.

[59] Throughout this submission, for convenience, New Zealand uses the word "pest" broadly to include a disease. The IPPC definition of pest is more limited: "Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products."

[60] General discussions of the biology of the disease are contained in (i) **Exhibit NZ-5:** Thomson, SV (2000) "Epidemiology of Fire Blight", Chapter 2 of Vanneste, JL (ed) *Fire Blight: the Disease and its Causative Agent,* Erwinia Amylovora. CABI Publishing, CAB International, Wallingford UK, pp. 9-36; (ii) **Exhibit NZ-6:** European and Mediterranean Plant Protection Organization (EPPO) (1997), "Data Sheets on Quarantine Pests: *Erwinia amylovora*", *Quarantine for Europe*, pp. 1-6; (iii) Mattheis, J (1996) "Fruit Maturity and Ripening" Chapter 11 of Malib, KM, Andrews, PK, Lang GA, *Tree Fruit Physiology: Growth and Development*, K Mullinix Pub. Washington State University Short Course Proceedings 166pp, pp. 117-123.

[61] Other important host plants include the genera *Cotoneaster*, *Crataegus* (hawthorn), *Pyracantha* (firethorn), and *Sorbus* (mountain ash), although individual species within each genus may not serve as hosts.

fruit fail to develop fully, turning brown to black, and becoming mummified, frequently remaining attached to the limb. Such fruit are not harvested. Limbs and trunks of trees may also develop cankers (sunken or swollen necrotic lesions) which, if disease development is severe, may result in tree death.

(b) Life cycle

3.48 Fire blight bacteria (*E. amylovora*) live through the winter exclusively in infected host plants. In the presence of warm, wet conditions in spring, the disease cycle commences when cankers on infected trunks and shoots become active and exude a bacteria-laden ooze, which is the inoculum for primary infection in the spring time. The inoculum is transmitted primarily through rain, but also by insects, to open flowers, and to a lesser extent to stomata (openings through which the plant breathes) or wounds, on the same or new host plants. In flowers, the bacteria multiply externally on the stigma and enter the plant through nectaries (plant glands that secrete nectar).

3.49 Cankers become inactive during the growing season, especially in warmer, drier months. The cankers generally cease ooze production during the hot summer months and remain inactive until the following spring when they reactivate and the disease cycle begins again.

(c) Spread

3.50 The bacteria may spread within host plants, infecting blossoms, fruits, spurs, twigs, branches, and leaves, and form new cankers (sunken areas surrounded by cracked bark) on infected branches and twigs. With appropriate environmental conditions, inoculum may then be exuded from infected shoots, cankered bark, and infected fruitlets and blossoms. Infection may also occur when host plants produce sporadic, late blossoms ('rattail bloom') or become wounded through pruning, hailstorm damage, or insect injury.

3.51 On rare occasions fruit can be infested with low levels of *E. amylovora*.[62] This occurs when small populations of bacteria are present on the developing flower parts. An infested flower can develop into a mature apple but bacteria are localised in the calyx (remnant of the blossom), and then in very small numbers. Infection of mature apple fruit does not occur. It has never been demonstrated that mature fruit are involved in dissemination of *E. amylovora* or serve as a source of new infection in orchards (Thomson 2000: 17).

(d) Distribution

3.52 Fire blight is thought to be native to North America. The earliest known observation and description of the disease was reported in New York State in the United States in 1793. By the early 1900s, fire blight had been reported in Canada from Ontario to British Columbia, in northern Mexico, and in the United States from the East Coast to California and the Pacific Northwest. The spread of fire blight has never been linked to trade in apple fruit.

3.53 Fire blight has spread across northern and western Europe, the Mediterranean region and several Central European countries, although it remains localized in France and Switzerland and is restricted to certain spots in Spain, Italy, and Austria.[63] Portugal and Finland are fire blight-free and Norway has an eradication programme underway. Most recently fire blight has been reported in Latvia, Morocco and Syria. These recent incursions are attributed to spread by the introduction of nursery stock from infected regions and not from trade in apple fruit. Latin America and substantial parts of Africa and Asia apparently remain fire blight-free.[64]

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[62] "Infestation" refers to the presence of an organism (e.g. bacteria, fungus, insect) on the outside of a host plant (including the fruit), without any implication that an infection has occurred. The use of the term in the text above refers to the presence of *E. amylovora* on the outside of the fruit, without any implication that the fruit is infected.

[63] Panel Report, *Japan – Apples*, para. 2.6.

[64] Panel Report, *Japan – Apples*, para. 2.6.

3.54 Fire blight was first reported in New Zealand in 1919. Its establishment and spread around the country is associated with the movement of infected rootstocks and nursery material, not with the distribution of fruit.

3.55 Australia claims to be free of the fire blight disease. However, in 1997 fire blight was detected by a New Zealand scientist, Dr Chris Hale, on several cotoneaster plants in the Melbourne Royal Botanic Gardens. It is not known how long the disease had been at this site before it was detected or how it came to be there. Australia reports that it has eradicated the disease.

2. European canker[65]

3.56 European canker is a plant disease caused by the fungus *Neonectria galligena* (*N. galligena).*[66] The primary hosts are types of aspen, beech, birch, elm, maple and oak trees, apple trees and European and Oriental pear trees.

(a) Symptoms

3.57 The primary symptom of infected plants is the production of cankers on limbs and trunks. The fungus can infect fruit and cause lesions that develop into "fruit rots",[67] but only under climatic conditions of high summer rainfall, in particular in the United Kingdom.

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[65] This discussion of the biology of the disease on apples is drawn principally from the following sources: **Exhibit NZ-7:** (i) Grove, GG (1990) "Nectria canker" in Jones, AL and HS Aldwinckle (eds) *Compendium of Apple and Pear Diseases*, American Phytopathological Society, St. Paul, Minnesota, USA, 35-36; (ii) **Exhibit NZ-8:** Snowdon, AL (1990) *A Colour Atlas of Post-Harvest Diseases and Disorders of Fruits and Vegetables* (Vol 1 General Introduction and Fruits), Wolfe Scientific, London, 184-185; (iii) **Exhibit NZ-9:** Swinburne, TR (1975) "European canker of apple (*Nectria galligena*)" *Review of Plant Pathology*, 54(10), 787-799; (iv) **Exhibit NZ-10:** McCartney, WO (1967) "An unusual occurrence of eye rot of apple in California due to *Nectria galligena*" *Plant Disease Reporter,* 51(4), 278-281; (v) **Exhibit NZ-11:** Swinburne, TR (1964) "Rotting of apples of the variety 'Bramley's seedling' by *Nectria galligena*, (Bres.)" *Nature*, 204, 493-494; (vi) **Exhibit NZ-12:** Dubin, HJ and H English (1975) "Effects of temperature, relative humidity, and desiccation on germination of *Nectria galligena* conidia" *Mycologia,* 67, 83-88.

[66] Previously known as *Nectria galligena.*

[67] In fruit the disease is known as "eye rot" when on the calyx end, or "bull's eye rot" when on the fruit surface.

(b) Life cycle

3.58 *N. galligena* spores are of two types; asexual[68] spores (called "conidia") and sexual spores (called "ascospores").

3.59 Conidia are produced from tree cankers during humid conditions, mainly in late summer, autumn and spring. Conidia also may be produced on infected fruit showing visible rot symptoms.

3.60 Ascospores are produced in fruiting bodies called "perithecia", produced by the sexual stage of the fungus. Perithecia only occur in regions with a climate conducive to their development. Perithecia are produced almost exclusively on tree cankers that are untreated and are one or more years old. In New Zealand, perithecia appear on cankers towards the end of June (early winter).[69] They mature during winter and produce ascospores during late winter and spring. Perithecia and ascospores have occasionally been reported on fruit overwintered under specific conditions, but this has never been observed in New Zealand.

(c) Infection

3.61 European canker infection[70] occurs when spores (conidia or ascospores) that have been deposited on the surface of a host plant enter the plant through wounds in the plant surface. Leaf scars (that result from leaf fall in autumn) are the most important site of infection. Under prolonged moist conditions leaf scars remain susceptible to infection for a number of days. However, susceptibility is short-lived under dry conditions. Wounds arising from orchard practices or from natural cracks in tree branches also provide infection sites for both conidia and ascospores at times other than leaf fall.

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[68] The formal name of the asexual form of this pathogen (also called the imperfect state) when asexual spores (such as conidia) are produced, is *Cylindrocarpon mali*.

[69] Brook PJ and Bailey FL (1965) "Control of European Canker", *The Orchardist of New Zealand,* 38, 117-118, p. 117.

[70] Infection refers to the process by which an organism (e.g. *N. galligena*) enters into a host plant and establishes a pathogenic relationship with the host. This is to be contrasted with infestation which refers to the presence of the organism on the outside of a host plant (including the fruit), without any implication that an infection has occurred.

3.62 The infection process includes spore germination and entry of the germ tube[71] into the plant and requires wetness on the plant surface provided by a prolonged period of rainfall. After infection the fungus grows within the plant and remains latent for a period of weeks to months, depending on temperature. Eventually, disease symptoms appear as cankers on wood or lesions on fruit. In regions where the climate is very conducive to fruit infection (prolonged rainfall late in the production season) a proportion of the infections may remain latent within the fruit at the time of harvest. However, not all latently infected fruit will express rot symptoms.

(d) Sporulation

3.63 After a period of wood canker or fruit lesion growth (weeks to months, depending on temperature) conidia may be produced on cankers or lesions. After a further period, which generally includes a winter, perithecia may be produced on wood cankers or on mummified fruit.

(e) Spread

3.64 European canker is transmitted over short distances by spores. Conidia are spread by rain splash and are only distributed a few metres, while ascospores are spread by wind.

3.65 Long distance spread of the disease is as a result planting infected nursery stock: it has never been linked with the movement of apple fruit.

3.66 Several factors influence spore production, spore survival and infection, but the most important is climate.[72] The key climate determinants of European canker's establishment and spread are rainfall frequency and temperature (see Annex 3).

(f) Distribution

3.67 The worldwide distribution of European canker appears to correspond with major apple and pear growing regions, although its occurrence is restricted to those areas and

[71] Germ tube: a slender tubular outgrowth from a spore in germination.

[72] Other factors include cultivar, root stock, soil type, water management, pruning and fertiliser regimes.

occasions when suitable climatic conditions occur. European canker was first reported in New Zealand in 1905.

3.68 Australia reports that it is free of European canker. An outbreak of the disease in Tasmania, Australia's southern-most state, was reported in 1954, although there is evidence to suggest that it had been present there for twenty years prior to identification (Ransom 1997: 121).[73] An eradication programme was initiated in 1954 with eradication declared in 1991.

3. Apple leafcurling midge[74]

3.69 Apple leafcurling midge (ALCM) is a small fly, 1.5–2.5 mm long, with dusky wings covered in fine dark hairs. The only host plant of ALCM is the apple tree (CABI 2008 and Barnes 1948: 38).

(a) Symptoms

3.70 ALCM larvae feed on the unfurling young leaves of apple trees causing the leaf margins to curl or roll. This can result in reduced shoot and tree growth.

(b) Life cycle

3.71 ALCM reproduce sexually. Females mate once or, rarely, twice. On average, males mate 2.7 times (Suckling *et al.* 2007: 749). ALCM have a short life span. In the laboratory, protected from adverse conditions, adults have been reported to live from 3-4

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[73] **Exhibit NZ-13:** Ransom LM (1997) "The eradication of *Nectria galligena* from apple trees in Tasmania, 1954 to 1991" in *Australasian Plant Pathology* 26 (2), 121-125.

[74] This discussion of the biology of the pest is principally drawn from the following sources: (i) **Exhibit NZ-14:** Commonwealth Agriculture Bureau International (2008) *Crop Protection Compendium Datasheet on Dasineura mali* (apple leafcurling midge); (ii) **Exhibit NZ-15:** Suckling DM, Walker JTS, Shaw PW, Manning L, Lo P, Wallis R, Bell V, Sandanayaka WRM, Hall DR, Cross JV and El-Sayed AM (2007) "Trapping *Dasineura mali* (*Diptera: Cecidomyiidae*) in Apples", *Journal of Economic Entomology* 100(3), 745 – 751; (iii) **Exhibit NZ-16:** Shaw PW, Wallis DR, Alspach PA, Sandanayaka WRM (2005) "Phenology of Apple Leafcurling Midge (Dasineura mali) in relation to Parasitism by Platygaster demades" *New Zealand Plant Protection* 58, 306 – 310; (iv) **Exhibit NZ-17:** Rogers DJ, Walker JTS and Cole LM (2006) "Apple Leafcurling Midge Cocoons on Apple: Pupal Occupancy and Mortality", *HortResearch, Havelock North, New Zealand*; (v) **Exhibit NZ-18:** Barnes HF (1948) *Gall Midges of Economic Importance* (Vol 3, Gall Midges of Fruit), Crosby Lockwood and Son Ltd, London, 35 – 41; (vi) **Exhibit NZ-19:** Morrison LG (1953) "Apple Leafcurling Midge in New Zealand", *New Zealand Journal of Agriculture*, 86(6), 565 – 566.

days (Barnes 1948: 38 and Morrison 1953: 566). In the field, when exposed to natural conditions, adult life spans are likely to be significantly shorter. Males have been reported to live for only 1 – 2 days (Suckling *et al.* 2007: 746). Mating has to take place within this short window.

3.72 ALCM have four life stages: egg, larva, pupa and adult. Eggs are laid by mated females on soft new unfurling apple leaves at the tips of shoots and branches. In New Zealand most egg-laying occurs during spring and summer. These eggs hatch to produce larvae, which are legless red maggots. Being legless, the larvae are essentially sessile (immobile) and do not move far from the egg-laying site. The larvae develop by feeding on the unfurled leaf causing marginal leaf rolling, which then prevents the leaf from unfurling normally, or results in a curled margin on the leaf.

3.73 When ready to pupate, the mature larvae drop, or crawl, from the leaves to the ground to find a pupation site below the surface of the ground (Rogers *et al.* 2006: 1), where the pupa is protected from climate and predation. Pupation is instigated by rainfall (Shaw *et al.* 2005: 309). A small proportion of the pupating larvae may also lodge and pupate on the tree, often in cracks in the bark or sometimes on the calyx or stalk ends of fruit. Pupating larvae spin a white silken cocoon and the pupation time is 13-18 days under experimental conditions (Barnes 1948: 36). Pupation time in the field would depend on spring and summer climatic conditions.

3.74 Emergence of an adult ALCM from its pupae is triggered when critical environmental conditions, such as day-length and temperature, are appropriate. The cocoons of the emerging adults remain where they were formed, i.e. in the soil, on the trunk, or on the calyx of fruit. In spring and summer, after the required pupation period, adult ALCM emerge leaving their cocoons empty. In late summer and autumn ALCM pupating in cocoons enter an "overwintering" state called "diapause."[75] Their development and emergence is not completed until the following spring (CABI 2008).

[75] A period of suspension of development in some insects.

3.75 The life cycle of ALCM (mating, egg-laying, larval growth, pupation and adult emergence) is usually repeated four times a year, that is there are usually four generations of ALCM per year in New Zealand, although up to five have been reported (CABI 2008 and Shaw *et al.* 2005: 306).

3.76 Numbers of ALCM larvae vary depending on the availability of young apple leaves (Rogers 2006: 1 and Shaw *et al.* 2005: 306). The peak ALCM infestation of apple shoots occurs in late November (early summer), during the peak availability of new unfurling leaf shoots (Shaw *et al.* 2005: 306). Infestation declines from early December when the number of new shoots begins to decline (Shaw *et al.* 2005: 306 and Rogers *et al.* 2006: 1). By harvest time (February onwards), generations 1-2 and most of generation 3 will have emerged (but the empty cocoons from earlier generations will be left at the pupation site, including the small number that spin a cocoon on fruit). The last generation before winter will not have had time to emerge by harvest.

(c) Spread

3.77 ALCM are not strong fliers, and are not capable of directional flight over long distances. Mated female midges have been found to have a flight range of less than 30m (Suckling *et al.* 2007: 750). Male flight range is thought to be similar (Suckling *et al.* 2007: 750). As a result, spread of ALCM by flight alone is highly localised.

(d) Distribution

3.78 ALCM are presumed to be native to Europe, where they are widespread. They are found in countries with cool to moderate temperate apple producing regions (Rogers *et al.* 2006: 1). ALCM establishment outside of Europe has only been linked to the movement of infested nursery stock (CABI 2008 and Morrison 1953: 566). Establishment has never been linked to the movement of apple fruit (CABI 2008).

3.79 ALCM were first recorded in New Zealand in 1950 following the shipment of Malling 9 rootstocks from the Netherlands earlier that year. ALCM's establishment and spread around the country is associated with the movement of infested rootstocks and nursery material, not with the distribution of fruit (CABI 2008 and Morrison 1953: 565).

3.80 Australia reports that it is free of ALCM.

E. THE MEASURES AT ISSUE

1. Australia's measures

3.81 The March 2007 determination of the Australian Director of Animal and Plant Quarantine on the importation of apples from New Zealand into Australia was that importation was "subject to the *Quarantine Act 1908* and the application of the measures specified in the *Final import risk analysis report for apples from New Zealand*, November 2006."[76] According to the IRA, these measures are to be implemented in practice through a Work Plan and "Standard Operating Procedures".[77] Under the IRA these instruments are required to be developed by New Zealand and approved by Australia before trade can take place.

3.82 In its panel request, New Zealand identified seventeen specific measures of particular concern that New Zealand considers are inconsistent with Australia's obligations under the *SPS Agreement*. These measures fall into two categories; those applicable to all three pests (fire blight, European canker and apple leafcurling midge) and those applicable to only one of those pests.

3.83 The measures are as follows:

<u>Measures applicable to fire blight</u>

(a) The requirement that apples be sourced from areas free from fire blight disease symptoms.[78]

(b) The requirement that orchards/blocks be inspected for fire blight disease symptoms, including that they be inspected at an inspection intensity that would,

[76] **Exhibit NZ-2:** Biosecurity Australia (2007), *Biosecurity Australia Policy Memorandum 2007/07; Biosecurity Policy Determination – Importation of Apples from New Zealand*, 27 March 2007, Canberra.

[77] IRA, pp. 313-314.

[78] IRA, p. 106.

at a 95% confidence level, detect visual symptoms if shown by 1% of the trees, and that such inspections take place between 4 to 7 weeks after flowering.[79]

(c) The requirement that an orchard/block inspection methodology be developed and approved that addresses issues such as visibility of symptoms in the tops of trees, the inspection time needed and the number of trees to be inspected to meet the efficacy level, and training and certification of inspectors.[80]

(d) The requirement that an orchard/block be suspended for the season on the basis that any evidence of pruning or other activities carried out before the inspection could constitute an attempt to remove or hide symptoms of fire blight.[81]

(e) The requirement that an orchard/block be suspended for the season on the basis of detection of any visual symptoms of fire blight.[82]

(f) The requirement that apples be subject to disinfection treatment in the packing house.[83]

(g) The requirement that all grading and packing equipment that comes in direct contact with apples be cleaned and disinfected (using an approved disinfectant) immediately before each Australian packing run.[84]

(h) The requirement that packing houses registered for export of apples process only fruit sourced from registered orchards.[85]

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[79] IRA, p. 316.

[80] IRA, p. 316.

[81] IRA, p. 316.

[82] IRA, p. 316.

[83] IRA, p. 318.

[84] IRA, p. 318.

[85] IRA, p. 317.

Measures applicable to European canker

(a) The requirement that apples be sourced from export orchards/blocks free of European canker (pest-free places of production).[86]

(b) The requirement that all trees in export orchards/blocks be inspected for symptoms of European canker, including that orchards/blocks in areas less conducive for disease are inspected for symptoms by walking down every row and visually examining all trees on both sides of each row, and that areas more conducive to the disease are inspected using the same procedure combined with inspection of the upper limbs of each tree using ladders (if needed), and that such inspections take place after leaf fall and before winter pruning.[87]

(c) The requirement that all new planting stock be intensively examined and treated for European canker.[88]

(d) The requirement that an orchard/block be suspended for the season on the basis that any evidence of pruning or other activities carried out before the inspection could constitute an attempt to remove or hide symptoms of European canker.[89]

(e) The requirement that exports from an orchard/block be suspended for the coming season on the basis of detection of European canker and that reinstatement would require eradication of the disease, confirmed by inspection.[90]

Measures applicable to apple leafcurling midge

(a) The requirements of inspection and treatment for apple leafcurling midge, including:

[86] IRA, p. 153.

[87] IRA, p. 316.

[88] IRA, p. 154.

[89] IRA, p. 154.

[90] IRA, p. 316.

the option of inspection of each lot on the basis of a 3000 unit sample selected at random across the whole lot for apple leafcurling midge, symptoms of quarantineable diseases, quarantineable pests, arthropods, trash and weed seeds, with detection of any live quarantineable arthropod resulting in appropriate treatment or rejection for export;

the option of inspection of each lot on the basis of a 600 unit sample selected at random across the whole lot for symptoms of quarantineable diseases, trash and weed seeds, plus mandatory appropriate treatment of all lots.[91]

<u>Measures applicable to all pests</u>

(a) The requirement that Australian Quarantine and Inspection Service officers be involved in orchard inspections for European canker and fire blight, in direct verification of packing house procedures, and in fruit inspection and treatment.[92]

(b) The requirement that New Zealand ensure that all orchards registered for export to Australia operate under standard commercial practices.[93]

(c) The requirement that packing houses provide details of the layout of premises.[94]

2. The *SPS Agreement* and Australia's measures

3.84 Article 1.1 of the *SPS Agreement* states that the "Agreement applies to all sanitary and phytosanitary measures which may, directly or indirectly, affect international trade."

3.85 "Sanitary or phytosanitary measures" are further defined in paragraph 1 of Annex A of the *SPS Agreement* as:

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[91] IRA, pp. 319-322.

[92] IRA, p. 314.

[93] IRA, p. 315.

[94] IRA, p. 317.

Any measure applied:

(a) to protect animal or plant life or health within the territory of the Member from risks arising from the entry, establishment or spread of pests, diseases, disease-carrying organisms or disease-causing organisms;

…

(d) to prevent or limit other damage within the territory of the Member from the entry, establishment or spread of pests.

3.86 Paragraph 1 of Annex A also provides that:

Sanitary or phytosanitary measures include all relevant laws, decrees, regulations, requirements and procedures including, *inter alia*, end product criteria; processes and production methods; testing, inspection, certification and approval procedures;…

3.87 Australia's measures set out above are clearly "phytosanitary measures", as defined in the *SPS Agreement*, because they constitute measures "to protect…plant life or health…from the risks arising from the entry, establishment or spread of pests, diseases, disease-carrying organisms" within the meaning of paragraph 1(a) of Annex A[95] and measures "to prevent or limit other damage within the territory of the Member from the entry, establishment or spread of pests" within the meaning of paragraph 1(d) of Annex A. Moreover, by their very nature the measures, which set out the conditions and requirements that must be met in order to export apples from New Zealand to Australia, also clearly affect trade in New Zealand apples.

3.88 New Zealand notes that Australia itself acknowledges in the IRA that the provisions of the *SPS Agreement* are applicable to its import risk analysis.[96] In discussing

[95] There is no suggestion in this case that fire blight, European canker and apple leafcurling midge have any effects on human or animal life or health. Indeed, Australia acknowledges at p. 100 of the IRA that there are "no known direct impacts of [fire blight] on human life or health." Similar assertions are made in respect of European canker (p. 147) and apple leafcurling midge (p. 185). Nor does Australia identify any indirect effects of these pests on human life or health, or any effects on animal life or health whatsoever. Paragraphs 1(b) and 1(c) of the definition of "SPS measure" would therefore appear to be inapplicable.

[96] IRA, p. 3.

its approach to addressing requests for imports of plants and their products, Australia notes that its policy is, where appropriate, to "draw on existing SPS measures for similar products with comparable risks…Where measures for comparable biosecurity risks have not previously been established, further action would be required to assess the risks to Australia and determine the SPS measures to achieve Australia's ALOP."[97]

3. Australia's measures "individually and as a whole"

3.89 The requirement that apples imported from New Zealand are subject to "the application of the measures specified in the *Final import risk assessment report for apples from New Zealand"*[98] is a requirement to comply with each and every measure contained in the IRA. This includes each of the measures listed in paragraph 3.83 above. New Zealand therefore considers that each of the measures listed in paragraph 3.83, individually and as a whole, is inconsistent with Australia's obligations under the *SPS Agreement*.

3.90 In *Japan – Apples* the Panel treated the separate measures identified by the United States in respect of fire blight as a single measure, although reserving the right to determine the legality of each of the individual measures identified by the United States.[99] The Appellate Body did not interfere with that approach.[100]

3.91 The Panel in *Japan – Apples (Article 21.5 – US)*, while treating all the requirements imposed by Japan as elements of one measure in accordance with the approach of the original Panel, made specific findings on each of the different elements of the measure, on the basis that such an approach was necessary to "assist in the prompt resolution of the dispute".[101]

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[97] IRA, p. 5.

[98] **Exhibit NZ-2:** Biosecurity Australia (2007), *Biosecurity Australia Policy Memorandum 2007/07; Biosecurity Policy Determination – Importation of Apples from New Zealand*, 27 March 2007, Canberra.

[99] Panel Report, *Japan – Apples*, paras. 8.10 – 8.20.

[100] Appellate Body Report, *Japan – Apples,* paras. 14-16.

[101] Panel Report, *Japan – Apples (Article 21.5 – US)*, paras. 8.29 – 8.30.

3.92 Since none of the measures identified in paragraph 3.83 is, individually, in conformity with the *SPS Agreement*, failure by the Panel to rule on each individual measure will not resolve the dispute between the parties and could result in implementation that leaves in place a measure that is claimed to be inconsistent with the *SPS Agreement* but has not yet been ruled on. Accordingly, New Zealand respectfully requests that the Panel rule individually on each of the measures identified in paragraph 3.83.

IV. LEGAL ANALYSIS

A. General Considerations

1. Burden of proof

4.1 The burden of proof in WTO cases has been well established since the decision of the Appellate Body in *US – Wool Shirts and Blouses*. It is for the complaining party to adduce sufficient evidence and arguments to establish a prima facie case of inconsistency with the provision in question.[102] Once such a case has been made, the defending party must rebut the claimed inconsistency. This approach has been applied consistently to all WTO disputes, including those under the *SPS Agreement*.

4.2 In this submission, New Zealand will establish that Australia is in violation of its obligations under the *SPS Agreement*.

B. Australia's measures for the importation of New Zealand apples are inconsistent with its obligations under Article 2.2 of the *SPS Agreement*

1. The basic obligation of Article 2.2

4.3 Article 2.2 provides

> Members shall ensure that any sanitary or phytosanitary measure is applied only to the extent necessary to protect human, animal or plant life or health, is based on scientific principles and is not maintained without sufficient scientific evidence, except as provided in paragraph 7 of Article 5.

4.4 New Zealand is not aware of any Australian claim that the measures subject to this dispute relating to apples imported from New Zealand are based on Article 5.7. Accordingly, Australia must comply with its obligations under Article 2.2.

4.5 As the Panel in *EC – Approval and Marketing of Biotech Products* pointed out, one of the central obligations under Article 2.2 is the obligation not to maintain measures

[102] Appellate Body Report, *US – Wool Shirts and Blouses*, p. 14.

"without sufficient scientific evidence."[103] With regard to the obligation not to maintain measures "without sufficient scientific evidence", in *Japan – Agricultural Products II* the Appellate Body stated that for there to be "sufficient scientific evidence", there had to be a "rational or objective relationship" between the SPS measure and the scientific evidence, and that this has to be determined in the light of factors such as the characteristics of the measure and the quantity and quality of the scientific evidence.[104] This approach was reiterated by the Appellate Body in *Japan – Apples*.[105]

4.6 As New Zealand will establish, there is no "rational or objective relationship" between the measures imposed by Australia and scientific evidence. The measures have been imposed either in the absence of scientific evidence or in the face of scientific evidence to the contrary. Accordingly, Australia's measures are inconsistent with the obligation in Article 2.2 not to maintain any sanitary or phytosanitary measure without sufficient scientific evidence. As New Zealand will point out in respect of Articles 5.1 and 5.6 below, the Australian measures are also inconsistent with the requirements in Article 2.2 that they be "based on scientific principles", and "applied only to the extent necessary to protect human, animal or plant life and health."

2. Fire blight

(a) Australia's measures for fire blight applied to apples from New Zealand are based on the contention that mature, symptomless apples provide a pathway for transmitting fire blight, which is not supported by sufficient scientific evidence

4.7 The Australian contention that mature, symptomless apples provide a pathway for transmitting fire blight is not supported by scientific evidence. Such a pathway has not been shown to exist.

4.8 Australia's contention finds no support in science. Speculation about a transmission pathway does not constitute "sufficient scientific evidence" within the

[103] Panel Report, *EC – Approval and Marketing of Biotech Products*, para. 7.1424.

[104] Appellate Body Report, *Japan – Agricultural Products II*, para. 84.

[105] Appellate Body Report, *Japan – Apples*, para. 162.

meaning of Article 2.2. The likelihood of the coincidence of circumstances that would be required to establish such a pathway for transmission of the disease via mature, symptomless fruit is negligible.

4.9 The relevant scientific literature was reviewed by the Panel and by its group of scientific experts in *Japan – Apples*. The Panel found that the risk that mature, symptomless apple fruit would transmit fire blight was negligible.[106] Thus, any claim by Australia that its measures are supported by "sufficient scientific evidence" ignores what was decided in *Japan – Apples*, or perhaps proceeds on the assumption that the Panel and the scientific experts in *Japan – Apples* were somehow wrong. There is, however, nothing to suggest that the Panel and the scientific experts in *Japan - Apples* were wrong. Indeed, scientific research on fire blight since the *Japan – Apples* case only reinforces the Panel's conclusions.

(b) Crucial steps for the Australian contention that mature, symptomless apples transmit fire blight are not supported by science

4.10 The contention that mature, symptomless apples can provide a pathway for transmitting fire blight depends on certain prerequisites being met. But, as New Zealand will point out, there is no scientific support for concluding that those prerequisites have been or could be met.

<u>(i) Fire blight bacteria are not found internally in mature, symptomless apples, are only rarely found externally and then only in limited quantities</u>

4.11 Immature fruit infected with *E. amylovora* do not mature and cannot ripen and for this reason they would not be harvested. The scientific evidence is clear that mature, symptomless apples do not harbour internal fire blight bacteria. In Roberts 2002, 30,900 mature fruit from two sites in the State of Washington, United States, were harvested at 0, 10, 25, 50, 100, or 300 metres from sources of fire blight inoculum.[107] Nine hundred fruit

[106] Panel Report, *Japan – Apples*, para. 8.153.

[107] **Exhibit NZ-20:** Roberts, RG (2002) "Evaluation of buffer zone size and inspection number reduction on phytosanitary risk associated with fire blight and export of mature apple fruit", *Acta Horticulturae* 590: 47-53.

were analysed directly after harvest, and no *E. amylovora* were detected inside any fruit, even from apples sourced from trees with fire blight symptoms or directly adjacent to trees with fire blight symptoms. The remaining (30,000) fruit were placed in cold storage for 2-3 months (depending on the date of harvest). None of those fruit developed external disease symptoms. Of the 30,000 fruit, 1,500 were sliced open, and no internal disease symptoms were present. Of the 1,500 sliced fruit, the internal surfaces of 500 were analysed microbiologically, and none yielded *E. amylovora*. Despite similar efforts in previous work, Roberts *et al.* 1989 did not detect any internal bacteria in mature apple fruit harvested from infected orchards.[108]

4.12 The Panel in *Japan – Apples* concluded "that there is not sufficient scientific evidence to conclude that mature, symptomless apples would harbour endophytic [internal] populations of bacteria."[109] New Zealand is unaware of any scientific evidence published since the Panel Report for *Japan – Apples* that would contradict the Panel's conclusion.

4.13 The presence of *E. amylovora* on the outside of mature apples is uncommon and is generally only detected on fruit from the few orchards that are occasionally severely affected with fire blight (Hale *et al.* 1987;[110] Thomson 2000: 17). The only demonstrated site where *E. amylovora* populations have been detected on mature apples is on the calyx (the remnant of the blossom) (Roberts *et al.* 1998;[111] Hale *et al.* 1987: 37).

4.14 Even where *E. amylovora* has been detected on calyces of mature apple fruit, the populations have not been sufficiently large to initiate infection even if there were a (still

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[108] **Exhibit NZ-97:** Roberts, RG, Reymond ST, and McLaughlin RJ (1989) "Evaluation of mature apple fruit from Washington State for the presence of *E. amylovora*", *Plant Disease* 73: 917-921. **Exhibit NZ-96:** Dueck, J (1974) "Survival of *E. amylovora* in association with mature apple fruit", *Canadian Journal of Plant Science*, 54, pp. 349-351 did not detect *E. amylovora* on the fruit of naturally infected trees during the harvest period and concluded "the risk of disseminating fireblight bacteria on symptomless mature apples is considered negligible."

[109] Panel Report, *Japan – Apples*, para. 8.128.

[110] **Exhibit NZ-21:** Hale, CN, McRae, EM, and Thomson, SV (1987) "Occurrence of *Erwinia amylovora* on apple fruit in New Zealand", *Acta Horticulturae,* 217: 33-40.

[111] **Exhibit NZ-22:** Roberts, RG, Hale, CN, van der Zwet, T, Miller, CE and Redlin, SC (1998) "The potential for spread of *Erwinia amylovora* and fire blight via commercial apple fruit; a critical review and risk assessment", *Crop Protection* 17(1), 19-28.

hypothetical) vector to transmit the *E. amylovora* from the infested calyx to susceptible host tissue. In other words, the bacteria are not present in epidemiologically significant quantities.[112] Large-scale experiments seeking to cause infection via external infestation have all been unsuccessful.[113] Taylor *et al.* 2003b: 332 found that the population levels of *E. amylovora* required to cause disease far exceeded those found on infested apples at harvest.[114]

4.15 The Panel in *Japan – Apples* found that there was insufficient scientific evidence to conclude that mature, symptomless apples would be likely to harbour epiphytic [external] populations of *E. amylovora* capable of transmitting fire blight.[115] The Panel in *Japan – Apples (Article 21.5 – US)* agreed, taking the view that "the existence of an epiphytic infestation of apple fruit by *E. amylovora* in quantities capable of reproduction and ultimately of infecting a host plant has not been established."[116] Again, New Zealand is unaware of any scientific evidence published subsequent to the Panel Report for *Japan – Apples* that would contradict the Panel's conclusion.

4.16 Thus, the scientific evidence does not support the contention that mature, symptomless apples transmit *E. amylovora*. Fire blight bacteria are not found internally in mature apple fruit. They are only rarely to be found externally on such fruit (and then only on the calyx). Even where they are found on the calyx, they are in quantities insufficient to transmit and initiate an infection in a susceptible host (were such transmission possible).

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[112] Epidemiologically significant: able to cause outbreaks and spread of disease, in this case fire blight, i.e., here the levels of bacteria are not epidemiologically significant because they are so low that there is no evidence that they could initiate a fire blight infection.

[113] Panel Report, *Japan – Apples*, para. 8.147.

[114] **Exhibit NZ-23:** Taylor, RK, Hale, CN, Henshall, WR, Armstrong, JL, and Marshall JW (2003b) "Effect of inoculum dose on infection of apple (*Malus domestica*) flowers by *Erwinia amylovora*", *New Zealand Journal of Crop and Horticultural Science*, 31: 325-333.

[115] Panel Report, *Japan – Apples*, para. 8.136.

[116] Panel Report, *Japan - Apples (Article 21.5 - US)*, para. 8.89.

(ii) Any fire blight bacteria found externally on mature, symptomless apples are unlikely to survive post-harvest handling, storage and transportation in quantities sufficient to initiate infections

4.17 The limited numbers of bacteria present externally on a very small number of infested mature, symptomless apples at harvest are unlikely to survive the normal commercial processes of handling, storage and transportation in quantities that are epidemiologically significant. The environmental conditions in which *E. amylovora* thrive are mean temperature of >15.6 degrees Celsius, a wetting event such as rain or heavy dew, and humid conditions (>90%). The low temperatures (<5 degrees Celsius) and fluctuating humidity (50-90%) in which handling, storage and transport of apples take place lead to a rapid decline in the numbers of any surviving bacteria, particularly when the fruit are cold stored. Since fruit are stored and transported at cool temperatures in order to maintain freshness, the conditions for the survival of fire blight bacteria are extremely poor.

4.18 The scientific evidence shows that fire blight bacteria on apples stored for 25 days at cool temperatures have greatly reduced in number as a result of the storage period. Hale and Taylor 1999 detected greatly reduced amounts of fire blight bacteria on fruit inoculated with *E. amylovora* after 25 days of cold storage under commercial storage conditions of 2 degrees Celsius. They concluded that cool stored, mature export quality fruit are unlikely to be a vector of *E. amylovora*.[117] Taylor and Hale 2003 also found that populations of *E. amylovora* on the calyx decrease with time spent in cold storage and that storage of apples provides further assurance that mature fruit can be exported with a negligible risk of introducing the disease into countries free of fire blight.[118] This was confirmed by the Panel in *Japan – Apples*, which noted that while external bacteria on the calyx could potentially survive commercial handling, storage and transport, their numbers

[117] **Exhibit NZ-24:** Hale CN and Taylor RK (1999) "Effect of cool storage on survival of *Erwinia amylovora* in apple calyxes", *Acta Horticulturae* 489: 139-143.

[118] **Exhibit NZ-25:** Taylor RK and Hale CN (2003) "Cold storage affects survival and growth of *Erwinia amylovora* on the calyx of apple", *Letters in Applied Microbiology* 37(4): 340-343.

would be reduced and in some cases would result in bacteria no longer being discernible.[119]

4.19 What clearly emerges is that, even if *E. amylovora* were present on a small number of apple calyxes, epidemiologically significant quantities of bacteria would not exist, especially following post-harvest handling, storage and transport of apples. The population levels of the bacteria after cold storage are far lower than those found on apples at harvest and far lower than the population needed to spread to a host plant and initiate disease.

(iii) Fruit would not be contaminated with *E. amylovora* during harvest, handling, storage and transportation

4.20 The scientific evidence shows it is highly unlikely that there will be sufficient external populations of *E. amylovora* present on fruit or leaves at harvest to contaminate other fruit during handling, harvest storage or transportation (Dueck 1974; Roberts *et al.* 1989; Hale *et al.* 1987; Roberts 2002). *E. amylovora* on leaf and plant surfaces have very short survival rates when exposed to solar radiation or high humidity (Thomson 2000: 27; Ockey and Thomson 2006[120]). As noted in Thomson 2000: 16, "*E. amylovora* is not generally considered a very good epiphyte and populations usually decline rapidly on most flower parts or leaves within a few hours or days."

4.21 The numbers of fire blight bacteria reported even on mature apples from severely infested orchards are always very low so transfer of bacteria, if it occurred, would only have the effect of diluting already very low concentrations. The apple calyx, the only place on which bacteria survive, mainly consists of dead plant tissue, providing an environment that is not conducive for the growth, survival or transfer of *E. amylovora.* Any such bacteria would not be available to contaminate other fruit.

[119] Panel Report, *Japan – Apples*, para. 8.163.

[120] **Exhibit NZ-26:** Ockey SC and Thomson SV (2006) "Influence of rain on transient populations of *Erwinia amylovora* on leaf surfaces", *Acta Horticulturae* 704: 113-119.

(iv) Even if external fire blight bacteria survived handling, processing and transport of New Zealand apples to Australia, they would not be transmitted to a susceptible host in Australia

4.22 Even if sufficient quantities of fire blight bacteria could be found externally on the calyx of mature apples after arrival in Australia, those bacteria would have to be transmitted from the infested apples to a susceptible host before an infection could be initiated. But there is no scientific evidence that this could occur, or ever has occurred. Australia contends that bees or other insects foraging on discarded apples imported from New Zealand which have been discarded in relatively close proximity to Australian host plants could accumulate sufficient inoculum which might be transmitted to a susceptible host, and that the inoculum could initiate an infection.[121]

4.23 First, discarded apples are unlikely to be infested with *E. amylovora*. Even if they were infested, however, the bacteria on the calyx would be at a level that is not epidemiologically significant. Second, infested apples do not become infected and therefore do not produce bacteria-laden ooze (Taylor *et al.* 2003a).[122] Even if they did *and,* hypothetically, a pollinating insect landed on that infested apple and was able to pick up enough bacteria, for transmission and infection to occur that insect would have to visit both the discarded apple and a host while the host was susceptible (within 4 days after budburst). At the same time, the climatic conditions would have to be suitable for infection. This highly improbable sequence of events has neither been demonstrated in the field nor experimentally in the laboratory, even under conditions that are highly favourable.[123]

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[121] IRA*,* p. 87.

[122] **Exhibit NZ-28:** Taylor RK, Hale CN, Gunson FA and Marshall JW (2003a) "Survival of the fire blight pathogen, *Erwinia amylovora*, in calyxes of apple fruit discarded in an orchard", *Crop Protection* 22: 603-608.

[123] In *Japan - Apples (Article 21.5 - US)*, paragraph 8.65 the Panel referred to the experiment conducted by Tsukamoto *et al.* (2005b). "Transmission of *Erwinia amylovora* from blighted mature apple fruit to host plants via flies", which involved soaking surface sterilised flies in a bacterial broth of *E. amylovora* at the unnaturally high concentration of 10^9 CFUs/ml for ten minutes. These flies were then confined with a range of damaged immature apple and pear fruit and plant parts for an unspecified period. While transmission of *E. amylovora* to damaged plant parts and immature fruit was reported to have occurred, the Panel noted that "the Tsukamoto *et al.* (2005b) study does not establish that flies would serve

4.24 Hale *et al.* 1996 found that there was no spread of external bacteria from artificially infested apple fruit to susceptible apple flowers in close proximity.[124] Taylor *et al.* 2003a found no spread of *E. amylovora* to apple flowers, leaves, rainwater or insects in an orchard in the 20 day period after 1,800 artificially heavily infested apple fruit had been carefully placed in trees (to provide maximum opportunity for bacteria to spread) and left to decay.

4.25 The above was also confirmed by the Panel in *Japan – Apples*, which concluded that it had not been established with sufficient scientific evidence that the last stage of the pathway (i.e. the transmission of fire blight to a host plant) would likely be completed.[125] It noted specifically that such an event had "not even been experimentally established"[126] and that experiments trying to reproduce the conditions applicable to discarded apples had not led to any viable contamination.[127]

4.26 Scientific study conducted since *Japan-Apples* only reinforces the above conclusions. Roberts and Sawyer 2008 reassessed the phytosanitary risk associated with the movement of export-quality apple fruit to countries where fire blight does not occur.[128] As in Roberts 1998, Roberts and Sawyer 2008 employed a statistical model to estimate the likelihood of fire blight outbreaks in new areas due to commercial fruit shipment. They conservatively used non-zero estimates for certain steps, even those for which there was no evidence the hypothetical pathway would be completed. Otherwise the model would have predicted the number of years before an outbreak to be infinity. The updated pest risk assessment in Roberts and Sawyer 2008: 367, which was based on data available to the authors of the IRA, calculated a probability of outbreak of fire blight

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as a vector which would complete the pathway. In particular, the conditions of the experiment are too removed from natural conditions. Comparatively, we note that the study by Taylor *et al.* (2003), carried out in natural conditions, did not recover bacterium from insects."

[124] **Exhibit NZ-27:** Hale CN, Taylor RK and Clark RG (1996) "Ecology and epidemiology of fire blight in New Zealand", *Acta Horticulturae* 411: 79-85.

[125] Panel Report, *Japan – Apples*, para. 8.168.

[126] *Ibid*, para. 8.171.

[127] *Ibid*, para. 8.166.

[128] **Exhibit NZ-29:** Roberts RG and Sawyer AJ (2008) "An updated pest risk assessment for spread of *Erwinia amylovora* and fire blight via commercial apple fruit", *Crop Protection* 27: 362-368.

once in 217,925 years, even where no phytosanitary requirements were implemented, based on trade of 20 million apples per year. The study concluded that "the risk of importing *E. amylovora* on commercial apple fruit and the concomitant risk of establishing new outbreaks of fire blight is so small as to be insignificant" (Roberts and Sawyer 2008: 362).

(c) The conclusions of science are reinforced by the reality of the international trade in apples

4.27 It is not surprising that the scientific evidence does not establish a pathway for the transmission of fire blight by mature, symptomless apples. In the long history of trade, in which billions of apple fruit have moved between those exporting countries that have fire blight and importing countries that are free from fire blight, there has been no case of the introduction, establishment and spread of the disease via apple fruit.

4.28 In terms of actual trade in apples, over the last 10-20 years New Zealand has exported billions of apple fruit without any phytosanitary measures for fire blight to several countries with commercial apple or pear industries (e.g. Chinese Taipei, India and Russia) yet these countries remain free of fire blight.

4.29 Likewise, and as noted by the Panel in *Japan-Apples*, the United States has exported 53 billion apples world-wide over the preceding 37 years including 22.1 billion apples to its top ten fire blight-free export markets with no spread of fire blight resulting.[129]

4.30 These observations from the experience of trade are also supported by a scientific study conducted by Jock *et al.* 2002 which found that, in respect of the distribution of strains of *E. amylovora* throughout Europe, there was no observed mixing of DNA fingerprint types despite the uncontrolled trade in fruit throughout Europe.[130] If trade in fruit had distributed the disease, the DNA types would have been similar in different

[129] Panel Report, *Japan – Apples,* para. 4.75.

[130] **Exhibit NZ-30:** Jock S, Donat V, Lopez MM, Bazzi C and Geider K (2002) "Following spread of fire blight in Western, Central and Southern Europe by molecular differentiation of *Erwinia amylovora* strains with PFGE analysis", *Environmental Microbiology* 4 (2): 106-114.

areas. For example, the Eastern European strain of *E. amylovora* would have been found in Central and Western Europe, but this was not observed.

(d) Since there is no scientific support for the contention that mature, symptomless apples are a pathway for the transmission of fire blight, the measures maintained by Australia in respect of fire blight for apples from New Zealand are inconsistent with Article 2.2

4.31 As pointed out earlier, in order to establish "sufficient scientific evidence" within the meaning of Article 2.2, there has to be a "rational or objective relationship" between the measures and the relevant scientific evidence. For such a relationship to exist there must be some scientific evidence to start with. As the Panel and Appellate Body have concluded in *Japan – Apples*, there is no such evidence supporting measures such as those imposed by Australia in relation to fire blight. Even if Australia's assumptions about the presence and spread of fire blight bacteria on mature apples during picking, processing and transport were supported by science, there is no scientific support for the contention that such bacteria will transfer to susceptible hosts and infection will occur.

4.32 Since mature, symptomless apple fruit do not provide a pathway for fire blight to be transmitted to Australia, none of the following measures imposed by Australia has a "rational or objective relationship" with scientific evidence.

<u>(i) The requirement that apples be sourced from areas free from fire blight disease symptoms</u>

4.33 Australia claims that area freedom is required because it would "substantially reduce the likelihood that picked fruit is infected or infested", as there are "lower bacterial populations in areas free from disease symptoms".[131] But, since there is no scientific evidence that mature, symptomless fruit are infected, or that infested fruit, even from a severely infected orchard, contain *E. amylovora* populations of epidemiological significance for the spread and establishment of fire blight, there is no scientific support for the measure.

[131] IRA, p. 106.

4.34 This view is supported by the decision of the Panel in *Japan – Apples (Article 21.5 – US)*. There the Panel took the view that a Japanese requirement that fruit be produced in designated fire blight-free orchards, and that export orchards be free of plants infected with *E. amylovora*, was not supported by sufficient scientific evidence. The Panel determined that:[132]

> …available scientific evidence does not support the view that mature symptomless apples harvested from blighted orchards, whether severely blighted or not, or from non-blighted orchards where other plants have been found to be infected, would harbour populations of *E. amylovora* capable of spreading fire blight disease.

<u>(ii) The requirement that orchards/blocks be inspected for fire blight disease symptoms, including that they be inspected at an inspection intensity that would, at a 95% confidence level, detect visual symptoms if shown by 1% of the trees, and that such inspections take place between 4 to 7 weeks after flowering</u>

4.35 Australia claims that the purpose of this inspection is to "ensure that fire blight [is] not active in the orchard at an early stage of fruit development and therefore reduce the likelihood that *E. amylovora* would be present in the calyxes of mature apples".[133] But, since there is no scientific evidence that mature fruit, even from a severely infected orchard, are infested with *E. amylovora* populations of epidemiological significance for the spread and establishment of fire blight, there is no scientific support for any inspection requirement.

4.36 This conclusion is also supported by the decision of the Panel in *Japan – Apples (Article 21.5 – US)*, which concluded that a requirement that orchards and surrounding buffer zones be inspected once a year at early fruitlet stage, could not be "considered to be supported by sufficient scientific evidence." Since the Panel had concluded that the

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[132] Panel Report, *Japan - Apples (Article 21.5 - US)*, para. 8.89.

[133] IRA, p. 114.

scientific evidence showed that mature, symptomless apples were not capable of spreading fire blight, there was no scientific support for any inspection requirement.[134]

(iii) The requirement that an orchard/block inspection methodology be developed and approved that addresses issues such as visibility of symptoms in the tops of trees, the inspection time needed and the number of trees to be inspected to meet the efficacy level, and training and certification of inspectors

4.37 Australia does not attempt to demonstrate any scientific support for this measure. Since inspection requirements cannot be supported by scientific evidence, equally the need to develop a regime dealing with inspection efficacy issues is not supported by scientific evidence.

(iv) The requirement that an orchard/block be suspended for the season on the basis that any evidence of pruning or other activities carried out before the inspection could constitute an attempt to remove or hide symptoms of fire blight

4.38 Australia also makes no attempt to demonstrate the scientific support for this measure. In addition to there being no scientific evidence that mature, symptomless apples are capable of transmitting fire blight, pruning is good agricultural practice and is necessary for good orchard hygiene. The primary purpose of pruning is to shape the plant by controlling plant growth to increase the yield or quality of flowers and fruits in order to maximise fruit production. The requirement not to prune has the potential to make orchards commercially non-viable. Pruning is also an important method for managing fire blight disease. Because *E. amylovora* has the ability to move systemically, it is imperative that pruning be done promptly (Thomson 2000: 29-30). This was acknowledged by the then General Manager of Plant Biosecurity, Biosecurity Australia, in the Senate Hearings in March 2004. He said pruning is "a normal practice as one

[134] Panel Report, *Japan - Apples (Article 21.5 - US)*, paras. 8.89 - 8.90.

means of physically reducing the level of infection of a block" and that it was a "normal practice" for managing fire blight.[135]

4.39 In any event, the pruning measure is closely related to the area freedom and inspection requirements. Since those requirements are not supported by science, there can equally be no scientific support for the pruning measure.

(v) The requirement that an orchard/block be suspended for the season on the basis of detection of any visual symptoms of fire blight

4.40 This requirement appears to be consequent on the inspection requirement. But since the inspection requirement has no scientific support, then suspending an orchard block for a season in the light of an inspection result equally lacks scientific support.

4.41 Furthermore, since there is no scientific evidence that mature, calyx-infested fruit, even from a severely infected orchard, contain *E. amylovora* populations of epidemiological significance for the spread and establishment of fire blight (even if that were theoretically possible by means of mature symptomless fruit), there can be no scientific support for a measure that suspends from exporting orchards that contain visual symptoms of fire blight.

4.42 This conclusion, too, is supported by the Panel in *Japan – Apples (Article 21.5 – US)*, which concluded that the requirement that detection of a blighted tree would disqualify the orchard from eligibility to export, could not be "considered to be supported by sufficient scientific evidence."[136] Again, the Panel took the view that, since the scientific evidence showed that mature, symptomless apples were not capable of transmitting fire blight, such a measure had no support in science.

[135] **Exhibit NZ-31:** Commonwealth of Australia (2004) *Official Committee Hansard, Senate Rural and Regional Affairs and Transport Legislation Committee; Reference: Import risk assessment on New Zealand apples; Wednesday, 31 March 2004*, Canberra, p. 22.

[136] Panel Report, *Japan - Apples (Article 21.5 - US)*, para. 8.89.

(vi) The requirement that apples be subject to disinfection treatment in the packing house

4.43 Australia claims that chlorine disinfection is required to eliminate surface infestation of fruit.[137] New Zealand has already referred to the evidence that epidemiologically significant amounts of *E. amylovora* are not found on mature fruit. The measure would not therefore be justified.

4.44 This approach was also taken by the Panel in *Japan - Apples (Article 21.5 - US)*, which concluded that Japan's requirement that harvested apples be treated with surface [chlorine] disinfection was not justified by scientific evidence.[138]

(vii) The requirement that all grading and packing equipment that comes in direct contact with apples be cleaned and disinfected (using an approved disinfectant) immediately before each Australian packing run

4.45 Australia cites no scientific evidence to show that *E. amylovora* can be transferred to apple fruit by grading and packing equipment. Indeed, the then General Manager of Plant Biosecurity at Biosecurity Australia told the Senate Committee during the 2004 Senate Inquiry that "…it is not an issue in the sense that machinery is not a great means of spreading bacteria onto apples."[139]

4.46 Even if there were *E. amylovora* on the surface of apples, the possibility of such surface bacteria contaminating machinery which then contaminates apples bound for Australia is negligible. Even if such contamination were to occur, it would not involve epidemiologically significant quantities of bacteria.

4.47 This conclusion is again supported by the Panel in *Japan - Apples (Article 21.5 - US)*, which concluded that Japan's requirement that the interior of the packing facility be

[137] IRA, pp. 108 and 113.

[138] Panel Report, *Japan - Apples (Article 21.5 - US)*, para. 8.97.

[139] **Exhibit NZ-32:** Commonwealth of Australia (2004) *Official Committee Hansard, Senate Rural and Regional Affairs and Transport Legislation Committee; Reference: Import risk assessment on New Zealand apples; Wednesday, 30 June 2004*, Canberra, p. 35.

disinfected by a chlorine treatment, was inconsistent with Article 2.2. The Panel said, "…while proper sanitation may be required and seems to be established commercial practice, the scientific evidence does not justify chlorine disinfection of packing facilities in order to prevent contamination of mature, symptomless apples by *E. amylovora*".[140]

<u>(viii) The requirement that packing houses registered for export of apples, process only fruit sourced from registered orchards</u>

4.48 Australia does not provide any rationale for a measure requiring all apples for export to Australia to be processed by registered packing houses and that packing houses registered for export of apples source fruit only from registered orchards. Again, given that there is no scientific support for disinfection requirements, there can be no support for a requirement that packing houses registered for export of apples process only fruit sourced from registered orchards.

4.49 The absence of support for the packing house requirement is supported by the findings of the Panel in *Japan - Apples (Article 21.5 - US)*, which held, in relation to the Japanese requirement that fruit destined for Japan be kept separate post-harvest from other fruit, that:[141]

> …since scientific evidence and the experts have confirmed that mature, symptomless apples are unlikely to harbour viable populations of epiphytic *E. amylovora*, we conclude that the requirement of separation of fruit destined for Japan is not supported by sufficient scientific evidence.

4.50 The Panel's conclusion in *Japan - Apples (Article 21.5 - US)* is equally applicable to the separation requirement imposed by Australia.

(f) Conclusion

4.51 Under Article 2.2, Australia is obliged to ensure that its measures are not maintained without sufficient scientific evidence. There is no "rational or objective

[140] Panel Report, *Japan - Apples (Article 21.5 - US)*, para. 8.102.

[141] Panel Report, *Japan - Apples (Article 21.5 - US)*, para 8.106.

relationship" between the measures that Australia has established for apples from New Zealand in respect of fire blight and any scientific evidence. Hence, Australia's measures are maintained without sufficient scientific evidence and, as a result, they are inconsistent with Australia's obligations under Article 2.2.

3. European canker

(a) Australia's measures for European canker applied to apples from New Zealand are based on a contention that mature, symptomless apples provide a pathway for transmitting European canker, which is not supported by sufficient scientific evidence

4.52 The Australian measures for European canker are based on the contention that mature, symptomless apples provide a pathway for transmitting European canker. This assumes that imported, mature New Zealand apple fruit may be latently infected or infested with *N.galligena* which could, in turn, be transferred to a susceptible host in Australia, from which the disease could establish and spread.

4.53 The Australian contention rests solely on conjecture. The pathway proposed by Australia for the transmission of *N. galligena* has never been reported or observed in any of the scientific literature, nor has it been demonstrated to have occurred anywhere in the world. In particular, the Australian contention is not based on scientific evidence about the incidence of fruit infection in New Zealand caused by *N. galligena*. It also fails to take into account the relevant climatic conditions in New Zealand and Australia. Further, the Australian contention is not based on scientific evidence relating to the production and spread of spores from mature apple fruit.

4.54 In short, there is no scientific evidence to support Australia's contention and accordingly there can be no rational or objective relationship between the scientific evidence and the measures imposed by Australia in respect of European canker for New Zealand apples. The measures are therefore maintained without sufficient scientific evidence, in breach of Article 2.2 of the *SPS Agreement.*

(b) Crucial steps for the Australian contention that European canker can be transmitted through mature, symptomless apples are not supported by science

(i) *N.galligena* is not found in or on mature, symptomless New Zealand apples

a. European Canker is found in New Zealand only in climatically suitable areas

4.55 While European Canker is present in some parts of New Zealand, its distribution reflects its climatic dependence. In Annex 3, New Zealand has included a study of the effect of climatic conditions on the occurrence of European canker. This study, based on information available to the IRA team at the time that the IRA was prepared, demonstrates that the climatic conditions associated with European canker occurrence are a simultaneous combination of: 1) rainfall on 30% of days per month; and 2) temperatures between 11°C and 16°C for eight hours per day.

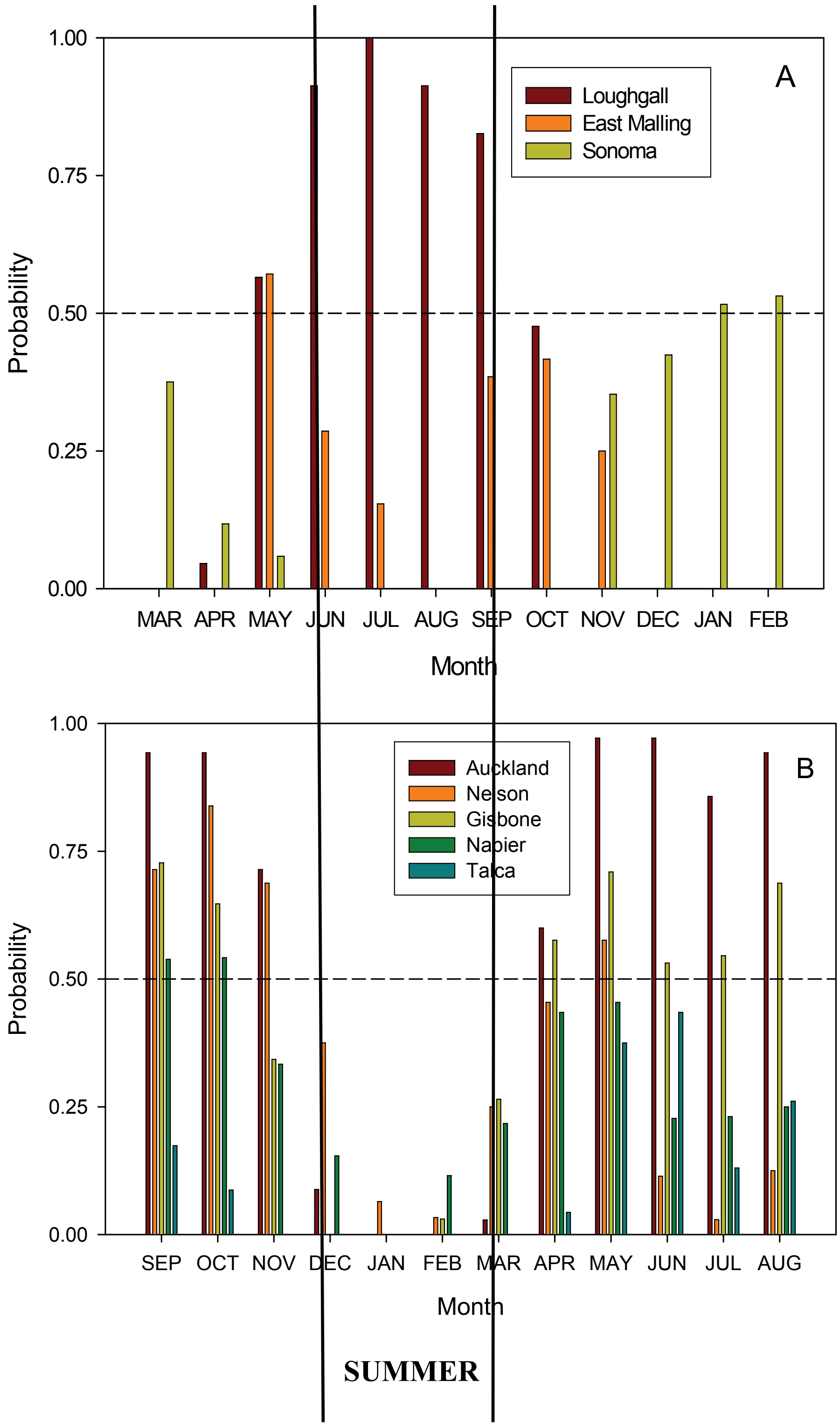
4.56 Consistent with the above, European canker is found only in regions of New Zealand where the climatic conditions are conducive to the disease – that is, Gisborne, Auckland, Waikato and parts of Nelson – and principally causes tree cankers in these regions (Annex 3, p. 219). Climatic factors also explain why European canker is not found in the major apple-growing areas of Hawkes Bay and Central Otago (Annex 3, pp. 218-219).

b. Incidence of fruit infected with N. galligena *in New Zealand is extremely low*

4.57 The study presented in Annex 3 also demonstrates why research relating to Europe and the United Kingdom, where summer conditions are more conducive to fruit infection, is not applicable to any understanding of European canker in New Zealand, and in particular the likelihood of fruit rots from *N. galligena*. Specifically, the climate analysis demonstrates that in New Zealand no region has weather conditions favourable for European canker during summer. In particular, temperatures are too high and rainfall is generally too low for fruit infection to occur. This explains the extremely low incidence in New Zealand of fruit infection (or fruit rots) from the pathogen *N. galligena*.

4.58 A comparison between the summer conditions in the United States (California) and United Kingdom (England and Ireland) and the conditions in New Zealand and Chile (Talca) is set out below in Figure 1 (based on data assessed in Annex 3). Figure 1 (overleaf) demonstrates that the conditions (simultaneous occurrence in the same month of rainfall on more than 30% of days and temperatures between 11ºC and 16ºC more than 8 hours per day) in New Zealand during summer are less conducive to European canker infection than those in Ireland and England where *N.galligena* fruit rots occur frequently.

Figure 1: Probability that summer conditions are conducive for European canker at sites in United Kingdom (Loughgall, East Malling), United States (Sonoma) (Graph A) and New Zealand and Chile (Talca) (Graph B)



4.59 The rarity of fruit rots resulting from *N. galligena* in New Zealand has meant that there is very little literature on the subject, a fact that is acknowledged in the IRA.[142] The IRA cites a communication from MAF Biosecurity New Zealand (MAFBNZ) to Biosecurity Australia (BA) which stated that, of a sample of 3,300 rotted fruit (pre-harvest field rots) taken between 1999-2005 in the Waikato only seven were found to be infected with *N. galligena*.[143] Further, it is significant that this reported incidence relates to a minor apple producing region with a known occurrence of European canker.

c. The potential for latent fruit infection, or infestation of fruit, with N. galligena *is negligible*

4.60 Even when *N. galligena* fruit rots do occur in New Zealand (an extremely rare event), fruit that is infected early in the production season rots on the tree or falls to the ground and is therefore not harvested (as occurred in the Waikato example above at paragraph 4.59). Thus, the Australian contention about the transmission of European canker through imports of New Zealand apples depends on the fruit being either *latently* infected[144] or infested with European canker.

4.61 However, there is no scientific evidence of latent infections occurring in mature New Zealand apple fruit. Instead, the IRA relies on scientific research about latent fruit infection in the United Kingdom and Northern Europe,[145] ignoring the climatic differences. As explained above, fruit infection occurs only where there is both summer rainfall and moderate temperatures, something that does not generally occur in the apple-growing areas of New Zealand, which normally have warm, dry summers (Annex 3, p. 222). Latent infection has only been observed where prolonged periods of rainfall occur late in the production season. However, as the IRA acknowledges, harvest

[142] IRA, p. 122.

[143] Ibid.

[144] Latently infected fruit refers to fruit infected by *N. galligena* but which do not show fruit rot symptoms.

[145] For example, Bondoux, P and Bulit, J (1959*)* "Sur la pourriture des pommes due au *Cylindrocarpon mali* (All.)", *Wr. Comptes Rendus de L'Academie d'Agriculture de France*, 45, 275-277 ; **Exhibit NZ-8:** Snowdon 1990; and **Exhibit NZ-9:** Swinburne 1975.

conditions typically reported in the major apple producing regions of Hawkes Bay and Nelson are normally too dry for fruit infection to occur. [146]

4.62 Further, the northern hemisphere research on latent infection relied on by the IRA relates to cooking cultivars and immature fruit (Swinburne 1975: 794). As acknowledged by the IRA, in mature, dessert apple varieties (the kind exported by New Zealand), infected fruit usually rots before harvest, reducing the likelihood of latent infections (Swinburne 1975: 794).[147] The IRA speculates that infection could remain latent in dessert varieties if infection occurred late in the season.[148] However, this is pure conjecture and the IRA provides no evidence to show that this has ever in fact been reported or demonstrated to occur - nor could it as no such evidence exists.

4.63 The IRA uses Braithwaite (1996)[149] to 'suggest' that latent infections may also occur in New Zealand.[150] However, the basis for that 'suggestion', "Mike Dance Pers. Comm." (Braithwaite 1996: 5) has never been substantiated.[151]

4.64 The information that does exist points strongly to the conclusion that latent infection of *N. galligena* is virtually non-existent in New Zealand:

- In a New Zealand study which examined 12,675 New Zealand apples (following post-harvest apple washing), none of the fruit rots found were caused by *N. galligena* (Scheper *et al.* 2007: 9).[152]

[146] IRA, p. 122.

[147] IRA, p. 122-123.

[148] IRA, p. 123.

[149] **Exhibit NZ-34:** Braithwaite, M (1996) "The occurrence of fruit rots caused by *Nectria galligena* (European canker) in New Zealand and a comparison of brown rot strains between New Zealand and Australia" Report prepared for Ministry of Agriculture and Forestry New Zealand.

[150] IRA, p. 123.

[151] Australia has previously requested information on the ability of *N. galligena* to remain latent in fruit. However, a May 2005 communication from MAFNZ to BA (**Exhibit NZ-35**) stated that "Pipfruit NZ Inc. does not have any data on the incidence of latent *N. galligena* in fruit as it has never been an issue": Ministry of Agriculture and Forestry Biosecurity New Zealand (2005) *Letter from Senior Advisor Plant Exports to Apple IRA Taskforce*, 16 May 2005, Wellington, p. 3.

- AQIS interception data (set out in the IRA[153]) shows that, of the more than 450 fresh apple fruit that were intercepted at the border by AQIS staff between 1988 and 2003 from travellers arriving in Australia from countries where European canker is present (including 53 apple fruit confiscated from travellers from New Zealand), none had fruit rot caused by *N. galligena*.

4.65 Further, there is no scientific evidence to support the contention that mature apple fruit could be infested (surface contaminated) with spores at harvest which could later infect the apple. For infestation to occur, cankers, producing spores, would need to be present within an orchard during harvest. Any spore production that occurred during harvest time would be of conidia only as ascospores are not produced in New Zealand in late summer and early autumn when harvest occurs. Conidia require high humidity and rainfall for production and dispersal (Munson 1939: 446, 452). [154] As acknowledged by the IRA,[155] such conditions are uncommon in New Zealand's major apple-growing regions during harvest time.

4.66 Australia alleges that "wind currents" during harvesting would be a possible means of spore dispersal, resulting in fruit contamination.[156] However, conidia (the only spores produced at harvest in New Zealand) are not dispersed on wind, but by rain splash (Munson 1939: 452) and travel only short distances (Marsh 1940: 264)[157]. As noted above, wet conditions are unusual during harvest time in New Zealand's major apple-growing areas. Accordingly, conidia are extremely unlikely to be either produced or dispersed.

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[152] **Exhibit NZ-36:** Scheper RWA, Rogers DJ, Walker JS, Manning MA and Wood PN (2007) "The incidence of storage rots after postharvest apple washing", *New Zealand Plant Protection* 60, pp. 7-14.

[153] IRA, p. 123.

[154] **Exhibit NZ-37:** Munson RG (1939) "Observations on apple canker. I. The discharge and germination of spores of *Nectria galligena* Bres.", *Annals of Applied Biology,* 26(3), 440-457.

[155] IRA, pp. 122 and 125.

[156] IRA, pp. 124-5.

[157] **Exhibit NZ-39:** Marsh RW (1940) "Apple canker and the weather (Abstract)", *Transactions of the British Mycological Society*, 24.

4.67 Even if conidia were to be dispersed by rain onto the surface of a mature apple immediately prior to or during harvest, they would be unlikely to survive without continued moisture. Conidia are sensitive to desiccation (drying out) even for short periods (3–12 hours) and at high relative humidity (85–98%) (Dubin and English 1975: 87). Ascospores exposed to ambient laboratory conditions failed to germinate after 5–6 days (Munson 1939: 454), indicating that spores on the external surfaces of fruit will mostly be dead at harvest.

4.68 In short, Australia's assumption that, because European canker is present in some parts of New Zealand, fruit picked at harvest time in New Zealand would be either infested or latently infected by *N. galligena*, is not supported by science. The fact that harvested fruit can be infected by *N. galligena* in other countries, in climatically different areas, does not reflect the situation in New Zealand. In fact, the evidence relating to New Zealand confirms that the potential for latent fruit infection or infestation of mature, symptomless apple fruit with *N. galligena* is negligible.

<u>(ii) Fruit would not be contaminated with *N. galligena* during harvest, handling, storage and transportation</u>

4.69 There is also no scientific evidence that fruit could be contaminated during picking, handling, processing and transportation.

4.70 For infected fruit to contaminate other fruit during processing and transport, it would need to produce spores. However, *N. galligena* only sporulates on very badly rotted or mummified fruit. As the IRA concedes, such fruit would not be harvested and therefore not be processed or transported.[158] The IRA also acknowledges that since symptomless fruit do not produce spores, it would be "extremely unlikely" for such fruit to contaminate other fruit during post-harvest handling or transportation.[159] For the same reason, there is no scientific basis for suggesting that latently infected mature, *symptomless* fruit could cross-contaminate other fruit along the rest of the processing pathway.

[158] IRA, p. 123.

[159] IRA, p. 124.

4.71 As noted above, the IRA's assertion of the incidence of infestation (surface contamination) of mature fruit at harvest is not supported by science, as conidia (the only spores present at harvest) are extremely unlikely to be produced, to be dispersed or to survive for any length of time on the surface of the fruit. That surface-contaminated fruit could then cross-contaminate other fruit during processing and transport is equally unsupported by science. The IRA claims that such contamination could occur when fruit is washed in the dump tank during processing in the packing house, although correctly acknowledges that "given the *extremely small* likelihood of fruit being infested/infected with *N.galligena*, the probability of surface spores being present on fruit and contaminating the dump water is similarly *extremely small*" (emphasis added).[160]

4.72 There is no scientific evidence that fruit has ever been contaminated by *N. galligena* in this way during processing in the packing house. In any event, if surface spores were present (which, as stated above, the evidence does not support), most would remain in the dump tank, especially after the high volume water washer,[161] so any contamination would in fact be reduced.

(iii) *N. galligena* would be unlikely to survive handling, processing and transport

4.73 The IRA asserts that latent infections would survive packing house operations.[162] However, there is no scientific basis for this assertion. Australia relies on data from the United Kingdom and Europe relating to latent survival and the incidence of storage rots.[163] As explained above at paragraphs 4.55 to 4.68, not only does the IRA ignore the climatic and varietal differences, but it also fails to provide any scientific data relating to the occurrence of storage rots of New Zealand apples.

[160] IRA, p. 127.

[161] Almost all New Zealand export packing houses use dump tanks followed by high pressure water washers. High pressure water washers involve banks of water jets operated at ~100psi at ~15cms above rotating long-staple, brushed rollers. High volumes of water are directed onto the rotating fruit that pass over these rollers typically with a 12-20 second exposure period.

[162] IRA, p. 126.

[163] Bondoux and Bulit (1959), **Exhibit NZ-8 :** Snowdon, 1990 and **Exhibit NZ-9 :** Swinburne (1975), **Exhibit NZ-11 :** Swinburne (1964)

4.74 Further, consistent with the increasing tendency towards 'retail-ready' and 'just-in-time' delivery in other markets[164] (i.e. cold stored in bulk in the country of origin and then packaged only a few days before shipment, ready for immediate use by retail outlets in the destination market), the majority of apple fruit exported to Australia from New Zealand would be 'retail-ready' and 'just-in-time'.[165] Accordingly, if any latently infected fruit were to develop visible rot symptoms in storage, this would be detected and removed at the time of packaging while the fruit was still in New Zealand and would not enter Australia.

4.75 As for infestations, the IRA concedes that processing procedures (e.g. washing) may be effective in removing surface spores. Further, as acknowledged elsewhere in the IRA, surface-contaminating spores, if any, would be short-lived and would not survive processing and transportation.[166]

4.76 In summary, there is no scientific evidence to show that *N. galligena* would survive handling, processing and transport in or on apples exported from New Zealand.

<u>(iv) Even if *N. galligena* survived handling, processing and transport of New Zealand apples to Australia, spores would not be produced and transmitted to a susceptible host</u>

4.77 The Australian contention that *N. galligena* can be transmitted to Australia through apples imported from New Zealand requires a plausible pathway for European canker to establish in Australia. For this to occur, an infested or latently infected fruit would need to produce spores; those spores would need to be transferred to a host; and the climatic conditions would need to be favourable to the establishment of European canker.

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[164] New Zealand exports Class 1 export quality mature fruit to its main markets of Europe, North America and Chinese Taipei with increasing quantities being shipped as "just-in-time" consignments in "retail-ready" packs.

[165] **Exhibit NZ-56:** MAF Biosecurity Authority (2005) *Comments by the Government of New Zealand on Biosecurity Australia's Draft Import Risk Analysis Report for apples from New Zealand, December 2005,* Ministry of Agriculture and Forestry, Wellington, pp. 1 and 5.

[166] IRA, p. 124.

a. Spore production would not take place

4.78 Trees (through cankers) are known to produce spores, but there is no scientific evidence that a mature, symptomless apple has ever produced conidia or ascospores, or to show that it could do so in Australian conditions.[167]

4.79 Australia contends, to the contrary, that infested or latently infected mature fruit would rot and produce spores following removal from cold storage.[168]

4.80 In response, as demonstrated above, the likelihood that mature symptomless apples imported from New Zealand would be latently infected with *N. galligena* is negligible.

4.81 Further, it is likely that a proportion of fruit with latent infection would never show rot symptoms (Biggs 1995: 1064).[169] As acknowledged elsewhere in the IRA, fruit with no rot symptoms do not produce spores.[170]

4.82 Even if some latently infected fruit were to develop rot, there is no scientific basis for the assumption that such fruit would necessarily be a source of inoculum for new infections. The IRA does not provide any evidence relating to the production of conidia spores from storage rots including after removal from cold storage.[171] The only evidence of ascospore production by apple fruit infected by *N. galligena* in natural conditions is by mummified fruit that have overwintered in United Kingdom/Northern European orchards (see, for example, Swinburne 1964: 493). Scientific research under artificial conditions shows that naturally infected Bramley cooking apples need to be either partially buried in

[167] Fruit that had developed visible rot symptoms in the orchard or in storage would be excluded from export before packing.

[168] IRA, pp. 134-135.

[169] **Exhibit NZ-62:** Biggs, AR (1995) "Detection of latent infections in apple fruit with paraquat", *Plant Disease* 79, 1062-1067. In this study fruit were inoculated in the field with *Botryosphaeria dothidea* and *Colletotrichum acutatum*. Only 30% of fruit inoculated with *B. dothidea* and 38% of fruit inoculated with *C. acutatum* expressed pathogens. This compares with 71% and 91% for the respective pathogens recovered from fruit inoculated and then treated with paraquat (paraquat treatment is a method for determining levels of latent infection).

[170] IRA, p. 124.

[171] Conidia may be produced on rots but only occasionally and then only after the rots are well developed (Swinburne 1964: 493 and Swinburne 1975: 794).

moist peat for three months (Swinburne 1964: 494) or stored in a refrigerator for 12 months at 4.4ºC (McCartney 1967: 279) in order to develop perithecia and produce ascospores.

4.83 However, none of these examples shows that a latently infected apple would mummify, develop perithecia and produce ascopores in Australian conditions, where it is generally too dry for ascospore production (Munson 1939: 455, Ransom 1997: 124, and Annex 3, pp. 222-223). Further, the development of perithecia has never been reported on mature, dessert apples (the varieties predominantly exported by New Zealand) in New Zealand or anywhere else, even under laboratory conditions. Finally, in the real world, a discarded apple would not survive three months in the open air. Common sense dictates that other rots, birds, foraging insects, marsupials and other mammals would consume the apple long before any rots caused by *N. galligena* could develop. It is also worth noting that most discarded fruit would have been consumed, leaving only the core. Such fruit is unlikely to produce rots, as most of any infected portions would have been eaten.

4.84 Consideration by the IRA of infested fruit as a source of spores at this point in the pathway is not based on any scientific analysis of the pathogenic process for *N. galligena*.[172] There is no scientific evidence to show the short-lived conidia on fruit could survive cool storage and transport without drying out, and germinate once the fruit was warmed to ambient temperatures following removal from cold storage. Likewise, the IRA does not explain how the fruit would become infected, develop rot and produce spores. This assumed chain of events can only be based on speculation, as the process has never been observed to occur in the real world.

b. There would be no dispersal of spores

4.85 Even if infested or latently infected fruit could produce spores, those spores would need to be transmitted to a host plant. However, as noted by Biosecurity Australia's Principal Scientist in March 2007, European canker spores are "not very well

[172] IRA, pp. 134-135.

transmitted" because they can only travel "a few metres".[173] While Australia alleges that conidia can disperse up to 125m in "stormy conditions",[174] scientific evidence shows that conidia dispersal is typically no more than 10m from a canker on a tree under wet and windy conditions (Taylor and Byrde 1954: 72 and Marsh 1940: 264).[175]

4.86 Ascospores are dispersed on wind, but this occurs when they are produced by perithecia on a tree (Munson 1939: 455). Dispersal for any significant distance is unlikely to occur when ascopores are produced by perithecia on an apple on the ground where they are less likely to become airborne. Further, as described above, these airborne spores are unlikely to be produced from mature, symptomless apples in Australia in the first place. The absence of airborne spores during the Tasmanian outbreak has been associated with the restricted spread of the disease in that case (Ransom 1997: 124).

<u>(v) Even if latently infected or infested fruit could produce spores which could be transmitted to a susceptible host, the climatic conditions in Australian apple-growing regions are not suitable for disease establishment or spread</u>

4.87 Finally, even if a latently infected or infested apple could produce spores, which were then somehow dispersed to a host plant, the climatic conditions in Australian apple-growing regions would have to be suitable to disease establishment or spread. Thus, a key part of the Australian theory is that Australian apple producing regions have climatic conditions similar to other regions in the world that have European canker, such as the United States, Europe and New Zealand.

4.88 Australia claims that Grove 1990 found that areas where average annual rainfall is greater than 1,000mm favour establishment of the disease.[176] It thus concludes that, because several apple-growing areas in Australia have an average rainfall of around

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[173] **Exhibit NZ-38:** Commonwealth of Australia (2007) *Official Committee Hansard; Senate Standing Committee on Rural and Regional Affairs and Transport; Reference: Biosecurity Australia briefing;* Thursday, 22 March 2007, Canberra, p. 10.

[174] IRA, p. 135.

[175] **Exhibit NZ-40:** Taylor RE and Byrde RJW (1954) "Control of Nectria eye-rot of apple by an eradicant fungicide", *Plant Pathology*, 3, 72.

[176] IRA, pp. 137 and 140.

1,000mm, the climate in these parts of Australia would be suitable for European canker to develop. However, that is not what Grove found. Grove stated only that "Nectria canker of apple is particularly troublesome in areas of coastal California where fog, moderate temperatures and mean annual precipitation of 100cm or more occur."(Grove 1990: 35).

4.89 Australia also claims that Munson 1939 found that European canker "readily survives from 2ºC to 30ºC with the optimum temperature for disease development being between 20ºC to 25ºC", and uses that to infer that, because such conditions are quite common in some parts of Australia, the disease must be able to establish and spread.[177] However, Munson only studied ascospore germination in the laboratory and did not suggest that his finding of an optimum temperature of 20ºC represented the optimum for disease development in the field (Munson 1939: 456). In fact, there is strong evidence that much cooler temperatures are associated with field development of European canker (Dubin and English 1975: 84).

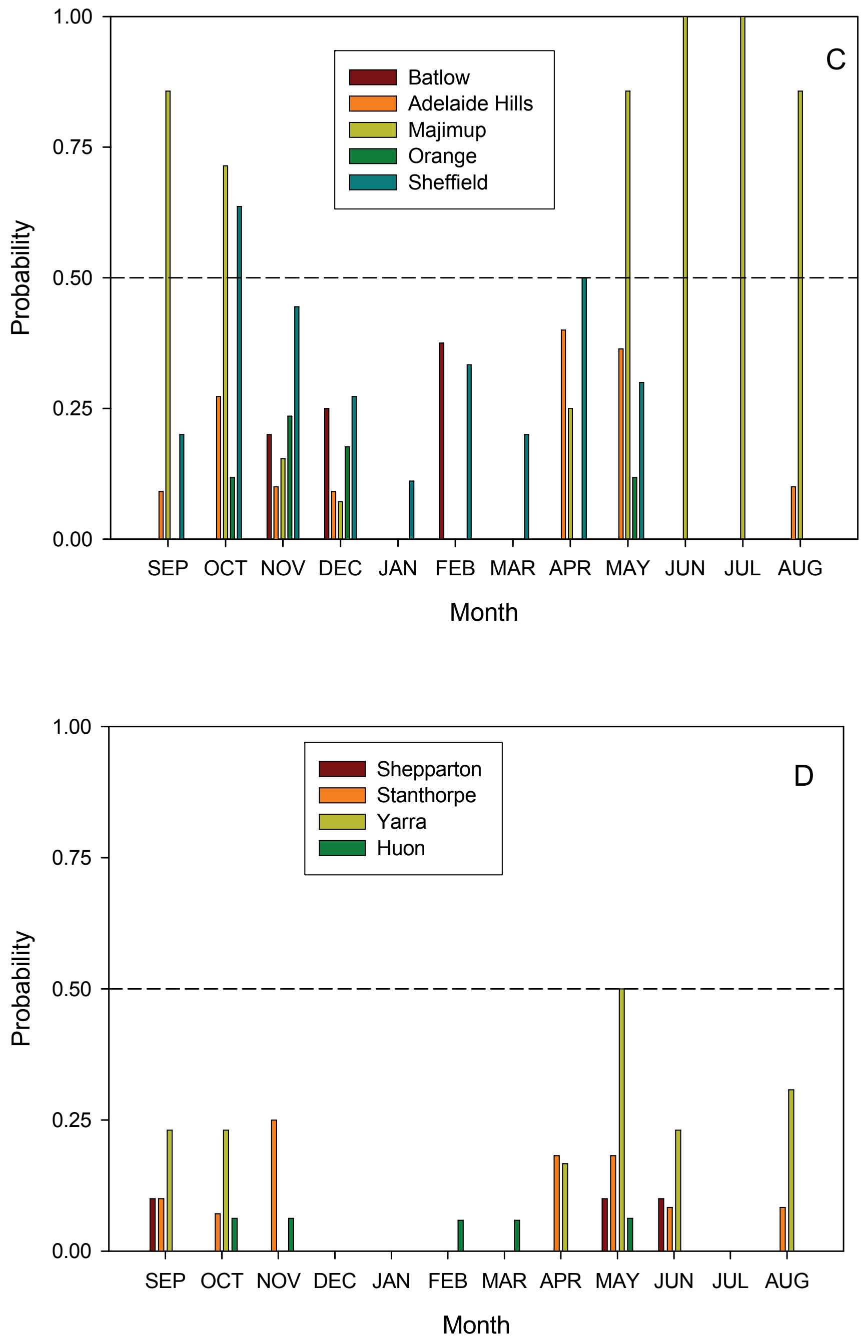
4.90 Not only has Australia misinterpreted Grove 1990 and Munson 1939, it also failed to evaluate relevant information about climatic conditions and their effect on the establishment of European canker. As the study in Annex 3 shows, the climatic conditions associated with the occurrence of European canker are the simultaneous occurrence in the same month of rainfall on more than 30% of days and temperatures between 11ºC and 16ºC more than 8 hours per day.

4.91 In Australian apple-growing regions, these conditions only occur with a 50% probability in Manjimup in Western Australia (an area outside this dispute)[178] and in Sheffield, in northern Tasmania, and then only during October and November (see Figure 2 below based on data assessed in Annex 3).

[177] IRA, p. 137. See also p. 140.

[178] Australia has determined that New Zealand may not export apples to Western Australia, and New Zealand is not challenging that prohibition in this proceeding. Climatic data relating to Manjimup has been included in this discussion for completeness, and to respond to the information presented in the IRA.

FIGURE 2: Probability that conditions are conducive for European canker at sites in Australia



4.92 The outbreak of European canker in Tasmania (an area where conditions are marginally favourable to European canker) confirms the unsuitability of the rest of Australia to the disease. No better opportunity for European canker to establish and spread elsewhere in Australia existed than during this outbreak of the disease in the mid-twentieth century. However, it did not do so.

4.93 The disease was present in the affected orchards in Spreyton, Tasmania (adjacent to Sheffield) for approximately 20 years before it came under regulatory control in 1954 (Ransom 1997: 121).[179] The eradication programme was only finalised in 1991 following a final survey of affected blocks which were confirmed to be free of the disease (Ransom 1997: 124). During that entire time there was no evidence of the spread of the disease to other apple orchards or to other host plants in Tasmania or mainland Australia (Ransom 1997).

4.94 Moreover, throughout the period of the outbreak, there were no restrictions on the movement of apple fruit.[180] The IRA attempts to attribute this to limited apple production during that period.[181] However, once again, the IRA relies on supposition rather than looking at available data. Information available from the yearly publications of *Statistics for the State of Tasmania*, and the *Tasmanian Yearbook*, shows that from the 1920s on there was significant apple production in Tasmania, averaging 109,344 tonnes per year in the 1940s, a time when European canker is known to have been present (see Annex 5). That production volume included quantities shipped to other states in Australia. Yet at no time was there any evidence of European canker being spread from apples produced in Tasmania. There can be no better testimony to the lack of pathway and inhospitability of the Australian climate to the establishment and spread of European canker than this.

[179] An American reference suggests the disease was present even before 1926: **Exhibit NZ-41:** Zeller SM (1926) "European Canker of Pomaceous Fruit Trees", *Station Bulletin 222,* Oregon Agricultural College, Experiment Station, Corvallis, Oregon, p. 7.

[180] **Exhibit NZ-42:** *Tasmanian State Proclamation*, 16 August 1955 under the Plant Diseases Act 1930. The 1955 Proclamation prohibited the movement of apple propagation material (from Spreyton only) but not apple fruit.

[181] IRA, p. 155.

(c) The conclusions of science are reinforced by the reality of the international trade in apples

4.95 The IRA itself concedes that there is no evidence in the scientific literature that the long-distance spread of European canker has ever been attributed to the movement of apple fruit.[182] Over the last 15 years New Zealand has exported billions of apples and in no instance have apples exported from New Zealand been associated with the entry, establishment or spread of European canker. In a March 2007 briefing to a Senate Standing Committee, Biosecurity Australia's Principal Scientist conceded that the long-distance spread of European canker is almost invariably via planting materials.[183]

(d) Since there is no scientific support for the contention that mature, symptomless apples are a pathway for transmitting European canker, the measures maintained by Australia in relation to European canker for apples from New Zealand are inconsistent with Article 2.2

4.96 All of the Australian measures (sourcing from European canker-free orchards, the intensive orchard inspections, the examination of nursery stock and consequent suspension of orchards and the pruning requirements) are based on the contention that mature, symptomless apple fruit provide a pathway for transmitting European canker. However, as demonstrated above, there is no scientific evidence that such a pathway exists.

4.97 As noted earlier, for there to be "sufficient scientific evidence" within the meaning of Article 2.2, there has to be a "rational or objective relationship" between the measure and the scientific evidence. Since there is no scientific support for the contention that mature, symptomless apple fruit are a pathway for European canker to be transmitted to Australia, there can be no "rational or objective relationship" between the measures that Australia has imposed for mature apple fruit from New Zealand in respect of European canker, and the scientific evidence. Hence, Australia's measures are

[182] IRA, p. 142.

[183] **Exhibit NZ-38:** *Official Committee Hansard*, 22 March 2007, p. 10.

maintained without "sufficient scientific evidence" and are inconsistent with Australia's obligations under Article 2.2.

(i) The requirement that apples be sourced from export orchards/blocks free of European canker (pest-free places of production)

4.98 Australia claims that orchard/block freedom from European canker is required because "…apples sourced from orchards free of cankers would…be relatively less likely to be infected or infested with *N. galligena*…".[184] However, as demonstrated above, the likelihood of a mature, symptomless apple being latently infected or infested with European canker is negligible and, most importantly, there is no scientific evidence that a mature, symptomless New Zealand apple (even if latently infected or infested) could be a pathway for transmitting the disease. Thus, the measure is maintained without "sufficient scientific evidence".

(ii) The requirement that all trees in export orchards/blocks be inspected for symptoms of European canker

4.99 Australia claims that the purpose of orchard/block inspections is to "detect if the disease has established in the orchard during the previous spring, summer and autumn".[185] Australia claims that "if it has not, there will be no inoculum for infection in the next growing season".[186] However, as there is no scientific evidence that mature, symptomless apples from New Zealand could transmit the disease, the measure is maintained without "sufficient scientific evidence".

(iii) The requirement that all new planting stock be intensively examined and treated for European canker

4.100 Since the requirement to source apples from orchards/blocks free from European canker is not supported by science – because there is no scientific evidence that mature, symptomless apples are a pathway for the transmission of European canker – equally a

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[184] IRA, p. 153.

[185] *Ibid*, p. 154.

[186] *Ibid,* p. 154.

requirement that planting stock be examined and treated for European canker is also maintained without "sufficient scientific evidence".

(iv) The requirement that an orchard/block be suspended for the season because of evidence of pruning or other activities carried out before the inspection could constitute an attempt to remove or hide symptoms of European canker

4.101 Australia makes no attempt to demonstrate scientific support for this measure. Moreover, pruning is sound orchard management practice and an important method for managing tree growth, as well as for managing European canker (and other diseases). Thus, the absence of scientific support for a requirement that discourages pruning is not surprising.

4.102 In any event, this measure is closely related to the orchard freedom and inspection requirements. Since those requirements are maintained without sufficient scientific evidence, there can equally be no scientific support for the pruning requirement.

(v) The requirement that exports from an orchard/block be suspended for the coming season on the basis of detection of European canker and that reinstatement would require eradication of the disease, confirmed by inspection

4.103 Again, this requirement appears to be consequent on the inspection requirement. But since the inspection requirement is maintained without "sufficient scientific evidence", then suspension in the light of inspection equally lacks scientific support.

4.104 Furthermore, since there is no scientific evidence that mature, symptomless apples could transmit the disease, a measure that suspends from exporting those orchards which contain visual symptoms of European canker is also maintained without "sufficient scientific evidence".

(f) Conclusion

4.105 Under Article 2.2, Australia is obliged to ensure that its measures are not maintained without sufficient scientific evidence. There is no "rational or objective relationship" between the measures that Australia has established for apples from New

Zealand in respect of European canker, and scientific evidence. Hence, Australia's measures are maintained without "sufficient scientific evidence" and, as a result, they are inconsistent with Australia's obligations under Article 2.2.

4. Apple leafcurling midge

(a) Australia's measures for ALCM applied to apples from New Zealand are based on assumptions about the possibility of transfer of ALCM through apples which are not supported by sufficient scientific evidence

4.106 The Australian contention is that mature, symptomless apples provide a pathway for the transmission and establishment of ALCM. However, Australia's contention about the possibility of such transfer occurring is not supported by scientific evidence. The low number of viable cocoons on New Zealand apples combined with the biology of the ALCM renders highly improbable the sequence of events which Australia relies upon as a potential occurrence.

(b) Crucial steps for the Australian contention about the transfer of ALCM through mature, symptomless apples are not supported by science

(i) The level of infestation of viable ALCM cocoons on New Zealand apples is not biologically significant

4.107 A 1994 survey of 30 orchard blocks in Waikato (a minor apple production area of New Zealand which, due to its climate, is more conducive to ALCM than the major apple production areas) and one orchard block in the Bay of Plenty, found that 0-11.5% of harvested apples were infested with ALCM cocoons, and that 63% of those cocoons were empty, indicating that adults had already emerged before the fruit had been harvested (Tomkins *et al.* 1994: 347).[187] Another more recent study found that 37-42% (giving a

[187] **Exhibit NZ-43:** Tomkins AR, Wilson DJ, Hutchings SO and June S (1994) "A survey of Apple Leafcurling Midge (*Dasyneura mali*) management in Waikato Orchards", *Proceedings of the 47th New Zealand Plant Protection Conference*, 346-349. Notably, Tomkins *et al.* 1994 was conducted before the integrated fruit production measures for ALCM (set out in **[Exhibit NZ-45:** the New Zealand Pipfruit Integrated Fruit Production Manual, New Zealand Pipfruit Ltd, October 2006, pp. 36-37) **business in confidence]** were put in place in the late 1990s. Those measures have decreased the significance of ALCM

mean of approximately 40%) of cocoons found on apples were empty (Rogers *et al.* 2006: 3). The same study found that only 25% of occupied cocoons contained live pupae. The authors of that study stated that these figures were "representative of viability or otherwise of cocoons found on unwashed New Zealand apples" (Rogers *et al.* 2006: 3). Those figures indicate that only approximately 15% of cocoons on New Zealand apples contain viable pupae.

4.108 The high number of non-viable cocoons on New Zealand apples is the result of two factors. The first is the seasonal population development of ALCM, which means that, by harvest, many adults will have emerged leaving only their empty cocoons. The second is parasitism, caused by the wasp *Platygaster demades*.

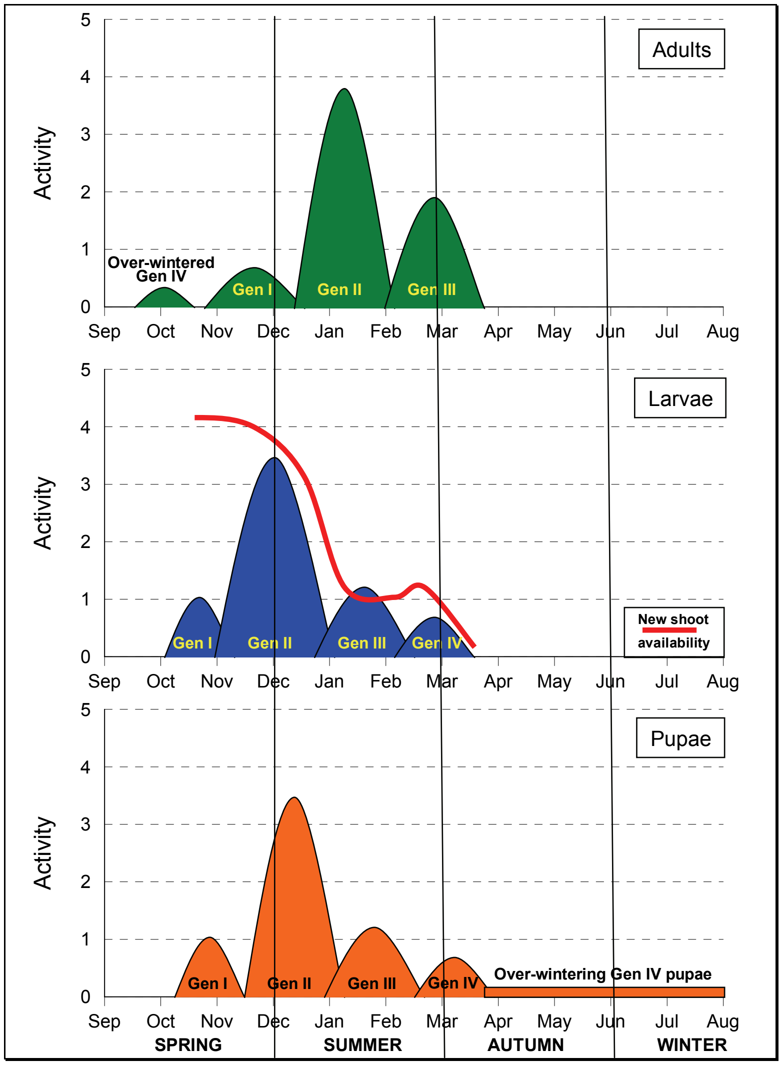
a. Seasonal population development results in a low number of occupied cocoons

4.109 ALCM populations peak in early summer when there is the maximum number of new shoots available for egg-laying and larval development. Populations decline as shoot availability declines between January and late April (i.e. mid-summer to early autumn). The small number of larvae from generations 2 and 3 that pupate on fruit will emerge as adults in January and February (summer) respectively and contribute to counts of empty cocoons found on fruit at harvest. Numbers of larvae belonging to the final generations before winter are relatively small because the availability of new shoots is limited (Todd 1959: 867[188] and Shaw *et al.* 2005: 306). These larvae either drop to the soil or remain on the tree to pupate or overwinter depending on the season. However, a small proportion of the final generation before winter may also infest fruit. The graph set out below shows ALCM population peaks during late spring and early summer.

in New Zealand (Rogers *et al.* 2006: 1). Thus, the infestation levels observed in Tomkins 1994 are not indicative of current infestation levels in New Zealand.

[188] **Exhibit NZ-44:** Todd DH (1959) "The Apple Leafcurling Midge, Dasyneura mali Kieffer, Seasonal History, Varietal Susceptibility and Parasitism" *New Zealand Journal of Agricultural Research*, 2, 859 - 869.

FIGURE 3: Generalised population levels and life cycle of ALCM in New Zealand[189]



b. Presence of the wasp, Platygaster demades*, causes a high level of parasitism*

4.110 The second reason for the high number of non-viable cocoons is that a high number of occupied cocoons actually contain dead pupae. This is caused primarily by the wasp, *Platygaster demades*, introduced to New Zealand in 1925 to control apple/pear

[189] This graph is a summary by Dr Jim Walker, one of the authors of Suckling *et al.* 2007, of the data presented in Todd 1959, Shaw *et al.* 2005 and Suckling *et al.* 2007.

leafcurling midge. This parasite lays eggs inside the ALCM eggs, develops in the mature ALCM larva and emerges from the ALCM cocoon killing the pupa inside (Shaw *et al.* 2005: 306). Indeed, high levels (50 – 60%) of parasitism by the wasp *Platygaster demades* have been reported recently in third and fourth generation ALCM cocoons (Shaw *et al.* 2005: 310). Heavy parasitism of later generations has also been recorded by Todd 1959: 868.

4.111 Australia ignored the scientific evidence available on the viability of cocoons found on New Zealand apples and focussed only on presence of cocoons, regardless of whether they contain live ALCM. However, cocoons themselves are not a risk factor for ALCM. It is only cocoons that contain viable ALCM that pose a potential risk. Thus, Australia's conclusions about the level of infestation of New Zealand apples are not supported by scientific evidence.

(ii) Fruit would not become contaminated with ALCM during harvest, handling and transportation to the packing house

4.112 The only potential post-harvest source of ALCM contamination is infested apple tree leaves.[190] However, female ALCM lay eggs on the young soft leaves at the branch tips. These are typically far away from the apple fruit which grows only on the older part of the branch (i.e. fruit only grows on wood produced in the previous year). Thus, ALCM-infested leaves are not harvested with the fruit and contamination is extremely unlikely to occur during the picking and transportation processes.

4.113 The leaves most likely to be harvested with apples are leafy stipules which are located close to the fruit. Leafy stipules are formed during flowering in spring but cease to grow or develop beyond the very early stages of fruitlet development. ALCM damage or infestation has never been reported on these leafy stipules.

4.114 Finally, even if young branch shoot leaves could somehow mistakenly be harvested with apple fruit, they would be very unlikely to be infested with ALCM eggs or

[190] As acknowledged by Australia in the IRA, dislodged ALCM pupae would not be able to move about and attach to other fruit. Even if they could, viable pre-pupae or pupae dislodged from fruit would not survive harvesting and packhouse procedures (IRA, p. 163).

larvae. By harvest, leaves normally associated with ALCM (young actively growing leaves) are few in number (Todd 1959). Likewise, by harvest, ALCM eggs will have hatched and most larvae will be in cocoons.

4.115 Thus, there is no basis for Australia's contention that some fruit will become contaminated with ALCM during harvest, handling and transport to the packing house.[191]

(iii) Any infestation of New Zealand apples will be at so low a level that establishment in Australia is extremely unlikely

4.116 Even if apples infested with live pupae were to enter Australia, the live pupae would need to develop and emerge from cocoons simultaneously in sufficient numbers near enough to each other for the males readily to locate females and mate. Further, the mated female, with a limited flight range, would need to find young actively growing apple leaves on which to lay its eggs. This would all need to occur in the very short life span of an adult ALCM (approximately 3-4 days under laboratory conditions: Barnes 1948: 36). There is no scientific evidence that this has ever occurred, or could occur in the real world.

a. Most New Zealand apples will be consumed or decay before emergence can take place

4.117 The first requirement for the Australian contention is that live pupae enter Australia, complete development and emerge from their cocoons.

4.118 Emergence of ALCM is dependent on environmental conditions. All apples in commercial trade are held in cool storage after packaging to delay the ripening process. Because cool storage mimics the environmental conditions in autumn and winter, any pupae attached to apples would enter into the delayed developmental stage of diapause during transport to Australia. Adult emergence from diapause is synchronised to occur in spring when environmental conditions change. Thus, adults would not emerge as soon as

[191] IRA, p. 161.

the apples were removed from cool storage but rather would only emerge when critical environmental conditions have been met, such as longer day length and warmer conditions of spring, at a time similar to that required for leaf and shoot development on its host – apple trees.

4.119 However, New Zealand fruit would arrive in the Australian market in autumn and winter. By spring, most of this fruit will have been sold and consumed, or, if removed from the cool store and not consumed, would have been disposed of. And, even if ALCM emerged in this period, there would be no young, actively growing apple leaves available on which to lay eggs.

4.120 Thus, by spring, the total number of New Zealand apples available to transfer ALCM would be significantly reduced, due to apple consumption in the intervening months, conservatively to one sixth of the amount imported.[192]

b. Virtually no opportunity for mating to occur

4.121 Even if pupae did enter Australia and successfully emerge, the short adult life span and limited flying distances of ALCM mean that there is virtually no chance of male and female emerging from cocoons on individual apples in close enough proximity to find each other and successfully mate.

4.122 While adults can live for up to 3 - 4 days under controlled laboratory conditions (Barnes 1948: 36), in the wild they are likely to live for an even shorter period. This means that there is only a very narrow window of opportunity for reproduction to occur.

4.123 The IRA suggests, based on communications with a researcher in the United Kingdom, that male ALCM could fly distances of more than 50m.[193] However, that communication is not supported by the published scientific evidence. A peer reviewed scientific study on orchard colonisation by ALCM found that ALCM infestation was not

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[192] This figure is based on the assumption that apples are consumed evenly over the six month period from first delivery in Australia until the Australian spring.

[193] IRA p. 171. That communication would have been based on sex pheromone trap studies under field conditions where males would have been exposed to quantities of pheromones several orders of magnitude greater than those released naturally by an unmated female.

evident more than 30m into an adjacent newly established apple orchard after 3 generations of observations, indicating that mated female ALCM movement is likely to be limited to less than 30m during one generation (Suckling *et al.* 2007: 750).[194] That study also indicated that male movement is likely to be similar (Suckling *et al.* 2007: 750).

4.124 Given their short lifespan, for a male and female ALCM from cocoons on individual apples to have time to find each other and mate there would need to be near simultaneous emergence of the male and female. In addition, the short flying distances mean that the emerging male would have to be located very close to the female.

c. It is extremely unlikely that males and females will emerge in close proximity to a susceptible host

4.125 ALCM require apple trees with growing shoot tips on which to lay their eggs. Given the limited flight range of mated ALCM females, emergence and mating would also need to occur within 30m of an apple tree with growing shoot tips. Thus, there would have to be a sufficient number of viable cocoons located within 30m of such hosts.

4.126 Baker 1990[195] showed (using a probability analysis) that, if a mean of three insect larvae are present at the same time and place, there is a 60% chance that both a male and a female will be among them (Baker *et al.* 1990: 15). Thus, a minimum of three viable ALCM cocoons would be needed close to each other at the same time for there to be 60% chance of a mating pair emerging. Most infested fruit carry only one cocoon (Tomkins *et al.* 1994: 347). Approximately 15% of fruit with cocoons would actually contain live

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[194] Suckling *et al.* 2007 (**Exhibit NZ-15**) was conducted in New Zealand between November and March during peak ALCM population activity and would have been associated with typical spring/summer winds that would have further assisted female ALCM dispersal flights into the study site. While the study found low levels of ALCM infestation at 100m and 200m the authors associated this with background ALCM populations from nursery stock in a newly planted orchard.

[195] **Exhibit NZ-46:** Baker RT, Cowley JM, Harte DS and Frampton ER (1990) "Development of a Maximum Pest Limit for Fruit Flies (*Diptera: Tephritidae*) in Produce Imported into New Zealand", *Journal of Economic Entomology* 83(1), pp. 13-17.

ALCM (Rogers *et al.* 2006: 3). Thus, in order to have three live ALCM, 20 apples with cocoons would have to be discarded close together.[196]

4.127 The standard AQIS fruit inspection regime involving a 600 fruit sample inspection would provide 95% confidence that no more than 0.5% (1 in 200) fruit have cocoons. On this assumption, at least 4,000 fruit[197] would need to be deposited in one place at the same time to obtain three apples with three live ALCM.

4.128 The New Zealand interception data provided to Australia and set out in the IRA[198] indicates the actual infestation level is much lower than that detected with 95% confidence with a 600 fruit sample, and is more likely to be 0.13%, not 0.5%, suggesting that over 15,000 fruit[199] would need to be deposited in one place at the same time to obtain three apples with live ALCM.

d. The potential for significant numbers of fruit being deposited in the same place near apple trees at the same time is negligible

4.129 New Zealand apple exports to Australia will be retail ready[200] and are therefore unlikely to be sent to orchard wholesalers. As apples will be sent straight to urban centres, the chance of large quantities of apples being discarded near apple trees is minimal.

4.130 In any event, large quantities of apples would not be discarded uncovered near apple trees at an orchard wholesaler. This is because, in a country such as Australia, where removal of discarded fruit from orchards is essential for good fruit fly management, it would be contrary to good operational practice for commercial packing house operators, or even nearby orchardists, to leave any discarded fruit uncovered and

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[196] 20 apples with cocoons x 15% of cocoons with live ALCM = three apples with live ALCM.

[197] 20 apples with cocoons ÷ 0.005 (infestation level) = 4,000.

[198] IRA, Table 40, p. 166, ALCM cocoon interceptions from endpoint inspections between 2001-2004.

[199] 20 apples with cocoons ÷ 0.0013 (infestation level) = 15,384.

[200] Meaning that they are ready for retail sale and do not require any re-packaging.

exposed to pests. Also, fruit discarded in a landfill would almost certainly be covered within hours of it being left there.

4.131 Even if large quantities of apples were left uncovered for a short time, emergence would be unlikely to occur. ALCM will not emerge from fruit as soon as it is removed from cold storage. It first has to break diapause and complete pupation, which takes 13-18 days (Barnes 1948: 36). Thus, an ALCM could not emerge from a viable cocoon attached to a discarded apple during the few hours it might remain uncovered as waste.

4.132 In short, the likelihood of an Australian buyer of New Zealand apples disposing of at least 4,000 (let alone 15,000) of those apples uncovered at a single site near apple trees with new shoots is negligible.

(c) The conclusions of science are reinforced by the reality of the international trade in apples

4.133 The implausibility of the above sequence of events is borne out by the history of trade in apple fruit. For example, New Zealand has, over the last 18 years, exported over 800 million apples, sourced from throughout the country, to Chinese Taipei, with no special measures for ALCM.[201] Chinese Taipei remains free of this pest.

(d) As there is no scientific support for Australia's assumptions about the possibility of transmission of ALCM by New Zealand apples, the measures maintained by Australia in relation to ALCM for apples from New Zealand are inconsistent with Article 2.2

4.134 Australia's assumptions about the likelihood of transmission and establishment of ALCM are not supported by the scientific evidence. The low number of viable cocoons on New Zealand apples combined with the biology of the ALCM, both factors which Australia has ignored, render highly improbable the sequence of events on which

[201] Data extracted from the World Trade Atlas, which records volumes of apples traded in kilograms. The approximate number of apples imported is derived on the basis of an 18kg tray carton equivalent (TCE) containing approximately 90 apples based on the apple size generally preferred by that market.

Australia relies to support its measures. There is no scientific evidence demonstrating that such a sequence of events has ever occurred or could occur. Thus, the measures maintained by Australia are without sufficient scientific evidence.

4.135 As pointed out earlier, in order to establish "sufficient scientific evidence" within the meaning of Article 2.2, there has to be demonstrated a "rational or objective relationship" between the measures and the relevant scientific evidence.

4.136 Australia requires that New Zealand conduct either a 3,000 unit sample inspection for ALCM (with treatment or rejection on detection), or a 600 unit sample inspection with mandatory treatment (fumigation) of the lot (whether or not there is detection during the inspection). However, neither of these alternative measures is maintained with sufficient scientific evidence.

4.137 For the reasons set out above at paragraphs 4.127 to 4.132, given the negligible risk of transmission and establishment of ALCM with a 600 fruit sample, the higher 3000 fruit sample inspection regime required by Australia is clearly disproportionate to the risk.[202] A 600 fruit sample would ensure to 95% confidence that proportion of apples with cocoons entering Australia did not exceed 0.5%.[203] However, as is clear from the above analysis, an infestation level of 0.5% would not be enough to initiate a colony. Thus, there is insufficient scientific evidence for Australia to maintain its first alternative measure for ALCM.

4.138 Australia's second alternative measure for ALCM is a 600 unit sample and mandatory treatment. A 600 unit sample on its own is more than sufficient to meet the risk, and is not itself objectionable since it is commonly undertaken for a range of quarantine pests. The additional requirement of mandatory treatment has no scientific support, however. That is, it too bears no rational or objective relationship to the scientific evidence on ALCM.

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[202] Panel Report, *Japan - Apples*, para 8.181.

[203] This is the level of infestation accepted by using the standard 600 unit inspection used by AQIS for imports of other produce.

4.139 Under Article 2.2, Australia is obliged to ensure that its measures are not maintained without sufficient scientific evidence. There is no "rational or objective relationship" between the measures that Australia has established for apples from New Zealand in respect of ALCM and scientific evidence.

4.140 Australia's measures are maintained without "sufficient scientific evidence" and as a result they are inconsistent with Australia's obligations under Article 2.2.

5. None of the additional measures applicable to all three pests has a "rational or objective relationship" with scientific evidence

4.141 Since mature, symptomless apple fruit are not a pathway for fire blight or European canker to be transmitted to Australia, and since there is no scientific evidence that entry, establishment and spread of ALCM could occur at the levels of infestation reported on New Zealand apples, there is also insufficient scientific evidence for Australia to maintain its additional measures applicable to all three pests.

(a) The requirement that AQIS officers be involved in orchard inspections for European canker and fire blight, in direct verification of packing house procedures, and in fruit inspection and treatment

4.142 Australia does not provide a rationale for this measure. Further, as there is no justification for requiring any of these inspections or packing house procedures, there is equally no justification for requiring AQIS staff to be involved in orchard inspections, packing house inspections, or in fruit inspection or treatment.

4.143 This view is supported by the decision of the Panel in *Japan – Apples (Article 21.5 – US)*. There the Panel took the view that whether confirmation or inspection of a particular measure, treatment or action will be scientifically justified depends on whether such measure, treatment or action is itself scientifically justified. Thus, the Panel concluded that: [204]

[204] Panel Report, *Japan - Apples (Article 21.5 – US)*, para 8.115

> Japan is entitled to apply confirmation procedures in relation to requirements that Japan is scientifically justified to apply. Confirmation and inspection procedures can be legitimate phytosanitary instruments if they support measures necessary to address legitimate phytosanitary risks.

4.144 Here, because Australia's measures relating to orchard inspections for fire blight and European canker, packing house procedures for fire blight, and fruit inspections for ALCM are maintained without sufficient scientific evidence in breach of Article 2.2, so must be any type of AQIS involvement in or supervision of those procedures.

(b) The requirement that New Zealand ensure that all orchards registered for export to Australia operate under standard commercial practices

4.145 Australia claims that this measure is necessary because "[i]nformation provided by New Zealand on orchard and packing house practices and procedures and levels of pest infestation/infection in orchards and on apples is largely based on data derived from commercial apple production systems used in New Zealand for the production of export grade fruit".[205] This would require NZMAF to verify, through a costly compliance program, that industry was operating in accordance with standard commercial practice. Australia does not, to New Zealand's knowledge, impose such a requirement with regard to any other plant product imported into Australia.

4.146 While New Zealand apples are processed according to standard commercial practice, there is no justification for the imposition of a measure requiring *verification* of such compliance by New Zealand. Indeed, Australia does not attempt to demonstrate any scientific support for this measure.

4.147 This conclusion is again supported by the panel in *Japan - Apples (Article 21.5 - US)*. In that case Japan argued that its requirement for sanitation of packing houses, including through chlorine treatment, was justified because packing house sanitation was "established commercial practice". The panel rejected this argument, finding that, "…while proper sanitation may be required *and seems to be established commercial*

[205] IRA, p. 315.

practice, the scientific evidence does not justify chlorine disinfection of packing facilities in order to prevent contamination of mature symptomless apples by *E. amylovora*".[206]

4.148 Thus, the Panel was clear that any measure must be justified by science. That a measure might be in accordance with established commercial practice is not relevant to an assessment under Article 2.2.

(c) The requirement that packing houses provide details of the layout of premises

4.149 It is not clear how such a measure could be justified. Nor is it clear what risk this measure is intended to address. Indeed, Australia does not attempt to demonstrate any scientific support for this measure.

6. Conclusion on Article 2.2

4.150 There is insufficient scientific evidence to maintain the measures applied by Australia to apples imported from New Zealand in respect of fire blight, European canker and ALCM. That is, there is no rational or objective relationship between Australia's measures and the scientific evidence. Australia has thus failed to comply with its obligations under Article 2.2. As New Zealand will point out in respect of Articles 5.1 and 5.6 below the Australian measures are also inconsistent with the requirements in Article 2.2 that they be based on scientific principles, and applied only to the extent necessary to protect human, animal or plant life and health.

C. AUSTRALIA'S MEASURES FOR THE IMPORTATION OF NEW ZEALAND APPLES ARE INCONSISTENT WITH AUSTRALIA'S OBLIGATIONS UNDER ARTICLE 5.1 OF THE *SPS AGREEMENT*

1. The basic obligation under Article 5.1

4.151 Article 5.1 provides:

206 Panel Report, *Japan - Apples (Article 21.5 – US)*, para. 8.102.

> Members shall ensure that their sanitary and phytosanitary measures are based on an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health, taking into account risk assessment techniques developed by the relevant international organizations.

4.152 The Appellate Body in *EC – Hormones* agreed with the Panel that Article 5.1 may be viewed as a specific application of the basic obligations in Article 2.2.[207] The Appellate Body added "Articles 2.2 and 5.1 should constantly be read together. Article 2.2 informs Article 5.1: the elements that define the basic obligations set out in Article 2.2 impart meaning to Article 5.1."[208] While not every violation of Article 2.2 will necessarily entail a violation of Article 5.1,[209] Australia's breach of Article 2.2 in this case indicates that it is likely not to be in compliance with Article 5.1.

4.153 There are two elements to the obligation under Article 5.1 of the *SPS Agreement*. First, there must be a risk assessment, within the meaning of Article 5.1 and paragraph 4 of Annex A. Second, Australia's measures must be based on that risk assessment. In the present case, a risk assessment within the meaning of the *SPS Agreement* does not exist to support Australia's measures. As a consequence, Australia's measures cannot be said to be "based on" a risk assessment.

4.154 An assessment of risk must conform with paragraph 4 of Annex A of the *SPS Agreement*, which defines that a risk assessment as:

> The evaluation of the likelihood of entry, establishment or spread of a pest or disease within the territory of an importing Member according to the sanitary or phytosanitary measures which might be applied, and of the associated potential biological and economic consequences […]

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[207] Appellate Body Report, *EC – Hormones*, para. 180. Article 2.2 of the *SPS Agreement* provides: "Members shall ensure that any sanitary or phytosanitary measure is applied only to the extent necessary to protect human, animal or plant life or health, is based on scientific principles and is not maintained without sufficient scientific evidence, except as provided for in paragraph 7 of Article 5."

[208] Appellate Body Report, *EC – Hormones*, para. 180.

[209] Panel Report, *Australia – Salmon*, para. 8.52

4.155 This definition contains a three-pronged test. Thus, to conduct a risk assessment that complied with Article 5.1, Australia had to:

a. *identify* the pests or diseases whose entry, establishment or spread a Member wants to prevent within its territory, as well as the potential biological and economic consequences associated with the entry, establishment or spread of these pests or diseases;

b. *evaluate the likelihood* of entry, establishment or spread of these pests or diseases, as well as the associated potential biological and economic consequences; and

c. evaluate the likelihood of entry, establishment or spread of these pests or diseases *according to the SPS measures which might be applied.*[210]

4.156 The definition of "risk assessment" in Annex A must be read and applied in the context of the general obligation in Article 5.1 to base sanitary and phytosanitary measures on a risk assessment, and should also be read in light of the specific factors a risk assessment has to take into account pursuant to Article 5.1,[211] Article 5.2[212] and Article 5.3.[213]

4.157 As Article 5.1 provides, a risk assessment must take account of techniques developed by the relevant international organisations. While the *SPS Agreement* identifies the IPPC as the relevant standard-setting body for plant health issues, the principles and techniques of risk analysis are similar across the standard-setting bodies for plant and animal health (the IPPC and the Organisation for Animal Health – OIE) and

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[210] Appellate Body Report, *Australia – Salmon*, para. 121; and Appellate Body Report, *Japan – Agricultural Products II*, para. 112. See, also Panel Report, *Australia – Salmon*, para. 8.72.

[211] Article 5.1 refers to "risk assessment techniques developed by the relevant international organizations."

[212] Article 5.2 refers to: "available scientific evidence; relevant processes and production methods; relevant inspection, sampling and testing methods; prevalence of specific diseases or pests; existence of pest- or disease-free areas; relevant ecological and environmental conditions; and quarantine or other treatment."

[213] Article 5.3 refers to: "the potential damage in terms of loss of production or sales in the event of the entry, establishment or spread of a pest or disease; the costs of control or eradication in the territory of the importing Member; and the relative cost-effectiveness of alternative approaches to limiting risks."

are based on common biological principles. Both the IPPC and the OIE have developed standards and guidelines for import risk analysis, and the OIE has developed a detailed text book.[214] The assessment techniques developed by the IPPC and the OIE are relevant in determining whether Article 5.1 has been complied with.

4.158 New Zealand will show that Australia's IRA is not a risk assessment within the meaning of Article 5.1 and paragraph 4 of Annex A of the *SPS Agreement*. Like Japan in the *Japan – Apples* case, Australia has neither "evaluated the likelihood" of entry, establishment or spread of the pests of concern to Australia, nor has it evaluated the likelihood of entry, establishment or spread "according to the SPS measures which might be applied". Either failure is sufficient for the Panel to find that Australia has failed to base its measures on a risk assessment and thus has failed to comply with Article 5.1.

2. Australia's IRA does not constitute a "risk assessment" within the meaning of Article 5.1 and Annex A of the *SPS Agreement* because it fails to evaluate "likelihood"

4.159 In *Australia – Salmon*, the Appellate Body said that it is not sufficient that a risk assessment under Article 5.1 concludes that there is a *possibility* of entry, establishment and spread of a disease.[215] Drawing on previous remarks in *EC – Hormones*, the Appellate Body emphasised that "[a] proper risk assessment must evaluate the "likelihood", i.e. the "probability", of entry, establishment and spread of diseases", rather than an assessment only of possibility.[216] In *EC – Hormones*, the Appellate Body explained that the type of risk being examined under Article 5.1 was something more than the uncertainty that theoretically always remains since science can never provide

[214] **Exhibit NZ-47:** OIE (2004a), *Handbook on Import Risk Analysis for Animals and Animal Products Volume 1: Introduction and Qualitative Risk Assessment*, World Organisation for Animal Health, Paris; and **Exhibit NZ-48:** OIE (2004b), *Volume 2: Quantitative Risk Assessment*, World Organisation for Animal Health, Paris.

[215] Appellate Body Report, *Australia – Salmon*, para. 123.

[216] Appellate Body Report, *Australia – Salmon*, para. 123. Appellate Body Report, *EC – Hormones*, para. 184.

absolute certainty. It therefore agreed with the Panel that "theoretical uncertainty is not the kind of risk which, under Article 5.1, is to be assessed."[217]

4.160 The "import risk analysis" conducted by Australia in respect of apples from New Zealand does not meet the requirements for a risk assessment as explained by the Appellate Body. It does not evaluate the "likelihood", that is the "probability", of the entry, establishment and spread of the pests at issue. Rather, it approaches the assessment in a way that ascribes quantitative probability values to what are often no more than possibilities – in some instances the remotest of possibilities – and treats as continuous, pathways that even under Australia's own analysis are not shown to exist. It compounds this problem with several fundamental methodological flaws, which result in it being impossible to have any degree of confidence in the levels of risk ascribed in the IRA.

4.161 The methodology adopted by Australia in the IRA to assess the risks from importing New Zealand apples was one that was partially based on numbers (quantitative) rather than one solely based on descriptive terms (qualitative). This move to a "semi-quantitative" approach occurred after the Senate Committee on Rural and Regional Affairs and Transport Legislation had proposed, in its 2001 interim report, that a quantitative method be adopted.[218] The "risk analysis" process and the political process were closely in step.

4.162 New Zealand does not object in principle to Australia using a "semi-quantitative" method to assess risk. It is well-recognised, however, that "… although a quantitative assessment is based more firmly on mathematical methods, the results are not necessarily more accurate than a qualitative assessment."[219]

4.163 In fact, a significant number of problems may arise from using a semi-quantitative method in an import risk analysis. These problems are described in the OIE *Handbook on Import Risk Analysis for Animals and Animal Products*. The Handbook states:

[217] Appellate Body Report, *EC – Hormones*, para. 186.

[218] **Exhibit NZ-75:** Commonwealth of Australia (2001) *The proposed importation of fresh apple fruit from New Zealand; Interim report, Senate Rural and Regional Affairs and Transport Legislation Committee*, *July 2001*, Canberra, Recommendation 6, p. 206.

[219] **Exhibit NZ-95:** IPPC (2007) *Pest Risk Analysis Training Participant Manual*, p. 37.

> …all risk analyses inevitably include a degree of subjectivity. Nevertheless, because many people find numbers seductive and reassuring, some analysts use so-called semi-quantitative methods in the mistaken view that they are somehow more 'objective' than strictly qualitative techniques. However, a number of significant problems may arise from adopting a semi-quantitative approach in import risk analysis.[220]

4.164 It goes on to note some of the particular problems:

> [A semi-quantitative approach] is sometimes employed as a means of combining various qualitative estimates, by assigning numbers to them, to produce a summary measure or to prioritise risks. The numbers may be in the form of probability ranges or scores, which may be weighted before being combined by addition, multiplication etc. The numbers, ranges, weights, and methods of combination are usually quite arbitrary, and need justification to ensure transparency. It should be recognised that numbers assigned to categories cannot be manipulated mathematically and statistically. It is impossible to assign precise numbers unless a quantitative assessment has already been carried out.[221]

4.165 The OIE makes clear that semi-quantitative assessments are highly dependent on the numbers chosen and the assumptions used to run the model. The OIE concludes in its handbook:

> Semi-quantitative assessments often give a misleading impression of objectivity and precision and may not adequately reflect relativities, which can lead to inconsistent outcomes. Assigning numbers to subjective assessments does not result in a more objective assessment, particularly when the numbers chosen and their method of combination are arbitrary. Semi-quantitative methods may offer no advantage over a well-researched, transparent, peer-reviewed qualitative assessment.[222]

4.166 For these reasons, any semi-quantitative method has limits. Indeed, there is some evidence that Australia itself is aware of the limits of semi-quantitative methods. New Zealand's access request for apples is one of only two occasions out of approximately 29

[220] **Exhibit NZ-47:** OIE (2004a), *Handbook on Import Risk Analysis for Animals and Animal Products Volume 1: Introduction and Qualitative Risk Assessment*, World Organisation for Animal Health, Paris, p. 27.

[221] Ibid, pp. 27-28.

[222] Ibid, p. 28.

current or concluded risk analyses for importing plant products in which Australia has used this method of risk analysis.[223] On both occasions, the Australian Senate has been actively involved in the issue.

4.167 The limits of a "semi-quantitative" approach are nowhere more evident than in the Australian IRA. As New Zealand will show, the very consequences of "arbitrariness" and a "misleading impression of objectivity and precision" that the OIE has cautioned against are hallmarks of the IRA.

(a) The flaws in the use of the "semi-quantitative" method in the IRA

4.168 The approach of the IRA was to look at a sequence of steps (which it called the "importation scenario") to consider how the pests at issue could enter Australia from apples imported from New Zealand. This involved eight steps in sourcing, processing and exporting apples from orchards in New Zealand up to the point where the fruit is released from quarantine in Australia. The end-point of the importation scenario is "arrival in Australia" of what the IRA describes as infested/infected fruit or packaging materials.[224] Each importation step was assigned a range of probability values and a mathematical distribution. These probabilities were then combined with the projected volume of trade in New Zealand apples in a commercially available computer programme called @Risk (Palisade Corporation, 2007), to provide an estimate of the number of infested/infected apples that may be imported into Australia.[225]

4.169 The IRA next combined a number of what it describes as "on-shore" factors with its estimate of infested/infected apples to make a calculation of the risk of entry, establishment and spread of each pest. This involved an estimation of the likelihood of transfer of a pest from an infested/infected apple to a susceptible host plant, and the likelihood of the pest then establishing and spreading in Australia. These factors comprised a number of variables, which were similarly assigned a range of probability

[223] See www.daff.gov.au/ba/ira/current-plant and www.daff.gov.au/ba/ira/final-plant. The other example of a semi-quantitative approach being followed is in the *Revised Draft IRA Report for the Importation of Cavendish Bananas from the Philippines*, February 2007.

[224] IRA, p. 19.

[225] IRA, p. 23.

values and a mathematical distribution, and were then combined with the estimated likelihood of importation in the @Risk programme to generate the overall probability of entry, establishment and spread of each pest.

4.170 The failings of Australia's application of the semi-quantitative method are starkly evident in the IRA's assessment of the probability of entry, establishment and spread of fire blight. The Panel in *Japan – Apples* found that the risk of mature, symptomless apples transmitting fire blight was "negligible". It made this finding in relation to all trade in apples: in other words, the Panel found that the risk of fire blight being transmitted through trade in *any number* of mature, symptomless apples was "negligible".

4.171 Australia's use of the semi-quantitative method discounts this finding and produces a distorted estimate of risk. The approach in the IRA was to analyse the probability of entry, establishment and spread in terms of a number of individual events – or steps in the transmission pathway – and to assess the likelihood of each event occurring on a "per apple" basis. While the IRA concedes that there is a negligible likelihood of some of these events occurring on a "per apple" basis, the overall output from its semi-quantitative model is that the likelihood of transmission of fire blight from mature, symptomless apples is not "negligible" at all, but "very low". Moreover, this conclusion represents the *annual* risk of transmission of fire blight from unrestricted trade. Nowhere does the IRA attempt to justify or explain why its assessment of the likelihood of transmission of fire blight on an annual basis is significantly higher than the Panel's assessment in *Japan – Apples* of the likelihood of the same event from all trade in apples.

4.172 While this failing applies specifically to the level of risk ascribed to fire blight in the IRA, it is indicative of the numerous flaws that plague Australia's application of the semi-quantitative method. New Zealand will focus here on three fundamental flaws, which affect Australia's analysis of all three pests at issue in this dispute:

1. the choice of an inflated maximum value for the probability of events with a "negligible" likelihood of occurring;

2. the inappropriate use of the uniform distribution to model the likelihood of events, particularly those with a "negligible" likelihood of occurring; and

3. the IRA's overestimation of the projected volume of trade.

4.173 The effect of these flaws was to magnify the assessment of risk, turning remote possibilities into probabilities. Events that would "almost certainly not occur"[226] became under the IRA events that will be expected to occur relatively frequently, and pathways that did not exist were treated as continuous pathways for the transmission of pests.

<u>(i) Australia's maximum probability value for "negligible" events is significantly greater than is justified on the basis of known data</u>

4.174 The probability intervals assigned under the IRA for the qualitative descriptions of various events were based on ranges of pre-determined probability values set out in Table 1 below.

4.175 Biosecurity Australia explains in its draft *Guidelines* that it adopted these probability intervals for the semi-quantitative method to correlate directly with six qualitative descriptors (High, Moderate, Low, Very Low, Extremely Low and Negligible).[227] The *Guidelines* provide little insight as to how Australia has determined the predefined numerical ranges assigned to each category, although they acknowledge that the probability intervals are "arbitrary".[228]

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[226] This is the term used in the IRA to describe events with a "negligible" likelihood of occurring. See Table 1 below.

[227] Biosecurity Australia *Draft Guidelines for Import Risk Analysis*, September 2001, Department of Agriculture, Fisheries and Forestry, Canberra, p. 86.

[228] Biosecurity Australia *Draft Guidelines for Import Risk Analysis*, September 2001, Department of Agriculture, Fisheries and Forestry, Canberra, p. 89.

TABLE 1: Biosecurity Australia's nomenclature for qualitative likelihoods, corresponding semi-quantitative probability intervals[229]

Likelihood	Qualitative descriptors	Probability interval	Midpoint (if uniform distribution used)
High	The event would be very likely to occur	$0.7 \rightarrow 1$	0.85
Moderate	The event would occur with an even probability	$0.3 \rightarrow 0.7$	0.5
Low	The event would be unlikely to occur	$5 \times 10^{-2} \rightarrow 0.3$	0.175
Very low	The event would be very unlikely to occur	$10^{-3} \rightarrow 5 \times 10^{-2}$	2.6×10^{-2}
Extremely low	The event would be extremely unlikely to occur	$10^{-6} \rightarrow 10^{-3}$	5×10^{-4}
Negligible	The event would almost certainly not occur	$0 \rightarrow 10^{-6}$	5×10^{-7}

4.176 This arbitrariness, however, had important consequences. It is the source of the first fundamental flaw in the IRA's method.

4.177 The common meaning of "negligible" is something that is "not worth considering, insignificant".[230] As Table 1 shows, Australia itself recognises in the IRA that a "negligible" event "would almost certainly not occur".

4.178 However, in expressing this in quantitative terms, Australia chooses 1×10^{-6} (one in a million) to represent the maximum value for the probability of negligible events. Notably, this figure is applied on a per apple basis, rather than in respect of trade as a whole as in *Japan – Apples*. As New Zealand will show later, the effect of Australia's choice of 1×10^{-6}, combined with Australia's choice of the uniform distribution to model key events with a negligible likelihood of occurring, is that events that "almost certainly

[229] IRA, p. 43.

[230] Allen, RE (ed.) (1990) *Concise Oxford Dictionary of Current English*, 8th Edition, Oxford University Press, London, p. 794. This common meaning is endorsed by the OIE in its handbook: **Exhibit NZ-47:** OIE (2004a), *Handbook on Import Risk Analysis for Animals and Animal Products*, Volume 1: Introduction and Qualitative Risk Assessment, World Organisation for Animal Health, Paris, p. 20.

will not occur" are turned into events that will be expected to occur approximately once in every two million apples imported.

4.179 The IRA describes how the range of 0 to 1 x 10^{-6} was selected in the following terms:

> In all cases the IRA team considered carefully whether they were confident that the range they had chosen would contain the actual value…[231]

4.180 There is, however, no indication of the basis on which the IRA team came to the conclusion that they were "confident". In particular there is no indication why the IRA team considered that one in a million was "negligible" in the case of the importation of apples. For it is clear that whether one in a million can be regarded as "negligible" will depend on the event in question. The chance of something happening once in a million years might seem to be "negligible" but the chance of something occurring once in a million apples may not, in terms of the volumes of apples traded, be seen to be "negligible".

4.181 Risk assessments should be based not on "feelings of confidence" but rather on conclusions that are technically justified, which as the IPPC indicates means justified on the basis of the examination and evaluation of available scientific information.[232]

4.182 The IRA team did not look at available scientific information. They could have looked to see whether the supposition of a maximum value of 1 x 10^{-6} had any relationship to what occurs in the real world. They could have looked at available trade data. And if they had done so, they would have seen that a maximum probability value of 1 x 10^{-6} for an event that "would almost certainly not occur" is substantially greater than can be concluded on the basis of known data.

4.183 This can be illustrated by looking at freely available trade data for the export of apples from New Zealand and the United States to Chinese Taipei – from countries where fire blight is present to a region where fire blight is not present and which has host plants

[231] IRA, p. 42.

[232] International Plant Protection Convention, Rome, 1999, Article II:1.

and a climate suitable for fire blight transmission. Between January 1990 and December 2007, Chinese Taipei imported over eight hundred million apples (161,197,765 kg; 805,988,825 apples) from New Zealand and over seven billion apples (1,491,983,175 kg; 7,459,915,875 apples) from the United States.[233] Despite the absence of any special measures to protect against fire blight, no case has occurred of fire blight being introduced into Chinese Taipei from this trade.

4.184 Assuming, then, that it might be possible to transmit fire blight through trade in apples, it would be possible to determine the probability of introducing fire blight in the next shipment of apples from New Zealand or the United States to Chinese Taipei. Using standard methods, endorsed by the OIE, for calculating the probability of a given event occurring based on known data and using the known trade flows between New Zealand and the United States and Chinese Taipei, the probability of this event occurring is between three in a billion and four in ten billion *at the most*.[234]

4.185 These figures provide a "real world" basis for deducing that the maximum probability of an event that "would almost certainly not occur" – and indeed, in this case, has not occurred in 18 years of trade – is considerably lower than one in a million on a "per apple" basis. Thus, even if it were biologically feasible for fire blight to be introduced to another country through mature apple fruit (which New Zealand has shown it is not), Australia could have used freely available data to inform the maximum

[233] Data extracted from the World Trade Atlas, which records volumes of apples traded in kilograms. The approximate number of apples imported is derived on the basis of an 18kg tray carton equivalent (TCE) containing approximately 90 apples (based on the usual size exported to Chinese Taipei). The IRA in its calculations assumes 100 apples per TCE.

[234] See **Exhibit NZ-48:** OIE (2004b) *Handbook on Import Risk Analysis for Animals and Animal Products, Volume 2: Quantitative Risk Assessment*, World Organisation for Animal Health, Paris, pp. 35-36). Using the known trade flows between New Zealand and the United States and Chinese Taipei, running 100,000 iterations of @Risk, where "P" is the probability of an adverse event, the probability distributions below are generated. The 95th percentile figures show probabilities ranging from approximately 3 in a billion (for New Zealand apples only) to approximately 4 in ten billion (for apples from New Zealand and the United States combined). The use of the 95th percentile represents a conservative estimate of risk, in that 95% of iterations generated probability values lower than the figure shown. The 95th percentile figure shows that the probability of introducing fire blight remains negligible even when represented by a figure that falls near the top of the range of results that were generated.

	P NZ apples	**P US apples**	**P combined apples**
Mean	1.12×10^{-9}	1.34×10^{-10}	1.21×10^{-10}
95th Percentile	3.72×10^{-9}	4.01×10^{-10}	3.63×10^{-10}

probability limit to be used in its risk assessment to represent events that "would almost certainly not occur".

4.186 Instead, Australia's choice of maximum probability for negligible events of one in a million (1×10^{-6}) is at least three orders of magnitude (i.e. 1,000 times) greater than can be concluded on the basis of known data. If Australia had chosen a maximum probability for "negligible" events on a "per apple" basis that was informed by actual data, negligible events would have remained events that "would almost certainly not occur" and not, as the IRA concludes, events that will be expected to occur relatively frequently.

(ii) The choice of the uniform distribution to model events, particularly those with a "negligible" likelihood of occurring, inflates the calculation of risk beyond what is credible

4.187 The second fundamental flaw in the IRA's semi-quantitative method is Australia's use of the uniform distribution to model events, particularly those that have a "negligible" likelihood of occurring, including events that have never been seen in the real world. This flaw results in the IRA inflating at key points the likelihood of entry, establishment and spread of the three relevant pests, again turning events that would almost certainly not occur into events that will be expected to occur relatively frequently.

4.188 The IRA uses a range (or probability interval) to express numerically the probability of certain events occurring. Where the IRA team considered that there was insufficient information to determine the most likely value for an event within that range, it used a uniform distribution to model the likelihood of the event occurring.[235]

4.189 A uniform distribution (see Annex 4) is the crudest possible distribution for modelling a range of estimates. In this distribution every value between the maximum and minimum value is equally likely to occur. There is no "most likely" value.

4.190 As applied in the Australian risk assessment model, the @Risk software randomly selected a number from within the uniform distribution to represent the likelihood of an

[235] IRA, p. 42.

event occurring; it did this several thousand times (as determined by the operator) and averaged the outputs. Under such an approach, the more times the model is run, the closer the mean of the output will be to the mean of the uniform distribution – i.e. a value half-way between the maximum and minimum.[236] This means that the selection of the maximum probability limit is a critical choice in applying the uniform distribution.

4.191 Under the semi-quantitative analysis in the IRA, key parameters with a negligible likelihood of occurring were given a uniform distribution with zero as minimum and one in a million (1×10^{-6}) as maximum. The mid-point of this distribution is 5×10^{-7} or one adverse event in every two million samples. In other words, under Australia's approach, an event that "would almost certainly not occur" will in fact be expected to occur on average approximately once in every two million samples. In the Australian model, an individual apple is one "sample", so an event described in the IRA as being of negligible risk, one that "would almost certainly not occur", turns out to be an event that takes place once in every two million apples, which is 20,000 cases or 360 tonnes (or 75 times a year according to Australia's inflated estimate of the annual volume of trade). Negligible is no longer negligible under this approach.

4.192 In Annex 4, the effect of the choice of distribution on the levels of risk produced by Australia's model is demonstrated graphically. It shows that by using a uniform distribution which effectively averages the higher and lower ends of the probability range, the IRA gave undue weight to the maximum probability of a "negligible" event occurring.

4.193 The result of applying a uniform distribution to model events with a negligible likelihood of occurring is that Australia predetermined that the value chosen was weighted towards the event occurring. As a result, Australia has artificially inflated the risks of such events occurring in most if not all cases. If Australia had chosen an alternative distribution with a "most likely" value informed through eliciting expert

[236] By contrast, the pert and triangular distributions require a most likely value and this has a significant effect on where the mean lies, and on the 95th percentile value – the value below which 95% of the estimates lie (see Annex 4).

opinion on the basis of known data, negligible events would have remained negligible and not inflated into events that will be expected to occur relatively frequently.

(iii) Australia's estimate of the likely volume of trade inflates the assessed level of risk by a factor of at least three

4.194 The third fundamental flaw in Australia's risk assessment is the estimate and use of the likely volume of trade in New Zealand apples.

4.195 Under the semi-quantitative method used in the IRA the assigned "probability" *per apple* of a pest being imported is then multiplied by Australia's estimate of the annual volume of trade in New Zealand apples, to give the number of infested or infected apples imported.[237] From this value, the overall assessed level of risk is calculated. The higher the estimated volume of trade, the higher the overall assessed risk.

4.196 Australia's estimate of the likely volume of apple fruit to be imported from New Zealand is out of all proportion with the trade that would be likely to occur in fact. The IRA Team chose a 12 month period and decided to represent trade volume in the model with a range of 50 million to 400 million apples (representing 5% to 40% of the Australian market) , and a "most likely" value of 150 million apples or 15% of the market.[238] But such a value bears no relationship to the reality of likely Australian demand for New Zealand apples or New Zealand's capacity to supply that demand.

a. Australia misconceives actual demand for apples from New Zealand

4.197 Likely consumer demand in Australia for New Zealand apples in the order of 150 million fruit per year is not supported by the facts. Currently, all of Australia's domestic demand for apples is supplied from local sources.[239] Apple and Pear Australia Limited

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[237] IRA, p. 24.

[238] IRA, p. 19.

[239] **Exhibit NZ-50:** USDA Foreign Agricultural Service "Australia Fresh Deciduous Fruit Annual 2006", Global Agriculture Information Network Report, 28 December 2005, p. 4.

(APAL) recently acknowledged the open support by supermarkets for Australian-grown produce except when it cannot be sourced in Australia.[240]

4.198 Moreover, the variety mixes produced by Australia and New Zealand are significantly different, with most of the varieties favoured by Australian consumers produced only in limited quantities in New Zealand (see Table 2 below).

TABLE 2: Variety mix (percent) of apples in Australia and New Zealand in 2007[241]

Variety	**Australia (forecast total production)**	**New Zealand (national planted area)**
Pink Lady®	21.5	2.8
Sundowner®	7.2	0
Red Delicious	12.5	0
Golden Delicious	6.7	0
Granny Smith	21.3	3.4
Fuji	9.5	9.5
Royal Gala	13.8	33
Braeburn	0.7	28.3
Pacific Series (Beauty, Queen, Rose)	0	10.6
Cox	0	3.6
Jazz®	0	6.6
Other	6.8	2.2

4.199 Initially the main opportunity for New Zealand exporters would be to supply limited volumes of high quality varieties of apples that are unfamiliar to Australian consumers. These are unlikely to attract a significant market share. Furthermore, in the longer term, joint venture investment between the New Zealand and Australian orchard

[240] **Exhibit NZ-51:** Australian Pear and Apple Ltd, *Public Submission to ACCC Grocery Inquiry by Apple and Pear Australia Limited*, 11 March 2008, p. 8 (response to question 53).

[241] **Exhibit NZ-3:** Pipfruit New Zealand Incorporated (2008) *Pipfruit Industry Statistical Annual 2007,* New Zealand, Table 1.2 p. 12, normalised to exclude pears. World Apple and Pear Association (2008) *World Apple and Pear Association Annual General Meeting, The Australian Industry Report*, 8 February 2008, Messe Berlin, Germany, southern hemisphere crop forecasts.

industries is expected to make available the same new apple varieties to both countries so any niche market advantage that New Zealand growers might have at present over Australian growers is unlikely to persist.[242]

b. Australia has ignored the economic impact of 150 million additional apple fruit on the Australian market

4.200 Even if Australian supermarkets were to move away from their strongly stated preference for locally-produced apples, recent analysis by ABARE (2006)[243] shows that prices in the Australian apple market are highly sensitive to volume. Any attempt by New Zealand to capture the 15% market share suggested by Australia would lead to a large fall in prices – 20% or more – which would quickly make exports uneconomic.

4.201 In fact, the Australian market is likely to be even more price-sensitive to volume than suggested by the ABARE analysis, because New Zealand does not produce some of the varieties favoured in the Australian market, and one of New Zealand's major varieties, Braeburn, which accounts for 28.3% of New Zealand production (based on planted area – Table 2), is not favoured by Australian consumers. Braeburn accounts for only 0.7% of Australian production.

[242] Prevar Limited is leading such efforts. A New Zealand company, it was formed in 2004. Prevar Ltd's shareholders are Pipfruit NZ Incorporated (the New Zealand Industry organisation): 45%, Apple and Pear Australia Ltd (the Australian industry organisation): 33%, Horticulture and Food Research Institute of NZ Ltd (HortResearch is a plant science and breeding company owned by the New Zealand Government): 10%, and Associated International Group of Nurseries (an international nursery group): 12%. The objectives of the company include purchasing outputs from the HortResearch Ltd breeding programmes and commercialising them in a manner that delivers an advantage to the New Zealand and Australian industries.

[243] **Exhibit NZ-52:** Australian Bureau of Agricultural and Resource Economics *Potential penetration of New Zealand apples in the event that the Australian ban on imports is lifted,* 20 October 2006.

c. Australia wrongly assumes that New Zealand is in a position to supply apples to the Australian market in the order of 150 million fruit per year

4.202 Constraints in the supply side of the equation would also limit the number of fresh apples that could be exported to Australia. Most New Zealand fruit is now committed to programmed supply with major supermarkets in Germany, the United Kingdom and the United States. These fruit are unlikely to be diverted to Australia. New Zealand suppliers have consistently valued long-term supply relationships. Even in the event of a shortfall in the Australian market due to temporary adverse climatic events, it would make little commercial sense for New Zealand exporters to put at risk their longer term supply relationships with supermarket chains in other export markets simply to take advantage of short term higher prices.

d. Conclusion

4.203 Apple imports into Australia initially are likely to be experimental and the volume is unlikely to exceed five million fruit per year. For its part, in an optimistic scenario, the New Zealand pipfruit industry expects that this volume could grow slowly from 5 million apples initially to a most likely volume eventually of about 50 million fruit per year. Australia has therefore overestimated the volume of trade by a factor of at least three, with the consequence that Australia's estimate of the number of infested or infected apples is similarly inflated by a factor of at least three.

(iv) Conclusion

4.204 The overall effect of the three fundamental flaws in the Australian "semi-quantitative" method – inflating the maximum value for the probability of events with a negligible likelihood of occurring, using the uniform distribution to model critical events (particularly those with a negligible likelihood of occurring), and overestimating the likely volume of trade – has been to seriously overestimate the likelihood of events with a negligible probability occurring. For example, if Australia had used an estimate of the volume of trade of 50 million apples, and a pert distribution with a most likely value of one in 100 million (1×10^{-8}) for an event with a negligible likelihood of occurring, it would have dropped *by approximately a factor of 10* the probability of entry, establishment and spread for fire blight and European canker from imports of New Zealand apples.[244]

4.205 The fundamental flaws in the IRA demonstrate, both individually and in combination, that Australia has grossly overestimated the probability of entry, establishment and spread of the three pests at issue in this case. As a result the measures for New Zealand apples have been imposed not on the basis of a risk assessment, but on the basis of a methodology that has, arbitrarily and without reference to actual data, assumed that events that almost certainly will not occur are in fact expected to occur relatively frequently.

4.206 In short, as applied by Australia in the IRA, the semi-quantitative method does not constitute an assessment of risk within the meaning of Article 5.1 and paragraph 4 of Annex A. Thus, Australia has failed to comply with its obligation under Article 5.1 to base its measures on a risk assessment.

3. Australia failed to evaluate the likelihood of entry, establishment or spread of the pests, as well as the associated potential biological and economic consequences

4.207 In addition to the impacts identified in the previous section of this submission, Australia's flawed semi-quantitative methodology, which evaluates possibilities, not probabilities, has affected the analysis of overall risk in respect of each pest. As New Zealand will demonstrate, in each step of the analysis a qualitative value has been rendered into an arbitrary quantitative value that inflates the level of risk leading to the imposition of measures for which there is no justification in science.

[244] This conclusion is based on New Zealand's estimate of the impact of the three fundamental flaws described in this submission using the assumptions described here, but could presumably also be verified by running Australia's model with these alternative inputs. In the case of ALCM, the impact of the three fundamental flaws on Australia's analysis cannot be directly extrapolated, because Australia has estimated the end result rather than calculating it.

(a) Fire Blight

(i) Australia's analysis of the "probability of importation" of fire blight does not constitute an evaluation of the "likelihood of the entry" of the disease within the meaning of the *SPS Agreement*

4.208 The IRA sets out an eight-step analysis of the likelihood of importation or entry of fire blight bacteria.[245] Each step is assigned a probability value, which is then inserted into the IRA's risk simulation model. The result, according to the IRA, is a mean infestation rate of 3.9% of apples imported from New Zealand. However, there is no objective and rational relationship between the scientific evidence that is cited for each step and the probability value that is chosen. Indeed, frequently a value is chosen in the absence of scientific support and even contrary to the evidence found in the scientific literature. The result is the IRA's unfounded assertion of a highly inflated value for the likelihood of entry of fire blight into Australia, without acknowledging the lack of scientific evidence supporting a pathway for the entry of the disease via trade in mature apples.

a. Importation step 1: Likelihood of presence of Erwinia amylovora *in the source orchard*

4.209 The IRA concludes that the likelihood that *E. amylovora* is present in the source orchard is 1; that is, 100%.[246] This conclusion, based on a misreading of scientific literature and incorrect assumptions, is not supported by the scientific evidence.

4.210 The IRA states "*E. amylovora* was detected in New Zealand both from orchards with fire blight symptoms (Hale *et al.* 1987; Clark *et al*. 1993[247]) and those without symptoms (Clark *et al.* 1993)". The second part of this statement is factually incorrect. The Clark *et al.* 1993 study involved testing immature fruit for the presence of *E.*

[245] IRA, pp. 53-80.

[246] IRA, p. 53.

[247] **Exhibit NZ-53:** Clark RG, Hale CN, and Harte D (1993) "A DNA approach to *Erwinia amylovora* detection in large scale apple testing and in epidemiological studies", *Acta Horticulturae* 338: 59-66.

amylovora over five seasons from 1987-1991. *E. amylovora* was detected on the calyxes of immature fruit from two orchards with no fire blight symptoms at flowering. However, it was later discovered that there were infected alternative hosts in close proximity to these orchards. *E. amylovora* was also detected on immature fruit from three orchards which, while apparently fire blight free, were found, on closer inspection to have fire blight. Subsequently, approximately 60,000 apple fruit were tested from orchards verified free of symptoms of fire blight and *E. amylovora* was not detected on any apple fruit. Indeed, it is widely accepted in the scientific literature and by the scientific community that fruit from orchards with no symptoms of fire blight do not harbour populations of *E. amylovora* (Thomson 2000: 17, Roberts *et al.* 1998: 23, Hale *et al.* 1987: 37).

4.211 The IRA also states[248] that "fire blight caused by *E. amylovora* is widespread throughout New Zealand and supports the conclusion that the bacterium would be present in all orchards at harvest throughout the major production areas". However, fire blight is not routinely detected in all orchards in New Zealand; the disease is sporadic in nature (Thomson and Hale 1987: 1).[249]

4.212 In short, the contention that all orchards in New Zealand are infected with *E. amylovora* is incorrect and the probability value of 100% for importation step 1 is a significant overestimation.

b. Importation step 2: Likelihood of infestation or infection of mature fruit

4.213 The IRA concluded that it was appropriate to choose a value for the likelihood that picked fruit would be infested/infected with *E. amylovora* that "adequately took into account the range of variation" found in the literature.[250] Accordingly it chose "a minimum value of 10^{-3} (1 in 1,000) a maximum value of 5×10^{-2} (5 in 100) and a most

[248] IRA, p. 53.

[249] **Exhibit NZ-94:** Thomson SV and Hale CN (1987) "A Comparison of Fire Blight Incidence and Environment Between New Zealand and Western United States", *Acta Horticulturae* 217*,* pp. 93-97.

[250] IRA, p. 65.

likely value of 3×10^{-2} (3 in 100). In this step, too, a probability value has been assigned on the basis of a misreading or discounting of the scientific literature.

4.214 In determining the probability that symptomless, mature picked fruit would be infested with *E. amylovora* the IRA relies on Clark *et al.* 1993 to conclude that 14.7% of immature fruit from an orchard with no symptoms were found to be infested.[251] However, there is a typographical error in Table 2 in Clark *et al.* 1993: 64. It is clear from the text at page 62 of this study that on further inspection the orchard referred to by the IRA, Orchard V, had symptoms of fire blight.

4.215 The IRA also claims that van der Zwet *et al.* 1990 showed that approximately 4% of apparently non-infested mature fruit sourced from a symptomless orchard developed fire blight symptoms when wounded on the surface.[252] The IRA concludes from this that fire blight bacteria were present on the external surface of mature fruit at harvest. But van der Zwet subsequently advised the United States that the study was on immature, not mature, apples, a fact noted by the Panel in *Japan – Apples*.[253] van der Zwet's study thus provides no basis for the assumption that mature apples harvested for export would be contaminated with *E. amylovora*.

4.216 The IRA conclusion that 0.1-5% of mature apples sourced from New Zealand would be infested with *E. amylovora* at harvest is an overestimation of the rate of infestation. Hale *et al*. 1987: 33 found the infestation rate to be 3% when apples were sourced from severely infected orchards (>75 infections per tree). Hale and Taylor 1999: para. 3.2.1 found *E. amylovora* on 2% of fruit from an orchard with fire blight symptoms (<5 strikes per tree). Apples sourced from orchards without fire blight symptoms would have a zero infestation rate. Furthermore, the IRA does not distinguish between infestation and infection. There is no evidence that mature, symptomless apples are infected with *E. amylovora*.

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[251] IRA, p. 56.

[252] IRA, p. 56.

[253] Panel Report, *Japan – Apples*, paras. 4.94, 8.126-8.127; See also Roberts and Sawyer 2008: 364.

4.217 The IRA assigns a most likely value of 3% to the likelihood that fruit picked from any orchard would be infected/infested, where the maximum reported infestation in New Zealand is 3%, and that was from a severely infected orchard (Hale *et al*. 1987). Infestation levels are normally much lower than 3% or more likely close to zero (Dueck 1974; Roberts *et al.* 1989; Roberts 2002). The IRA seriously overestimates the likelihood of mature fruit being infested (let alone infected).

4.218 Other scientific studies have assigned much lower probabilities to this step. Roberts *et al.* 1998: 24-25 concluded that the probability of infection or contamination of fruit was 0.003502 (0.35%) where there were no phytosanitary controls in place. Using corrected and subsequently published data (all of which would have been available when the IRA was drafted), Roberts and Sawyer 2008: 366 further reduced that probability to 0.0013817 (0.14%).

4.219 In other words, the IRA assigns a probability for infection or infestation of mature fruit that is over 20 times higher than is justified by the scientific evidence. In any event, the numbers of bacteria found on mature fruit are insufficient to be spread to and colonise a new host to initiate an infection (were such spread possible). Indeed, there is no pathway for the transmission of fire blight by mature, symptomless apples.

4.220 In the absence of scientific support for the probability assigned to this step, the IRA should instead have treated such probability as negligible.

c. Importation step 3: Likelihood that clean fruit is contaminated by E. amylovora *during picking and transport to the packing house*

4.221 The IRA concludes that the likelihood that clean fruit becomes contaminated by *E. amylovora* during picking and transportation to the packing house is a most likely value of 1%.[254] This conclusion, too, has no basis in science. It turns a negligible likelihood into a relatively high probability.

[254] IRA, p 65.

4.222 Even the IRA acknowledges that "the likelihood of the presence of epiphytic bacteria on leaves and mature fruit surface (except calyx) at the time of apple picking is very small, and the likelihood of transfer of bacteria to clean fruit during picking and transport would be even lower."[255]

4.223 Indeed it is generally acknowledged, including by the IRA, that any *E. amylovora* present on mature apples at harvest are most likely to be on the calyx and thus not available to contaminate anything. Additionally, as described elsewhere, the populations of *E. amylovora* reported on mature fruit, even those from severely infected orchards, have been zero or so low as to be epidemiologically insignificant. Therefore contamination, if it occurred, would only have the effect of diluting already small populations.

4.224 The correct conclusion to draw from the scientific literature is that the likelihood of contamination by *E. amylovora* during picking and transportation to a packing house is negligible and the probability value assigned in the IRA is incorrect. It is an event that would almost certainly not occur. In any event, before reaching this point the authors of the IRA should have noted that the reported number of bacteria isolated from mature fruit are insufficient to initiate an infection, and concluded that there is no pathway for the transmission of *E. amylovora* on mature symptomless apple fruit.

d. Importation step 4: Likelihood that E. amylovora *survives routine processing procedures in the packing house*

4.225 The IRA concludes that the likelihood that *E. amylovora* would survive routine processing procedures in the packing house should be assigned a maximum value of 0.7 and a most likely value of 0.65.[256] The IRA's analysis of this step is based on an assumption rather than on scientific data. The likelihood of arriving at this step is, as New Zealand has demonstrated, negligible.

[255] IRA, p. 69.

[256] IRA, p. 71.

4.226 Having assumed the existence of endophytic infection of mature apples, the IRA goes on to discuss epiphytic infestations and assumes that such bacteria would survive to the point of processing in a packing house. The IRA ignores the impact that cold storage would have on such (assumed) bacteria. It states, "none of the processes undertaken at this stage would have a large influence on the survival of *E. amylovora* on apple fruit".[257] The scientific literature strongly indicates that the opposite is the case. Evidence documented in Hale and Taylor 1999, Taylor and Hale 2003: 343 and Temple *et al*. 2007: 1263, 1272 shows marked reductions in *E. amylovora* on mature apple fruit following a post harvest chilling period.[258] Population levels of *E. amylovora* on apple calyxes artificially infested with 1,000,000 (106) cfu decreased to 100 (102) cfu when stored at 2°C for 20 days. Population levels of *E. amylovora* on apple calyxes infested with 10,000 (10^4) cfu declined below the detection limit of the method used after 14 days' cold storage (Taylor and Hale 2003: 341).

4.227 In short, the proposition that the limited numbers of *E. amylovora* likely to be present on apple fruit at harvest would survive normal processing procedures is a step that should have been treated as an event with a much lower probability. Australia ignored a further opportunity to recognise that there will be insufficient bacteria to initiate an infection and indeed that there is no evidence of a pathway for the transmission of fire blight by way of mature apples.

e. Importation step 5: Likelihood that clean fruit is contaminated by E. amylovora *during processing in the packing house*

4.228 The IRA concludes that the likelihood that clean fruit would be contaminated by *E. amylovora* during processing in the packing house should be a maximum value of 1 in 20 (5×10^{-2}) and a most likely value of 1 in 40 (2.5×10^{-2}).[259] This step, like importation step 3, rests on the assumption that mature apples will contaminate clean fruit. As was

[257] IRA, p. 76.

[258] **Exhibit NZ-98:** Temple, TN, Stockwell, VO, Pusey, PL, Johnson KB (2007) "Evaluation of Likelihood of Co-Occurrence of *E. amylovora* with Mature Fruit of Winter Pear, *Phyopathology,* 97(10), pp. 1263-1273.

[259] IRA, p. 78.

submitted earlier, the scientific evidence indicates that the likelihood of this happening during picking, handling and transportation is negligible. It is equally negligible during processing in the packing house.

f. Importation step 6: Likelihood that E. amylovora *survives palletisation, quality inspection, containerisation and transportation*

4.229 The IRA concludes that the likelihood that *E. amylovora* would survive palletisation, quality inspection, containerisation and transportation to Australia has a minimum value of 0, a maximum value of 1 and a most likely value of 0.8.[260] The IRA has little to say about how this probability range was derived. It seems to be based on an assumption that because *E. amylovora* has been reported to survive for periods longer than the transit, it would necessarily survive the time and conditions of transit. But the fact that it is possible for bacteria to survive does not imply they will survive in epidemiologically significant numbers. The IRA does not take account of the fact that containerisation and transportation involves cold storage which significantly reduces the viability of *E. amylovora* (Hale and Taylor 1999, Taylor and Hale 2003, and Temple *et al.* 2007: 1263, 1272).

4.230 Roberts 1998: 25 gives a "subjective estimate" (because published data was lacking) of 0.1 for the probability that *E. amylovora* will survive storage, transport and discard conditions but notes "prolonged epiphytic survival of *E. amylovora* on fruit is unlikely under any condition discussed in the Biological Characteristics section." In Roberts and Sawyer 2008: 366 the probability for this step was further reduced to 0.0035088, based on data from Hale and Taylor 1999 involving cold storage for 25 days, followed by 14 days at room temperature.

4.231 Once again, the IRA has attributed an inflated likelihood in its calculations for this step.

[260] IRA, p. 79.

g. Importation step 7: Likelihood that clean fruit is contaminated by E. amylovora *during palletisation, quality inspection, containerisation and transportation*

4.232 The IRA concludes that the likelihood that clean fruit is contaminated by *E. amylovora* during palletisation, quality inspection, containerisation and transportation to Australia should be a minimum value of 0, a maximum value of 10^{-6} and a most likely value of 5×10^{-7}. This step is a further reiteration of steps 3 and 5, the assumption that clean fruit can become contaminated with *E. amylovora* during the process from picking to arrival at its export destination. Just as the assumptions behind steps 3 and 5 are unsupportable, equally step 7 is without support. This is another event with an exceedingly small probability of occurrence.

h. Importation step 8: Likelihood that E. amylovora *remains with the fruit after on-arrival minimum border procedures*

4.233 The IRA concludes that the likelihood that *E. amylovora* survives and remains with the fruit after on-arrival minimum border procedures should be 1.[261] Indeed, it is difficult to disagree. If *E. amylovora* is present when apples arrive at the border it seems hardly likely that "on-arrival minimum border procedures" could have any effect on it.

4.234 But the statement is hardly meaningful. It, too, depends on the assumption that a pathway exists for the transmission of *E. amylovora*, an assumption for which there is no supporting scientific evidence.

i. The IRA's conclusion on the probability of importation is greatly inflated

4.235 Based on the likelihoods contended for importation steps 1-8, the IRA estimates that the infestation rate for *E. amylovora* is 3.9% (mean) of all apples imported from New Zealand.[262] For the reasons set out above, this figure is greatly inflated. It exceeds the maximum reported infestation in New Zealand, which was from a severely infected

[261] IRA, p. 80.

[262] IRA, p. 80.

orchard. Based on Roberts 1998: 25, the likelihood for this step would be 0.035%. Based on the revised pest risk assessment in Roberts and Sawyer 2008: 366, the likelihood would be even lower, 0.00048%.

j. Summary

4.236 With the exception of importation step 1 and importation step 8, all of the importation steps deal with possibilities, not probabilities. In assigning probability values to what are frequently the remotest of possibilities (i.e. an event that almost certainly would not occur – one that is negligible), Australia has ignored or significantly misunderstood scientific evidence, which throughout provides no support for the suggestion that these steps could occur. The IRA assigns probability values that give the false impression that these are indeed probabilities rather than mere possibilities.

4.237 The simple fact, reiterated in the scientific evidence, endorsed by the scientific experts in *Japan – Apples* and by the Panel itself in that case, is that mature, symptomless apple fruit is not a vector for the transmission of *E. amylovora.* Hence, fire blight would not be transmitted to host plants in Australia through the importation of mature, symptomless apples. The IRA's analysis of the probability of introduction rests on the assumption that this is wrong. As a result, this analysis is not an evaluation of the "likelihood of entry"; it is speculation on the possibility of entry, and does not conform to Australia's obligations under Article 5.1 of the *SPS Agreement*.

(ii) Australia's analysis of the "probability of establishment or spread" of fire blight does not constitute an evaluation of the "likelihood of the establishment or spread" of the disease within the meaning of the *SPS Agreement*

4.238 The fact that the Australian assertion of the probability of entry of *E. amylovora* does not constitute an evaluation of the likelihood of entry of the disease within the meaning of paragraph 4 of Annex A to the *SPS Agreement* is alone sufficient to demonstrate that Australia has failed to comply with Article 5.1. Nevertheless, New Zealand will also show that the IRA equally fails to evaluate the likelihood of the "establishment or spread of the disease".

4.239 Australia contends that once apples infested or infected with *E. amylovora* arrive in Australia, the disease would be likely to be transmitted to host plants. This contention assumes that there is a dispersal mechanism to move the bacteria to a susceptible host. However, there is no scientific evidence of any likelihood that this could occur. In this area, too, the IRA's analysis rests on remote possibilities and not on probabilities based on scientific evidence.

4.240 To support its argument on establishment, the IRA has to assume that apples will arrive at certain "utility points"[263] close enough to host plants that there can be a transfer of bacteria from the infested apples to the host plants.[264] The dispersal mechanism chosen in the IRA to effect this transfer is that of insects which, browsing on discarded apples that are infested with *E. amylovora*, will transmit the pathogen to susceptible host plants nearby.

4.241 On the basis of this theory, the IRA proceeds to assign probability values to various utility points (orchard wholesalers, urban wholesalers, retailers, food services, consumers) based on their likelihood to be near to commercial fruit crops, nursery plants, household and garden plants and wild and amenity plants. In this process, too, values are assigned in a seemingly arbitrary manner and events that have an extremely low likelihood (urban retailers in proximity to commercial fruit crops) are nevertheless assigned probability values which suggest they are likely to occur.

4.242 There are further, specific problems with the IRA's analysis of "establishment and spread". First, just as the IRA ignores the effect of cold storage on the pathogen in the processing, packaging, storage, containerisation and transport stages, it equally ignores the fact that apple fruit would still be subject to periods of cold storage, often lengthy, before retail sale and distribution outside cold storage. The scientific evidence shows that any bacterial populations present on apples at harvest will greatly decline during periods of cold storage (Taylor and Hale 2003; Temple *et al*. 2007: 1263, 1272).

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[263] "Utility points" are places where apples are distributed or used, for example, retailers.

[264] IRA, p. 80.

4.243 Second, the transfer mechanism posited in the IRA involves discarded apples and apple cores rotting, with a multiplication of bacteria resulting in the production of bacterial ooze, which is then transferred in sufficient quantities by insects to susceptible hosts.[265] There is, however, no scientific basis for the assumption that there can be multiplication of *E. amylovora* on a discarded apple causing it to produce ooze, and the IRA cites none. It has never been demonstrated that *E. amylovora* localized in the calyx have been released into the environment during rotting. The apple calyx mainly consists of dead plant tissue providing an environment that is not conducive for the growth and survival of *E. amylovora*. Nor has it ever been demonstrated that *E. amylovora* have been spread from apples to a susceptible host by browsing insects. Experiments conducted by Taylor *et al.* 2003a: 608 supported earlier research (Hale *et al.* 1996) showing that populations of *E. amylovora* associated with mature fruit would have a negligible probability of infecting host, even if the host were receptive.

4.244 The IRA claims that there is no accepted threshold number of *E. amylovora* required to initiate an infection.[266] The scientific evidence on this matter is, however, that large populations of ≥104 (10,000) cfu of *E. amylovora* are required in the early stages of flowering for successful initiation of infection of apple flowers in the orchard (Thomson and Gouk 2003: 1;[267] Taylor *et al*. 2003b: 332). Small populations of <103 (1,000) cfu of *E. amylovora* have a low probability of causing disease symptoms and consequently are considered to be of little epidemiological significance (Taylor *et al.* 2003b: 332).

4.245 Third, aspects of the IRA's argument about the dispersal mechanism are based on an assumption that conditions that have been reproduced only in the laboratory will be replicated in real life after the importation of New Zealand apples. Thus, the IRA states[268] that "one bacterium could produce one million bacteria in 10 hours" on the basis of a textbook statement, not specific to *E. amylovora*, which referred to a reproductive

[265] IRA, pp. 80-90.

[266] IRA, p. 88.

[267] **Exhibit NZ-54:** Thomson SV and Gouk SC (2003) "Influence of Age of Apple Flowers on Growth of *E. amylovora* and Biological Control Agents", *Plant Disease* Vol 87, No 5 pp. 502-509

[268] IRA, p. 92.

rate demonstrated in the laboratory (Agrios 1997[269]). But laboratory conditions are not replicated in a natural orchard environment, where, even under conditions conducive for infection, bacterial populations are unlikely to reach such high inoculum levels in such a short period. The Compliance Panel in *Japan - Apples (Article 21.5 – US)*, in assessing whether there was sufficient scientific evidence that apples can serve as a pathway for the entry, establishment and spread of fire blight in Japan, expressed reservations about the worth of experiments that were too far removed from natural conditions.[270]

4.246 The IRA's contention that *E. amylovora* can spread via mature fruit not only requires that each of the following unproven events must occur but that they must all occur in sequence in a short period of time when a host blossom is susceptible and the climate is conducive to infection by *E. amylovora*. The sequence of events would have to be as follows:

a. mature fruit must arrive in Australia with significant quantities of *E. amylovora* in the calyx;

b. the bacteria must survive cold storage before or after arrival;

c. the mature apple must be discarded near a susceptible host;

d. the bacteria in the calyx must multiply and produce ooze containing high levels of fire blight bacteria;

e. a browsing insect must visit the apple and become contaminated with significant quantities of bacteria;

f. the browsing insect must then visit a flower when it is susceptible (a 2-3 day period 4 days after bud burst) and deposit sufficient bacteria; and

g. the bacteria must multiply to $>10^6$ (1 million) cfu in a short period during weather conditions (mean daily temperatures >15.6 degrees Celsius and a

[269] Agrios, GN (1997) *Plant Pathology,* (Fourth Edition), Academic Press.

[270] Panel Report, *Japan - Apples (Article 21.5 – US)*, para. 8.169

wetting event (heavy dew, rainfall) that are conducive for colonisation and infection of a susceptible host.

4.247 The probability of each of these never demonstrated events occurring is negligible; the probability of them occurring in the correct sequence at the correct time has to be very close to zero. Once again, the IRA deals in possibilities, rather than probabilities. Possibilities are not adequate for an assessment of risk under the *SPS Agreement*.

4.248 The result is that the IRA has failed to show that its theory of the dispersal of *E. amylovora* is supported by scientific evidence. It is an assumption about a possibility that has never occurred in fact. On the basis of the available scientific evidence it is an event that almost certainly would not occur.

4.249 The IRA concludes that the likelihood of transfer of *E. amylovora* from a single infested or infected apple to a susceptible host (exposure value) is in the range of 0 to 1 in a million with a uniform distribution.[271] The IRA earlier concludes[272] that a mean of 3.9% of apples (approximately 6 million fruit based on Australia's inflated estimate of an annual volume of 150 million fruit) imported from New Zealand would be infested with *E. amylovora*. When all of the importation and within-Australia steps are combined with the exposure value, the IRA concludes that the median overall probability of entry, establishment and spread (PEES) for fire blight is 4.5% or, in other words, an outbreak of fire blight could be expected to occur in Australia approximately once in every 22 years from apples imported from New Zealand.

4.250 This contention is grossly exaggerated. There is no scientific evidence that transfer of fire blight bacteria from mature fruit to a susceptible host, causing an infection in that host, has ever or will ever occur. The only scientific evidence of the probability of such events occurring assigns values of one event per several thousand years.

[271] IRA, p. 90.

[272] IRA, p. 80.

4.251 Roberts *et al.* 1998: 25 estimated one fire blight outbreak in a fire blight free area, caused by trade in apples from an area affected by fire blight, every 11,364 years. Roberts and Sawyer 2008: 367, analysing data available to the IRA's authors, further reduced that estimate to one event every 217,925 years (based on trade of about 20 million apples per year). The chance of an individual apple being contaminated with fire blight and passing that contamination on to an un-infested host in the fire blight free area was estimated to be about 2.3×10^{-13} (about 1 chance in 4 trillion). Based on the updated pest risk assessment in Roberts and Sawyer 2008, and taking Australia's (inflated) estimated volume of trade (150 million apples per annum), an outbreak of fire blight in Australia caused by a New Zealand apple would be expected to occur once in 29,057 years, not once in 22 years as contended by the IRA. The Roberts and Sawyer 2008 model provides statistical support to show that the risk of importing *E. amylovora* on commercial apple fruit and the concomitant risk of establishing new outbreaks of fire blight is so small as to be "insignificant".[273]

4.252 The evaluation of the likelihood of establishment or spread in the IRA has not been an evaluation of likelihood at all in terms of the definition of "risk assessment" in Annex A, paragraph 4 of the *SPS Agreement*. The IRA has only offered speculation about hypothetical events that have never been shown to occur. As a result, Australia has not complied with its obligations under Article 5.1 of the *SPS Agreement*.

(iii) Australia's analysis of the consequences of fire blight does not constitute an evaluation of the "associated potential biological and economic consequences" of the disease within the meaning of the *SPS Agreement*

4.253 In accordance with Annex A paragraph 4, a risk assessment involves an evaluation of the "associated potential biological and economic consequences" of the entry, establishment and spread of the pest in question. In order to do this, Australia sought to measure the consequences of entry, establishment and spread by a single qualitative method, assigning a value from A to G ranging from "unlikely to be

[273] **Exhibit NZ-29:** Roberts and Sawyer 2008: 362; quoting **Exhibit NZ-22:** Roberts *et al.* 1998: 1.

discernible" up to "highly significant" in respect of the whole Australian community after considering the effects at the local, district, regional and national levels. The conclusion in the IRA is that the overall consequence of the introduction and establishment of fire blight would be "high".

4.254 As is the case with much of the IRA, this conclusion is reached on the basis of selectively chosen evidence and on assumptions that have no basis in scientific evidence or fact.

4.255 The IRA estimates multi-million dollar losses from a fire blight incursion across all states of Australia. These loss figures are based on the worst case assumption in Roberts 1991 of 50% production loss in pears and 20% production loss in apples.[274] However, Roberts 1991 uses unsubstantiated assumptions of high production losses from a severe fire blight outbreak in different Australian growing areas and extrapolates them to assess production losses on the national scale. Assumptions on the rate and scope of the disease spread across Australian states inevitably led to exaggerated estimates of the nationwide impact and losses, a factor Roberts 1991: 630 describes in his assessment of risk as "a subjective judgement".

4.256 The IRA suggests that the impact of fire blight will be severe every year.[275] The New Zealand experience is to the contrary with sporadic fire blight outbreaks occurring only once in 10 years with production losses defined as "inconsequential" in non-outbreak years.[276]

4.257 Part of the reduction in the severity of the impact of fire blight in New Zealand has been attributed to the presence of bacteria such as *Erwinia herbicola*, *Pseudomonas fluorescens* and others which aggressively compete with *E. amylovora* for nutrients and

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[274] **Exhibit NZ-55:** Roberts WP (1991) "Using weather records and available models to predict the severity of fireblight should it enter and establish in Australia", *EPPO Bulletin* 21, pp. 623-631.

[275] IRA, pp. 98-104.

[276] **Exhibit NZ-56:** MAF Biosecurity New Zealand, *Comments by the Government of New Zealand on Biosecurity Australia's Revised draft Import Risk Analysis Report for Apples from New Zealand*, December 2005. Ministry of Agriculture and Forestry, Wellington, paras. 96 and 131; **Exhibit NZ-94:** Thomson and Hale 1987.

space on a susceptible host. There are also commercially available products for reducing the incidence of fire blight, relying on a microorganism establishing and competing with the pathogen (Vanneste 2006: 226)[277]. *Erwinia herbicola* and *Pseudomonas fluorescens* are cosmopolitan bacteria that have been recorded in Australia as well. It is probable that they would have a similar impact on *E. amylovora* in Australia. However, Roberts 1991: 630 (the same study relied on in the IRA) used "the conservative assumption that this would not occur".

4.258 The conclusion that the impact of fire blight on pipfruit production in New Zealand in non-outbreak years is inconsequential is shared by Hinchy and Low 1990: 10 who state "it [the impact of fire blight in New Zealand] has declined to a level where it is seldom regarded as a problem and control measures are rarely applied".[278] Roberts 1991: 623 also acknowledges that "now only sporadic outbreaks occur and [fire blight] is not generally considered to be of major economic importance". Thomson and Hale 1987: 96 concluded "…the occurrence of fire blight is of minor importance and growers express little concern for the disease."

4.259 Using the worst case scenario of a disease outbreak is a useful exercise to model the consequences of fire blight if no disease control measures are taken. However, applying the estimated figures to the estimates of production losses across the whole industry nationwide requires sound evidence. Actual pipfruit industry losses from fire blight at the national and local levels in the USA and New Zealand do not support such exaggerated production loss figures for the entire industry nationally.

4.260 Estimating production losses is critical in the assessment of the impacts of an incursion of fire blight into Australia. The evidence from New Zealand, however, shows that pipfruit production losses from a fire blight outbreak are not discernible at the national and regional level, and are likely to be minor at a district and local level in most

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[277] **Exhibit NZ-57:** Vanneste JL (2006), "Biological control of fire blight: an overview of the work carried out in New Zealand", *1st International Symposium on Biological Control of Bacterial Plant Diseases: Proceedings*, 23 - 26 October 2005, Seeheim/Darmstadt, Germany, pp. 224-227.

[278] **Exhibit NZ-58:** Hinchy M and Low J (1990) "Cost-benefit analysis of quarantine regulations to prevent the introduction of fire blight into Australia" *Australian Bureau of Agricultural and Resource Economics (ABARE) publication*.

years. They may occasionally be significant at a local level only. In New Zealand, major fire blight outbreaks occur only occasionally (approximately once in 10 years) with regional losses of up to 5.8%, but with inconsequential production losses between major outbreaks.

4.261 The IRA also seeks to support its case by quoting the estimated loss of NZ$10 million for the Hawkes Bay region of New Zealand after a severe fire blight outbreak in 1998.[279] However, in 1998 New Zealand exported NZ$341.95 million worth of apples and NZ$11.27 million worth of pears.[280] Hawkes Bay supplied 48% of the total pipfruit export in 1998. The quoted NZ$10 million loss corresponded only to 2.8% of the New Zealand national pipfruit export, which is 7.1-fold lower than the 20% loss estimate used in Australian studies. At the district level the cited NZ$10 million loss corresponded to 5.9% of the total Hawkes Bay pipfruit export. That is, the impact at a district/regional level is still minor even in a severe outbreak year.

4.262 Australia also treats the indirect impact on control or eradication, surveillance/monitoring and compensation strategies as high. The IRA cites the estimated loss of $20 million in revenue to the Australian pome fruit and nursery industries as a result of the fire blight incursion in the Melbourne Royal Botanic Gardens in 1997.[281] However, the cost of surveys, eradication programmes, diagnostics and publicity (total of $2.2 million) accounted for only 11% of the cited revenue losses. In fact, 68% of the losses were due to restrictions on the movement of apple fruit and these were incurred because of erroneous assumptions about pathways of fire blight transmission (Rodoni *et al.* 2006: 59).[282] In other words, over two-thirds of Australia's costs in that incident resulted from the same misunderstanding of the biology of fire blight and its inability to be transmitted by mature, symptomless apples as is displayed in the IRA.

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[279] IRA, p. 98.

[280] World Trade Atlas.

[281] IRA, p. 100.

[282] **Exhibit NZ-59:** Rodoni BC, Merriman PR, McKirdy SJ and Wittwer G (2006) "Costs associated with fire blight incursion management and predicted costs of future incursions", *Acta Horticulturae* 704: 55-61.

4.263 Equally, in considering the costs of compensating pipfruit growers and replanting trees following a fire blight outbreak, the IRA ignores actual New Zealand experience in these matters, which shows only orchards with young pear trees of fire blight-prone varieties might have up to 20% tree mortality. Average pear tree losses across a district are closer to 5%.

4.264 The IRA's estimates of the indirect impact on international trade, and on communities in Australia, also amount to no more than conjecture. None of the 65 countries to which New Zealand exports apples constrains access due to the presence of fire blight in New Zealand, and there is no basis for suggesting that exports of Australian apples or pears would be constrained in any way should the disease become established there. The result is that the IRA overestimates the consequences of the establishment and spread of fire blight. A more realistic assessment, relying on the actual experience of countries where fire blight is present, would have resulted in the overall consequences being "very low".

<u>(iv) Conclusion</u>

4.265 The IRA fails to evaluate the "likelihood" of entry, establishment and spread of fire blight as well as the potential biological and economic consequences within the meaning of paragraph 4 of Annex A. Accordingly Australia has failed to comply with its obligations under Article 5.1 of the *SPS Agreement*.

(b) European Canker

<u>(i) Australia's analysis of the "probability of importation" of European canker does not constitute an evaluation of the "likelihood of the entry" of the disease within the meaning of the *SPS Agreement*</u>

4.266 Following the pattern for fire blight, the IRA sets out an eight-step analysis of the likelihood of importation or entry of European canker. Each step is again assigned a likelihood or probability value, all of which were then inserted into the IRA's @Risk simulation model. The result, according to the IRA, is a mean infection/infestation rate of 0.0068% of apples imported annually from New Zealand, or approximately 1 in 15,000.

4.267 As in the case of fire blight, there is no objective and rational relationship between the scientific evidence and the probability value that is chosen at each step. Indeed, frequently a value is chosen in the absence of any scientific support at all.

4.268 The IRA's analysis of the probability of importation rests on a flawed contention that mature, symptomless apples provide a pathway for the transmission of European canker, a contention which has been demonstrated to be unsupported by scientific evidence. In support of this contention, it treats as probable a series of events that are no more than possible. As a result, the IRA's analysis is not an analysis of likelihood at all. Rather, it is speculation on the possibility of entry, and does not conform to the obligation under Article 5.1 of the *SPS Agreement*.

a. Importation step 1: Likelihood of presence of N. galligena *in the source orchard*

4.269 The IRA concludes that it is most likely that the European canker pathogen, *N. galligena*, would be present in 3% of New Zealand orchards. New Zealand does not take issue with the figure of 3%, while noting the importance of climatic factors to the distribution of European canker in New Zealand.

b. Importation step 2: Likelihood of infection or infestation of mature fruit

4.270 The IRA assesses the likelihood of a mature apple being infested or infected with *N. galligena* as a uniform distribution with a minimum value of 10^{-6} and a maximum value of 10^{-3}. But the IRA fails to cite any scientific or other evidence that supports this proposition.

4.271 Climatic analysis shows that in New Zealand, no region, not even Auckland, has weather conditions favourable to European canker in the summer, leading to extremely low incidence of fruit infection caused by *N.galligena*.[283] In particular, during summer,

[283] Annex 3.

New Zealand temperatures are too high, and rainfall is generally too low, for infection of fruit to occur. Thus, in those regions where climatic conditions are conducive to establishment, namely the minor apple producing regions of Gisborne, Auckland and Waikato, as well as parts of Nelson, the disease manifests principally as cankers on trees (Annex 3, p. 219). Indeed, there have been no reported incidences of fruit infections outside of the Auckland/Waikato region in the past 15 years (Annex 3, p. 219). Accordingly, there is very little literature on fruit rot in New Zealand, a fact that is acknowledged in the IRA.[284]

4.272 In determining the likelihood of mature, picked fruit being *latently* infected with European canker, the IRA presents no data or evidence to show that latent infections actually occur in New Zealand. Instead, the IRA relies primarily on scientific research about latent fruit rots in the United Kingdom and Northern Europe, where climatic conditions are more conducive to infection.[285] No equivalent studies exist from New Zealand because the fruit rot phase of the disease is so insignificant in New Zealand.

4.273 The IRA also relies on Braithwaite 1996 which, it claims, "acknowledged the *possibility* that European canker *could* go unnoticed at harvest or during the early part of storage, and therefore *could* be transmitted in fruit as latent infections"[286] (emphasis added). However, Braithwaite's assumptions are speculative and based on studies of the disease development in the United Kingdom and Northern Europe, not under conditions in New Zealand (Braithwaite 1996: 2-4). Further, Braithwaite's assertion, relied on by the IRA, that the fungus has been associated with storage rots, *suggesting* that latent infections also occur in New Zealand, is not substantiated (Braithwaite 1996: 5).

4.274 In fact, the only relevant information that is cited in the IRA suggests latent infections do not occur in mature, New Zealand apple fruit. Of the 450 fresh apple fruit intercepted by AQIS at the border, from countries where European canker was present,

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[284] IRA, p. 122.

[285] Bondoux and Bulit 1959, **Exhibit NZ-8:** Snowdon 1990 and **Exhibit NZ-9:** Swinburne 1975. See also Figure 1 above.

[286] IRA, p. 122.

common fruit rotting fungi was isolated in about 30% of the fruit, but there were no records of *N. galligena*.[287]

4.275 The IRA's conclusion that between 10^{-6} (1 in a million) and 10^{-3} (1 in 1,000) mature apples sourced from New Zealand would be infested or infected with *N. galligena* is thus an estimate for which there is no scientific support. Indeed, fruit showing visible rot symptoms on the tree are not harvested, a point that is acknowledged in the IRA.[288] The Australian conclusion relies therefore on the harvested apple fruit being infested or *latently* infected – an occurrence which the scientific evidence demonstrates to be negligible. The IRA should therefore have treated the probability of this step as negligible and should not have assigned the probability values it did. Its doing so has mischaracterised an event that would almost certainly not occur as an event which could be expected to occur with some frequency.

c. Importation step 3: Likelihood that clean fruit is contaminated by N. galligena *during picking and transport to the packing house*

4.276 The IRA concludes that the likelihood that clean fruit is contaminated by *N. galligena* during picking and transport to the packing house is between 1 in a million (10^{-6}) and 1 in 10,000 (10^{-4}), with a most likely value of 1 in 100,000 (10^{-5}).

4.277 The IRA's analysis of this step is based on the assumption that *N. galligena* spores could be transferred to clean fruit. This is an event that has never been recorded and that would almost certainly not occur. As acknowledged by the IRA[289], latently infected but symptomless fruit would not have any rot and therefore could not generate spores (Dillon-Weston 1927).[290] Thus, there is no way for fruit contamination to occur. Moreover, as New Zealand has shown above, the likelihood of mature fruit being latently infected with *N. galligena* is itself negligible.

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[287] IRA, p. 123.

[288] IRA, p. 123.

[289] IRA, p. 124.

[290] **Exhibit NZ-60** Dillon-Weston WAR (1927) "Notes on the canker fungus (*Nectria galligena* Bres.)", *Transactions of the British Mycological Society*, 12, 5-12.

4.278 Australia alleges that "wind currents" during harvesting would be a possible means of dispersal of spores, resulting in fruit contamination.[291] However, conidia (the only spores produced at harvest) are not dispersed by wind but require rainfall both to stimulate spore production and for dispersal (Munson 1939: 446, 452). Wet conditions are not typical during harvest time in major New Zealand apple-growing areas, and so conidia are both very unlikely to be produced and very unlikely to be dispersed. Indeed, the IRA acknowledges that conditions in most areas of New Zealand during the harvesting season are not favourable for spore production.[292] Further, even if conidia could be dispersed by rain onto the surface of a mature apple immediately prior to or during harvest, they are sensitive to desiccation and would be unlikely to survive without continued moisture, a point also recognised in the IRA.[293]

4.279 The other suggested source of spores at harvest, rotten fruit that has mummified on trees or on the orchard floor,[294] is implausible. Mummified fruit would not be a source of contamination, as formation of perithecia takes place during winter and they are not therefore even present at harvest (Swinburne 1964: 493).

4.280 The IRA also suggests that contamination from alternative hosts is possible during harvest in "the wetter districts of Auckland and the Waikato".[295] However, the IRA acknowledges at the same time that there is no scientific evidence that the disease is well established in other hosts in New Zealand or that alternative hosts outside an orchard could contaminate apples within an orchard.[296] The transfer of spores in this way is nothing more than unsubstantiated speculation, since the event has never been observed to occur. Here, again, the IRA's analysis is based on assumptions that are not supported by scientific evidence.

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[291] IRA, p. 124.

[292] IRA, p. 125.

[293] IRA, p. 124.

[294] IRA, p. 124.

[295] IRA, p. 125.

[296] IRA, p. 123.

4.281 The correct conclusion to draw from the scientific literature is that the likelihood of contamination of clean fruit during picking and transport is negligible, an event that would almost certainly not occur, and not an event with the most likely probability value of 1 in 100,000 apples assigned to it by the IRA.

d. Importation step 4: Likelihood that N. galligena *survives routine processing procedures in the packing house*

4.282 The IRA concludes that the likelihood that *N. galligena* would survive routine processing procedures in the packing house should be assigned a minimum value of 0.7, a maximum value of 1, and a most likely value of 0.85, that is an 85% likelihood that *N. galligena* will survive routine processing procedures in the packing house. The IRA's analysis of this step is based on an assumption that fruit entering the packing house will be infected or infested – an event which itself has a negligible likelihood of occurring.

4.283 The IRA claims that "none of the processes in the packing house are likely to substantially reduce infections".[297] However there is no relevant scientific evidence on which to determine this likelihood. The scientific data relied on by Australia in the IRA to support its theories are simply not applicable.

4.284 The studies referred to in the IRA[298] on latent survival and the incidence of storage rot rely on data from the United Kingdom and Northern Europe where the climate is much more conducive to European canker and fruit rots than New Zealand. Moreover, this research related to immature and cooking cultivars not the mature, dessert varieties typically exported by New Zealand. The IRA does not provide any scientific evidence of latent survival or storage rots in relation to mature, symptomless New Zealand apples.

4.285 Since the majority of consignments of New Zealand mature, symptomless apple fruit will be 'retail-ready' and 'just-in-time', if latently infected fruit were to develop visible rot symptoms in storage, this would be detected and removed at the time of

[297] IRA, p. 126.

[298] **Exhibit NZ-11:** Swinburne 1964, **Exhibit NZ-9:** Swinburne 1975 and **Exhibit NZ-8:** Snowdon 1990.

packaging while the fruit was still in New Zealand and accordingly would not enter Australia.

4.286 Concerning infestation, the IRA acknowledges that "[i]nitial washing of fruit in a dump tank and subsequent high-volume, high-pressure water washing (if available) may remove surface spores…..",[299] but then fails to factor this into its analysis. In fact, all New Zealand export packing houses use "water dump" tanks[300] at the start of their packing line, almost always followed by a high-volume, high pressure water washer[301] to remove debris and sessile and motile insects. These processes have been shown to be highly effective in removing other external contaminants (Walker and Bradley 2006: 2).[302]

4.287 Given that routine packing house processes would almost certainly reduce any external contamination, and in the absence of any relevant scientific evidence relating to latent survival for mature, symptomless New Zealand apple fruit, there is simply no scientific basis for the IRA's claim that there is an 85% likelihood that *N. galligena* would survive processing.

e. Importation step 5: Likelihood that clean fruit is contaminated by N. galligena *during processing in the packing house*

4.288 The IRA concludes that the likelihood that clean fruit will be contaminated by *N. galligena* during processing in the packing house is between 1 in 100,000 (10^{-5}) and 1 in 10,000 (10^{-4}), with a most likely value of 1 in 20,000 (5×10^{-5}). This step, like step 3, rests on the assumption that infested or infected mature apples – assuming they exist in the first place – would contaminate clean fruit. However, as has been pointed out

[299] IRA, p. 125.

[300] At the very beginning of a packing house processing line, apples are floated out of bulk bins by being placed into a water-filled "dump tank" rather than being rolled or dropped from the bin which can cause bruising.

[301] Banks of water jets operated at ~100psi at ~15cms above rotating long-staple, brushed rollers. High volumes of water are directed onto the rotating fruit that pass over these rollers typically with a 12-20 second exposure period.

[302] **Exhibit NZ-61:** Walker JTS and Bradley SJ (2006) *Apple Washing for Removal of Mealybugs*, Hortresearch, Havelock North, New Zealand.

already, the scientific evidence suggests that the likelihood of this happening during picking and transport is negligible. It is equally negligible during processing in the packing house.

4.289 As the IRA acknowledges, latent fruit infections present a "minimal likelihood" of contamination in the processing pathway because spores do not develop on infected fruit until they become severely rotted or mummified.[303]

4.290 The IRA claims that such contamination might occur when infested fruit is washed in the dump tank, although noting that "given the extremely *small* likelihood of fruit being infested/infected with *N.galligena*, the probability of surface spores being present on fruit and contaminating the dump water is similarly *extremely small*" (emphasis added).[304]

4.291 The IRA also asserts a probability, albeit "extremely low",[305] of clean fruit becoming contaminated by twigs or by washing in the dump tank. This is unsubstantiated speculation, and is certainly not supported by the scientific evidence: contamination of clean fruit with *N. galligena* during processing in the packing house has never been observed to occur. As acknowledged in the IRA "there would be a very large dilution of spores in the tank and surface contamination could be washed off in any subsequent high pressure wash".[306]

4.292 The likelihood of contamination of clean fruit in the packing house is accordingly negligible and not a most likely value of 1 in 20,000 as suggested by the IRA.

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[303] IRA, p. 127.

[304] IRA, p. 127.

[305] IRA, p. 127.

[306] IRA, p. 127.

f. Importation step 6: Likelihood that N. galligena *survives palletisation, quality inspection, containerisation and transportation*

4.293 The IRA concludes that the likelihood that *N. galligena* would survive palletisation, quality inspection, containerisation and transportation is "1" (i.e. a likelihood of 100%).

4.294 The IRA asserts that "quality inspection will not detect latent infections or any surface infestation, and these will survive palletisation, containerisation and transport because there are no mechanisms in these procedures to remove them."[307] However, the likelihood value of "1" is an overestimation because, even assuming that some fruit could be latently infected at the point of palletisation, a proportion of fruit with latent infection would never develop symptoms (Biggs 1975). The actual proportion of fruit with latent infection that might eventually develop symptoms would be much less than 100%.

4.295 In the absence of any supporting scientific data that could resolve this question for *N. galligena*, the estimation of likelihood of survival of palletisation, quality inspection, containerisation and transportation can only be speculative but it must certainly be lower than "1".

g. Importation step 7: Likelihood that clean fruit is contaminated by N. galligena *during palletisation, quality inspection, containerisation and transportation*

4.296 The IRA's evaluation of the "likelihood" that clean fruit would be contaminated by *N. galligena* during palletisation, quality inspection, containerisation and transportation is a uniform distribution with a minimum value of 0 and a maximum value of 10^{-6}. The IRA states clear reasons why the risk is negligible. For example, the IRA states: "Packed fruit would be securely stored and would present a '*negligible'* likelihood of becoming contaminated during palletisation, quality inspection and transportation. The short period of storage and temperatures maintained during transportation *would not be*

[307] IRA, p. 127.

conducive to spore production" (emphasis added).[308] However, when the likelihoods assigned to this step are used in the Australian model, this again results in a negligible event being mischaracterised as an event that is likely to occur – approximately one in every two million apples imported from New Zealand. This 'probability' value has no basis in science.

h. Importation step 8: Likelihood that N. galligena *remains with the fruit after on-arrival minimum border procedures*

4.297 The IRA's evaluation of the likelihood that *N. galligena* will remain with the fruit after on-arrival minimum border procedures is "1"; that is, 100%.

4.298 While it is difficult to fault the IRA's logic on this point, the conclusion is hardly meaningful. It depends on an assumption about mature, symptomless apple fruit being a pathway for the transmission of European canker for which there is no scientific evidence, and for which the likelihood has been demonstrated to be negligible.

i. Summary

4.299 There is no scientific evidence to support the contention that mature, symptomless apples are a pathway for the transmission of European canker. Nonetheless, the result of the IRA's analysis of likelihood of entry is a mean infection/infestation rate of 0.0068% of apples imported annually from New Zealand, or approximately 1 in 15,000 apples – for an event that has never been documented to occur.

4.300 In assigning 'probability' values to individual steps which are often no more than remote possibilities, Australia ignores or misapplies scientific data or speculates about events that would almost certainly not occur. This kind of speculation as to the possibility of entry is not an evaluation of the "likelihood of entry" within the meaning of paragraph 4 of Annex A. Australia has thus failed to comply with its obligations under Article 5.1 of the *SPS Agreement*.

[308] IRA, p. 128.

(ii) Australia's analysis of the "probability of establishment or spread" of European canker does not constitute an evaluation of the "likelihood of the establishment or spread" of the disease within the meaning of the SPS Agreement

4.301 Just as Australia has failed to evaluate the likelihood of entry of European canker, it equally fails to evaluate the likelihood of "establishment or spread" of the disease. The Australian contention is that once apples infected or infested with *N. galligena* arrive in Australia, the pathogen will be transferred to host plants from which it will establish and spread throughout Australia. However, there is no scientific evidence that this has ever occurred or to support the likelihood of this occurring. At this point in the pathway also, the IRA's analysis rests on remote possibilities and not probabilities based on scientific evidence.

a. IRA's consideration of proximity and exposure is based on possibilities not probabilities

4.302 The IRA assumes, as it does in the case of fire blight, that apples will arrive at certain "utility points"[309] close enough to host plants that there can be a transfer of fungal spores from the infected apples to the host plants ("proximity").[310] As for fire blight, the IRA assigns probability values to the various utility points based on their likelihood to be proximate to host plants. As noted for fire blight, these values are assigned in a seemingly arbitrary manner and describe events that in reality have a very low likelihood of occurring. For example, orchard wholesalers near commercial fruit crops are assigned a proximity rating of 1 (certainty). However the text describing the rationale for assigning this probability value shows that this is in fact no more than a possibility: "orchard wholesaler waste *may* be dumped at a site…close to landfills. Before waste is finally disposed of, it *could* remain exposed to the elements…near the packing house" (emphasis added).[311]

[309] "Utility points" are places where apples are distributed or used, for example, retailers.

[310] IRA, p. 129.

[311] IRA, p. 130.

4.303 The IRA's contention also requires the transfer of the pathogen from an infested/infected apple to a susceptible host ("exposure"). This assumes that a sufficient quantity of spores could be produced from an infected apple and dispersed under suitable climatic conditions to infect a susceptible host. However, there is no scientific evidence to show that there is any likelihood that this could occur. Once again, the IRA's analysis is nothing more than a consideration of remotest possibilities.

4.304 There is no scientific evidence that conidia or ascospores could develop on mature, symptomless New Zealand apple fruit or that this could occur under Australian conditions.

4.305 The IRA speculates that discarded, latently infected apples could rot and become a source of inoculum for infection in new areas.[312] However, as noted earlier, the IRA fails to take into account the fact that not all latently infected fruit would express symptoms (such as visible rot symptoms).[313] Symptomless fruit do not produce spores. Even if symptoms were to develop, the IRA does not provide any evidence that conidia spores are produced from storage rots or rots which develop after removal from cold storage from latently infected fruit.

4.306 Further, the IRA states: "as the rot progresses, the fruit may become mummified followed by the development of perithecia in autumn, releasing ascospores in winter and spring (Munson 1939 and Grove 1990)."[314] However, although these references mention ascospore release from canker infections in winter and spring, neither mentions production of perithecia from rotted, mummified apples on the ground.

4.307 Research based on European conditions indicates that infected apple fruit may develop perithecia with mature ascospores if overwintered under particular conditions.[315] However, only three out of 700 mummified fruit collected from cankered trees from infected orchards were reported doing this, even under the conditions of an English

[312] IRA, p. 135.

[313] **Exhibit NZ-62:** Biggs (1995).

[314] IRA, p. 134.

[315] Swinburne 1964 and McCartney 1967, and refer para. 4.82 above.

orchard, which are favourable to European canker (Dillon-Weston 1927: 5). While referred to in the IRA, the proper inference to draw from these examples would have been that development of ascospores from mummified fruit is negligible, even under suitable conditions.

4.308 Further, production of ascospores is induced by low temperatures and is delayed by dry conditions (Munson 1939: 455); both of these climatic factors mean that under Australian conditions the likelihood of perithecia development and thus ascospore production is negligible. This is confirmed by experience in the Tasmanian European canker outbreak, where "mature asci were never found" either on tree cankers or rotten fruit (Ransom 1997: 124). In some geographic areas, ascospores play no role in the development of the disease (Annex 3, p. 224).

4.309 The IRA also fails to provide any evidence to support its assumption that infested apple fruit would produce spores at this point in the pathway. Surface spores are short-lived because they are prone to desiccation without continued moisture and would likely be dead well before arrival in Australia.

4.310 Consequently, although the IRA details numerous combinations of "proximity" of utility points and "susceptible hosts", all of this ignores the negligible likelihood that spores will be produced from mature, symptomless New Zealand apples in Australia in the first place.

4.311 Even if latently infected New Zealand fruit could produce spores in the Australian environment, these spores would need to be transferred to the host plant. Any dispersal of conidia would primarily be by rain splash and would likely only be a few metres from a discarded apple. The IRA acknowledges this when it states that "[t]hese studies relate to conidia produced from cankers on trees and the distances are likely to be far less for conidia originating from infected fruit on the ground".[316]

4.312 The Australian contention must therefore rely on airborne transfer of spores. Scientific evidence shows that ascospores from perithecia from a tree need rainfall and a

[316] IRA, p. 135.

subsequent drying period for discharge (Lortie and Kuntz 1963: 1207)[317] and are dispersed by wind (Munson 1939: 455). However, the evidence says nothing about dispersal when ascospores are produced on perithecia on an apple on the ground. In any event, as explained above, there is no evidence that these airborne spores would develop in the first place from mature, symptomless New Zealand apples.

4.313 Where the IRA discusses host plant receptivity, it fails to acknowledge that most infection studies are conducted under artificial conditions. For example, the IRA quotes Wilson 1966 that infection of leaf scars can occur up to 4 weeks post-leaf fall.[318] However, the IRA does not mention that this study was done in laboratory climate chambers at 14.4-15.5°C and continuous high (100%) humidity for 72 hours followed by holding the test plants in a greenhouse at elevated temperatures and humidities (Wilson 1966: 184).[319]

4.314 Further, for infection to occur, the number of spores must be at or above a certain threshold. Although the IRA acknowledges this, citing a figure of 1,000 conidia to initiate leaf scar infection,[320] there is no connection between the quantitative data from the literature cited and the ultimate assignment of probability values for exposure.

4.315 In addition, the IRA's analysis of the climate conditions conducive to infection both misconstrues the relevant literature[321] and is inconsistent with climatic information from countries where European canker is present. In general terms, rainy weather and moderate temperature are the key predictors of European canker infection and establishment (see Annex 3). As set out in Annex 3 pp. 222-225 and discussed further below at paragraphs 4.321 to 4.323, the climatic conditions in Australia are not conducive to European canker.

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[317] **Exhibit NZ-63:** Lortie M and Kuntz JE (1963) "Ascospore discharge and conidium release by *Nectria galligena* Bres. under field and laboratory conditions", *Canadian Journal of Botany*, 41(8), 1203-1210.

[318] IRA, p. 136.

[319] **Exhibit NZ-64:** Wilson, EE (1966) "Development of European canker in a California apple district", *Plant Disease Report* 50(3), 182-186.

[320] IRA, p. 136.

[321] See paragraphs 4.88-4.89 above.

4.316 Most of the IRA's discussion of spore production, disease spread and establishment relates to populations of *N. galligena* already resident as cankers within trees allowing repeated release of sufficient spores to reach potential infection sites. This is achievable where cankers are already present and repeated release of spores can take place. The suggested pathway via a discarded apple on the ground does not relate to the evidence presented. As the IRA rightly concedes, "[n]o studies exist in the literature to demonstrate long-distance spread from fruit infections."[322]

4.317 In sum, the IRA's analysis of transfer of *N. galligena* from a single discarded apple to a susceptible host is in reality a consideration of a series of remote possibilities. There is no scientific evidence to support any likelihood of spore production from mature, symptomless apple fruit, nor is there any evidence to support the contention of spore dispersal from infected fruit, let alone in sufficient numbers to initiate infection, or that climatic conditions in Australia would be suitable for infection to occur. Accordingly, the IRA should have treated the likelihood of exposure in all cases as negligible, an event that would almost certainly not occur. [323]

b. The IRA's consideration of establishment and spread is based on possibilities not probabilities

4.318 The IRA relies on alternative hosts of *N. galligena* (in particular in the exposure groups of household and garden plants and wild and amenity plants) in support of its contention for the likelihood of establishment and spread of European canker. However, the IRA's consideration of alternative hosts for *N. galligena* relates to northern hemisphere hardwood forest (deciduous) trees (e.g. Birch, Beech, Oak, Elm and Maple).[324] *N. galligena* is considered native to North America (Castlebury *et al.* 2006:

[322] IRA, p. 135.

[323] For example, the IRA does not treat as negligible the probability of exposure from a single discarded apple for consumer waste/household and garden plants and consumer waste/wild and amenity plants. (IRA, p. 139).

[324] IRA, pp. 131-133.

1431).[325] It has co-evolved with these northern hemisphere hosts (Flack and Swinburne 1977)[326] in their associated climate, which is typified by moderate temperatures and distribution of rainfall over the year (see Annex 3, p. 225). It does not necessarily follow that *N. galligena* will cause disease in these hosts in New Zealand and Australia where climatic conditions are considerably different (see Annex 3, p. 225).

4.319 In New Zealand there is no evidence of European canker causing pathogenic symptoms in other host plants. The IRA acknowledges that while there are records of *N. galligena* occurring on hosts other than apple or pear trees, "there is no information in the literature indicating these species are hosts…and there is no evidence that the disease has become established on these species".[327]

4.320 Including other hosts in arguments about risk of establishment and spread in Australia from New Zealand apples is therefore misleading and reflects the often unsubstantiated nature of the analysis in the IRA. The arguments about alternative hosts use information from the United Kingdom, Northern Europe and Nova Scotia,[328] which is not relevant to Australia, where the climate is much less suitable for this disease than in these northern hemisphere countries. It is notable that European canker did not spread to alternative hosts in Spreyton, Tasmania, despite the disease being present in apple orchards there for several decades.

4.321 Further, in seeking to substantiate its argument that European canker could establish and spread in Australia, the IRA comments that "Australia has areas with similar environments to these countries [the USA, Europe and New Zealand]".[329] However, as pointed out in Annex 3, climatic conditions are in fact quite different,

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[325] **Exhibit NZ-65:** Castlebury LA, Rossman AY and AS Hyten (2006) "Phylogenetic relationships of *Neonectria/Cylindocarpon* on *Fagus* in North America" *Canadian Journal of Botany* 84, 1417-1433.

[326] **Exhibit NZ-66:** Flack NJ and Swinburne TR (1977) "Host range of Nectria galligena Bres. and the pathogenicity of some Northern Ireland isolates", *Transactions of the British Mycological Society* 68 (2), 185- 192.

[327] IRA, p. 125.

[328] IRA, p. 139.

[329] IRA, p. 141.

especially between Australian apple production areas and areas in the USA, the United Kingdom and Northern Europe where European canker is prevalent.

4.322 Likewise, in its discussion of the outbreak of European canker in Spreyton, Tasmania, the IRA is misleading. For example, the IRA overestimates the significance of the eradication program when it claims that one reason European canker did not spread far "can be attributed to the eradication programme which began within two years of confirmation of the disease (Ransom 1997)".[330] It fails to take into account that the disease was probably present for more than 20 years before the eradication program began (Ransom 1997: 121).

4.323 As New Zealand has shown, the primary reasons European canker did not spread into other apple growing regions or alternative hosts within Tasmania or onto the Australian mainland during the outbreak, despite unrestricted movement of fruit from the affected orchards,[331] is that fruit are not a pathway for the disease under New Zealand and Australian conditions, and the climate of Tasmania – let alone the rest of Australia – is not suitable for its establishment and spread (see Annex 3, p. 225). It is significant that while the Tasmanian climatic conditions are unfavourable for European canker (which the IRA acknowledges as one reason behind the limited spread during the outbreak),[332] the conditions in Northern Tasmania where the outbreak occurred are comparatively more conducive to European canker than other parts of Australia (Annex 3, p. 225).

4.324 Despite this, the IRA determines that for each of the scenarios posited there is a moderate or high likelihood of establishment and spread, turning these into events which would be expected to occur with an even probability or that would be very likely to occur.[333] However, as demonstrated, these conclusions are not supported by scientific evidence.

[330] IRA, p. 141.

[331] **Exhibit NZ-42:** The 1955 Tasmanian State Proclamation banned the movement of planting material (from Spreyton only) but not apple fruit.

[332] IRA, p. 141.

[333] IRA, p. 144. Only spread of European canker among wild and amenity plants is considered to have a very low probability.

4.325 In summary, the IRA fails to establish that, even if there were a pathway for the transmission of European canker to Australia by mature, symptomless apples, European canker could subsequently establish or spread. Australia's arguments are based on assumptions about production and dispersal of spores and speculation about climatic similarity and alternative hosts. None of this finds any support in science. All of this is in the realm of the remotest of possibilities. None of it constitutes an evaluation of the likelihood of the establishment or spread of European canker within the meaning of paragraph 4 of Annex A. Australia thus has failed to comply with its obligations under Article 5.1.

(iii) Australia's analysis of the consequences of European canker does not constitute an evaluation of the "associated potential biological and economic consequences" of the disease within the meaning of the *SPS Agreement*

4.326 The IRA asserts that the Australian climate is favourable for European canker development based on its climatic comparisons with other parts of the world where European canker exists. The IRA assigned a rating of 'E' for the direct impact of European canker on plant life or health, suggesting that the consequences would be minor at the national level, significant at the regional level and highly significant at the district level. New Zealand has shown that the IRA vastly overestimates the risk of establishment or spread of European canker in Australia (Annex 3). The IRA's rating for the direct impact of European canker is also a significant overestimate.

4.327 All of the IRA's examples of serious impacts of European canker apply only to the cool temperate conditions of Europe and North America and to the plants and apple varieties commonly grown there, rather than to Australian conditions. The climate data provided by New Zealand suggests that the direct impact of European canker on plant life or health in Australia would be at most minor, even at the local level.

4.328 The IRA claims that environmental effects would be significant at the district level and highly significant locally. Relying on data from areas where climate and flora are significantly different from most parts of Australia, it concludes that European canker could establish and spread in many parts of the country, ignoring the actual experience from the Tasmanian outbreak. The IRA states "the most likely reason why the disease did not spread to environmental species in Spreyton is because of the eradication program with measures to prevent spread put in place within two years after detection and confirmation of the disease".[334] But this eradication programme began in 1954, more than 20 years after the probable establishment of the disease in Spreyton, and continued until 1978, with eradication declared in 1991 (Ransom 1997).

4.329 The IRA provides a significant overestimate of the likely direct impact of the establishment and spread of European canker. As the climatic data presented by New Zealand demonstrates, there are few areas in Australia where European canker could establish and spread. One demonstration of the IRA's failure to take into account the relevant evidence as to climatic differences and reliance on assumption is the statement of the BA Principal Scientist at the Senate Committee Briefing in March 2007. In that forum, the Principal Scientist acknowledged that "…it is *likely*, although again we have assumed the worst, that it would be a significant disease only in a few areas of Australia. Again, I say we have *assumed* that it would be equally bad across all of Australia" (emphasis added).[335]

4.330 The IRA's approach to the analysis of indirect impact of European canker exaggerates the predicted overall effect that European canker would have on Australia. *N. galligena* is not known worldwide to cause damaging diseases of amenity plants. For example, when the disease occurred in Tasmania, there were no reports of it affecting forest, household or garden plants (Ransom 1997).

4.331 As regards control or eradication, climate data presented by New Zealand suggests that any outbreak is likely to be highly localised, as in Tasmania where only six orchards were affected in a 40-plus year period (Ransom 1997: 121). Consequently, the costs of eradication are not likely to be high. Experience in New Zealand suggests that

[334] IRA, p. 148.

[335] **Exhibit NZ-10:** *Official Committee Hansard*, 22 March 2007, p. 10.

routine orchard control of the disease is possible as part of routine controls of other apple diseases already present in Australia, such as apple scab.

4.332 With regard to international trade, New Zealand's experience is that the presence of *N. galligena* has not constrained its trade in apples, with countries other than Australia. Furthermore, the experience of Tasmania, New Zealand and all other apple-producing countries where *N. galligena* is or has been present, shows that its impact on the environment and communities is negligible. In particular, there is no basis for the IRA's suggestion that European canker disease in the elm tree population of Melbourne could have indirect flow-on effects for tourism.[336] In sum, the IRA's assessment of the overall consequences as moderate is a significant overestimation.

(iv) Conclusion

4.333 The IRA has failed to evaluate the "likelihood" of entry, establishment and spread of European canker as well as the potential biological and economic consequences within the meaning of paragraph 4 of Annex A. Accordingly Australia has failed to comply with its obligations under Article 5.1 of the *SPS Agreement*.

(c) Apple Leafcurling Midge

(i) Australia's analysis of the "probability of importation" of apple leafcurling midge does not constitute an evaluation of the "likelihood of the entry" of the pest within the meaning of the *SPS Agreement*

4.334 The IRA follows the same eight-step approach to considering the probability of importation of ALCM as for the other pests at issue. Each step was again assigned a likelihood or probability value, all of which were then inserted into the IRA's @Risk simulation model. The IRA asserts an infestation rate of 4.1% of apples imported from New Zealand, or just over 1 in 25 apples.[337]

[336] IRA, p. 150.

[337] IRA, p. 165.

4.335 As in the case of fire blight and European canker, there is frequently no objective and rational relationship between the scientific evidence that is cited for a step and the probability value that is chosen. Indeed, frequently a value is chosen in the absence of sufficient scientific support. As a result, the IRA's analysis is not an analysis of likelihood at all, it is speculation, and does not conform to the obligation under Article 5.1.

a. Importation step 2: Likelihood that picked apple fruit is infested with ALCM

4.336 The IRA concludes under importation step 2 that the likelihood that picked apple fruit will be infested with ALCM is a minimum value of 1.5 x 10^{-2} (1.5 in 100), a maximum value of 0.115 (11.5 in 100) and a most likely value of 5 x 10^{-2} (5 in 100).[338] However, this conclusion is based on historical data from two minor apple producing regions, Waikato and Bay of Plenty, both of which have warm wet climates more conducive to ALCM than the major apple export production area in New Zealand (Hawkes Bay), and which have very little role in growing apples for export.[339] The IRA has used figures of 11.5% and 1-2% of fruit infested with cocoons at harvest from these small, atypical production regions as the basis for analysing the risk of fruit infested with cocoons for the remaining major New Zealand export apple producing areas.

4.337 More critical, Australia's assessment of importation step 2 is based only on the presence of cocoons on apples. It does not take into account the scientific evidence on viability of cocoons. The scientific evidence indicates that only 15% of ALCM cocoons contain live pupae (Rogers *et al.* 2006: 3). As explained earlier, cocoons alone are not a risk factor for ALCM. It is only cocoons that contain viable ALCM that pose a potential risk. While noting the scientific data related to cocoon viability, the IRA failed to factor it into its assessment of importation step 2. Accordingly, the probability value assigned to this step is not supported by scientific evidence.

[338] IRA, p. 159.

[339] **Exhibit NZ-3:** Pipfruit New Zealand Incorporated (2006 and 2008) *Pipfruit Industry Statistical Annuals,* January 2006 and March 2008, New Zealand pp. 18 and 20.

4.338 In short, a proper assessment of "likelihood" in respect of importation step 2 would have focused only on the presence of viable cocoons. Had it done so, the assigned probability value would have been much lower.

b. Importation step 3: Likelihood that clean fruit is contaminated by ALCM during picking and transport to the packing house

4.339 The IRA also overestimates the likelihood that clean fruit will be contaminated during picking and transport to the packing house (importation step 3). Using a uniform distribution, the IRA assigns a minimum value of 10^{-3} (1 in 1000) and a maximum value of 5×10^{-2} (1 in 20).[340] The IRA provides no explanation for how the values for this step were determined; they appear to have been arbitrarily chosen, ignoring the actual biology of ALCM.

4.340 As explained above, and as acknowledged by Australia in the IRA,[341] the only potential post-harvest source of ALCM contamination is infested apple tree leaves (i.e. leaves with larva present). However, the young soft leaves on which ALCM lay their eggs are spatially separate from the parts of the tree where fruit development occurs (the previous year's wood). That such leaves would be harvested with fruit is highly improbable.

4.341 The only leaves that are located near apple fruit that accordingly may be occasionally harvested with apples are "stipules". These are leaves formed during flowering in spring which cease to grow or develop beyond the very early stages of fruitlet development. ALCM damage or infestation has, however, never been observed on such leaves.

4.342 Finally, as explained above, even if young branch shoot leaves could somehow mistakenly be harvested with apple fruit, they would be very unlikely to be infested as, by harvest, ALCM infestation levels are low due to the declining availability of new shoot growth (Shaw *et al.* 2005: 309 and Todd 1959: 867).

[340] IRA, p. 161.

[341] IRA, p. 161.

4.343 In short, a proper assessment of "likelihood" in respect of importation step 3 would have recognised that the contamination of clean fruit by viable ALCM during picking and transportation was an event that almost certainly would not occur. The assigned value should have been much closer to zero.

c. Importation step 8: Likelihood that ALCM survives and remains with the fruit after on-arrival minimum border procedures

4.344 The IRA also fails to correctly evaluate "likelihood" for importation step 8 - the likelihood that ALCM survives and remains with fruit after on-arrival minimum border procedures. The "most likely" value assigned to this step in the IRA is a value of 0.9.[342]

4.345 However, in its assessment of importation step 8, the IRA failed to take into account the 2001-2004 data provided by New Zealand to Australia which provide a real world data-based value for the infestation level in a consignment prior to presentation to AQIS for inspection. That data is noted in the IRA, at Table 40.[343] However, it is not factored into the IRA's assessment of either importation step 8, or the overall infestation rate for ALCM.

4.346 The IRA also disregarded, in its assessment of importation step 8, the effect of AQIS inspection procedures at the border. If such inspection procedures had been taken into account, the probability that ALCM cocoons would not be detected in the traditional sample size inspected by AQIS at the border, a 600-unit inspection, could be calculated at approximately 46% (0.46).[344] This is substantially less than the IRA's most likely value of 90% (0.9).

4.347 The proportion of apples entering the country with a cocoon on them is the product of the cocoon infestation level at endpoint inspection and the probability that cocoons will remain with the fruit after endpoint inspection. Based on the 2001 – 2004

[342] IRA, p. 165.

[343] IRA, p. 166.

[344] The probability that no apples with cocoons are found in a 600 unit sample, drawn at random from a large consignment, when the proportion of apples with cocoons is 0.0013, can be estimated as $(1-0.0013)^{600}$ or, approximately 46%.

data provided by New Zealand (which, as noted above, provides a data-based value of 'p' (p = 0.0013) for the cocoon infestation level in a consignment prior to presentation to AQIS for inspection), and a probability of detection of 46% of cocoons (0.46) by a normal AQIS border inspection, the proportion of apples that may enter the country with cocoons after AQIS inspection is (0.0013 x 0.46 = 0.000598), i.e. approximately six in ten thousand apples that enter Australia would have a cocoon on them.

4.348 In short, the IRA's ultimate infestation rate for apples imported from New Zealand of a mean of 4.1% (approximately four in one hundred)[345] ignored the fact that there would be an AQIS inspection at the border and equated the total numbers of cocoons found on apples with the number of viable ALCM found on apples. But, of course, these are not the same thing. Only the number of viable ALCM after AQIS inspection should have been taken into account, not the number of cocoons prior to inspection. Thus there is no scientific evidence supporting the Australian conclusions on the probability of infestation.

4.349 Australia's analysis of the probability of importation of ALCM is thus not an evaluation of the "likelihood of entry" as required by Annex A for a risk assessment. It is a survey of remote possibilities that are then exaggerated into a "probability". As a result, Australia's risk analysis does not meet the requirements of Article 5.1.

(ii) Australia's analysis of the "probability of establishment or spread" of ALCM does not constitute an evaluation of the "likelihood of the establishment or spread" of the pest within the meaning of the *SPS Agreement*

4.350 Just as Australia has failed to evaluate the likelihood of entry of ALCM, it has equally failed to evaluate the likelihood of "establishment or spread" of the disease.

4.351 The Australian contention requires that apples with cocoons be in close proximity to susceptible apple trees, that live pupae emerge simultaneously, that a male locate a female and mate, and that the female deposit its eggs on the leaves of young actively growing apple trees. All of this would need to happen within the space of the short life

345 IRA, p. 165.

span of the ALCM adult female. However, Australia's contention is based on an assumption that is unsupported by scientific evidence. Such an event has never occurred, nor is there any likelihood that it could occur.

4.352 Australia's evaluation of establishment and spread is based on incorrect assumptions, including about the likelihood of apples being discarded in close proximity to susceptible host apple trees, the circumstances under which live pupae will emerge from cocoons, the flight range of ALCM, and the likelihood that mating can successfully occur.

4.353 The Australian contention requires that utility points at which apples will be discarded will be in sufficient proximity to apple trees with growing shoots (given that ALCM only lay eggs on freshly unfurling apple tree leaves) for mating and egg laying to occur. However, as explained earlier, ALCM are weak fliers. Female movement is likely to be limited to less than 30 metres during one season and male movement is likely to be similarly limited (Suckling *et al.* 2007: 750). The IRA ignored those findings in its evaluation of the proximity of "utility points" to available hosts. The IRA uses the term "near" in each case, but leaves it undefined. It appears to base its calculations on a flight range for ALCM of up to 200 metres, a figure which Australia appears to draw from Suckling *et al.* 2007.[346] However, while very low levels of infestation of up to 200 metres from the source orchard was observed in that study, the authors attributed this to a background population associated with nursery stock, used in the newly planted orchard, and not to ALCM flight (Suckling *et al.* 2007: 748).

4.354 Even using the IRA's overestimated flying distances, it is implausible to suggest, as the IRA does, that 5% of retailers and 5% of the Australian population live within 200m of commercial fruit crops.[347] The majority of the Australian population live in major cities and urban areas. It is highly probable that significantly more than 95% of the population live further than 200m from commercial fruit crops, contrary to the IRA's

[346] IRA, p. 168.

[347] IRA, pp. 168-170.

assertion.[348] The assumptions in the IRA as to the proximity of these two groups to areas of commercial apple production and the assumptions as to the distance that ALCM can fly, led to values that significantly overestimate the risk of proximity presented by these two groups.

4.355 With regard to nursery plants near utility points, the values assigned appear to be mostly arbitrary. Temporary storage of apples near garden centres with young apple trees in leaf is highly unlikely. Commercially traded apples are held in cool storage prior to sale. It is highly improbable that apples will be stored near garden centres at ambient air temperatures for sufficiently long periods to allow diapause to end, development to be completed (at least 13 – 18 days) and adult emergence to occur, all within close proximity (less than 30m: Suckling *et al.* 2007: 750) of young apple trees. Further, young apple trees are normally sold in a dormant condition (i.e. with no young leaves) adding to the implausibility of this risk scenario and values assigned.

4.356 No scientific or quantitative data is supplied in the IRA to support the claim that 5% of retailers may sell apples near nursery plants yet this value is used in assigning a risk probability determination.[349] Equally, with regard to food services near nursery plants, the high risk values attributed cannot be justified. It is also highly improbable that the 5% of Australian consumers each year (1 million people per annum) holding, eating and discarding New Zealand apples, would come into close contact (less than 30m) with nursery apple trees in the period of new bud development in spring which occurs after the normal period of tree planting (i.e. apple trees are typically planted while dormant).

4.357 The IRA assumes in one scenario that 70-100% of fruit will be sent to orchard wholesalers. However, as explained above, most New Zealand apple exports to Australia would be retail ready. The primary market for this fruit will be in the major urban centres

[348] IRA, p. 168.

[349] The apparent assumptions used are illogical if one considers a probable annual demand for about 1 million new apple trees. This demand would, at most, only support 4 - 6 commercial nurseries producing apple trees. The IRA claims that 5% of Australian (fruit) retailers (i.e. all retail outlets) are within close proximity to the nursery plantings of apples, seems highly improbable. The relatively small numbers of orchardists producing their own nursery trees are highly unlikely to be located within close proximity of fruit retailers.

and for commercial reasons the fruit would be stored nearby. The proportion requiring repackaging would be very small and readily handled by urban facilities. The IRA's notion of substantial repacking at rural packing houses defies commercial logic.

4.358 Further, the IRA's evaluation of the transfer of ALCM to a susceptible host rests on unsubstantiated assumptions about the circumstances and conditions under which adults will emerge, and the likelihood that they will successfully mate. As acknowledged by the IRA, successful transfer of ALCM to a susceptible host would depend on the cool chain[350] being broken to allow adults to emerge. However, adult ALCM will not necessarily emerge from viable cocoons when they are removed from the cool store. In the field, ALCM emergence is timed to coincide with the appearance of young unfurling apple leaves which are themselves triggered by the warmer temperatures and longer day-length of spring. Cool storage mimics the conditions that initiate the normal overwintering process and ALCM will only emerge if stimulated by the spring conditions. Thus, only viable pupae on New Zealand apples removed from temperature controls in spring would be able to emerge from diapause.

4.359 Second, even if emergence did occur, it would require near simultaneous emergence of a male and female for mating to occur in the limited lifespan of the ALCM. For egg laying to occur, emergence and mating would also need to occur when new apple shoots were present (as acknowledged by Australia in the IRA, ALCM require growing shoot tips on which to lay their eggs).[351] Thus, any ALCM emerging during the likely period of import – that is, autumn and winter (March to September) – could not go on to infest new hosts even if a male and female did emerge close enough to find each other and successfully mate, because there are no new leaf shoots in autumn and winter. Only a small proportion of New Zealand apples would remain in cold storage unsold until spring.

4.360 As explained above in paragraph 4.127, a standard AQIS fruit inspection regime involving a 600 fruit sample inspection, would provide 95% confidence that no more than

[350] The cool chain is broken when fruit is removed from cool storage and its flesh temperature returns to normal ambient temperatures.

[351] IRA, p. 180.

0.5% (1 in 200) fruit have cocoons. The evidence indicates the actual ALCM infestation rate is much lower (see paras. 4.337 and 4.347 above). But even on the basis of an assumed ALCM infestation rate of 0.5%, at least 4,000 fruit would need to be deposited in one place at the same time to obtain three apples with three live ALCM.

4.361 The only place where significant numbers of apple fruit could be removed simultaneously from cold storage, in close proximity to apple trees, is if the fruit were sent to an orchard wholesaler. However, as explained above, New Zealand fruit is very unlikely to be sent to an orchard wholesaler for re-packing given the "retail ready" and "just in time" nature of New Zealand's apple exports. Further, because ALCM take 13 – 18 days after being removed from cold storage to complete development and emerge from their cocoons, the only scenario in which the apples would remain out of cool storage for long enough for emergence to occur is if the apples were dumped as waste. Further, for emergence of adult ACLM to occur, the waste would need to remain uncovered for that period, which would be contrary to good operational practice.

4.362 In short, the likelihood of an Australian buyer of New Zealand apples disposing of at least 4,000 of those apples uncovered, at a single site within 30m of apple trees with new shoots is negligible.

4.363 From the above, it is clear that the IRA has greatly overestimated the probability of establishment of ALCM, and thus the evaluation of "likelihood" is also exaggerated.

4.364 Even if ALCM were to establish in Australia, the likelihood of spread is remote. ALCM distribution and pest status appears to be limited to cooler wetter climatic conditions, such as those found in temperate coastal regions (Rogers 2006: 1). For example, apple trees are grown in all 50 states of the USA and commercially in 36 states, yet there are no reports of ALCM being present on the east coast of North America south of New York State, despite its presence in the northern cooler states for over 70 years. ALCM has spread west during the same period but only to similar latitudes (coastal southern British Columbia and Washington state). It does not occur in the southern apple growing regions of Northern and Southern Carolina or Georgia or in California on the lower west coast. The reason for this is climatic (Rogers 2006). This pest has not become established in these regions despite more than 70 years of movement (unregulated with respect to ALCM) of apple nursery material (and fruit). Movement into California has only been regulated since 2001.

4.365 Based on this experience, if ALCM were ever to become established in Australia, it is highly unlikely that it would become successfully established in all of the areas where apples are grown commercially and where apple trees are grown in domestic gardens. It is highly unlikely that ALCM would either establish or have any pest status in the areas of Australia which do not have suitable climatic conditions (e.g. areas north of Canberra, including Sydney, which are too hot and dry).

4.366 In short, Australia's contention that ALCM would be likely to become established and spread in Australia is unsupported by fact, by scientific evidence or by experience. It ignores the issue of viability of cocoons, the actual biology of ALCM and the reality of commercial practice with respect to the sale, use and disposal of apple fruit. It does not constitute an evaluation of the "likelihood of establishment and spread" within the meaning of paragraph 4 of Annex A, and thus fails to meet the requirements of Article 5.1.

(iii) Australia's analysis of the consequences of ALCM does not constitute an evaluation of the "associated potential biological and economic consequences" of the pest within the meaning of the *SPS Agreement*

4.367 The data used by Australia to assess the impact of ACLM on plant life and health is now over ten years old and has no validity under today's production practices. For example, the IRA refers to impact data taken from a small survey of 30 growers in Nelson in the mid 1990s (Smith and Chapman 1995). This survey, however, dealt with a region which, at that time, had some ALCM control difficulties and was completed before the industry introduced the integrated fruit production programme (which decreased the incidence of ALCM in New Zealand: Rogers *et al.* 2006: 1) and at a time when growers were still using non selective insecticides (which disrupted biological control of ALCM eggs and larva (Shaw *et al.* 2005: 310)). Growers would be very unlikely to assign the same impact rankings to ALCM today.

4.368 In New Zealand today ALCM is an important pest solely in respect of young apple trees (Rogers *et al.* 2006: 1). In commercial orchards its effects are not considered significant and they are managed by the industry's integrated fruit production system (Rogers *et al.* 2006: 1).[352] The only situation where active control methods for ALCM are recommended is in the nursery or on young trees with no fruit.[353]

4.369 Because of the limited climatic range of ALCM, the IRA is incorrect in its use of the concept of "all of Australia" when referring to the impact on regions where apples may be grown either commercially or domestically. Potential ALCM establishment in Australia is limited by geographical and climatic barriers.

4.370 The IRA claims that an indirect consequence of the establishment of ALCM would be an increase in the use of insecticides, disruption of existing pest management programs, increases in control measures and increased costs to producers. Once again, the IRA fails to look at actual experience in dealing with ALCM.

4.371 In New Zealand, chemical control of ALCM is required only on nursery stock or recently planted apple trees (Rogers *et al.* 2006: 1). There is no industry requirement for insecticidal controls for midge on producing trees. On young trees the pesticide diazinon is used to control ALCM, a pesticide used to control the woolly apple aphid, *Eriosoma lanigerum*, which is a significant and widespread pest of apple crops in both New Zealand and Australia. Thus, diazinon applications targeted at woolly apple aphid have an incidental effect of suppressing ALCM numbers on young trees. There is no increase in insecticides or disruption of existing programmes.

4.372 Although the ALCM egg parasitoid *Platygaster demades* is absent from Australian orchards, New Zealand experience suggests that many other predaceous species contribute to effective biological control of ALCM (Shaw *et al.* 2003: 167). These include predaceous phytoseiid mites (*F. Phytoseiidae*), earwigs (e.g. *Forificula*

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[352] See also **[Exhibit NZ-45:** New Zealand Pipfruit Integrated Fruit Production Manual, New Zealand Pipfruit Ltd, October 2006, pp. 36-37, which set out the integrated fruit production measures for ALCM. **business in confidence]**

[353] **[Exhibit NZ-45:** New Zealand Pipfruit Integrated Fruit Production Manual, New Zealand Pipfruit Ltd, October 2006, p. 37 **business in confidence]**.

auriculavia), the whirligig mite (*Anystis baccarum*) and predaceous bugs (*F. Miridae* and *F. Anthocoridae*), all of which occur, and probably contribute to existing biological control programmes and integrated pest management in, Australian orchards.

4.373 Thus, there is simply no evidence that the consequences foreseen by the IRA would occur.

4.374 The IRA also anticipates consequences for domestic and international trade in apples, in part from the cosmetic damage to fruit from larval feeding on blossoms. Again, actual experience suggests otherwise. While cosmetic damage to fruit has been reported in New Zealand, the frequency is very rare, so uncommon in fact that commercial packing houses do not record this defect for pack-out analysis reports supplied back to growers.

4.375 Moreover, as already pointed out, ALCM establishment in Australia will be limited by geographical and climatic barriers. For example, the presence of ALCM in the Pacific North West states of the United States e.g. Washington and Michigan has not led to establishment in California. This is despite many years of unrestricted (prior to 2001) and large volume apple imports in large volumes from the other states and from New Zealand.

4.376 The presence of ALCM in New Zealand has no major impact on apple exports. New Zealand regularly exports apples to ALCM sensitive markets, e.g. China, Chinese Taipei, India, and California. When ALCM is detected the consignment is fumigated; New Zealand apple consignments have never been rejected because of the presence of ALCM. Fumigation on detection of a quarantine pest is a common practice in importing countries, including Australia.

4.377 In short, Australia's purported analysis of the "associated potential biological and economic consequences" of ALCM constitutes nothing more than a listing of unsubstantiated assumptions. It is not an evaluation of those consequences within the meaning of the *SPS Agreement*.

(iv) Conclusion

4.378 The IRA has failed to evaluate the "likelihood" of entry, establishment and spread of ALCM, as well as the potential biological and economic consequences within the meaning of paragraph 4 of Annex A. Accordingly Australia has failed to comply with its obligations under Article 5.1 of the *SPS Agreement*.

4. Australia has failed to evaluate the likelihood of entry, establishment or spread of the pests in question "according to the SPS measures which might be applied"

4.379 The third requirement of a risk assessment, within the meaning of Article 5.1 and Annex A, is that there must be an evaluation of the likelihood of entry, establishment or spread of the three pests according to the SPS measures which might be applied.[354]

(a) Legal standard

4.380 As noted by the Appellate Body in *Australia – Salmon*, "some evaluation [of the likelihood of entry, establishment or spread of the three pests according to the SPS measures which might be applied] is not enough".[355] While the Australian IRA at issue in *Australia – Salmon* examined "a large number of different risk reduction factors for each of the 24 diseases of concern"[356] it was held by the Appellate Body to have violated this requirement because it "only provided some evaluation of the extent to which these factors could reduce risk".[357]

4.381 A risk assessment that "identifies such measures but does not, in any substantial way, evaluate or assess their relative effectiveness in reducing the overall disease risk" does not "fulfil the third requirement" for a risk assessment, "i.e. it does not contain the

[354] Appellate Body Report, *Australia – Salmon*, para. 121.

[355] Appellate Body Report, *Australia – Salmon,* para. 134.

[356] Appellate Body Report, *Australia – Salmon*, para. 132.

[357] Appellate Body Report, *Australia – Salmon,* para. 134.

required evaluation of the likelihood of entry, establishment or spread of the disease according to the SPS measures which might be applied".[358]

4.382 Further, in *Japan-Apples*, the Appellate Body emphasised that the obligation under Article 5.1 implies "that a risk assessment should not be limited to an examination of the measure already in place or favoured by the importing member."[359]

4.383 While the IRA identifies various different risk reduction factors for the three pests at issue, it only provides 'some' evaluation of the extent to which these factors could reduce risk, particularly in relation to fire blight. Further, the IRA fails to provide any evaluation of a particular measure proposed by New Zealand. Accordingly, it is not an evaluation of the likelihood of entry, establishment or spread of the three pests according to the SPS measures which might be applied within the meaning of Article 5.1.

(b) The IRA fails to evaluate likelihood according to the SPS measures which might be applied

(i) Fire blight

4.384 The IRA identifies various measures for fire blight but fails to evaluate whether they are capable of reducing the risk associated with fire blight to within Australia's appropriate level of protectio3

a. Measures applied in relation to fire blight

4.385 The IRA evaluates only three measures with respect to their impact on the assessed level of risk: the requirement that apples be sourced from areas free from fire blight disease symptoms, the requirement that apples be subject to disinfection treatment, and the alternative requirement of subjecting apples to cold storage. After evaluating the impact of these three measures, the IRA states that a "…systems approach [of combining

358 Appellate Body Report, *Australia – Salmon,* para. 134.

359 Appellate Body Report, *Japan – Apples*, para. 208.

the areas free from disease symptoms, and chlorine requirements] would reduce the restricted risk estimate to 'very low' which meets Australia's ALOP."[360]

4.386 There is no evaluation, however, of three of the measures at issue in this dispute that the IRA imposes for fire blight. These are:

a. The requirement that an orchard/block be suspended for the season on the basis that any evidence of pruning or other activities carried out before the inspection could constitute an attempt to remove or hide symptoms of fire blight.[361]

b. The requirement that all grading and packing equipment that comes in direct contact with apples be cleaned and disinfected (using an approved disinfectant) immediately before each Australian packing run.[362]

c. The requirement that packing houses registered for export of apples process only fruit sourced from registered orchards.[363]

4.387 These measures all appear in the final operational section of the IRA, but most are not even mentioned in the "Risk Management for Fire Blight" section of the IRA. In fact, the one measure referred to in the risk management section (suspension for evidence of pruning) is noted only under the heading: "Responding to comments from stakeholders on risk management for fire blight". There is no evaluation of the effect of these measures on the risk factors identified in the IRA; that is no evaluation of the impact they would have, either on their own or as part of a systems approach, on the assessed level of

[360] IRA, p. 112.

[361] This measure is not assessed in the "Risk Management for fire blight" section of the IRA. It is mentioned briefly in the section of the IRA entitled "Responding to comments from stakeholders on risk management for fire blight" and then, without further reference, it appears in the final "operational framework" section of the IRA as one of various requirements for fire blight: IRA, pp. 114 and 316.

[362] This measure is not assessed in the "Risk Management for Fire blight" section of the IRA. It appears only in the final "operational framework" section of the IRA as one of various requirements for fire blight: IRA, p. 318.

[363] This measure is not assessed in the "Risk Management for Fire blight" section of the IRA. It appears only in the final "operational framework" section of the IRA as one of various requirements for fire blight: IRA, p. 317.

risk. Indeed, paragraph 4.385 above makes clear that these measures are imposed as additional to those measures recognised as necessary to bring the level of risk to within Australia's ALOP.

b. Other measures identified in the IRA

4.388 Australia also violates its obligation to evaluate likelihood "according to the SPS measures which might be applied" in relation to the alternative measures for fire blight identified in the IRA.

4.389 Under the heading "Other potential risk management measures" the IRA states:

> The IRA team considered other possible risk management measures including irradiation, fumigation and treatments with different bactericidal agents, vacuum infiltration of disinfectants and the use of pest free places of production. There was insufficient data relevant to fire blight for the IRA team to adequately assess the efficacy of these alternatives. However, the proposed measures are always open to review if additional relevant information is forthcoming that suggests alternative measures may be capable of reducing the risks to Australia's ALOP.[364]

4.390 The IRA goes on to note:

> The IRA team considered other possible risk management measures such as alternative disinfection agents, much longer storage times, treatments such as fumigation and the possible requirement that fruit could only be imported packed in boxes.[365]

4.391 The IRA fails, however, to evaluate the relative effectiveness in reducing the overall disease risk of any of these identified alternative measures. Instead, it simply dismisses them in a few brief lines, without any analysis at all, and without any consideration of whether these, or other, less stringent, measures, either individually or in combination, might be capable of reducing the risk of fire blight to an acceptable level.

[364] IRA, p. 113.

[365] IRA, p. 115.

4.392 In particular, the IRA's dismissal of certain measures on the basis that there was "insufficient data relevant" to "adequately assess the efficacy of these alternatives" is, itself, inadequate. As noted by the Appellate Body in *Australia - Salmon*, the existence of unknown and uncertain elements does not justify a departure from the requirements of Article 5.1.[366] Australia cannot rely on "insufficient data" to excuse itself from its obligation to evaluate the likelihood of entry, establishment or spread of fire blight according to the SPS measures which might be applied.

(ii) European canker

4.393 As with fire blight, the IRA identifies various measures for European canker but fails to evaluate whether they would be capable of reducing the risk associated with European canker to within Australia's appropriate level of protection.

a. Measures applied in relation to European canker

4.394 The IRA identifies only three options with respect to their impact on the assessed level of risk: the requirement that apples be sourced from pest free areas; the requirement that apples be sourced from areas of low pest prevalence; and the requirement to source apples from pest free places of production, established by conducting orchard inspections, and concludes that "The risk of *N. galligena* could be managed to an acceptable level below Australia's ALOP by sourcing apples for export from orchards free of the disease".[367]

4.395 However, there is almost no discussion in respect of two of the measures Australia applies in relation to European canker. These are:

a. The requirement that an orchard/block be suspended for the season on the basis that any evidence of pruning or other activities carried out before the inspection could constitute an attempt to remove or hide symptoms of European canker.

[366] Appellate Body Report, *Australia – Salmon*, para. 130.

[367] IRA, p. 155

b. The requirement that all new planting stock be intensively examined and treated for European canker.

4.396 Both measures are only mentioned briefly in the risk management section for European canker, without any evaluation at all. Again, there is no discussion of the effect of these measures on the risk factors identified in the IRA and there is no evaluation of what impact they would have, either on their own or as part of a systems approach, on the assessed risk. Indeed, as with fire blight, and as paragraph 4.394 above indicates, these measures are *not* required to meet Australia's ALOP. In respect of those measures therefore, Australia has again violated its obligation to evaluate likelihood of entry, establishment and spread "according to the SPS measures which might be applied".

(iii) Measures identified by New Zealand for evaluation

4.397 In its submission on the Revised Draft IRA 2005, New Zealand requested that Australia assess the level of risk in relation to an SPS measure requiring apples to be imported "retail-ready" – that is, imported in cases ready for retail sale, rather than in bulk bins requiring repacking in Australia before retail sale.[368] The IRA's failure to evaluate this proposed measure in any meaningful way is particularly significant.

4.398 In relation to fire blight, the IRA asserts without any analysis that "…the likelihood estimates produced by the model did not differ greatly for fruit packed for retail distribution versus fruit in bulk bins."[369] It then dismisses the possibility of a "retail-ready" requirement on the basis that there is no practical method of ensuring that apples in packed boxes are not handled in an orchard-based packing house/wholesaler, noting that: "The team concluded that a measure based on importation only of packed fruit would not be sufficient to meet Australia's ALOP."[370] But, these assertions are not based on any evaluation of likelihood. Thus, Australia has failed to properly evaluate the

[368] **Exhibit NZ-56**: MAF Biosecurity New Zealand (2006) *Comments by the Government of New Zealand on Biosecurity Australia's revised draft import risk analysis report for apples from New Zealand, December 2005*, Ministry of Agriculture and Forestry, Wellington, p. 1.

[369] IRA, p. 115.

[370] IRA, p. 115.

likelihood of entry, establishment or spread of fire blight if imports were restricted to "retail-ready" apples.

4.399 Australia also failed to properly evaluate the likelihood of entry, establishment or spread of European canker or ALCM if imports were restricted to "retail-ready" apples. There is no mention of this requirement at all in the sections of the IRA on Risk management for European canker or ALCM.

(iv) General measures

4.400 In relation to the following general measures, Australia also violates the requirement to evaluate the likelihood of entry, establishment or spread "according to the SPS measures which might be applied":

a. The requirement that Australian Quarantine and Inspection Service officers be involved in orchard inspections for European canker and fire blight, in direct verification of packing house procedures, and in fruit inspection and treatment.[371]

b. The requirement that New Zealand ensure that all orchards registered for export to Australia operate under standard commercial practices.[372]

c. The requirement that packing houses provide details of the layout of premises.[373]

4.401 All three measures are mentioned only in the final operational framework, not in the risk analysis section for any of the three pests at issue and without *any* discussion of their effect on the risk factors identified in the IRA, that is without any evaluation of what impact they would have, either on their own or as part of a systems approach, on the assessed risk.

[371] This measure only appears in the final "operational framework" section of the IRA, p. 314.

[372] This measure only appears in the final "operational framework" section of the IRA. p. 315

[373] This measure only appears in the final "operational framework" section of the IRA, p. 317.

(c) Conclusion

4.402 The IRA fails to provide an evaluation of the likelihood of entry, establishment or spread of the diseases and pests of concern "according to the SPS measures which might be applied" and, therefore, fails to meet the third requirement for a risk assessment within the meaning of paragraph 4 of Annex A. Thus, Australia is in violation of its obligations under Article 5.1.

5. Conclusion on Article 5.1

4.403 Article 5.1 requires that the SPS measures at issue be "based on" a risk assessment. As New Zealand has pointed out, the semi-quantitative method is applied by Australia in a way that produces a result that arbitrarily transforms possibilities into probabilities and does not constitute an assessment of risk within the meaning of paragraph 4 of Annex A. Equally, Australia has failed to evaluate the likelihood of entry, establishment and spread, assigning probability values to events that almost certainly would not occur and hence are not more than remote possibilities. The risks being assessed by Australia are thus no more than the uncertainty that always remains since science can never provide absolute certainty. These are the kinds of risks the Appellate Body in *EC – Hormones* held were not to be assessed under Article 5.1.[374] Further Australia has failed to evaluate the likelihood of entry, establishment and spread in respect of all diseases "according to the SPS measures which might be applied".

4.404 Accordingly, Australia's measures are not based on a risk assessment within the meaning of Article 5.1 and paragraph 4 of Annex A of the *SPS Agreement* and Australia is thus in violation of its obligations under Article 5.1.

4.405 In addition, because the measures are not based on a risk assessment, the measures are also in breach of the requirements of Article 2.2 that measures be "based on

[374] Appellate Body Report, *EC – Hormones*, para. 186.

scientific principles" and not be "maintained without sufficient scientific evidence". Australia has also, therefore, acted inconsistently with Article 2.2.[375]

D. AUSTRALIA'S MEASURES FOR THE IMPORTATION OF NEW ZEALAND APPLES ARE INCONSISTENT WITH AUSTRALIA'S OBLIGATIONS UNDER ARTICLE 5.2 OF THE *SPS AGREEMENT*

1. The basic obligation under Article 5.2

4.406 Article 5.2 of the *SPS Agreement* provides:

> In the assessment of risks, Members shall take into account available scientific evidence; relevant processes and production methods; relevant inspection, sampling and testing methods; prevalence of specific diseases or pests; existence of certain pest- or disease-free areas; relevant ecological and environmental conditions; and quarantine or other treatment.

4.407 As the panel in *Japan-Apples* pointed out, Articles 5.1 and 5.2 "directly inform each other in that paragraph 2 sheds light on the elements that are of relevance in the assessment of risks foreseen in paragraph 1".[376] In the context of Article 5.1, the Panel said that the obligation to "take something into account" was different from an obligation to base measures on it or to ensure conformity with it.[377]

4.408 More recently, in *United States – Continued Suspension of Obligations in the EC – Hormones Dispute*, the Panel stated, "…taking available scientific evidence into account does not require that a Member conform its actions to a particular conclusion in a particular scientific study."[378]

[375] Appellate Body Report, *Australia – Salmon*, paras. 137-138.

[376] Panel Report, *Japan* – Apples, para 8.230.

[377] Panel Report, *Japan* – Apples, para 8.241.

[378] Panel Report *US – Continued Suspension*, para 7.480.

4.409 The dictionary definition of the phrase "to take into account" is "to take into consideration, notice."[379] "Consideration" includes "the keeping of a subject before the mind; attentive thought; reflection; meditation". The phrase "take into consideration" is further defined as to "make allowance for."[380]

4.410 These definitions indicate that, in ordinary usage, the process of taking a matter into account is an active one, requiring attentive thought. Rather than merely passively referring to a matter, to "take it into account" requires it to have been genuinely considered.

4.411 New Zealand's Article 5.2 argument in the present case is not that Australia failed to conform its actions to the conclusions of scientific studies. Rather it is that the IRA failed to give genuine consideration: to relevant scientific evidence; to relevant processes and production methods; to relevant inspection, sampling and testing methods; to prevalence of the relevant diseases or pests; and to relevant environmental conditions. Accordingly Australia has failed to comply with its obligations under Article 5.2.

2. Australia has failed to take into account available scientific evidence

4.412 The preceding submissions contain several examples of Australia's failure to take into account available scientific evidence in relation to all three of the pests at issue. One example is that Australia's assessment of risk fails to give genuine consideration to the scientific evidence that mature, symptomless apple fruit do not provide a pathway for the transmission of fire blight. There is no evidence that fire blight has ever been transmitted through mature apple fruit or that apple fruit have been a pathway for the disease.

4.413 This scientific evidence was reviewed by the Panel in *Japan – Apples* which concluded that:

[379] *The New Shorter Oxford English Dictionary*, Leslie Brown (ed), Volume A-M, p. 15, from the definition of "account".

[380] Ibid, pp. 485-486, from the definition of "consideration".

> …the risk that mature, symptomless apple fruit be a vector for the entry, establishment or spread of fire blight within Japan is negligible, even if infested with epiphytic *E. amylovora*.[381]

4.414 The fact that the IRA makes no reference to the Panel's conclusion in *Japan – Apples* or to its thorough review of the scientific literature, is a clear indication that the IRA did not give genuine consideration to the lack of scientific evidence that mature symptomless apples provide a pathway for the transmission of fire blight.

4.415 A further example of Australia's failure to take into account relevant scientific evidence is the IRA's treatment of the outbreak of European canker in Tasmania. The IRA considers this incident minimally at most and proceeds on the basis of assumptions about interstate and international trade in apples from Tasmania that are not based on fact. The IRA fails to take account of the relevant fact that, despite significant interstate trade in Tasmanian apples, transmission of the disease to the Australian mainland did not occur.

4.416 Australia's failure to give genuine consideration to relevant scientific evidence contravenes Article 5.2.

3. Australia has failed to take into account relevant processes and production methods

4.417 Australia has also failed in its risk assessment to take into account relevant New Zealand practices with respect to the export of apples, and has failed to take into account the practices of its own packing industry. This failure affects Australia's assessment of the risk of entry, establishment and spread of fire blight, European canker and ALCM.

4.418 The IRA's assumptions about the transmission of the pests at issue in this case rest in part on the view that apple fruit from New Zealand will be repacked at rural packing houses in close proximity to orchards. As New Zealand has pointed out, this is an assumption that bears little relationship to reality. In particular, it ignores the fact that,

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[381] Panel Report, *Japan* – Apples, paragraph 8.154.

in line with commercial requirements, New Zealand increasingly exports apple fruit to its main markets of Europe, North America and Chinese Taipei as "just-in-time" consignments in "retail-ready" packs. The same procedure would be followed for the Australian market. This practice eliminates any need for regrading and repacking in rural packing houses in close proximity to fruit crops. The IRA has therefore failed to take account of relevant New Zealand processes and production methods.

4.419 These assumptions, too, show that Australia has also failed to take into account Australian domestic packing house practices and standards. In relation to European canker the IRA states: "Orchard wholesaler waste may be dumped at a site within the premises or in landfills close to orchards. Before waste is finally disposed of, it could remain exposed to the elements (for example, in a skip) near the packing house."[382] Similar statements about the dumping of fruit are made in respect of fire blight,[383] and ALCM.[384]

4.420 No country with a fruit fly problem like that of Australia would permit packing houses to leave waste exposed to the elements.

4.421 All of these unsubstantiated assumptions about repacking of fruit and the dumping by wholesalers of large quantities of fruit near orchards reflect a clear failure to give genuine consideration to the processes and production of apple fruit in both New Zealand and Australia. Australia has failed to take into account relevant processes and production methods as required by Article 5.2 and, therefore, is in breach of that Article.

4. Australia has failed to take into account relevant inspection, sampling and testing methods

4.422 In its consideration of the likelihood of importation of ALCM, Australia ignores the inspection that would take place by AQIS officials on the entry of apples into Australia. The standard AQIS protocol is a 600 unit inspection, which is applied to

382 IRA, p. 130.

383 IRA, p. 82.

384 IRA, p. 170.

virtually all of the many hundreds of plant products imported into Australia. As New Zealand pointed out in paras. 4.345 to 4.349 above, the IRA's failure to take into account such inspection has the effect of overestimating the risk that ALCM will enter Australia. This is a clear indication that, in its assessment of risk, the IRA failed to give genuine consideration to a relevant inspection method and thus is a violation of Article 5.2.

5. Australia has failed to take into account the prevalence of the relevant diseases or pests

4.423 In assessing the likelihood that apples will be infested with ALCM,[385] Australia failed to take into account the actual prevalence of viable ALCM pupae, rather than just cocoons which are in many cases empty. The IRA reached its conclusions on prevalence on the basis of a study (Tomkins *et al*. 1994)[386] recording that 1-2% of apples in the Bay of Plenty and 11.5% of apples in the Waikato region in 1993-1994 were infested with ALCM cocoons. What the IRA ignored in its calculation of likelihood is the issue of viability of the pupae in the cocoons. Tomkins *et al.* revealed that 63% of those cocoons contained no pupae and would therefore not be viable. Another study indicates that only approximately 15% of cocoons contain viable pupae (Rogers *et al.* 2006: 3). As well as being a failure to take into account available scientific evidence, Australia has also failed to give genuine consideration to the prevalence of the relevant pest or disease (that is, the prevalence of viable ALCM pupae), in breach of Article 5.2.

6. Australia has failed to take into account relevant environmental conditions

4.424 Australia has also failed, in its assessment on the risks associated with European canker, to take into account relevant environmental conditions, by ignoring climatic conditions. The climatic conditions Australia has ignored have a bearing both on the likelihood of infection in New Zealand and on the likelihood that European canker would establish and spread in Australia.

[385] *Ibid,* pp. 159-160.

[386] Tomkins AR, Wilson DJ, Hutchings SO and June S (1994) "A survey of apple leafcurling midge (*Dasyneura mali*) management in Waikato orchards", *Proceedings of the 47th New Zealand Plant Protection Conference 1994*: http://www.hortnet.co.nz/publications/nzpps/proceedings/94/94_346.htm. 5 pp.

4.425 As described above in paragraph 4.57 no region in New Zealand has climatic conditions suitable for fruit infections in summer, hence the extremely low incidence of fruit infections in New Zealand. The climate in Australian apple production areas is not conducive to the establishment and spread of European canker. European canker requires areas of temperate latitude and a wet climate. However, these conditions are simply not present in the major Australian apple production areas.

4.426 By assuming that European canker would have an equal and significant impact across all of Australia, Australia has failed to give genuine consideration to the relevant environmental conditions. As a result, the risk of establishment and spread of European canker is significantly overstated.

4.427 Thus, by failing to take into account relevant environmental conditions, Australia has again failed to comply with its obligations under Article 5.2.

7. Conclusion on Article 5.2

4.428 As New Zealand has pointed out, the IRA fails to give genuine consideration to relevant scientific evidence, relevant processes and production methods, relevant inspection sampling and testing methods, the prevalence of relevant diseases or pests, and relevant environmental conditions. It has, therefore, failed to take these factors into account as required by Article 5.2. As a result, Australia is in violation of its obligations under Article 5.2.

4.429 As Australia's measures are inconsistent with Articles 5.1 and 5.2 of the *SPS Agreement* they are also inconsistent with Article 2.2.[387]

[387] Appellate Body Report, *Australia – Salmon*, paras. 137-138.

E. AUSTRALIA'S MEASURES FOR THE IMPORTATION OF NEW ZEALAND APPLES ARE INCONSISTENT WITH AUSTRALIA'S OBLIGATIONS UNDER ARTICLE 5.5 OF THE *SPS AGREEMENT*

1. The basic obligation under Article 5.5

4.430 Article 5.5, first sentence, provides:

> With the objective of achieving consistency in the application of the concept of appropriate level of sanitary or phytosanitary protection against risks to human life or health, or to animal and plant life or health, each Member shall avoid arbitrary or unjustifiable distinctions in the levels it considers to be appropriate in different situations, if such distinctions result in discrimination or a disguised restriction on international trade.

4.431 Article 5.5 was needed, as explained in a note by the Secretariat, because:

> …there was still ample scope for governments to succumb to political pressures to protect certain domestic industries from foreign competition through their decisions regarding acceptable levels of risk/sanitary and phytosanitary protection.[388]

4.432 In *EC - Hormones* the Appellate Body pointed out that there are three elements to be satisfied to show a breach of this provision:

> First, that the Member imposing the measure complained of has adopted its own appropriate levels of sanitary protection against risks to human life or health in several different situations.
>
> Second, that those levels of protection exhibit arbitrary or unjustifiable differences ("distinctions" in the language of Article 5.5) in their treatment of different situations.
>
> Third, that the arbitrary or unjustifiable differences result in discrimination or a disguised restriction on international trade.[389]

[388] G/SPS/W/16, *Consistency in Risk Management Decisions*; *Note by the Secretariat*, 13 June 1995, para 7.

4.433 As New Zealand will show, Australia has adopted its own appropriate levels of protection against risks to plant life or health in different situations; these levels of protection exhibit arbitrary and unjustifiable differences in their treatment in different situations; and, consistent with the 'warning signals' and other additional factors (identified by the Appellate Body in *EC – Hormones* and the Panel in *Australia – Salmon*) that are shown to be present, these differences result in discrimination and a disguised restriction on international trade.

2. Australia has adopted its own appropriate levels of protection against risks to plant life or health in different situations, for example, Nashi pears from Japan

4.434 In *EC - Hormones*, the Appellate Body stated that the situations exhibiting different levels of protection must "present some common element or elements sufficient to render them comparable".[390] In *Australia – Salmon*, the Appellate Body accepted that common elements are present where situations involve a risk of entry, establishment or spread of the same or a similar disease, or where situations involve a risk of the same or similar associated biological and economic consequences. There is no need to show that both the risk of entry, establishment or spread of the disease and the biological and economic consequences are the same or similar.[391] Moreover, as the Appellate Body pointed out in *Australia - Salmon*, it is sufficient for these situations to have in common a risk of entry, establishment or spread of only one of the diseases of concern.[392]

4.435 For the purposes of this submission, New Zealand will consider Nashi pears imported from Japan to Australia as an illustration of a situation in which Australia has a level of protection that shows arbitrary and unjustified distinctions in treatment resulting in discrimination and a disguised restriction on trade.

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[389] Appellate Body Report, *EC – Hormones*, paras. 214-215. See also Appellate Body Report, *Australia – Salmon*, para.140; and the SPS Committee's *Guidelines to further the practical implementation of Article 5.5* (G/SPS/15) adopted at its meeting of 21-22 June 200 para. 4.2.

[390] Appellate Body Report, *EC – Hormones,* para. 217. See also G/SPS/15, para A.2.

[391] Appellate Body Report, *Australia – Salmon*, para. 146. See also G/SPS/15, para A.2.

[392] Appellate Body Report, *Australia – Salmon*, paras. 146 and 152.

(a) Japanese Erwinia

4.436 The importation of Nashi pears from Japan into Australia involves a risk of the entry, establishment and spread of "Japanese Erwinia", a strain of bacterium very similar to *Erwinia amylovora.* Japanese Erwinia has not been detected in Australia. It was first reported in Japan in 1972 (Matsuura *et al.* 2007: 53).[393] Japan claims that it is restricted to the Hokkaido prefecture (Matsuura *et al.* (2007) 53). Japan also reports that it is free of *E. amylovora* (the organism that causes fire blight in apples).

4.437 Japanese Erwinia is very hard to differentiate from *E. amylovora.* Each produces very similar symptoms and analysis at the molecular level is used to distinguish between the two (Kim *et al.* 2001: 2951 and Shrestha *et al*. 2007: 1023).[394] A difference between them is that, in the field, Japanese Erwinia has only been recorded on pears[395] whereas *E. amylovora* has been reported on apples and pears.

4.438 Given the close similarities between *E. amylovora* and Japanese Erwinia, the establishment and spread of the disease in Australia involves comparable biological and economic consequences for Australia. Australia has a large domestic pear production industry, comprising more than 2.1 million trees with an annual production of over 150,000 tonnes of fruit.[396]

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[393] **Exhibit NZ-67:** Matsuura T, Shinohara H, Inoue Y, Azegami K, Tsushima S, Tsukamoto T, Mizuno A (2007) "Erwinia isolates from the bacterial shoot blight of pear in Japan are close", *Journal of General Plant Pathology* 73, 53-58.

[394] **Exhibit NZ-68:** Kim WS, Hildebrand M, Jock S and Geider K (2001) "Molecular comparison of pathogenic bacteria from pear trees in Japan and fireblight pathogen *Erwinia amylovora*", *Microbiology* 147, 2951-2959, and Shrestha R, Lee SH, Kim JE, Wilson C, Choi SG, Park DH, Want MH, Hur JH and Lim CK (2007) "Diversity and detection of Korean Erwinia pyrifoliae strains as determined by plasmid profiling, phylogenetic analysis and PCR", *Plant Pathology* 56, 1023-1031.

[395] Japanese Erwinia has, however, been reported to cause infection in apples in laboratory trials in the United States. See **Exhibit NZ-69:** Australian Quarantine and Inspection Service, "Final import risk analysis of the importation of fruit of Fuji apple (*Malus pumila* Miller var. *domestica* Schneider) from Aomori prefecture in Japan", December 1998, Canberra, p. 7.

[396] **Exhibit NZ-70:** Australian Bureau of Statistics, "Agricultural Survey of Apples and Pears Australia 2004-5", 17 February 2006, Canberra, p. 1.

4.439 Australia has imported Japanese Nashi pears since 1989.[397] No IRA for Japanese Nashi pears has been released by Australia and Australia applies no measures specifically relating to Japanese Erwinia other than a requirement to report its presence if detected in a production area.[398] This substantial difference in sanitary measures applied by Australia to Nashi pears from Japan is evidence of a clear difference in the level of protection applied when compared to apples from New Zealand.[399]

(b) Brown rot

4.440 The importation of Nashi pears from Japan also involves the risk of the entry, establishment or spread of *Monilinia fructigena*, a fungal disease which is similar in many respects to European canker, causing fruit rots in apples and pears (Byrde and Willetts 1977: 4-9).[400] However, *Monilinia fructigena* has a wider range of host plants, given that it is also a significant disease of apricot, cherry, peach and plum, which European canker is not (Byrde and Willetts 1977: 5-6). While Japan reports that it is free of European canker (*N. galligena)*, brown rot has been observed in several Prefectures in Japan since at least 1986 (CABI/EPPO 2000).[401] Australia is free of brown rot.

4.441 Like European canker, brown rot is transmitted by spores and can infect both pears and apples, usually through natural openings or wounds. Apparently healthy fruit can be infected without showing any symptoms (Byrde and Willetts 1977: 108-109). The

[397] Between 1994 and 2004 Japan exported an average of 50 tonnes of pears per year to Australia. Data extracted from the World Trade Atlas.

[398] A BA publication on the findings of a 2003 review of Australian requirements for petal testing sets out a summary of the "Arrangement between Australian and Japan for the shipment of pears from Japan to Australia". It indicates that, while the arrangement between Australia and Japan contains various measures for other pests and diseases, Australia appears to apply no measures for Japanese Erwinia other than the requirement referred to concerning reporting in the event of detection in a production area. See **Exhibit NZ-71:** Biosecurity Australia *Review of the Australian Requirement for Petal Testing and Flower Cluster Examination at Blossoming for Pome Fruit from Japan, The Republic of Korea and The People's Republic of China*, January 2003, Canberra, pp. 61-63.

[399] Panel Report, *Australia – Salmon,* para. 8.129.

[400] **Exhibit NZ-72:** Byrde, RJW and Willetts HJ (1977) *The Brown Rot Fungi of Fruit: their biology and control*, Pergamon Press, Oxford, UK, pp. 4-9 and 108-109.

[401] CABI/EPPO (2000) *Monilinia fructigena*, Distribution Maps of Plant Diseases, Map No 22, Wallingford, UK: CAN International.

scientific evidence is clear that pears that are latently infected with brown rot *do* produce spores after removal from cold storage (Snowdon 1990: 180).[402] As shown earlier in this submission, this is not the case for European canker. Pears are therefore a potential vector of brown rot, unlike apples in respect of European canker. Thus the risk of Nashi pears from Japan transmitting brown rot is significantly higher than any risk of apples from New Zealand transmitting European canker.

4.442 Given the similarities between brown rot and European canker, the substantial Australian pear production industry referred to in the section of this submission addressing Japanese Erwinia, as well as Australia's production of apricots, cherries, peaches and plums, and the wider host range for brown rot, the establishment and spread of brown rot in Australia would involve greater biological and economic consequences for Australia than those involved with European canker.

4.443 While no IRA has been released for Japanese Nashi pears, the summary of the Arrangement in place between Japan and Australia contained in Australia's 2003 petal testing publication[403] indicates that, notwithstanding the higher risk profile for Japanese Nashi pears, Australia applies less restrictive measures regarding brown rot on these fruit. Those measures include a requirement (as is a common practice in Asia) that the fruit be bagged[404] while less than 25mm in diameter and sourced from disease-free areas.[405] Area freedom is established through orchard surveys completed by Japanese Prefectural officials, and is confirmed by an inspection of a "sample of export orchards" by one AQIS pre-clearance inspector. In contrast with the measures for apples from New Zealand, there are no requirements related to: the intensity and frequency of the surveys; AQIS involvement in the orchard survey; or in respect of pruning. Again, this substantial

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[402] **Exhibit NZ-99:** Snowdon, AL (1990) *A Colour Atlas of Post Harvest Diseases and Disorders of Fruits and Vegetables*, Wolfe Scientific, University of Cambridge, p. 180.

[403] **Exhibit NZ-71:** Biosecurity Australia, *Review of the Australian Requirement for Petal Testing and Flower Cluster Examination at Blossoming for Pome Fruit from Japan, The Republic of Korea and The People's Republic of China*, January 2003, Canberra, pp. 61-63.

[404] It is common practice in Asia to bag fruit for cosmetic reasons.

[405] **Exhibit NZ-71:** Biosecurity Australia *Review of the Australian Requirement for Petal Testing and Flower Cluster Examination at Blossoming for Pome Fruit from Japan, The Republic of Korea and The People's Republic of China*, January 2003, Canberra, p. 61.

difference in the sanitary measures imposed is evidence of a clear difference in the levels of protection applied.[406]

3. The levels of protection adopted by Australia exhibit arbitrary or unjustifiable differences in their treatment of different situations

4.444 Whether differences in appropriate levels of protection are arbitrary or unjustifiable has to be determined on a case-by-case basis.[407] In *Australia – Salmon*, the panel gave weight to the fact that less onerous measures had been imposed in respect of the comparator situations than in the case of the situation being challenged, even though the evidence pointed in the direction of a higher degree of risk in the case of the comparator situations.[408]

4.445 In the present case, Australia seeks to eradicate completely the negligible risk of fire blight being vectored by New Zealand apples, yet is willing to tolerate, without *any* efforts at mitigation, the risk of Japanese Erwinia from Japanese pears. Given the comparable risk profiles at issue, this significant difference in treatment constitutes an arbitrary and unjustifiable distinction in the levels of protection.

4.446 In the case of European canker, again Australia seeks to eradicate completely the negligible risk of New Zealand apples vectoring European canker, but applies less restrictive measures with regard to brown rot in Japanese pears. The New Zealand measures require that prior to standard winter pruning, all trees in all rows of all orchards/blocks registered for export to Australia be inspected (using ladders if needed) for symptoms of European canker. The inspection requirements for brown rot in pears from Japan are much less prescriptive. They simply require that pears be sourced from disease-free areas with area freedom being established through orchard surveys by prefectural officials.

[406] Based on the assumption made in Panel Report, *Australia – Salmon,* para.8.129.

[407] G/SPS/15, para. A.2.

[408] Panel Report, *Australia – Salmon*, para. 8.137.

4.447 In addition to applying very prescriptive inspection requirements for New Zealand apples, Australia also requires that AQIS officials be involved in *all* such inspections. For Japanese pears however, inspections for area freedom are done by Japanese prefectural officials only, with AQIS involvement limited to one AQIS pre-clearance inspector inspecting just a "sample of export orchards".[409]

4.448 Finally, Australia imposes on New Zealand the requirement that an orchard/block be suspended for the season on the basis that any evidence of pruning or other activities carried out before the inspection could constitute an attempt to remove or hide symptoms of European canker. No such requirement is applied in respect of Japanese pears.

4.449 The requirement that AQIS be involved in orchard inspections, packing house procedures and fruit inspections, is a particularly arbitrary and unjustifiable distinction. The efficacy of the New Zealand system has received broad international acceptance. Indeed, Australia does not require such AQIS involvement for the import of any other New Zealand fruit or other plant product. In particular, Australia has not indicated concerns in other contexts about the veracity, reliability and effectiveness of New Zealand's phytosanitary inspection systems. Nor, in fact, does the IRA raise any specific concern with New Zealand's verification systems.

4.450 In a different but comparable context, Australian comments appear to support the conclusion that the level of involvement of AQIS officials required by Australia in the case of New Zealand apples is an arbitrary and unjustifiable distinction. In a recent submission to the Japanese Government on the Japanese Regulatory Reform Program, Australia requested that the Japanese requirement for Japanese supervision of Australian pre-export treatments of certain fruit and vegetable exports be "converted to a full pre-clearance procedure" on the basis that:

[409] **Exhibit NZ-71:** Biosecurity Australia, *Review of the Australian Requirement for Petal Testing and Flower Cluster Examination at Blossoming for Pome Fruit from Japan, The Republic of Korea and The People's Republic of China*, January 2003, Canberra p. 61.

> Australia believes that supervision of pre-export treatments in Australia by Japanese officers duplicates the inspection and certification activities undertaken by [AQIS] in compliance with the Australian Export Control Act.
>
> Australia is concerned that Japanese actions indicate a lack of confidence in the ability and integrity of AQIS officers in undertaking duties that are prescribed by Australian Federal legislation…[410]

4.451 In sum, in relation to measures applied by Australia in the examples given of Japanese pears, the levels of protection Australia considers appropriate in different situations exhibit arbitrary and unjustifiable distinction.

4. The arbitrary and unjustifiable distinctions in the levels of protection adopted by Australia in different situations result in discrimination or a disguised restriction on international trade.

4.452 In seeking to determine whether the arbitrary or unjustifiable distinctions in levels of protection result in discrimination or a disguised restriction on international trade, panels and the Appellate Body have looked to "warning signals" and other additional factors. In *Australia - Salmon*, the Appellate Body accepted the relevance of the three "warning signals" and two "additional factors" identified by the Panel and upheld the Panel's finding that, considered cumulatively, the warning signals and other factors led to the conclusion that the levels of protection imposed by Australia in that case resulted in a disguised restriction on trade.[411]

4.453 As New Zealand will point out, many of the warning signals identified by the Panel in *Australia - Salmon* are found in the present case, along with various other additional factors which cumulatively show that the distinctions in levels of protection imposed by Australia in this case result in a disguised restriction on trade.

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[410] **Exhibit NZ-33:** Australian Government, Department of Foreign Affairs and Trade (2005) *2005 Submission of the Australian Government to the Japanese Government on the Regulatory Reform Program*, Canberra, pp. 9-10.

[411] Appellate Body Report, *Australia – Salmon*, paras. 159-178, in particular para. 177.

(a) Warning Signal 1 – "Arbitrary and unjustifiable character of differences in the level of protection"

4.454 In *EC - Hormones* the Appellate Body said that the arbitrary or unjustifiable character of differences in levels of protection:

> …may in practical effect operate as a 'warning' signal that the implementing *measure* in its application *might* be a discriminatory measure or *might* be a restriction on international trade disguised as an SPS measure.[412]

4.455 As has been pointed out above, the arbitrary and the unjustifiable nature of the differences in levels of protection in this case is clear. Thus, the first warning signal for a disguised restriction on trade is present.

(b) Warning Signal 2 – "Extent of the difference in levels of protection"

4.456 In *EC - Hormones* the Appellate Body said:

> …the degree of difference, or the extent of the discrepancy, in the levels of protection, is only one kind of factor which, along with others, may cumulatively lead to the conclusion that discrimination or a disguised restriction on international trade in fact results from the application of a measure.[413]

4.457 In *Australia - Salmon* the Appellate Body noted that the degree of difference found by the panel was "rather substantial" and on that basis it could be considered as a separate warning signal in that case.[414]

4.458 In the present case, in relation to fire blight, a multitude of measures have been applied to New Zealand apples, affecting all stages of the exportation of the fruit from the

[412] Appellate Body Report, *EC – Hormones*, para. 215. Emphasis in original. This 'warning' signal was relied on by the Panel in *Australia – Salmon*, and the Appellate Body did not interfere with the Panel's finding on this point. See Appellate Body Report, *Australia – Salmon*, paras. 161-162.

[413] Appellate Body Report, *EC – Hormones*, para. 240; confirmed in Appellate Body Report, *Australia – Salmon*, para. 163 and Panel Report, *Australia – Salmon*, para. 8.150.

[414] Appellate Body Report, *Australia – Salmon*, para. 164.

orchard to the packing house, including the requirement that AQIS be involved in all these steps. And the measures are intrusive and costly. However, in stark contrast, no such measures are applied to Japanese pears for Japanese Erwinia. This is without question a very substantial degree of difference.

4.459 In respect of European canker, again multiple measures have been applied to New Zealand apples, including the requirement that 100% of registered orchards be inspected for the disease before normal winter pruning, with AQIS involvement in those inspections. By contrast, in the case of pears from Japan, a product with a higher risk profile, the measures are less prescriptive. They include the requirement that pears be bagged and sourced from disease-free areas. Area freedom is permitted to be established by Japanese officials, subject only to confirmation by one AQIS official based on an inspection of only a sample of export orchards. By contrast, the New Zealand measures require the involvement of AQIS officials in *all* inspections. Given the greater risk posed by brown rot in Japanese pears, this is also a very substantial degree of difference.

4.460 There is a substantial difference between the intrusive, onerous and costly requirements unnecessarily imposed on the importation of apples from New Zealand, and the simpler measures in the case of pears from Japan. These significant differences constitute the second warning signal.

(c) Warning Signal 3 – "Inconsistency of the measures at issue with Article 5.1 of the SPS Agreement*"*

4.461 In *Australia - Salmon*, the Appellate Body agreed with the Panel that the fact that there was no risk assessment or that there was an insufficient risk assessment was also a warning signal of a disguised restriction on international trade. The lack of a risk assessment or an insufficient risk assessment was, in the Appellate Body's view, a strong indication that the measure was a "trade restrictive measure taken in the guise of an SPS measure."[415]

[415] Appellate Body Report, *Australia – Salmon*, para. 166.

4.462 As New Zealand has earlier established, since the IRA does not constitute a risk assessment within the meaning of Annex A to the *SPS Agreement*, Australia has failed to comply with Article 5.1. Accordingly, this constitutes the third warning signal that Australia's measures constitute a disguised restriction on international trade.

(d) Additional factor 1 - Level of politicisation in the New Zealand apples IRA process

4.463 The fourth signal that Australia's measures are discriminatory and constitute a disguised restriction on international trade is the level of Australian political involvement in the New Zealand apples IRA process. As explained above, in response to the Australian industry's economic concerns, the New Zealand apples IRA process: was subject to a number of Senate inquiries;[416] had a high profile domestically in Australia and figured in federal elections;[417] and there were numerous changes to the IRA process itself over the period in which the New Zealand requests were under consideration.[418]

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[416] An indication of relevant Senate activities are found in: **Exhibit NZ-75**: Commonwealth of Australia *The proposed importation of fresh apple fruit from New Zealand*, Interim report, Senate Rural and Regional Affairs and Transport Legislation Committee, July 2001, Canberra; **Exhibit NZ-76:** Commonwealth of Australia, *The proposed importation of fresh apple fruit from New Zealand; Government response to the recommendation of the Senate Rural and Regional Affairs and Transport Legislative Committee's interim report*, March 2003, Canberra; **Exhibit NZ-77:** Commonwealth of Australia *Official Committee Hansard, Senate Rural and Regional Affairs and Transport Legislation Committee; Reference: Import risk assessment on New Zealand apples*, 31 March 2004, Canberra; **Exhibit NZ-78:** Commonwealth of Australia *Official Committee Hansard, Senate Rural and Regional Affairs and Transport Legislation Committee; Reference: Import risk assessment on New Zealand apples*, 30 June 2004, Canberra.; **Exhibit NZ-79:** Commonwealth of Australia *Official Committee Hansard, Senate Rural and Regional Affairs and Transport Legislation Committee; Reference: Import risk assessment on New Zealand* apples, 9 February 2005, Canberra.; **Exhibit NZ-80:** Senate Rural and Regional Affairs and Transport Legislation Committee *Administration of Biosecurity Australia – Revised draft import risk analysis for apples from New Zealand*, March 2005, Canberra.; **Exhibit NZ-81:** Commonwealth of Australia *Official Committee Hansard; Senate Standing Committee on Rural and Regional Affairs and Transport; Reference: Biosecurity Australia briefing*, 22 March 2007, Canberra; **Exhibit NZ-82:** Commonwealth of Australia *Official Committee Hansard; Senate Standing Committee on Rural and Regional Affairs and Transport; Reference: Import risk analysis for apples from New Zealand follow-up hearing*, 9 May 2007, Canberra; **Exhibit NZ-83:** Senate Standing Committee on Rural and Regional Affairs and Transport, *Administration of the Department of Agriculture, Fisheries and Forestry, Biosecurity Australia and Australian Quarantine and Inspection Service in relation to the final import risk analysis report for apples from New Zealand*, June 2007, Canberra.

[417] By way of examples of relevant parliamentary records and media reporting: **Exhibit NZ-84:** Parliament of New South Wales *Legislative Assembly Hansard*, *New Zealand apples*, Urgent motion, 11 October 2000, 3.26pm; **Exhibit NZ-86:** Parliament of New South Wales *Legislative Assembly Hansard, New Zealand apple and pear importation*, Urgent motion, 6 March 2001, 3.50pm.; and **Exhibit NZ-87:** "Quarantine and Border Protection" *A Stronger Economy, a Stronger Australia*, the Howard Government

4.464 This level of political involvement is in marked contrast to that for Japanese pears.[419] Access for Japanese pears was granted in 1989 and confirmed in 2003 without there being any indication of an import risk analysis having been completed and there has been no Senate inquiry into the issue of access for Japanese pears.

4.465 A further reflection of the level of politicisation of the IRA process is Australia's decision to use the semi-quantitative model for the assessment of risks related to the importation of New Zealand apples. As outlined in B.2 of the SPS Committee's Guidelines, Members are expected to establish common approaches to assessing risks:

> A Member should establish *common approaches or consistent procedures* for use by the authorities assessing risks and evaluating the measures which might be applied to achieve the desired levels of protection. In particular, a common approach should be developed with respect to risks affecting human life or health, a common approach for consideration of risks to animal life or health, *and a common approach for risks to plant life or health*.[420]

Election Policy 2004; **Exhibit NZ-85:** comprising Adam Fricker "Aussies anti NZ apples" *Rural News*, 3 April 2000; Steven Dally "Fruit growers plan to target shaky Lib seats" *The Mercury*, 30 October 2000; Brendan Pearson "Lobby against NZ apple imports" *Australian Financial Review*, 9 October 2000; Adrian Tame "Blockade threat over NZ apples" *Sunday Herald Sun*, 10 December 2000; "Ruling out imports" *Forbes NSW Regional*, 24 April 2004; "Growers lobby against imports" *Stanthorpe Boarder Post*, 13 May 2004; "Lawrence's fighting words" *Daily News Warwick*, 15 May 2004; Jim Hawtin "State will fight for fruit growers" Business News, 10 June 2004; "Officer quizzed by MPs" *Country News*, Shepparton, 21 June 2004; "Coalition will drop apple IRA if re-elected" *Rural News*, 30 September 2004; Hon Dr Sharman Stone MP "Stone reiterates concern with IRA on NZ apples" Media Release, 19 December 2006.**Exhibit NZ-91:** Sally Edgar, "AQIS Stalls on NZ Apple Report", *The Land*, 31 August 2001; and **Exhibit NZ-92: "**Games Delay Apples", *Rural News*, 18 September 2000; **Exhibit NZ-73:** "Aussie MP seeks law to permanently ban NZ apples" *Fairfax Newspapers*, Wednesday 1 February 2006 (NZPA internet service); **Exhibit NZ-74:** Jim Hawton "State will fight for fruit growers" *Business News*, 10 June 2004, p. 25.

[418] An indication of changes to the IRA process can be found in: Biosecurity Australia (2001) *Plant Biosecurity Policy Memorandum 20001/11; Import Risk Analysis – Fresh Apples from New Zealand, 24 May 2001*, Department of Agriculture, Fisheries and Forestry – Australia, Canberra; Biosecurity Australia (2001) *Plant Biosecurity Policy Memorandum 20001/22; Import Risk Analysis – Apples from New Zealand, 8 October 2001*, Department of Agriculture, Fisheries and Forestry – Australia, Canberra; Biosecurity Australia (2004) *Plant Biosecurity Policy Memorandum 2004/22; New Arrangements to Import Risk Analysis, 16 August 2004*, Department of Agriculture, Fisheries and Forestry, Canberra; Biosecurity Australia (2005) *Plant Biosecurity Policy Memorandum 2005/03, 24 February 2005, Plant Biosecurity – Variation to Administrative Procedures*, Biosecurity Australia, Canberra.

[419] The only other plant product imported into Australia which has been subject to a Senate Inquiry is bananas from the Philippines. In that case, however, there was only a single Senate Inquiry.

[420] G/SPS/15, para.B2. Emphasis added.

4.466 However, Australia did not use a common approach to assessing the risks related to New Zealand apples. Instead of using its usual qualitative approach, it used the novel semi-quantitative method. Australia states in the IRA that it "generally undertakes pest risk analyses using a qualitative approach", and explicitly acknowledges that it adopted a semi-quantitative risk analysis for New Zealand apples in order to respond to "issues raised by some stakeholders".[421]

4.467 Australia's IRA for New Zealand apples is one of only two occasions out of approximately twenty-nine current or concluded risk analyses for imported plant products where Australia has used a semi-quantitative method of risk analysis. The only other occasion - bananas from the Philippines - was, like apples from New Zealand, a highly politically sensitive process (and also became the subject of WTO dispute settlement proceedings).

4.468 An additional reflection of the level of politicisation of the IRA process is found in the composition of the Risk Analysis Panel, subsequently known as the IRA team, which included amongst its members an Australian apple grower[422] and former President of the Australian Apple Pear Growers Association (AAPGA). Given that the IRA team appears to have worked by consensus,[423] this means that an individual whose financial interests would be affected if the doors were opened to the importation of New Zealand apples into Australia, had a direct part in all decisions taken by the team.

4.469 Australia was well aware of the need for impartiality. In announcing the proposed membership of the IRA team in 2002, Australia noted that its composition had been determined based on criteria including:

> absence of conflict of interest — any member would need to declare that their sources of income and/or representational responsibilities would not prevent them from providing

[421] IRA, p. 11.

[422] Former AAPG Chair, Mr Ian Armour, Managing Director of JE Armour and Sons Pty Ltd and Armour's Apples Pty Ltd, comprising an apple growing/packing business.

[423] **Exhibit NZ-100:** Department of Agriculture Fisheries & Forestry (2001), *Draft Administrative Framework for Import Risk Analysis: A Handbook,* p. 19.

impartial and independent advice; this is to ensure their membership of the IRA team would not put at risk stakeholder confidence in the scientific basis of the IRA.[424]

4.470 However, notwithstanding this, following recommendations from the Australian Senate, in 2002 the industry member already referred to was appointed to the IRA team. Other Australian IRA teams have not included industry participants. Public comments made by a senior Australian quarantine official at the time of the appointment acknowledge the clear conflict of interests created.[425]

4.471 In sum, there is a substantial difference in the level of political involvement in the development of the New Zealand apples IRA compared to the development of measures relating to Japanese pears. The presence of this "additional factor" of politicisation is a warning signal leading to the conclusion that the difference in levels of protection imposed by Australia have resulted in a disguised restriction on trade.

(e) Additional factor 2 – Undue delay

4.472 As set out in a subsequent section of this submission addressing the inconsistency of the measures at issue with Article 8 and Annex C(1)(a) of the *SPS Agreement*, Australia's process for considering New Zealand's request for access for New Zealand apples to the Australian market was delayed well beyond any reasonable period of time for considering the request.

4.473 New Zealand first formally requested access for apples to the Australian market in 1986. New Zealand's fourth and most recent request was lodged in 1999. The measures were not formally endorsed until March 2007. (Annex 1 sets out the chronology of the process.)

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[424] **Exhibit NZ-101:** Biosecurity Australia *Plant Biosecurity Policy Memorandum 2001/22; Import risk analysis – apples from New Zealand*, 8 October 2001, Canberra.

[425] In responding to news reports that apple and pear growers had "w[o]n the right to have a grower sit on an independent panel" and assess the risk of New Zealand apples entering Australia, the then head of Biosecurity Australia, Mary Harwood, was reported as agreeing that Mr Armour's appointment could be seen as compromising the independence of the panel. She is quoted as saying "It is a potential issue…but…essentially we're responding to a recommendation that…we need some more expertise on the panel in that area of industry, process and trading patterns. So that's what we've done." **Exhibit NZ-90:** "Apple grower added to risk panel", ABC National Rural News, 10 January 2002.

4.474 This additional factor is a further warning signal that Australia's measures are discriminatory and constitute a disguised restriction on international trade.

(f) Additional factor 3 – Absence of controls on the internal movement of apples

4.475 In *Australia - Salmon*, the Appellate Body held that arbitrary or unjustified domestic standards – that is, the absence of similarly strict sanitary measures applied in comparable domestic circumstances - can also be taken into account in relation to the third element of Article 5.5.[426]

4.476 Here, the Australian measures for European canker applied to apples from New Zealand are substantially at odds with the domestic standards put in place in Australia to deal with an outbreak of European canker in Tasmania during the period 1954 – 1991 (Ransom 1997).[427] While the movement of apple planting material out of Spreyton was prohibited after detection of the disease, there were no restrictions in place on the movement of apple fruit.[428] Nor was any restriction placed on movement of apple planting material out of Tasmania itself. Australia justifies this discriminatory treatment in the IRA on the basis that:

> …it is possible that in 1955, when the proclamation prohibiting movement of planting material was put in place, production in Spreyton was even smaller and there was no significant movement of fruit out of that area. The quarantine authorities at the time may have concluded that the small volume of fruit that would be moved out of the Spreyton area did not constitute an unacceptable risk.[429]

4.477 However, as noted above at paragraph 4.94, information from the *Tasmanian Yearbook* and the *Statistics for the State of Tasmania* suggest there was significant apple production in Tasmania the 1920s onwards, including over 100,000 tonnes per year in the

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[426] Appellate Body Report, *Australia - Salmon*, para. 176.

[427] Ransom LM (1997) "The eradication of *Nectria galligena* from apple trees in Tasmania, 1954 to 1991" *Australasian Plant Pathology* 26(2), 121-125. European canker is thought to have been present for at least 20 years prior to identification in 1954. Eradication was declared in 1991.

[428] **Exhibit NZ-42:** Tasmanian State Proclamation, 16 August 1955, under the Plant Diseases Act 1930.

[429] IRA, p. 155.

1940s when European canker was believed to be present (Ransom 1997: 121) (see Annex 5). Further, the relevant trade data suggests that the volume of apple fruit that moved out of Spreyton was not small. On average, 3,910 tonnes of apples were produced from the Spreyton area between 1970 and 1976 (the only years for which statistics identifying Spreyton have been readily available). Of those, 58% were exported to other countries. Of the remaining 30% (more than 1,500 tonnes per year), 12% were sent for processing and 30% were distributed throughout Tasmania and Australia (see Annex 5).

4.478 Given that Australia saw no reason to restrict the movement of apple fruit during the period between the 1954 confirmation and declaration of an outbreak of European canker in Tasmania and the declaration of its eradication in 1991, it is hard to see how Australia can justify the extensive and onerous measures for European canker applied to New Zealand apples.

4.479 This additional factor – the arbitrary approach taken by Australia to the application of domestic standards to the outbreak of European canker in Tasmania – is another clear warning signal.

5. Conclusion on Article 5.5

4.480 In sum, when all the "warning signals" and "additional factors" outlined above are considered cumulatively, it is clear that the distinctions in level of protection imposed by Australia for, on the one hand, Japanese pears and, on the other hand, New Zealand apples, result in a discrimination or disguised restriction on international trade in the sense of the third element of Article 5.5.[430]

4.481 In light of the above, Australia has failed to avoid making arbitrary and unjustifiable distinctions in the measures that it considers appropriate in different situations and these distinctions have resulted in discrimination and a disguised restriction on international trade. Thus, Australia is in violation of its obligations under Article 5.5 of the *SPS Agreement*.

[430] Appellate Body Report, *Australia - Salmon*, para. 177.

F. Australia's measures for the importation of New Zealand apples are inconsistent with Australia's obligations under Article 2.3 of the *SPS Agreement*

4.482 Article 2.3 provides:

> Members shall ensure that their sanitary and phytosanitary measures do not arbitrarily or unjustifiably discriminate between Members where identical or similar conditions prevail, including between their own territory and that of other Members. Sanitary and phytosanitary measures shall not be applied in a manner which would constitute a disguised restriction on international trade.

4.483 As noted by the Appellate Body in *Australia - Salmon*, a finding of violation of 5.5 will necessarily imply a violation of Article 2.3.[431] Since Australia is in this case in violation of its obligations under Article 5.5, it is accordingly also in violation of its obligations under Article 2.3.

G. Australia's measures for the importation of New Zealand apples are inconsistent with Australia's obligations under Article 5.6 of the *SPS Agreement*

1. The basic obligation under Article 5.6

4.484 Article 5.6 of the *SPS* Agreement provides:

> Without prejudice to paragraph 2 of Article 3,[432] when establishing or maintaining sanitary or phytosanitary measures to achieve the appropriate level of sanitary or phytosanitary protection, Members shall ensure that such measures are not more trade-

[431] Appellate Body Report, *Australia - Salmon*, para. 252.

[432] Article 3.2 states that measures which conform to international standards shall be deemed to be necessary to protect human, animal or plant life or health, and presumed to be consistent with the relevant provisions of the SPS Agreement and of GATT 1994. Here Australia does not claim to have based any of its measures on international standards.

restrictive than required to achieve their appropriate level of protection, taking into account technical and economic feasibility.[433]

4.485 The footnote to Article 5.6 clarifies the meaning of "technical and economic feasibility":

> For the purposes of paragraph 6 of Article 5, a measure is not more trade-restrictive than required unless there is another measure, reasonably available taking into account technical and economic feasibility, that achieves the appropriate level of sanitary or phytosanitary protection and is significantly less restrictive to trade.

4.486 In short, Article 5.6, which as the Panel in *Australia-Salmon* said should be read in light of Article 2.2,[434] imposes an obligation on a WTO Member not to establish or maintain sanitary or phytosanitary measures that are more trade-restrictive than required to achieve its ALOP.

4.487 In *Australia - Salmon*, the Appellate Body confirmed that the footnote to Article 5.6 put in place a three-pronged test to establish a violation of Article 5.6. The three elements were cumulative in the sense that each had to be established.[435] The three elements of the Article 5.6 test are that the SPS measure:

> is reasonably available taking into account technical and economic feasibility;
>
> achieves the Member's appropriate level of sanitary or phytosanitary protection; and
>
> is significantly less restrictive to trade than the SPS measure contested.

4.488 New Zealand will show that each element is met in this case and, therefore, that Australia's measures are inconsistent with Article 5.6.

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[433] "Appropriate level of sanitary or phytosanitary protection" is defined in Annex A of the SPS Agreement as "The level of protection deemed appropriate by the Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory."

[434] Panel Report, *Australia - Salmon*, para. 8.165.

[435] Appellate Body Report, *Australia-Salmon*, para. 194.

2. There are alternative measures in respect of fire blight and European canker that are reasonably available, that would meet Australia's ALOP and that are significantly less trade restrictive than the measures imposed by Australia

4.489 There is a very simple and straightforward measure which accords with the scientific evidence on the transmission of fire blight and European canker that could have been imposed by Australia. It is the restriction of imports to apple fruit that are mature and symptomless. As New Zealand will show, such a measure is reasonably available, it would achieve Australia's ALOP and it is significantly less trade restrictive than the measures imposed by Australia.

4.490 With regard to fire blight, alternative measures that would also be reasonably available, be less trade restrictive and achieve Australia's ALOP include restricting apple fruit imports to those fruit that have been cold stored, or limiting imports to apples that are "retail-ready packaged fruit." Such measures have little justification, however, as they would be based on an assumption that mature, symptomless apples could be a vector for the transmission of fire blight. Since there is no scientific basis for any such assumption, New Zealand will restrict its consideration to the alternative measure of restricting imports to mature, symptomless apple fruit.

4.491 With regard to European canker, alternative measures that would also be reasonably available, be less trade restrictive and achieve Australia's ALOP include restricting imports of apples to those that are sourced from "pest-free places of production", to be determined by a single inspection of each exporting orchard and maintained through controls on the subsequent movement of nursery stock, or limiting imports to apples sourced from areas of "low pest prevalence" to be determined by inspection of a sample of orchards. Again, such measures are without justification, as they would be based on an assumption that mature, symptomless apples could transmit European canker, and an assumption that the climatic conditions in Australia are conducive to European canker establishing and spreading. Since there is no scientific basis for either assumption, New Zealand will restrict its consideration to the alternative measure of restricting imports to mature, symptomless apples.

(a) Restricting imports of apples from New Zealand to mature, symptomless apples is a reasonably available measure, taking into account technical and economic feasibility

4.492 International fruit buyers, for example major supermarkets in Europe and North America, require New Zealand apples to meet the minimum standards of Pipfruit New Zealand, Class 1 export standard. That standard includes the requirement that apples meet maturity indices and are symptomless.[436]

4.493 New Zealand's pipfruit industry has quality control measures for apple fruit at both pre-harvest and post-harvest steps that ensure that the final exported product satisfies the Pipfruit New Zealand, Class 1 export standards for maturity. Prior to an orchard's anticipated harvest date, fruit is sampled and maturity-related tests are completed, including flesh firmness, starch pattern index, background colour and soluble solids (brix) testing.[437] The results of the testing inform when harvest is to take place. Samples are then taken twice weekly until it is confirmed that the fruit has reached maturity.[438] Once fruit is harvested, a second check for maturity is conducted in the packing house. Packing houses employ Quality Inspectors, who ensure that the fruit meet all relevant quality standards, and conduct routine grading out of any sub-standard fruit.

4.494 The post and pre-harvest controls mean that the likelihood of immature fruit being exported is extremely low. In fact, there are no records of New Zealand having exported immature apple fruit. In any event, to do so would make no commercial sense – any shipment of immature apple fruit would be rejected by the importer at the border, and

[436] **Exhibit NZ: 93** Pipfruit New Zealand Incorporated "Best Practice Guidelines for Production, Harvest, Cool-chain and Packing of New Zealand Pipfruit Industry: Quality Recommendations", 21 January 2005, Version 3, pp. 11, 22 and 23.

[437] *Ibid.*

[438] For multi-pick varieties involving multiple harvestings from the same trees, after the initial harvest triggered when physiological maturity levels have been attained, subsequent harvests then rely on colour as the main picking determinant.

would result in economic loss for the exporter and perhaps more importantly loss of reputation for both the exporter and the industry.

4.495 A requirement that New Zealand apple exports to Australia be mature, symptomless fruit would simply make current practice mandatory and is certainly a reasonably available measure. A measure requiring that apples be mature and symptomless is technically and economically feasible.

4.496 The availability and technical and economic feasibility of a measure restricting imports to mature symptomless apples was recognised by the compliance panel in *Japan – Apples (Article 21.5 – US)*. It found an identical alternative measure proposed by the US - that all imported apples be mature and symptomless - to be "undeniably 'reasonably available taking into account technical and economic feasibility' since this is the requirement already applied to export apples under the United States' Apple Export Act."[439]

4.497 In sum, a measure requiring that imports be restricted to mature, symptomless apples complies with the first element of the Article 5.6 test, in that it is reasonably available taking account of technical and economic feasibility.

(b) Restricting imports of New Zealand apples to mature, symptomless fruit would achieve Australia's ALOP in relation to fire blight and European canker

4.498 In the IRA, Australia states that its ALOP "is currently expressed as providing a high level of sanitary or phytosanitary protection aimed at reducing risk to a very low level, but not to zero."[440] Restricting imports of apple fruit to mature, symptomless apples would meet this level of protection.

4.499 As has been explained earlier, there is no scientific evidence that mature apple fruit can provide a pathway for the transmission of fire blight into Australia. Unrestricted trade in apple fruit has never been associated with the introduction of fire blight into any

[439] Panel Report, *Japan - Apples (Article 21.5 – US)*, para. 8.169.

[440] IRA, p. 4.

country. The earlier analysis of the scientific evidence shows that the risk of transmitting fire blight to Australia through mature, symptomless apples is lower than very low. It is negligible.

4.500 Equally in the case of European canker, the position is no different from that set out in relation to fire blight. The scientific evidence reviewed earlier shows that mature symptomless apple fruit do not provide a pathway for the transmission of *N. galligena* and hence the pathway for the transmission of European canker has not been shown to exist. That, of itself, indicates that the risk of European canker being transmitted to Australia through the export of apples from New Zealand is also lower than very low. It, too, is negligible. This clearly would meet or exceed the Australian ALOP of "a very low level [of risk], but not to zero".

4.501 Furthermore, in the case of European canker, the scientific evidence New Zealand has outlined shows that the climatic conditions in the apple-producing areas of Australia are not conducive to the establishment or spread of European canker. As a result, even if, contrary to all scientific evidence and experience, European canker were transmitted to Australia through apple fruit, the risk of it establishing and spreading would also be negligible.

4.502 Experience reinforces that the restriction of imports to mature symptomless apples would meet the Australian ALOP. New Zealand exports countless apples around the globe; indeed, for the past several years it has been one of the top ten apple exporters.[441] In no instance have apples exported from New Zealand been associated with the entry, establishment and spread of fire blight or any other disease. This is testament to the quality of New Zealand export controls that would equally apply to the export of mature, symptomless apples to Australia.

4.503 In *Japan – Apples (Article 21.5 - US)*, the Panel held that a requirement that apples exported from the United States to Japan must be mature and symptomless met

[441] World Apple Review, 2008 Edition, Belrose, Inc. Pullman, WA 99163, USA, p. 72.

Japan's ALOP.[442] Japan had expressed its ALOP as "preventing the introduction of *E. amylovora* with the security equivalent of import prohibition".[443] While this is not precisely the same as the Australian ALOP, it is the functional equivalent, if not a stricter level of protection. Thus, the conclusion of the Compliance Panel in *Japan – Apples (Article 21.5 - US)* is directly relevant here.

4.504 Accordingly, a measure requiring that imports be restricted to mature, symptomless apples complies with the second element of the Article 5.6 test in that it would achieve Australia's ALOP.

(c) Restricting imports of apples to mature, symptomless apples would be significantly less trade restrictive than the Australian measures in relation to fire blight and European canker

4.505 A single measure, restricting trade to mature, symptomless apples, would be significantly less trade restrictive than the combination of the eight individual measures for fire blight contained in the IRA. Moreover, given that New Zealand already has procedures in place to ensure that exported apples are mature and symptomless, additional costs to exporters would relate only to the validation of this process.

4.506 A measure that simply validates, through auditing, existing arrangements for the export of apples is by definition less trade restrictive than measures imposing multiple new requirements.

4.507 The Australian measures would restrict trade through the significant levels of economic risk to which New Zealand apple growers would be exposed. The various requirements in the IRA relating to fire blight and European canker - such as disease-free orchards, annual inspections, pruning restrictions, and chlorine treatment - introduce a high degree of risk for any New Zealand apple grower who decides to register an orchard for export to Australia. In the event of a single fire blight or European canker strike in an orchard, all that the orchardist had invested in order to satisfy the onerous measures at

[442] Panel Report, *Japan - Apples (Article 21.5 – US)*, para. 8.193.

[443] Panel Report, *Japan - Apples*, para. 4.58.

issue would be lost, as all the apple fruit produced by that orchard would lose eligibility for export to Australia.[444] In such circumstances, rational economic operators would be unwilling to undertake the risk. Growers would be forced instead to look to other export markets.

4.508 Under the alternative measure of restricting trade to mature, symptomless apple fruit, an orchard would not be disqualified as a result of the discovery of a single fire blight or European canker strike on a tree. Orchardists would therefore avoid risking the loss of investment that discovery of fire blight or European canker in an orchard would otherwise entail.

4.509 Moreover, under the Australian measures, orchards that have no history of either disease and no detected fire blight or European canker still have to undergo costly measures relating to the picking, handling, processing and transportation of apples. None of this would be necessary if the sole requirement was that trade be restricted to mature symptomless apples.

4.510 The trade restrictive effect of Australia's measures is also evidenced by the increased costs that compliance with the measures would impose. The competitiveness of New Zealand growers would be significantly reduced by the costs of the eight individual measures for fire blight and five individual measures for European canker, contained in the IRA. By comparison, given that New Zealand export apple fruit would already be compliant with any requirement that they be mature and symptomless, the only additional cost to exporters would be that of validation. Validation would entail only marginal additional cost as a component of the existing standard MAFBNZ systems audits.

4.511 Accordingly, a measure requiring that imports be mature, symptomless apple fruit complies with the third element of the Article 5.6 test in that it is significantly less trade restrictive than the Australian measures.

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[444] IRA, p. 316.

(d) Summary

4.512 New Zealand has shown that in respect of fire blight and European canker there is a measure – the requirement that New Zealand apples exported to Australia be mature, symptomless fruit – that is a reasonably available alternative measure, taking account of technical and economic feasibility, which would achieve Australia's ALOP and which is significantly less trade restrictive than the measures imposed by Australia. As a result, the measures imposed by Australia in respect of fire blight and European Canker are inconsistent with Australia's obligations under Article 5.6 of the *SPS Agreement*.

3. There are alternative measures in respect of ALCM that are reasonably available, would meet Australia's ALOP and are significantly less trade restrictive than the measures imposed by Australia

4.513 A single measure could have been imposed by Australia in respect of ALCM that would be consistent with standard AQIS inspection procedures for detection of quarantine pests. This single measure is the inspection of a 600 fruit sample from each import lot.

4.514 A requirement of a 600 fruit sample is a measure that is reasonably available. It would meet Australia's ALOP and it would be significantly less trade restrictive than the two alternative measures proposed by Australia, that is either: 1) inspection of a 3000 fruit sample from each lot with a find resulting in mandatory treatment or rejection for export; or 2) inspection of a 600 fruit sample from each lot, combined with mandatory treatment of all fruit (regardless of whether any quarantine pest is found).

(a) Requiring inspection of a 600 fruit sample is a reasonably available measure, taking into account technical and economic feasibility

4.515 A 600 unit sample inspection is certainly reasonably available, given that it is the standard export and import phytosanitary inspection procedure for detection of quarantine pests in a commodity. If no quarantine pests are detected in the sample prior to export then a phytosanitary certificate is issued by the exporting country confirming that the consignment is free of quarantine pests as nominated by the importing country. The consignment is further inspected on-arrival by importing country officials (in this case AQIS) using the same 600 fruit sample procedure. This practice applies to all plant commodities currently being traded between Australia and New Zealand and is used by many other countries. The procedures to implement it already exist. It is thus reasonably available and technically and economically feasible.

4.516 Thus, in relation to ALCM, a measure requiring that imports be subject to a 600 fruit sample for each lot complies with the first element of the Article 5.6 test, in that it is reasonably available taking into account technical and economic feasibility.

(b) Requiring inspection of a 600 fruit sample from each lot would achieve Australia's ALOP in respect of ALCM

4.517 There is a negligible risk of transmission and establishment of ALCM with a 600 fruit sample, as explained above in paragraphs 4.127 to 4.132. A 600 sample size would detect cocoon infestation levels of more than 0.5%, which is greater than the cocoon infestation level recorded on New Zealand apples, as reported in the IRA.[445]

4.518 However, as has been explained in the sections of this submission addressing Articles 2.2 and 5.1, establishment of ALCM in Australia from these levels of infestation would almost certainly not occur. The likelihood that sufficient apples from a lot that had passed a 600 fruit sample test would be discarded at the same place at the right time in order to produce sufficient numbers of adults to start a foundation colony is negligible. Thus, even the standard 600 fruit sample goes beyond what is required to meet Australia's ALOP.

4.519 Accordingly, in respect of ALCM, a measure requiring that imports be subject to a 600 fruit sample for each lot, more than satisfies the second element of the Article 5.6 test, in that it would more than achieve Australia's ALOP.

[445] IRA, p. 166, Table 40.

(c) Requiring inspection of a 600 fruit sample for each lot would be significantly less trade restrictive than the Australian measures in relation to ALCM

4.520 New Zealand is already required to undertake a 600 fruit sample inspection of export apple fruit in order to comply with other more general quarantine pest requirements in the IRA. Thus, coverage of ALCM within the same 600 fruit inspection would certainly be a less time consuming and expensive measure than sampling 3000 fruit, or requiring mandatory treatment of all fruit in addition to a 600 fruit sample.

4.521 The economic risk factors for New Zealand growers set out with respect to fire blight and European canker also apply in the case of ALCM. Growers would be discouraged from exporting to Australia because of the costly, time-consuming and unnecessary measure applied.

4.522 Accordingly, in respect of ALCM a measure requiring that imports be subject to a 600 fruit sample for each lot complies with the third element of the Article 5.6 test in that it is less trade restrictive than the Australian measures.

(d) Summary

4.523 New Zealand has shown that in respect of ALCM there is a measure – requiring inspection of a 600 fruit sample of each lot – that is a reasonably available alternative measure, taking account of technical and economic feasibility, which would achieve Australia's ALOP and which is significantly less trade restrictive than the measures imposed by Australia. As a result, the measures imposed by Australia in respect of ALCM are inconsistent with Australia's obligations under Article 5.6 of the *SPS Agreement*.

4. There are alternatives to the measures relating to inspections by AQIS officials, verification of standard commercial practice and provision of packing house details imposed by Australia on the importation of apples that are reasonably available, would meet Australia's ALOP and are significantly less trade restrictive than the measures imposed by Australia

4.524 In addition to the specific measures for each particular pest, Australia has imposed measures, including the requirements: (i) that AQIS officers be involved in inspection for European canker and fire blight, in direct verification of packing house procedures, and in fruit inspection and treatment; (ii) for verification of compliance with standard commercial practices; and (iii) that packing houses provide details of the layout of their premises.

4.525 There is an alternative, less trade restrictive measure reasonably available. This involves simple auditing by AQIS officers of New Zealand systems applicable to the import of apples to Australia from New Zealand. Such a measure would achieve Australia's ALOP and would be less trade restrictive than the three general measures imposed by Australia.

(a) Requiring audits by AQIS officials of New Zealand systems is a reasonably available measure, taking into account technical and economic feasibility

4.526 New Zealand has considerable experience with audits of its systems.[446] For example, such systems audits exist in relation to exports of potatoes to Chinese Taipei, bulbs (tulips and lilies) to Japan, and cherries to Korea and Japan. Systems auditing has taken place in respect of other products imported from New Zealand into Australia, for example stone fruit and tomatoes. Thus, it is a measure with which both New Zealand and Australia are familiar and which can easily be implemented. It is, therefore, "reasonably available".

[446] A systems audit involves an official coming from the country's quarantine agency to New Zealand to audit New Zealand systems, including policies, procedures and actual site visits.

4.527 Equally, such a systems audit is technically and economically feasible. Auditing of New Zealand systems by AQIS officials would simply require occasional visits under normal circumstances, or targeted visits in the event that non-compliance was to be detected during routine procedures. Audit visits normally assess the range of certification processes associated with the commodity in question - from any required field procedures to export inspections, and storage and handling procedures. In the first few years of trade such visits are often annual but frequency tends to reduce to rare or ad hoc as the importing country gains confidence in the exporting country's systems. In past practice between Australia and New Zealand, audit visits have generally been limited to the first year of trade and are ad hoc thereafter. The AQIS "involvement" proposed under the IRA goes beyond any other inspection regime currently in place for New Zealand exports to Australia.

4.528 A requirement that there be audits by AQIS officials of New Zealand systems would be a continuance of a common practice that New Zealand currently engages in with Australia and other countries. Therefore, it is clearly reasonably available, and technically and economically feasible.

4.529 Thus, in respect of the general requirement relating to inspections by AQIS officials, the first element of Article 5.6 is met in that the alternative measure of systems audits is reasonably available, and technically and economically feasible

(b) Requiring audits by AQIS officials of New Zealand systems would achieve Australia's ALOP

4.530 The New Zealand phytosanitary certification system operates on an administrative basis and has at its core a series of technical standards that all participating parties (MAFBNZ, independent verification agencies (IVAs) and grower, packer and exporter organisations) are required to meet. At the highest phytosanitary inspection and verification level, IVAs are required to obtain ISO 17020 accreditation prior to seeking MAFBNZ authorisation to deliver phytosanitary inspection and verification services on behalf of MAFBNZ. Organisations in receipt of MAFBNZ delegated authority are subjected to a series of audits on an annual basis, either by MAFBNZ or by an independent auditing agency. Further down the product supply chain, MAFBNZ-approved organisations are audited on a regular basis by MAFBNZ-authorised IVAs.

4.531 As explained above at paragraph 4.449, the efficacy of the New Zealand phytosanitary certification system has wide recognition internationally. Australia has not raised concerns in the context of other horticultural exports about the effectiveness of New Zealand's phytosanitary inspection systems or the reliability of the results they produce. Nor, in fact, does the IRA raise any specific concern with New Zealand's verification systems which the relevant measures identified in the IRA would address.

4.532 Given the standards met by New Zealand verification systems, AQIS officials' involvement in inspections, verification of standard commercial practice and the provision of packing house layout details will not have any impact on the overall risk of entry, establishment and spread of the three pests at issue.

4.533 The three general measures imposed by Australia are not required to meet Australia's ALOP. A measure requiring AQIS officials to audit New Zealand systems in line with normal practice would clearly meet Australia's high ALOP. Thus, the second element of Article 5.6 is met.

(c) Requiring audits by AQIS officials of New Zealand systems would be less trade restrictive than Australia's measures requiring involvement of AQIS officials in inspections of orchards and packing house procedures

4.534 The three general measures proposed by Australia - requiring AQIS officials' involvement (in inspections and packing house procedures in New Zealand), verification of standard commercial practice and provision of packing house details - would be time consuming, labour intensive and costly. These requirements are unprecedented and are not required in respect of any other New Zealand exports to Australia.

4.535 In particular, the requirement for AQIS involvement would double the number of inspectors and more than double the cost of orchard and packing house inspections. New Zealand would be responsible for the time cost of the AQIS inspectors involved, as well as for their international and domestic travel, accommodation and living expenses.

The proposed orchard inspections including, for example, a requirement to use ladders to inspect the tops of trees for European canker, are intensive, so the time involved would be considerable. Once again, New Zealand growers and exporters would incur heavy and unjustifiable costs, significantly restricting trade.

4.536 By contrast, systems audits are less frequent and less intrusive. They would simply require the reviewing and assessing from time to time of New Zealand phytosanitary practices associated with the export of apples to Australia. This would validate existing procedures which Australia has never suggested are inadequate. Systems audits would involve minimal additional costs and would not require the creation of new, expensive and unnecessary systems.

4.537 In addition, the requirement that New Zealand ensure that all orchards registered for export operate under standard commercial practices would require NZMAF to verify through a costly compliance programme that industry was operating in accordance with standard commercial practices. Australia does not provide any justification for this measure, or the requirement that packing houses provide details of the layout of premises. These measures have the effect of placing a trade restriction behind the border, and are unwarranted.

4.538 Accordingly, in respect of the requirement of involvement of AQIS officials, verification of standard commercial practice and provision of packing house details, the third element of Article 5.6 is met.

5. Conclusion on Article 5.6

4.539 In respect of the specific measures relating to fire blight, European canker, and ALCM and the general measures discussed above, there are alternative measures that are reasonably available, taking into account technical and economic feasibility, which would achieve Australia's ALOP and are less trade restrictive than Australia's measures. In light of this, Australia has failed to comply with its obligations under Article 5.6 of the *SPS Agreement*.

4.540 In addition, because they are more trade restrictive than required, the measures also breach the requirement in Article 2.2 that measures be "applied only to the extent necessary to protect human, animal or plant life or health." Australia has also, therefore, again, acted inconsistently with Article 2.2.

H. AUSTRALIA'S MEASURES FOR THE IMPORTATION OF NEW ZEALAND APPLES ARE INCONSISTENT WITH AUSTRALIA'S OBLIGATIONS UNDER ARTICLE 8 AND PARAGRAPH 1(A) OF ANNEX C OF THE *SPS AGREEMENT*

4.541 Australia's process for considering New Zealand's request for access for New Zealand apples to the Australian market was delayed well beyond any reasonable period of time for considering the request. Australia has not complied with its obligations under Article 8 and Annex C(1)(a) of the *SPS Agreement* to undertake and complete the relevant approval procedures "without undue delay".

1. The basic obligation of Article 8 and Annex C(1)(a)

4.542 Article 8 provides:

> Members shall observe the provisions of Annex C in the operation of control, inspection and approval procedures, including national systems for approving the use of additives or for establishing tolerances for contaminants in foods, beverages or feedstuffs, and otherwise ensure that their procedures are not inconsistent with the provisions of this Agreement.

4.543 Article 8 thus places an obligation on Members in operating their approval procedures to comply with the provisions of Annex C.

4.544 Annex C(1)(a) provides:

> Members shall ensure, with respect to any procedure to check and ensure the fulfilment of sanitary or phytosanitary measures, that:
>
> (a) such procedures are undertaken and completed without undue delay […]

4.545 The phrase 'undue delay' also occurs in the IPPC context. The IPPC International Standards for Phytosanitary Measures provide that:

> When a contracting party requests another contracting party to establish, modify or remove phytosanitary measures when conditions have changed or new facts have become available, this request should be considered without undue delay. Associated procedures, which include, but are not limited to, pest risk analysis, recognition of pest free areas or recognition of equivalence, should be performed promptly.[447]

4.546 As the Panel in *EC – Approval and Marketing of Biotech Products* pointed out, approval procedures serve "to check and ensure the fulfilment of sanitary or phytosanitary measures" within the meaning of Annex C(1)(a).[448] Accordingly, approval procedures must be "undertaken and completed without undue delay". The IRA process conducted by Australia to assess the conditions under which New Zealand apples could be exported to Australia was such an "approval procedure". Thus, Australia was under an obligation to undertake and complete the IRA process without undue delay.

4.547 The scope of the obligations under Annex C(1)(a) has yet to be defined by the Appellate Body. However, the obligations were considered in some detail by the Panel in *EC – Approval and Marketing of Biotech Products*. There, the Panel noted that Annex C(1)(a), first clause, should be viewed "essentially as a good faith obligation requiring Members to proceed with their approval procedures as promptly as possible, taking account of the need to check and ensure the fulfilment of their relevant SPS requirements".[449] Moreover, the obligation is not merely to undertake the approval procedures without undue delay; it is also to complete the approval procedures without undue delay. As the Panel in *EC – Approval and Marketing of Biotech Products* said, "approval procedures are not only to be undertaken, but are also to be finished, or concluded".[450]

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[447] International Plant Protection Convention *International Standards for Phytosanitary Measures*, Food and Agricultural Organisation, Rome (2008), Principle 2.14.

[448] Panel Report, *EC - Approval and Marketing of Biotech Products*, para. 7.1498.

[449] Panel Report, *EC - Approval and Marketing of Biotech Products*, para. 7.1498.

[450] Panel Report, *EC - Approval and Marketing of Biotech Products*, para. 7.1494.

2. Australia failed to complete its approval procedures for access for New Zealand apples without undue delay

4.548 "Delay" is defined as "the action or process of delaying; procrastination; lingering; putting off";[451] "act[s] of postponing or slowing"[452] and "[the] postponement or deferment of the making of a decision or doing some act". [453]

4.549 According to the Panel in *EC – Approval and Marketing of Biotech Products*, "undue" means "[g]oing beyond what is warranted […]" and "unjustifiable".[454] This definition was supported, in the view of the Panel, by the French text of Annex C(1)(a), first clause, which refers to "retard injustifié". Accordingly, the Panel concluded that, "Annex C(1)(a), first clause, requires that approval procedures be undertaken and completed with no unjustifiable loss of time".[455]

4.550 As the Panel in *EC – Approval and Marketing of Biotech Products* pointed out, "a determination of whether a particular approval procedure has been undertaken and/or completed 'without undue delay' must be made on a case-by-case basis, taking account of relevant facts and circumstances".[456] In this case the relevant facts and circumstances give a clear picture of excessive delay for which there is no justification.

(a) There was delay in the completion of Australia's IRA process

4.551 The facts relating to Australia's delay in this case are plain. Annex 1 to this submission sets out key events and dates. In January 1999, New Zealand lodged its fourth request for access for apples to the Australian market. The approval procedures

[451] Lesley Brown (ed) *The New Shorter Oxford English Dictionary*, volume A-M (1993), p. 623.

[452] Bryan A. Garner *Black's Law Dictionary* (7th edition), West Group (St Paul, Minnesota 1999) p. 437.

[453] Peter Spiller, *Butterworths New Zealand Law Dictionary* (6th edition), Lexis Nexis, (Wellington 2005), p. 80.

[454] Panel Report, *EC – Approval and Marketing of Biotech Products*, para. 7.1495.

[455] Panel Report, *EC – Approval and Marketing of Biotech Products*, para. 7.1495.

[456] Panel Report, *EC – Approval and Marketing of Biotech Products*, para. 7.1497.

were not completed until November 2006 and the measures formally endorsed in March 2007, more than eight years after the filing of the request.

4.552 This length of time must be seen against a background of three previous applications by New Zealand, starting in 1986, each of which had resulted in negative determinations. In each of those cases, the maximum period of time taken for the determinations to be made was three years. Since there was no justification for Australia's denial of access in any of these cases, in effect the delay by Australia on approving access for New Zealand apples goes back to 1986.

(b) Australia's delay has been undue

4.553 There is no justification for Australia's delay during this period of time. There has been no difficulty in gaining access to scientific information and there has been no significant evolution in the science during this period. Australia had a process by which to conduct risk assessment analyses. In April 1999, following the January 1999 request by New Zealand, Australia announced that the review of the New Zealand application would follow the procedures set out in the AQIS Import Risk Analysis Process Handbook.[457] New Zealand makes no complaint about the commencement of the approval process.

4.554 However, instead of following a science-based process, Australia followed a risk assessment path that was intertwined with a political process. Even before work actually commenced on the risk assessment, industry "stakeholders" were asked to comment on New Zealand's 1999 request for access.[458] Australia issued the first of its three draft

[457] Australian Quarantine Inspection Service *Letter to stakeholders, Import risk analysis – apples from New Zealand, DG 37/99 T99/237, 15 April 1999*, Department of Agriculture, Fisheries and Forestry, Canberra.

[458] Australian Quarantine Inspection Service *Letter to stakeholders, Import risk analysis – apples from New Zealand, DG 37/99 T99/237, 15 April 1999*, Department of Agriculture, Fisheries and Forestry, Canberra; Australian Quarantine Inspection Service *Letter to stakeholders, Import risk analysis – apples from New Zealand, DG 43 99/237, 28 June 1999*, Department of Agriculture, Fisheries and Forestry, Canberra.

IRAs in October 2000, and initiated stakeholder consultations.[459] Shortly after, a hearing was convened in the Australian Senate's Rural and Regional Affairs and Transport Legislation Committee, with broad terms of reference to inquire into the proposed importation of New Zealand apples. The Committee delivered an interim report in July 2001,[460] containing wide-ranging recommendations, many of which were implemented in October 2001, when changes were announced to the risk assessment process.[461] In response to an appeal by a stakeholder, Biosecurity Australia announced a further change in January 2002, involving the inclusion of an apple grower on the recently-established "risk analysis panel".[462]

4.555 The political debate continued during this period. This is evidenced by a report in the New South Wales Legislative Assembly that the Australian Prime Minister and Deputy Prime Minister had stated that they would never let New Zealand apples into Australia.[463]

4.556 In February 2004, Australia issued a revised draft IRA[464] and again initiated stakeholder consultations.[465] In March, the Senate Committee opened a new inquiry into

[459] Market Access and Biosecurity *Plant Biosecurity Policy Memorandum 2000/18; Import Risk Analysis – Fresh Apples from New Zealand, 11 October 2000*, Department of Agriculture, Fisheries and Forestry, Canberra.

[460] **Exhibit NZ-75:** Commonwealth of Australia *The proposed importation of fresh apple fruit from New Zealand*, Interim report, Senate Rural and Regional Affairs and Transport Legislation Committee, July 2001, Canberra.

[461] Biosecurity Australia *Plant Biosecurity Policy Memorandum 2001/22, Import risk analysis – apples from New Zealand, 8 October 2001*, Department of Agriculture, Fisheries and Forestry, Canberra. See also Commonwealth of Australia *The proposed importation of fresh apple fruit from New Zealand; Government response to the recommendation of the Senate Rural and Regional Affairs and Transport Legislative Committee's interim report, March 2003*, Canberra, p. 7.

[462] **Exhibit NZ-89:** Biosecurity Australia *Plant Biosecurity Policy Memorandum 2002/01, Import risk analysis – apples from New Zealand*, 10 January 2002, Department of Agriculture, Fisheries and Forestry, Canberra.

[463] **Exhibit NZ-86:** Parliament of New South Wales *Legislative Assembly Hansard, New Zealand apple and pear importation*, Urgent motion, 6 March 2001, 3.50pm.

[464] Biosecurity Australia, *Plants Biosecurity Policy Memorandum 2004/03; Revised draft import risk analysis report for apples from New Zealand, 19 February 2004*, Department of Agriculture, Fisheries and Forestry, Canberra.

[465] Biosecurity Australia *Plants Biosecurity Policy Memorandum 2004/03; Revised draft import risk analysis report for apples from New Zealand, 19 February 2004*, Department of Agriculture, Fisheries and Forestry, Canberra.

the importation of New Zealand apples.[466] Australia announced further changes to the IRA process in August 2004, including the establishment of an "eminent scientists group" to review all final IRA reports.[467] In October 2004, following another federal election in which the issue of importation of New Zealand apples figured once again, it was announced that all IRAs under development (including the Revised Draft IRA 2004) would be re-examined by Biosecurity Australia and re-issued for public comment and consultation.[468] In March 2005, the Senate Committee issued its report on the importation of apples from New Zealand, expressing concern about an approach that was based on permitting apples to be imported.[469]

4.557 In December 2005, Australia issued its third revision of the draft IRA. Although stakeholders had already been given a combined comments period of eight months on the previous drafts, Australia gave stakeholders another four months to provide comments on the new draft. [470] The draft was submitted to the Eminent Scientists Group in July 2006, and was eventually issued as an IRA on 30 November 2006.

4.558 Hearings were twice convened in the Australian Senate's Rural and Regional Affairs and Transport Legislation Committee.[471] Several federal elections were held in which the issue of the entry of apples from New Zealand was debated. [472]

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[466] Commonwealth of Australia *The proposed importation of fresh apple fruit from New Zealand – Final Report; March 2004*, Senate Rural and Regional Affairs and Transport Legislation Committee, Canberra.

[467] **Exhibit NZ-88:** Biosecurity Australia, *Plant Biosecurity Policy Memorandum 2004/22, New arrangements to strengthen import risk analysis, 16 August 2004*, Department of Agriculture, Fisheries and Forestry, Canberra.

[468] Minister of Agriculture, Fisheries and Forestry *Media release, Science will decide NZ apple request, DAFF04/292WT – 13 October 2004*, Minister of Agriculture, Fisheries and Forestry, Canberra. See also **Exhibit NZ-87:** *A Stronger Economy a Stronger Australia, The Howard Government Election 2004 Policy, Quarantine and Border Protection.*

[469] **Exhibit NZ-80:** Senate Rural and Regional Affairs and Transport Legislation Committee *Administration of Biosecurity Australia – Revised draft import risk analysis for apples from New Zealand*, March 2005, Canberra.

[470] Biosecurity Australia *Biosecurity Australia Policy Memorandum 2005/20, Revised draft import risk analysis report for apples from New Zealand,* 1 December 2005, Biosecurity Australia, Canberra.

[471] **Exhibits NZ-76 to NZ-83** provide Senate transcripts and reports relating to these processes.

[472] **Exhibits NZ-73, NZ-74 and NZ-85 to NZ-87** provide selected material, including media reporting, which indicates the profile of the issue in Australia.

4.559 There is no reason to believe that it was science-related factors that were causing the delay in the Australian approval procedures. Rather, it is reasonable to conclude that it was the parallel and interlinked political process that led to the delays. In *EC – Approval and Marketing of Biotech Products*, the Panel agreed that delay resulting from measures not related to scientific evidence could be considered undue, although it did not consider that this would always be so.[473] However, the examples the Panel gave of factors that could contribute to delay that was not undue included natural disasters and civil unrest. The Panel also considered that a sharp increase in applications for approval might justify a short delay. None of these factors is relevant in this case. Nor did the Panel in *EC – Approval and Marketing of Biotech Products* suggest that political involvement in the risk assessment process would prevent delay from being undue.

4.560 The overriding consideration, as the Panel in *EC – Approval and Marketing of Biotech Products* made clear,[474] is whether a Member has sufficient time to check and ensure the fulfilment of relevant SPS requirements. A Member that exceeds the time reasonably necessary to check and ensure the fulfilment of its SPS requirements has engaged in delay that is undue. By no stretch of the imagination could eight years be considered necessary for Australia to check and ensure the fulfilment of its phytosanitary requirements in the case of apple imports from New Zealand.

4.561 The lack of justification for Australia's delay of eight years is even more apparent when seen against the background of New Zealand's previous requests for entry of apples into the Australian market. The Australian assessment process did not start with a clean slate. The scientific evidence had been reviewed on successive occasions and any new research simply confirmed what had already been known. This was not an issue that was new or one of first impression.

4.562 Equally, the contemporaneous case brought by the United States against Japan (*Japan – Apples*) meant that the issues of phytosanitary measures in respect of fire blight had been reviewed under WTO dispute procedures with a clear indication of what was

[473] Panel Report, *EC – Approval and Marketing of Biotech Products*, para. 7.1500.

[474] Panel Report, *EC – Approval and Marketing of Biotech Products*, para. 7.1499.

appropriate. That, too, should have facilitated the process. Yet, it was more than four years after the panel decision in *Japan - Apples* that Australia issued the IRA, and even then it disregarded what the Panel and subsequently the Appellate Body had decided.

3. Australia has failed to comply with its obligations under Annex C(1)(a) and has violated Article 8 of the *SPS Agreement*

4.563 The failure to complete the approval procedures for the entry of apples from New Zealand without undue delay means that Australia has failed to comply with its obligations under Annex C(1)(a) of the *SPS Agreement*. Since Article 8 of the *SPS Agreement* requires that Members observe the provisions of Annex C, then Australia has acted inconsistently with both Annex C(1)(a) and Article 8 of the *SPS Agreement*.

V. CONCLUSION

5.1 For the reasons set forth in this submission, New Zealand requests the Panel to find that Australia's measures, as set out in the New Zealand panel request, are inconsistent with Australia's obligations under the *SPS Agreement.*

VI. REQUEST FOR RELIEF

6.1 Accordingly, New Zealand requests that the Panel recommend to the Dispute Settlement Body that Australia brings its treatment of imports of apples from New Zealand into conformity with its obligations under the *SPS Agreement.*

GLOSSARY: RELEVANT SCIENTIFIC AND TECHNICAL TERMS

Ascospores: Sexual spores of ascomycetes, a form of fungus. These are produced within an ascus or saclike cell within a perithecium.

Bacteria: Single-celled organisms which lack a distinct nuclear membrane, are found throughout nature and can be beneficial or cause disease.

Calyx: The outer floral leaves of a flower. On an apple fruit it refers to the structures at the end opposite to the stalk end.

Canker: A usually well-defined sunken or swollen necrotic lesion caused by a localised disease of the bark and the cambium (cells between the wood and the bark). There are several forms of canker based on shape, position of occurrence on the tree, and whether produced in one year or several.

Conidia: Asexual spores of a fungus, formed from specialised organs of the fungus.

Disease (of a plant): A disorder of structure or function in a plant of such a degree as to produce or threaten to produce detectable illness or disorder; a definable variety of such a disorder, usually with specific signs or symptoms.

Endophytic: With respect to *E. amylovora*, the term **endophytic** is used when the bacterium occurs inside a plant or apple fruit in a non-pathogenic relationship.

Entry, establishment and spread (of a pest): Entry refers to the movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled. Establishment means the perpetuation, for the foreseeable future, of a pest within an area after entry. Spread refers to the expansion of the geographical distribution of a pest within an area.

Epidemiologically significant: able to initiate an infection. For example, in the case of fire blight, levels of bacteria are not epidemiologically significant if they are so low that there is a negligible likelihood that they could initiate a fire blight infection.

Epiphytic: With respect to *E. amylovora*, the term **epiphytic** is used when the bacterium occurs on the outer surface of a plant or fruit in a non-pathogenic relationship, including on the calyx.

Infection: Process in which an organism (e.g., *E. amylovora or N. galligena*) enters into a host plant, establishing a permanent or temporary pathogenic relationship with the host.

Infestation: Presence of an organism (e.g. bacterium, fungus, insect) on the outside of a host plant (including the fruit), without any implication that an infection has occurred.

Inoculum: Material consisting of or containing bacteria to be introduced into or transferred to a host or medium. Inoculation is the introduction of inoculum into a host or into a culture medium. Inoculum can also refer to potentially infective material available in soil, air or water and which by chance results in the natural inoculation of a host.

Larva: Immature feeding stage of some insect types (e.g. flies, midges, moths), between egg and pupa, usually in the form of a grub, caterpillar, or maggot.

Nectar: A sweet liquid secreted by the nectaries of plants in order to attract pollinating animals.

Nectary: Nectar-secreting organs that serve as insect feeding stations in flowers and thus attract insects, which then assist in the transfer of pollen.

Pathogen: Any disease-producing organism.

Perithecium: A flask-shaped fruiting body produced by a fungus for the production and release of ascospores (sexual spores) from asci. The perithecium has a hole though which the spores emerge.

Pupa: A developmental stage of many insects types (e.g. flies, midges, moths), between the larva and the adult stages; this stage is generally inactive and encased in a case or cocoon.

Stigma: The receptive part of flowers (female organ of plants) that receives the pollen. The stigma is normally the site where *E. amylovora* bacteria initially multiply followed by movement, facilitated by rain or dew, to the other flower parts (especially the nectaries) where infection may occur.

Stomata: Pores in the leaf epidermis (surface cells) through which gaseous exchange occurs. They are bounded by specially adapted guard and accessory cells.

Vector: An organism or agent that transmits inoculum of a pathogen.

ANNEX 1
TIMELINE

1919:

- Fire Blight introduced to New Zealand on plant material.

1921:

- Australia bans New Zealand apple fruit.

1986:

- New Zealand makes first formal access request for apple fruit to Australia.

1988:

- First request denied.

1989:

- New Zealand makes second request.

1990:

- Second request denied.

1991:

- Visit by Australian SPS officials and scientists to New Zealand.

1992:

- Australia convenes meeting of fire blight researchers and experts from United States, Australia and New Zealand.

1995:

- New Zealand makes third request.

1997:

- 14 April: AQIS releases Draft Pest Risk Analysis.
- April: Fire Blight observed by New Zealand scientist at Melbourne Royal Botanic Gardens.

1998:

- 10 December: Final Import Risk Analysis released, denying third request.

1999:

- 13 January: New Zealand makes fourth request for access of fresh apple fruit to Australia.
- 25 February: AQIS invites comments from stakeholders.
- 15 April: AQIS announces review would follow normal risk analysis process of Import Risk Analysis Handbook, estimates process will take twelve months.
- 28 June: AQIS notes that it expects to release the draft IRA in November 1999, forms in-house team of scientists to conduct the IRA.

2000:

- 13 March: AQIS informs stakeholders of delay in producing draft due to late receipt of technical information, now expects to release draft in May.
- 25 July: AQIS advises stakeholders that technical work on the draft is substantially complete with an anticipated release date in August followed by a sixty day comment period.
- 11 October: First Draft IRA released, inviting submissions by 11 December 2000, plans to hold stakeholder meetings.
- 2 November: The Australian Senate refers the issue to Rural and Regional Affairs and Transport Legislation Committee for inquiry and report by March 2001 (this date was subsequently extended to June and finally 23 July 2001).
- 20 December: Australia extends comments period by two months to 28 February 2001.

2001:

- 6 February-11 May: The Australian Senate Committee holds a series of twelve hearings in apple growing regions.
- 6 March: DAFF announces an extension of and changes to the consultation process including issuing a draft inventory of issues for consultation.
- 14 May: week-long visit to New Zealand by the Australian Senate Committee, discussions with New Zealand Government, industry representatives and fire blight experts.
- 2 July: BA releases draft inventory of issues for thirty day consultation period, eleven comments received.

- 18 July: Senate Committee tables an interim report containing fifteen recommendations relating to the risk assessment process, including one that further research be undertaken.

- 28 September: Biosecurity Australia releases draft *Guidelines for Import Risk Analysis*.

- 8 October: Biosecurity Australia appoints Risk Assessment Panel to complete the IRA, in response to Senate Committee recommendations. Stakeholders had until 8 November to appeal composition.

- 10 November: Australian Federal Election held.

- 20 November: BA issues final inventory of issues identified in submissions on the draft IRA.

<u>2002:</u>

- 10 January: BA advises Risk Assessment Panel membership.

- 4 July: Risk Assessment Panel releases Scientific Review Paper to "provide information to stakeholders and assist them in contributing to the risk analysis process".

- 22-23 July: Stakeholder workshop held in Melbourne to explain Scientific Review Paper.

<u>2003:</u>

- March: Australian Government issues response to the Senate Committee's Interim Report.

- 15 July: Panel report for *Japan - Apples* released.

<u>2004:</u>

- 19 February: BA releases Revised Draft IRA, with comments due by 23 April.

- 8 March: comments period extended for an additional thirty days to 24 May to take account of apple harvest time.

- 24 March: comments period extended by another thirty days for a second time with comments now due by 23 June.

- 9 March: Australian Senate Committee decides to conclude initial inquiry and commence a new one focussing on Revised Draft IRA.

- 15 July: BA is established as a separate business unit outside of the trade section of DAFF. An 'Eminent Scientists Group' is established to independently examine technical submissions on final Draft IRA before it is released.

- 30 September: Coalition Government releases *Quarantine and Border Protection* election policy – including plans to reissue existing draft IRAs for comment.

- 9 October: Australian Federal election.

- 13 October: Australian Minister of Agriculture announces that BA would scientifically examine all IRAs under development and re-issue them for public comment and consultation.

<u>2005:</u>

- 24 February: announcement that the Revised Draft IRA 2004 would be reissued for a further sixty day comment period once comments on the draft had been considered, which could take some time.

- 17 March: Australian Senate Committee releases its final report on *Administration of Biosecurity Australia - Revised draft import risk analysis for apples from New Zealand*, calling for more focus on potential economic impact of fireblight outbreak and improvements to stakeholder consultation process.

- 1 December: Draft IRA reissued (Revised Draft IRA 2005) providing for a 120 day comment period, taking into account the harvest and holidays falling within this period, and the technical nature of the information.

<u>2006:</u>

- 30 March: Comments period closes on Revised Draft IRA 2005.

- 21 July: Eminent Scientists Group tasked with reviewing draft final IRA report, findings due within sixty days of receiving report.

- 1 August: Eminent Scientists Group receives draft final IRA.

- October: Eminent Scientists Group report issued, concluding unanimously that BA properly considered all submissions received in response to the revised draft IRA.

- 8 November: BA announces that they are finalising the IRA report and policy recommendations taking into account the Eminent Scientists Group report.

- 30 November: Final IRA for apples from New Zealand released.

<u>2007:</u>

- 12 January: Appeals period closes. Three appeals received.

- 26 February: Appeals considered and disallowed. Apple and Pear Australia Ltd calls for new Senate Inquiry, complaining of speed of appeals process.

- 27 March: Australia's Director of Quarantine issues a Final Policy Determination for importation of apples from New Zealand.

- March-June: Bilateral discussions, held in an effort to develop the Standard Operating Procedures and work plan required under the IRA, produce no agreement on a text.

- 5 June: Australian Senate Committee announces inquiry considering the administration of DAFF, BA and AQIS in relation to the Final IRA (third inquiry into the IRA process).

- 20 June: Australian Senate Committee releases its report: Administration of DAFF, BA and AQIS in relation to the final import risk analysis report for apples from New Zealand.

- 31 August: New Zealand requests consultations with Australia under Article 4 of the DSU.

- 4 October: Consultations with Australia held, the United States and European Community attend as third parties.

- 6 December: New Zealand requests the establishment of a panel under Article 6.1 of the DSU.

- 17 December: Australia blocks New Zealand's request for establishment of a panel.

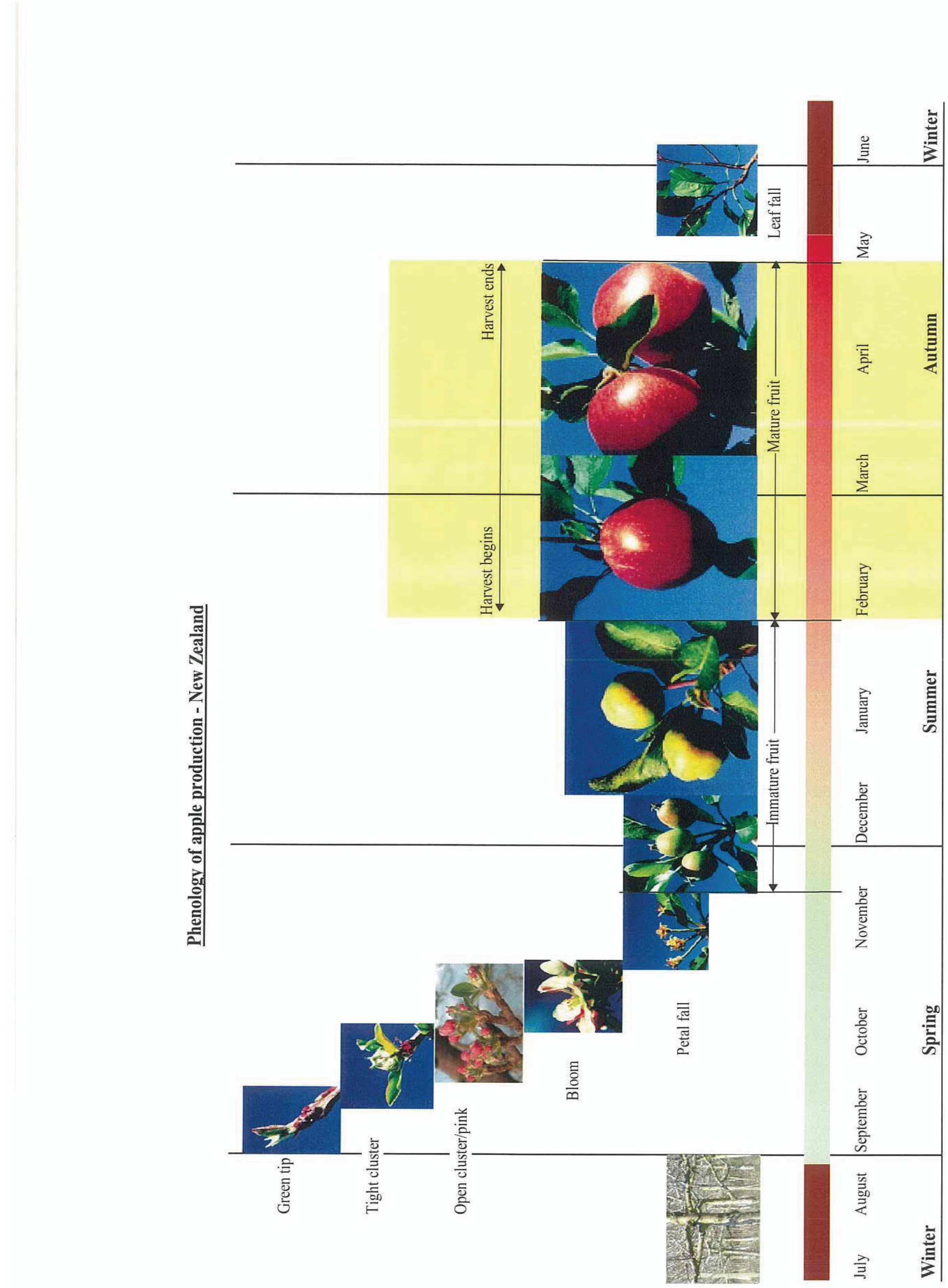
<u>2008</u>

- 17 January: New Zealand renews its request.

- 21 January: Panel established.

- 12 March: Director-General composes panel, Chile, Chinese Taipei, European Communities, Japan, Pakistan and the United States reserve their rights to participate as third parties.

ANNEX 2
APPLE PRODUCTION IN NEW ZEALAND



ANNEX 3
AN ANALYSIS OF CLIMATE REQUIREMENTS FOR ESTABLISHMENT OF EUROPEAN CANKER

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Introduction

This study considers the proposition in the IRA that any geographical area with >1,000 mm average annual rainfall favours establishment of European canker. On that basis, the IRA suggests that areas of Australia with an average rainfall of more than 1,000mm would be suitable for European canker to develop. This study compares the Australian proposition in the IRA with the substantial body of published world literature on climatic factors reported to be associated with European canker and data on the occurrence of European canker in New Zealand to clarify the climatic requirements for European canker establishment.

Climate Risk Factors

Two key climate factors that repeatedly appear in the published literature associated with risk of European canker development are: 1) a requirement for moderate temperatures and, 2) the distribution of rainfall over the months of the year.

Published literature clearly shows that a threshold of 1000 mm annual rainfall is in fact a poor predictor of risk of European canker occurrence around the world. For example, in parts of south eastern England (Kent), where annual rainfall is only 600-700 mm, apple orchards are prone to European canker development (McCracken *et al.* 2003). The IRA (Biosecurity Australia 2006) actually notes this:

"a study (McCracken et al. 2003) which demonstrated that European canker could be a problem in areas with rainfall significantly less than 1000 mm"

The annual rainfall in the parts of England discussed by McCracken *et al.* (2003) is, in fact, similar to that of Hawkes Bay, New Zealand, where the IRA acknowledges climatic conditions are not conducive to European canker (IRA p122). Clearly, 1000 mm of annual rainfall does not adequately predict the risk of EC, yet the IRA's discussion about the suitability of the Australian climate for European canker establishment is based entirely upon that threshold.

Methods

This study seeks to clarify the climatic requirements for European canker establishment through a review of world literature on climatic factors reported to be associated with European canker occurrence. The areas included in this review are shown in Table 1. This review was coupled to an analysis of climate data from key areas where European canker occurs, including New Zealand (Appendices 1 & 2). The New Zealand regions included represented apple production areas where European canker has either been recorded or could potentially occur. Auckland is representative of Waikato. Central Otago is not included because it has the lowest climatic risk of any New Zealand apple growing area and European canker is unknown in that region. The characteristics of the Australian climate were then compared with areas where European canker occurs in order to accurately determine the climatic risk of European canker establishment in Australia.

Table 1. Descriptive summary of European canker occurrence in world areas where climatic requirements for development of this disease have been studied plus regions of New Zealand where European canker occurrence is sporadic at best.

Region	Canker occurrence	Mean annual rainfall (mm)	References
Kent, England	Frequent, including fruit infection	650	McCracken *et al.* 2003
Loughgall, Northern Ireland	Frequent, including fruit infection	800	Swinburne (1971)
Sonoma County, California	Sporadic; fruit infection reported occasionally	900	Dubin and English (1975), Grove (1990)
Talca, Chile	Sporadic, fruit infection rare	700	Lolas and Latorre (1996), Latorre *et al.* (2002)
Auckland and Waikato, New Zealand	High risk of tree cankers; fruit infection rare	1200	Atkinson (1971), MAFNZ 2005
Gisborne, New Zealand	Sporadic occurrence of tree cankers; fruit infection not reported	1050	No published records
Hawkes Bay, New Zealand	No recorded occurrence in past 15 years	800	Atkinson (1971)
Nelson, New Zealand	Sporadic occurrence of tree cankers; fruit infection not reported	970	No published records

Weather data for this study were obtained from the US National Climate Data Center (NCDC) Global Surface Summary of the Day (GSOD) database[475]. This provided a consistent and uniform source of data to provide objective comparison of world sites

Analysis

In general terms, rainy weather and moderate temperatures are climatic factors known to be pre-requisites for establishment of European canker, allowing infection of leaf scars, tree limbs or apple fruit.

The Australian proposition that average annual rainfall of greater than 1,000mm favours establishment of the disease is based on Grove (1990) who stated that:

"Nectria canker of apple is particularly troublesome in areas of coastal California where fog, moderate temperatures and mean annual precipitation of 100 cm or more occur".

Grove's statement appears to have come from Dubin and English (1974, 1975) who indicate that a number of factors, including rainfall, fog and moderate temperature are associated with European canker in coastal California. Their work confirms much earlier suggestions of Zeller (1925) that temperature, rainfall and humidity are important climatic conditions that favour canker infections.

The discussion of temperature requirements for European canker development in the IRA claims that:

[475] This dataset has been used elsewhere for ecological studies (Nepstad et al., 2001, Kari and Huey, 2000).

*"*N. galligena *readily survives from 2°C to 30°C (Munson, 1939; Butler, 1949) with the optimum temperature for disease development being between 20°C to 25°C. These conditions are quite common in temperate and subtropical parts of Australia."* (p137)

However, Munson (1939) only studied germination *in vitro* and he did not suggest that his finding about an optimum of around 20°C for germination represented an optimum temperature for disease development in the field. There is strong evidence that much cooler temperatures, below 20°C, are better associated with field development of European canker (Dubin and English 1975, Lolas and Latorre 1996, Latorre *et al*. 2002). Dubin and English (1975) found that the number of hours between 11°C and 16°C could be a significant factor to predict European canker infection.

Dubin and English (1975) suggested that duration of rainfall was an important factor for infection of European canker:

"field infection occurs only where rainfall is abundant for long periods of time".

Swinburne (1971) and Lolas (pers. comm.[476]) also reported that it is the duration and not the intensity of rainfall that is important.

Published reports from world regions where European canker occurs in the field and where associated climatological factors have been reported were examined in order to define robust climatological criteria describing the risk of European canker development.

Southern Chile
In southern Chile, leaf scar infection by the European canker pathogen was found to cause serious damage under certain weather conditions during leaf fall in autumn (Latorre *et al.* 2002). Leaf scars on limbs have been widely reported to be an important site of infection. Apple leaf fall in mid-temperate latitudes in southern hemisphere countries occurs in autumn (April - June) and mostly during May.

Lolas and Latorre (1996) reported that incidence of European canker at Talca, Maule, was 48.3 % in 1993 and only 0.01% in 1995. Weather data for those periods from Curico, Maule, (60 km from Talca) showed that the 1993 European canker outbreak was associated with more than 30 % of days having rain during May when leaf fall occurred (Figure 1). Temperature in May in 1993 ranged between 11 °C and 16°C for more than 8 hours per day. By contrast, in 1995, when there was negligible European canker infection, rain occurred on less than 10% of days in May. May temperature was observed between 11°C and 16°C for fewer hours in 1995 than in 1993.

Long-term weather records from Talca (1974 to 2000) show that on average, in May, rain occurs on slightly more than 30 % of days and that temperatures are 11-16°C for more than 8 hours per day (Figure 3C). From these Chilean data it appears that the rainfall and temperature conditions required for European canker can be represented by criteria of more than 30 % of days with rain and temperatures from 11-16°C for more than 8 hours per day in the same month. This appears to suggest that May would be the main period of risk for European canker infection of leaf scars in Chile, which strongly agrees with the published observations of Latorre *et al.* (2002).

Southern England
In south-eastern England, European canker can be problematic even though mean annual rainfall is much less than 1000 mm (McCracken *et al.* 2003). McCracken *et al.* (2003)

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[476] Escuela de Agronomia, Universidad de Talca, Casila 721, Talca, Chile.

investigated occurrence of peripheral stem cankers at East Malling in Kent from March 1998 to August 2000 after the planting of an apple orchard in March 1998.

Few cankers were recorded from the time of planting until more than a year later, after which a large increase occurred during spring and summer (May to July), 1999 (Figure 2). This coincided with a marked increase in the number of hours per day that temperature was between 11 ^{o}C and 16^{o}C. During the period that peripheral cankers increased, more than 30% of days had rain for four consecutive months (Figure 2).

From August 1999 to April 2000, a lesser rate of increase in peripheral cankers occurred. During this period, percentage of days with rain and the hours between 11 and 16^{o}C were often less than 30 % and 8 hours, respectively. More peripheral cankers appeared from May to August 2000 coinciding >30% of days with rain and >8 hours per day between 11 ^{o}C and 16^{o}C in May 2000.

Long-term weather records (1994 to 2007) from a weather station near East Malling (Appendix 2) show that conditions are most conducive to European canker development in late spring (May), when temperatures become warm enough to allow infection (Figure 3A). In autumn (October), when temperatures are still relatively warm and rainfall occurs on average on 27% of days, another period occurs when conditions are more suitable for infection (Figure 3C). This coincides with leaf fall and the occurrence of susceptible leaf scars. Xu and Butt (1996) considered that most infection occurs in autumn in England.

Although European canker risk appears to be relatively high in East Malling compared to the percentage of rainy days this may be explained by the very uniform distribution of days with rain across all the months of the year (25-35%) and the very long periods of favourable temperatures (>9 hours per day) from late spring to early summer (Figure 3A, B) and again during autumn (Figure 3C).

Thus, even in southern England, where annual rainfall is much less than the 1000 mm threshold used in the IRA, the criteria for percentage of rainy days and moderate temperatures identified from the Chilean data appear to explain periods during which climatic conditions were conducive to European canker development.

Northern Ireland
Swinburne (1971) suggested that major infection occurred in spring and early summer in Northern Ireland. Cooke (1999) suggested that new cankers were initiated after leaf fall in autumn in the same region. Long-term weather records (1985 to 2007) from a weather station about 21 km from Loughgall, Armagh (Appendix 2), where those experiments were performed, shows that during that period every month of the year is likely to have rainfall on >30% of days (actually >50% of days) (Figure 3). Temperatures are in the range 11-16^{o}C from May-October for more than 8 hours. Therefore European canker could develop in Northern Ireland in autumn, late spring and summer.

Relatively frequent summer rainfall and very long periods of favourable temperatures during summer (Figure 3B) explain why the fruit rot phase of European canker is so important in Northern Ireland. Grove (1990) stated that in the British Isles *"epidemics are favored by excessive summer rain"* and that the *"causal organism can also infect apple fruit, resulting in a disease called eye rot, which is common in the British Isles and occurred in California in 1965."*

California
In California, infection of European canker predominates during autumn (Grove, 1990). Dubin and English (1974) suggested that November is the most important month for the infection in California. Long-term weather records (1973-2007) from Sonoma County

(Appendix 2) showed that from late autumn (November) until early spring (March) >30% of days have rain and just over 8 hours per day have temperature between 11°C and 16°C (Figure 3A, 3C, and 3D). Thus in California the leaf fall period in autumn and the winter months have similar conditions of rainfall and moderate temperature to those associated with European canker development in Chile, southern England, and Northern Ireland.

New Zealand regions
The analysis using field observations, weather data, and long term climatic records suggested that the common climatic factors in regions where European canker occurs regularly are more than 30 % of days per month with rain and temperatures from 11-16°C for more than 8 hours per day.

Occurrence of these conditions at localities in New Zealand representative of regions where European canker has been reported (Auckland, Gisborne, Nelson and Hawkes Bay) were investigated using long term (30 years) weather data (Figure 4 and Appendix 2).

During spring (Sept – Nov) in Auckland, Gisborne and Nelson conditions are suitable for European canker development, whereas conditions in Hawkes Bay are marginal for rainfall with 29-35% of days with rain (Figure 4 A). During summer and early autumn (December-March) conditions are unsuitable for European canker in all these regions because temperatures are too high for the temperature criterion to be met. In Hawkes Bay there are also not enough rainy days (Figure 4B-C). This lack of suitable conditions during summer, compared to the United Kingdom, correlates well with the observed lack of European canker fruit infection in New Zealand.

In late autumn (April-May) conditions are suitable for European canker in Auckland and Gisborne and this correlates well with the observed occurrence of leaf scar infection in Auckland (Clarke and Brook 1975). Conditions in Nelson and Hawkes Bay during autumn are only marginally suitable for European canker because of the low percentage of days with rain (Figure 4C).

In winter (June – Aug) conditions are highly suitable for infection in Auckland, whereas in Nelson it tends to be too cold. Gisborne is marginal for temperature and Hawkes Bay is marginal for both temperature and number of rainy days in winter (Figure 4D).

Australian regions
In Australia the IRA claims that Orange, Batlow, Adelaide Hills, and Manjimup all have climatic conditions favourable for European canker based on the assumption that mean annual rainfall is greater than 1000 mm (IRA p143).

However, the more rigorous climatic risk analysis based on the Dubin and English (1975) temperature criteria and the percentage of days per month with rain shows that climatic conditions in the main Australian apple production regions are, at best, marginally favourable for European canker (Figure 5A-D).

Only Manjimup[477] in Western Australia and Sheffield in northern Tasmania exceed the thresholds for days with temperature between 11 °C and 16°C and more than 30 % of days with rain per month, in any month. Sheffield, on average, only marginally exceeds these thresholds in October and November. Manjimup exceeds them from May-October, during late autumn, winter and early spring.

[477] Western Australia is not being considered for importation of New Zealand apples, but Manjimup is included in this discussion for completeness in relation to the information presented in the IRA.

In Orange and Batlow, wet conditions during winter are not matched with moderate temperatures (8 hours per day between 11 °C and 16°C on average). In Adelaide Hills, rain days were generally too few and temperatures were only in the right range for 30% of days in April and May (Figure 5C).

Shepparton in Victoria, Stanthorpe in Queensland, and the Huon Valley in Tasmania have been classified as regions that have low risk of European canker because mean annual rainfall is less than 1000mm (IRA, p. 143). In these regions, the percentage of days with rain was greater than 30 % for some months. However, hours between 11 and 16°C were less than 8 hours. In addition, the Yarra valley in Victoria had relatively wet conditions in winter and spring (Figure 5 D and A). However, temperature ranged from 11°C and 16°C for slightly less than 8 hours in a day on average during all the months.

Frequency of conducive conditions

Because weather varies from year to year, it is useful to determine how often the rain day and moderate temperature criteria were simultaneously met in a given month in order to assess climatic risk of EC. The probability that such conditions occur varied by months and by regions (Figure 6 A-D).

In Northern Ireland (Loughgall), the probability of the occurrence of European canker infection conditions is nearly 1.0 during summer and early autumn. Thus, a lack of rainfall is never likely to limit European canker infection in Northern Ireland (Figure 6A). Conditions can be expected to be favourable from late spring until late autumn, encompassing the fruit development periods and part of the leaf fall period.

Moderate temperatures and wet conditions are less frequent in southern England (East Malling). However, in that region weather conditions were favourable for the disease during spring (May) in every other year (Figure 6A). In autumn, such weather conditions occur about twice in three years.

In coastal California (Sonoma) and Chile (Talca), it is during autumn and winter that infection conditions occur frequently (Figure 6A, B). In California, the probability of infection conditions increases from autumn to mid-winter, whereas in Chile infection conditions decrease over that period.

In Auckland, conditions for European canker infection are met in some months almost every year (Figure 6B). The probability of infection conditions is similar in Nelson and Gisborne, being characterised by high probability in spring and autumn. In Hawkes Bay, the probability is generally lower than in Nelson and Gisborne.

In Australia (Figure 6 C-D), the probability that infection conditions for European canker occur is high in Manjimup from autumn to spring. In Adelaide Hills, the probability is relatively high (> 40%) in April and May. In the Yarra Valley, the probability was greater than 50 % in May. However, the probability in following months was considerably lower. For other regions, the probability is relatively low.

European canker in Tasmania from 1930-1974

The strongest evidence against there being any real climatic risk of establishment and spread of European canker in Australia comes from the well documented occurrence of European canker in Tasmania for about 40 years during the 20th century (Ransom 1997). European canker was present in northern Tasmania from around 1930 until the last detection in 1974. The canker symptoms that had been present in orchards near Spreyton for about 20 years were identified as *Nectria* canker in 1952 (Ransom 1997). The presence of the disease for the 20 years before eradication began was not associated with any recorded spread to nurseries or to wild and amenity plants and there was no spread recorded between apple orchards even locally within northern Tasmania. There was no recorded spread to anywhere else in Australia, despite unrestricted movement of apple fruit from all of Tasmania into mainland Australia for the entire 40 years. The long term occurrence of the disease in one of the higher rainfall apple growing areas in Australia (Figure 6) without spread clearly demonstrates that the climate in northern Tasmania was not conducive to spread of EC.

During the eradication programme in Tasmania only movement of propagation material was prohibited from the scheduled area around the infected orchards (Ransom 1997). There was no restriction on the movement of apple fruit from Tasmania to other states (Tasmanian State Proclamation 16 August 1955 under the Plant Diseases Act 1930), despite Tasmania being a major producer and exporter of apple fruit throughout the period. The lack of restriction on fruit movement shows that there was no concern at that time by Commonwealth authorities or in other states about the importation of fruit from an area within Australia with European canker to other areas within Australia without European canker.

Tasmanian climate in relation to European canker risk
A comparison of the climate of northern Tasmania with other world areas where European canker occurs and with other parts of Australia was made using the criteria derived from Dubin and English (1975). Weather data from Sheffield (SF), near Spreyton (the European canker outbreak area), showed that conditions are generally unsuitable for European canker. In late spring (October-November) conditions could be marginally suitable for infection because 30-50% of days have rain and temperature is 11-16^{o}C for just over 8 hours/day (Figure 5A). However, from summer to early autumn (December-March) there is insufficient frequency of rainy days for infection to be likely. In April and May percentage of rain days and temperatures from 11-16^{o}C are close to the threshold values (Figure 5C) and could be marginally suitable for infection. The climate analysis suggests that conditions in northern Tasmania could, at most, be marginally favourable for European canker. The fact that European canker was present there for more than 20 years without showing any signs of spread suggests that conditions there are not suitable for European canker and also suggests that the climatological criteria we have used may slightly over-predict the risk of European canker.

The IRA itself supports this view, including the statements, *"the extent of dispersal was quite limited despite being present for many years"* and Spreyton has *"unfavourable climatic conditions"* for this disease. Which is confirmed by the statement in Ransom (1997) that: *"there were no reports of the disease spreading to wild and amenity plants, including forest plants or household garden plants during the 40 year eradication programme".*

Climatic requirements for ascospore production
The European canker fungus (*Neonectria galligena)* produces two types of spores, conidia and ascospores. While conidial release depends mainly on rain-splash, ascospores are discharged after rain or moist periods (Swinburne, 1971). Marsh (1940) reported that the most likely maximum dispersal distance for conidia is 10 m. In contrast, ascospores, if they occur, are potentially better adapted to longer distance dispersal than conidia (Wilson, 1966). However, ascospores are only produced in climatic areas with high rainfall. Dubin and English (1975) reported that

"it is extremely doubtful that ascospores play an important role in infection in California."

They also reported that during the hot, dry summer and autumn in 1971-1972 there was very little development of perithecia. In Chile, ascospores do not develop in areas with about 500 mm rainfall per year, but they do occur and in areas >700 mm (Latorre pers. Comm.). Lolas (pers. comm.) considers that ascospores do not play a role in the epidemiology of European canker in Chile.

During the European canker outbreak in northern Tasmania, Ransom (1997) noted that "perithecia were found on several occasions but they never contained ascospores". Ransom (1997) reported that no ascospores of *N. galligena* were produced during the time that European canker was present in Tasmania. It therefore appears that the climate in northern Tasmania is not suitable for the production of ascospores and this may be one of the reasons for the lack of spread of European canker during the outbreak there.

Conclusions

The climatological criteria developed in this study (percentage of days per month with rain and the number of hours between 11°C and 16°C per month) were found to identify the general climatic conditions associated with European canker occurrence in five countries. They allowed a much greater degree of explanation of the observed patterns of European canker occurrence in time and space than the 1,000 mm threshold of annual rainfall that was used in the IRA. Application of these criteria to long-term climate data allowed climatic information to corroborate published observations in those countries with European canker, about the months of the year when infection occurs, the likelihood of occurrence of leaf scar infection and the likelihood of fruit infection.

The analyses indicated that in Talca, Chile the greatest risk of European canker infection occurs in autumn when there is sufficient rainfall and when leaf scars are present. In south eastern England (East Malling) infection occurs in spring, particularly May, when temperatures rise and again in early autumn while temperatures are still warm. In Northern Ireland there is adequate rainfall year-round and infection occurs at any time during spring, summer and autumn, being limited only by temperature. In coastal California conditions are suitable for infection over the leaf fall period and through the winter. In California summer temperatures are too high and rainfall too infrequent for infection to occur.

The climate analyses showed that in New Zealand, no region, not even Auckland, has weather conditions favourable for European canker during summer. This explains the extremely low incidence of fruit infection caused by *N. galligena* in New Zealand and explains why the IRA was unable to present any convincing evidence that fruit infection is an important aspect of this disease in New Zealand. Only in Nelson during December, do climatic conditions appear to be marginally suitable for European canker infection during summer. However, there are no records of *N. galligena* causing fruit rot in apples from Nelson.

Of the countries examined in this analysis, Australia clearly has the lowest risk of European canker establishment in all seasons of the year. In parts of Australia where the percentage of rain days might be sufficient, temperatures tend to be either too cold, as in the higher latitude areas of Tasmania, or too hot, as in the lower latitude areas of Victoria, New South Wales and Queensland. Only in southern Western Australia and northern Tasmania are the temperature and rainfall criteria met during some months. As Western Australia is not being considered for importation of New Zealand apples, the higher risk of European canker development there is only of academic interest.

The fact that European canker was introduced into northern Tasmania, probably in infected nursery trees, and was present there and not controlled for about 20 years without spreading from the initial infection sites shows that even in northern Tasmania there is negligible risk of establishment and spread of European canker.

Figure 1. Weather conditions in Maule, Chile from autumn to winter in 1993 and 1995.

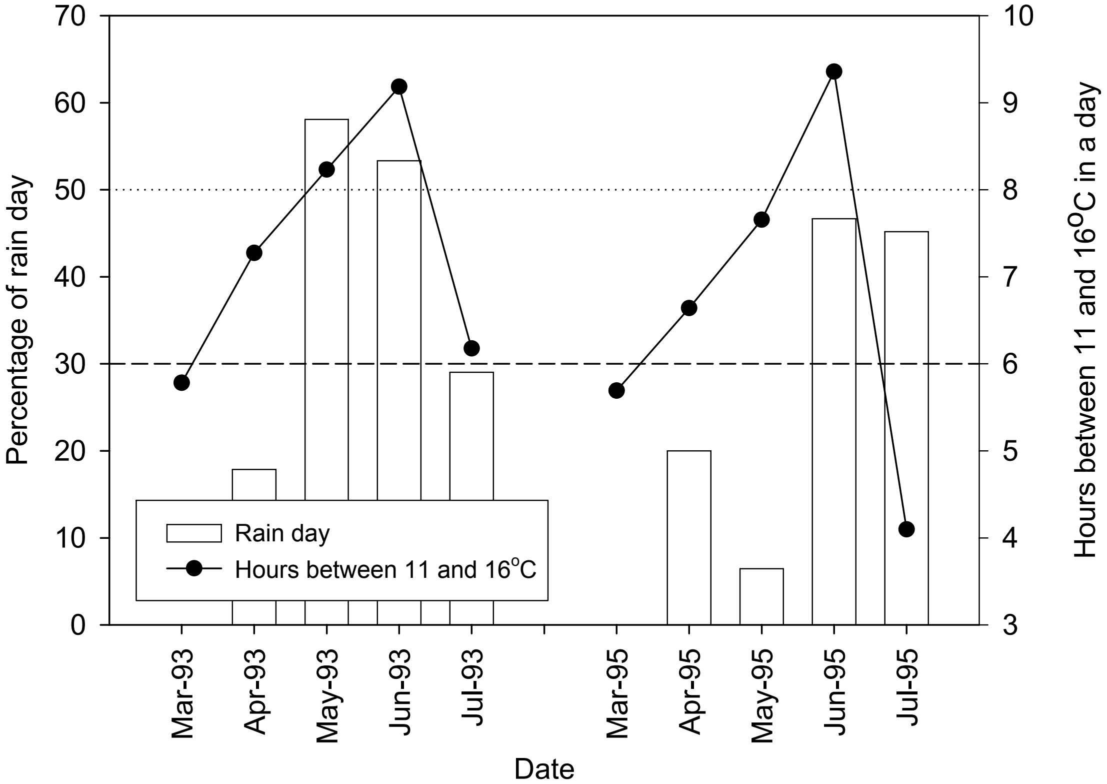


Figure 2. Percentage of trees with peripheral stem cankers and weather conditions at Horticulture Research International (HRI) at East Malling, Kent, UK, from March 1998 to August 2000. European canker data were obtained from McCracken *et al.* (2003). Weather data were measured at Gravesend, Kent, UK, which is about 20 km distant from East Malling.

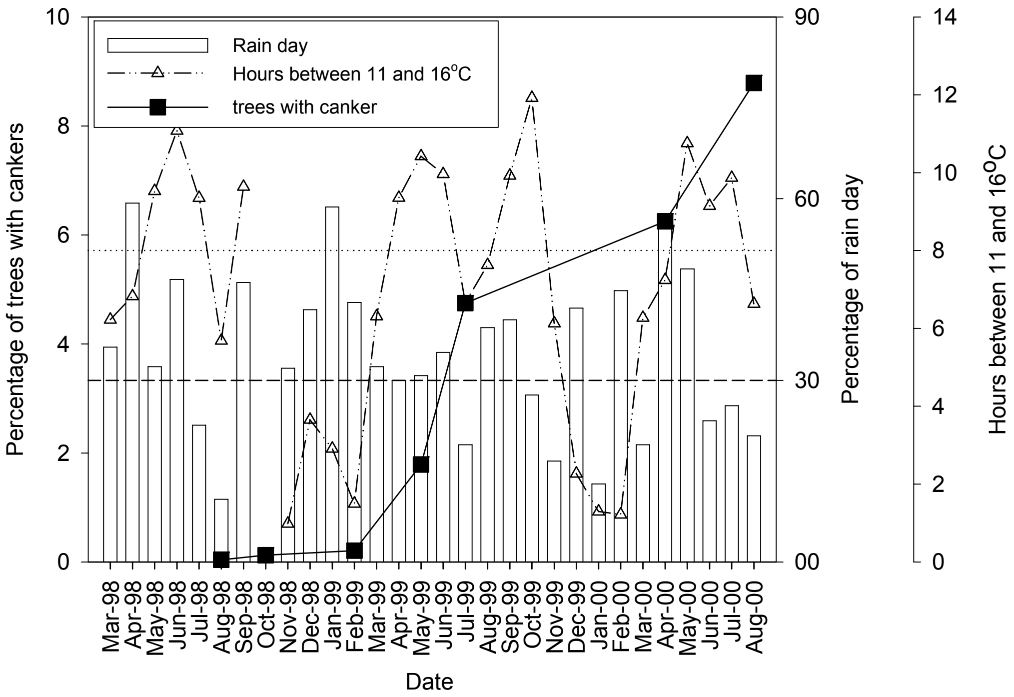
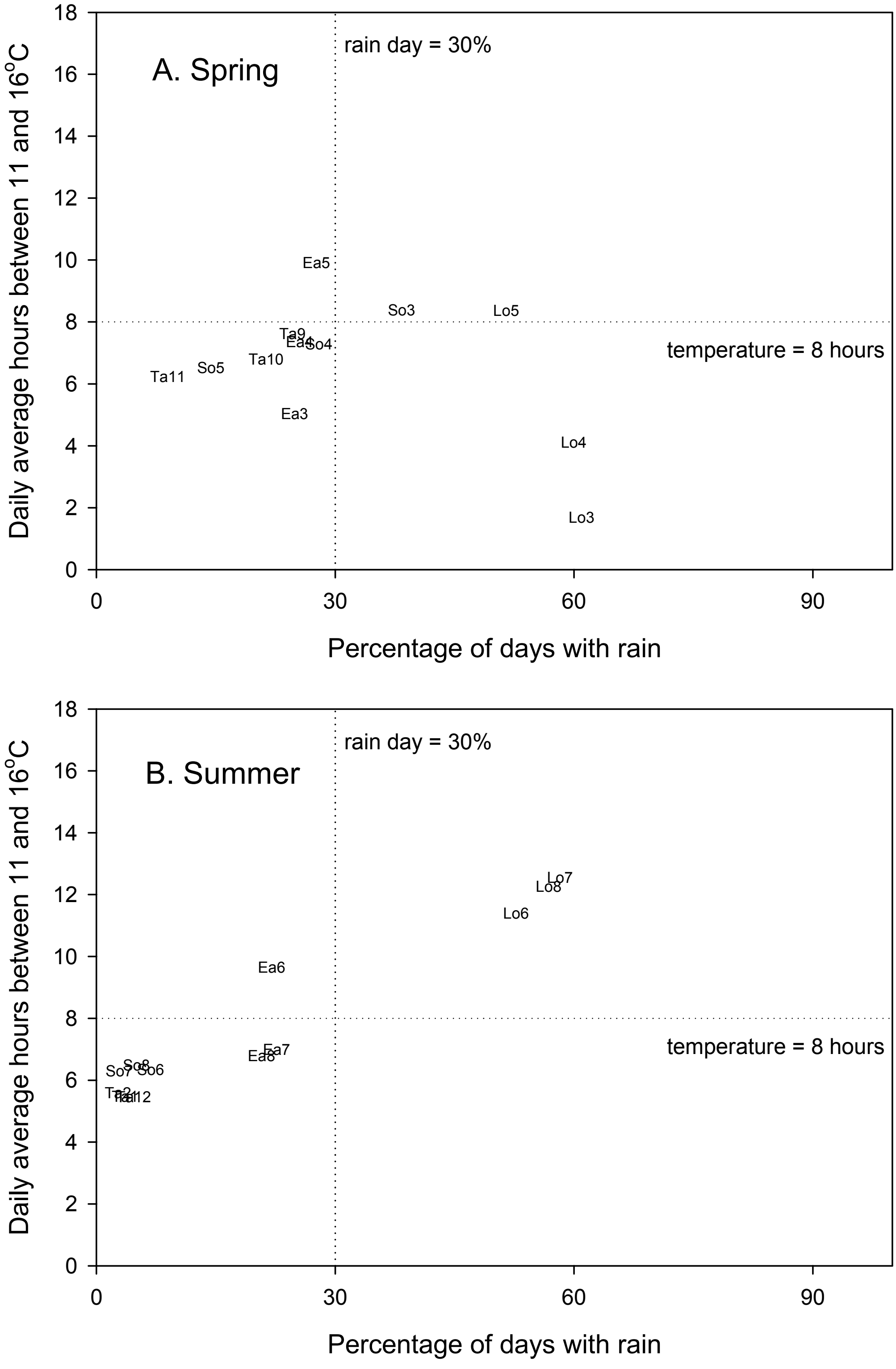
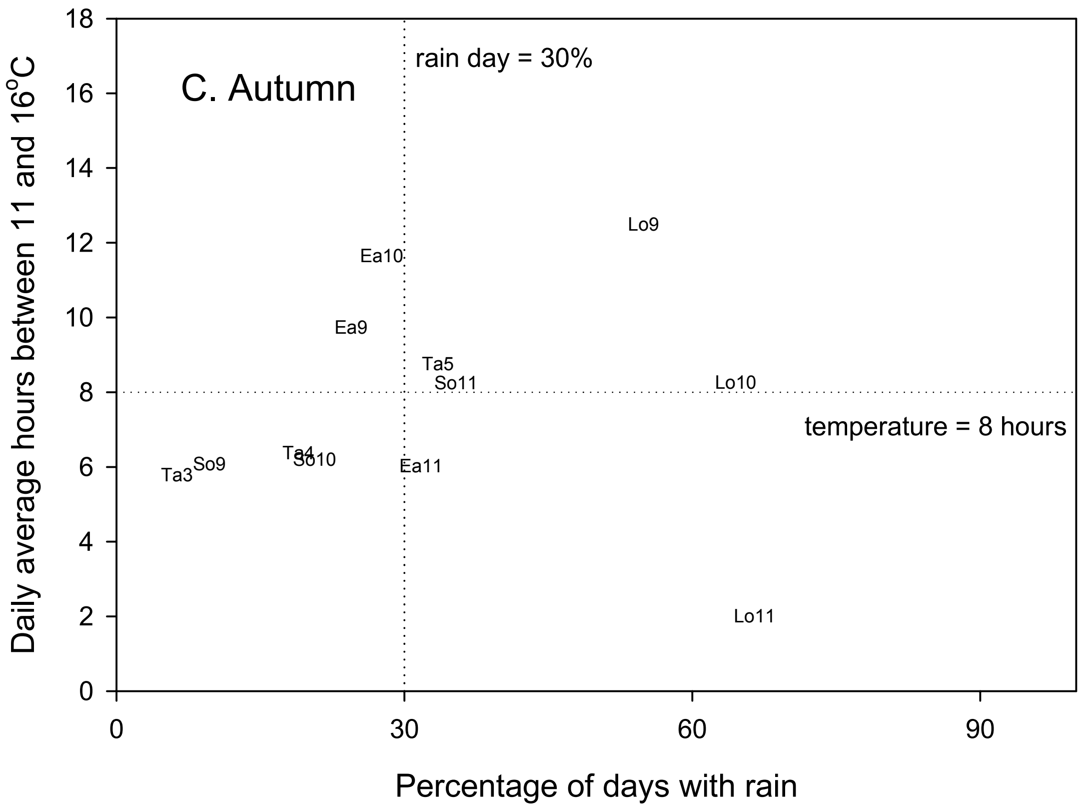


Figure 3. Climatic suitability for European canker development in Chilean, United Kingdom and Californian localities shown in Appendix 2 using the rainfall and temperature criteria derived from Dubin and English (1975). The first two letters of each plotted point represent the locality name and the numeric postfix represents a month during A) spring, B) summer, C) autumn, and D) winter. Analysis of published studies showed that simultaneous occurrence of >30% of days with rain and >8 hours per day between 11 °C and 16°C represent high risk of European canker infection. Ea = East Malling, Lo = Loughgall, So = Sonoma, Ta = Talca



Ea = East Malling, Lo = Loughgall, So = Sonoma, Ta = Talca



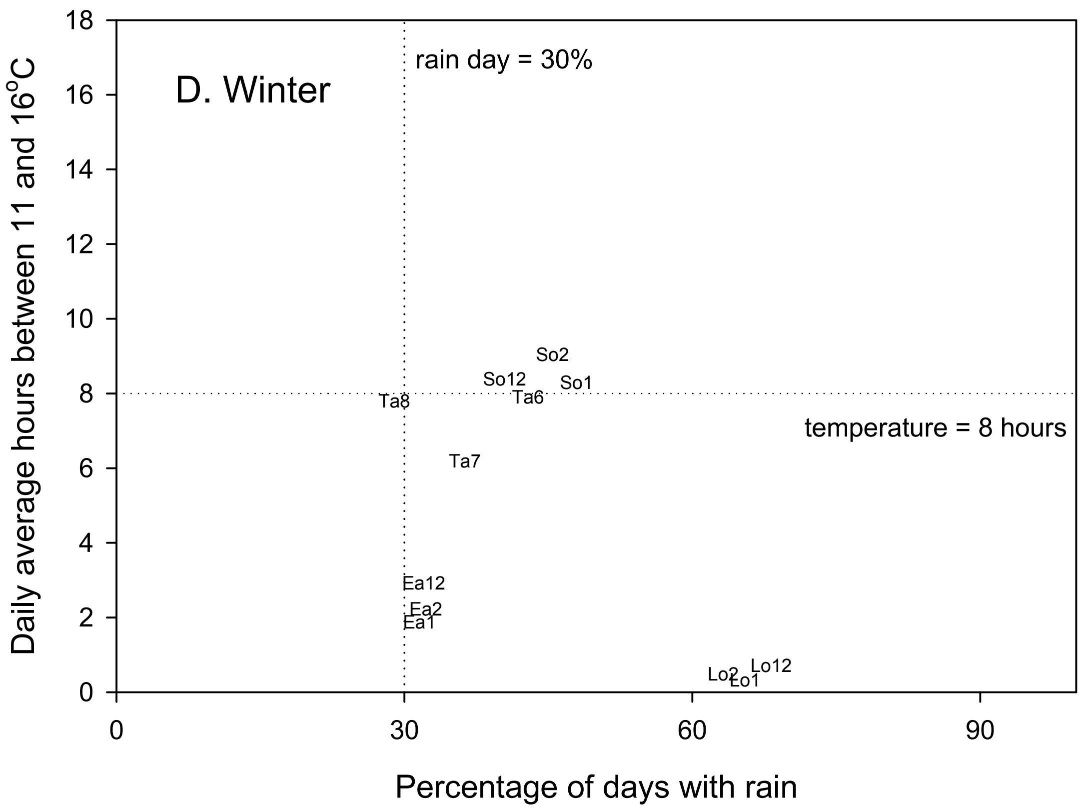
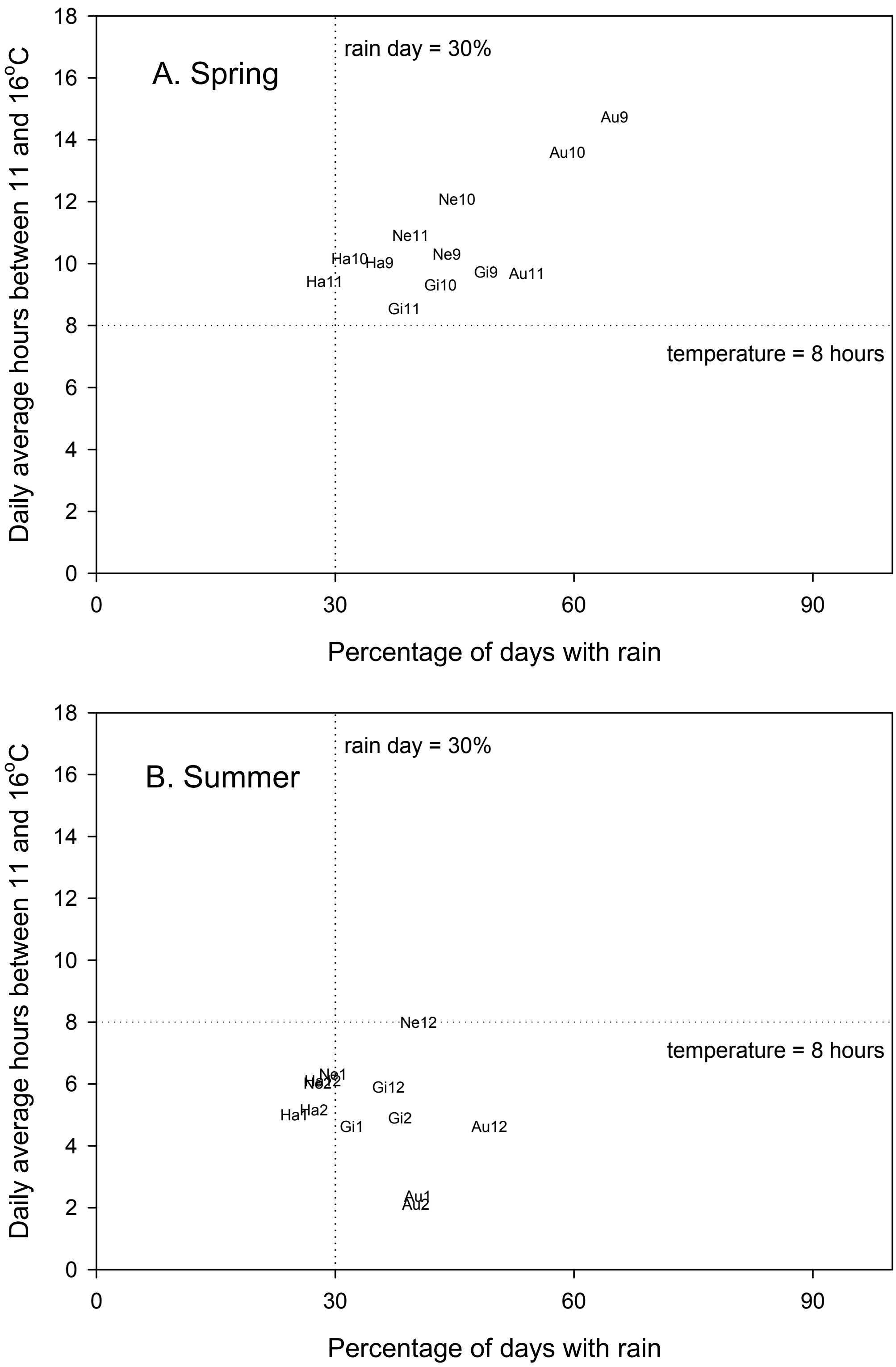
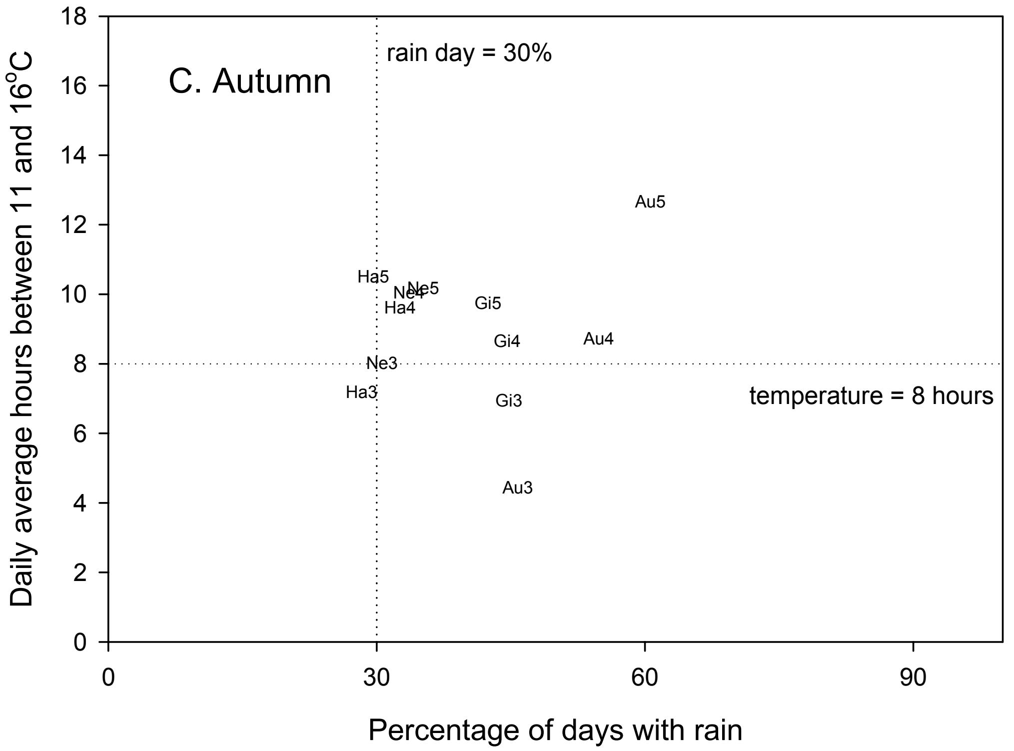
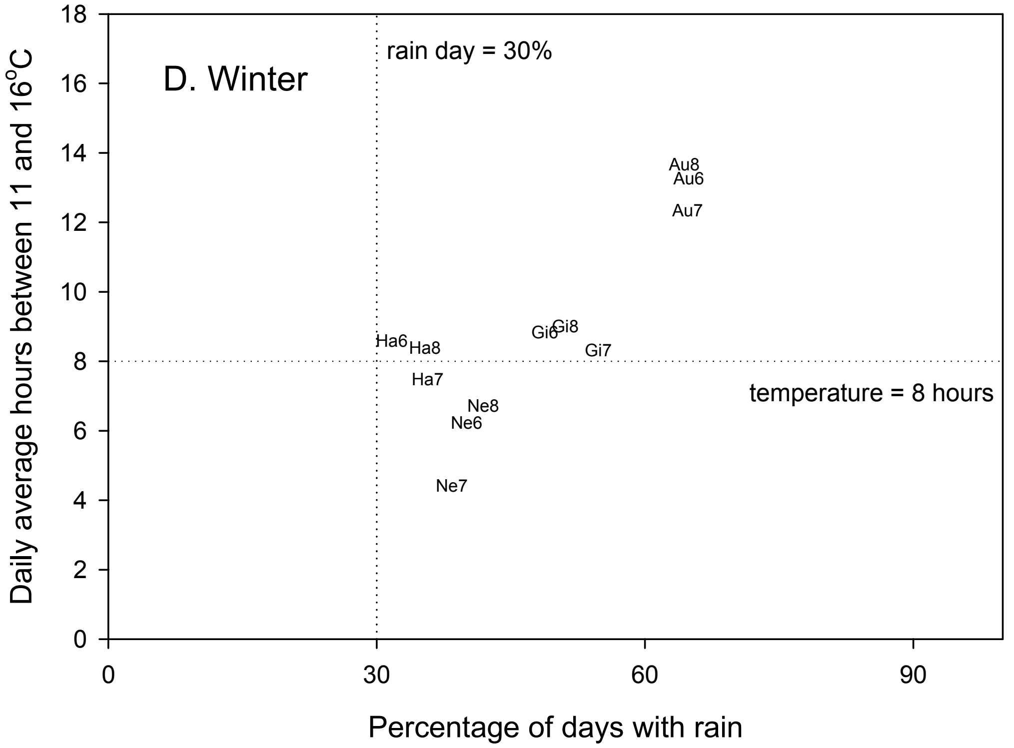


Figure 4. Climatic suitability for European canker development in New Zealand localities shown in Appendix 2 using the rainfall and temperature criteria derived from Dubin and English (1975). The first two letters of each plotted point represent the locality name and the numeric postfix represents a month during A) spring, B) summer, C) autumn, and D) winter. Analysis of published studies showed that simultaneous occurrence of >30% of days with rain and >8 hours per day between 11 °C and 16°C represent high risk of European canker infection.

Au = Auckland, Gi = Gisborne, Ha = Hawkes Bay, Ne = Nelson

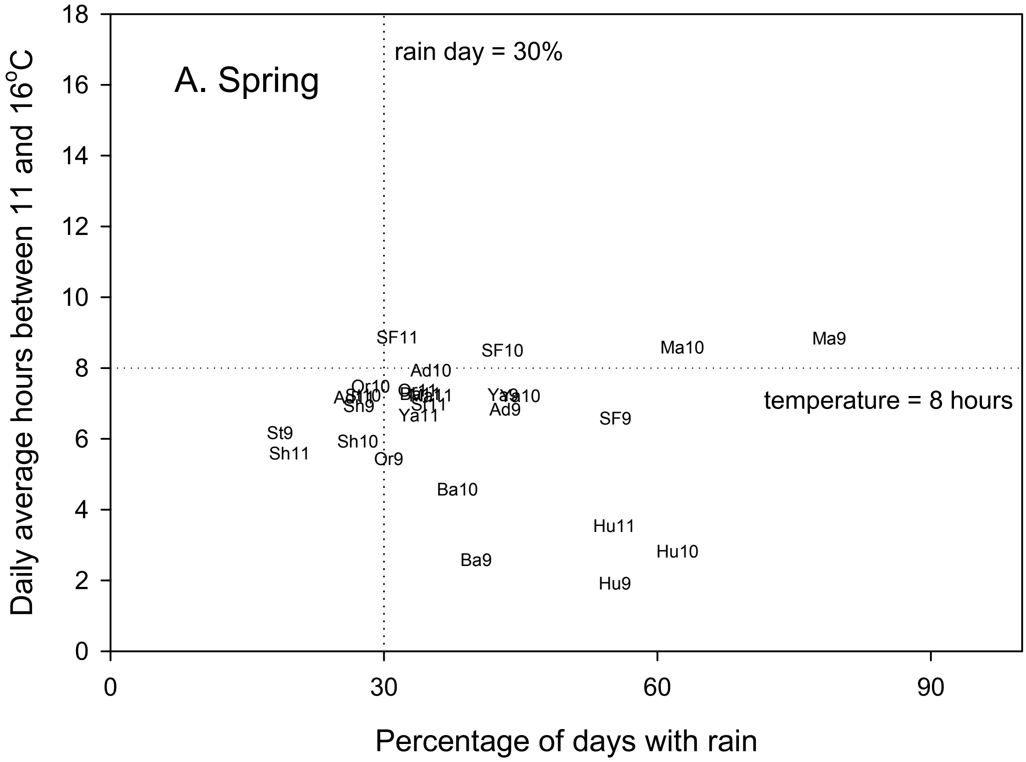


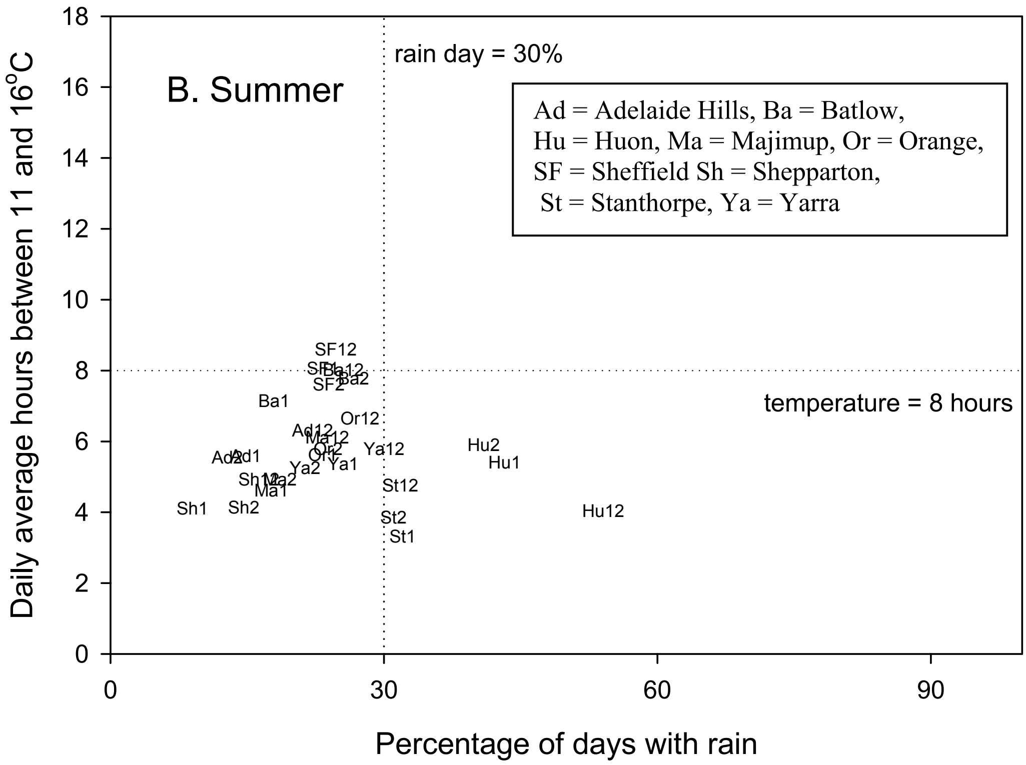




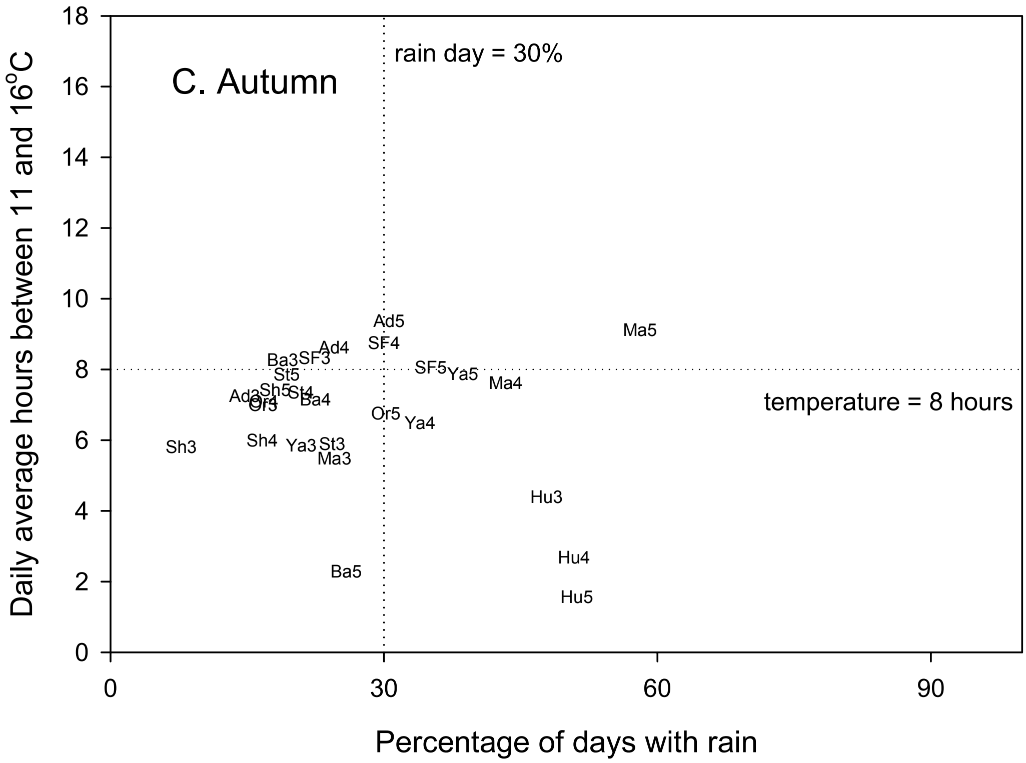
Au = Auckland, Gi = Gisborne, Ha = Hawkes Bay, Ne = Nelson

Figure 5. Climatic suitability for European canker development in Australian localities shown in Appendix 2 using the rainfall and temperature criteria derived from Dubin and English (1975). The first two letters of each plotted point represent the locality name and the numeric postfix represents a month during A) spring, B) summer, C) autumn, and D) winter. Analysis of published studies showed that simultaneous occurrence of >30% of days with rain and >8 hours per day between 11 °C and 16°C represent high risk of European canker infection.





Ad = Adelaide Hills, Ba = Batlow, Hu = Huon, Ma = Manjimup, Or = Orange, SF = Sheffield Sh = Shepparton, St = Stanthorpe, Ya = Yarra.



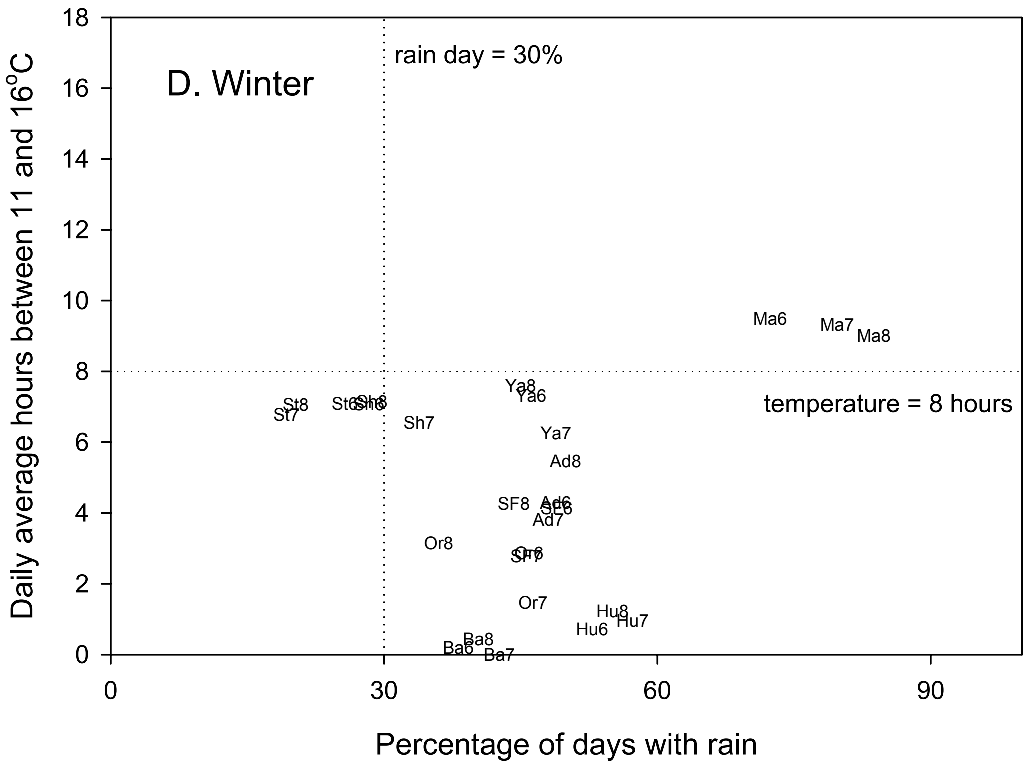
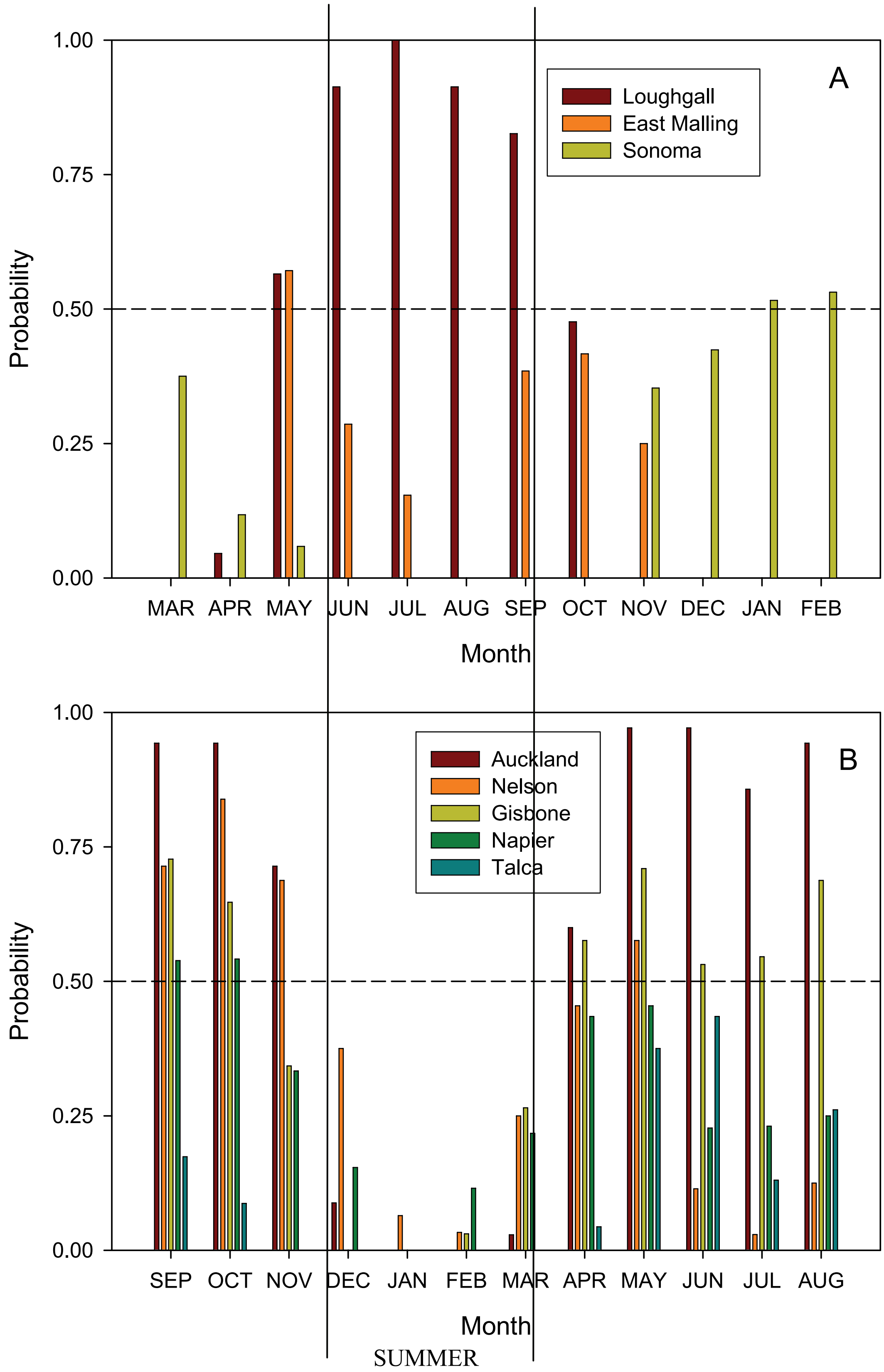
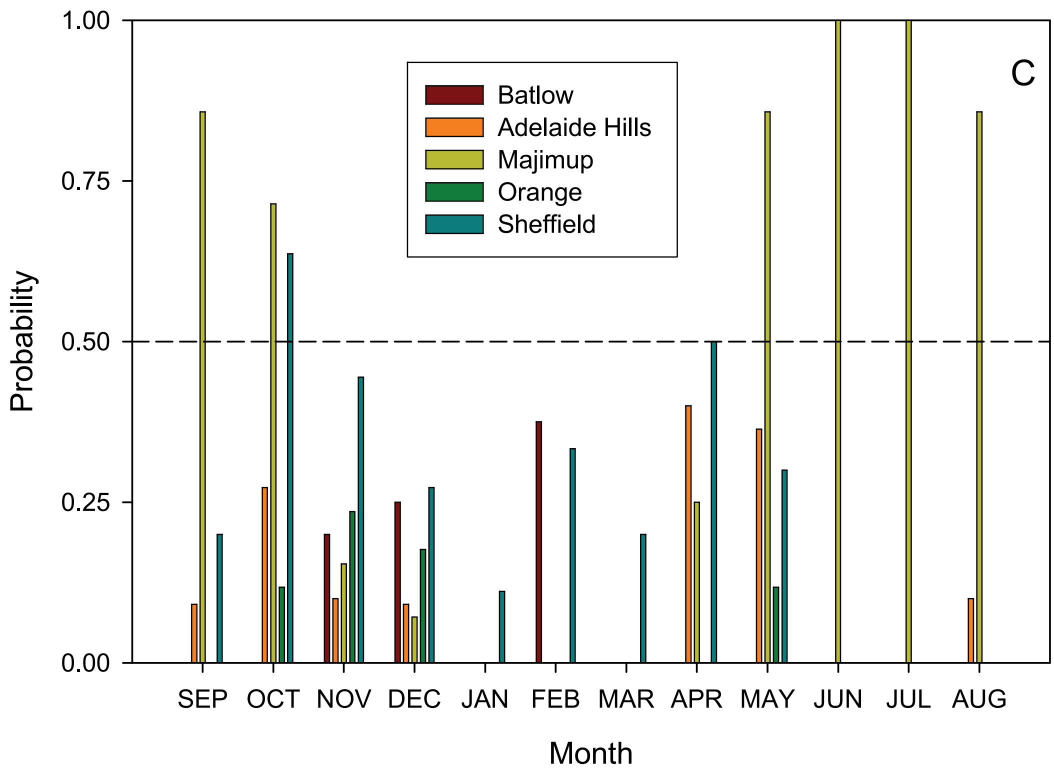
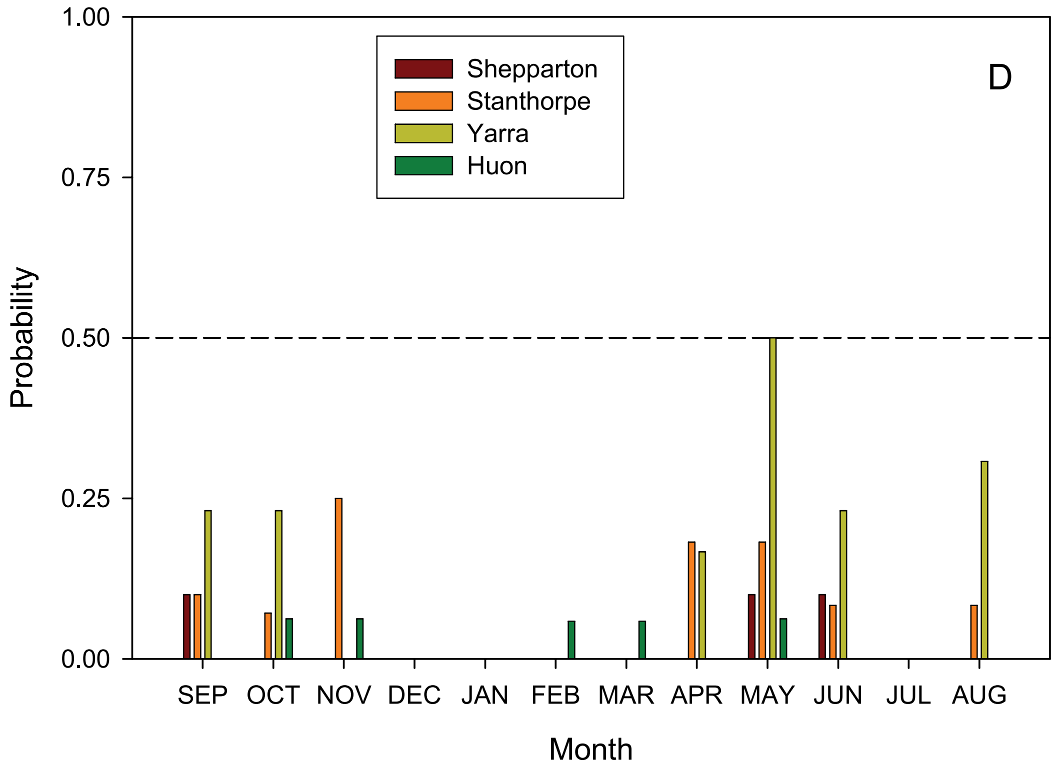


Figure 6. Probability that the percentage of rain day and hours between 11 and 16C are greater than 30% and 8 hours at the same time in a month at sites A) in the Northern Hemisphere, UK and the US, B) in the Southern Hemisphere, Chile and New Zealand, and C, D) in Australia.




C
Batlow
Adelaide Hills
Majimup
Orange
Sheffield
Probability
1.00
0.75
0.50
0.25
0.00
SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG
Month


D
Shepparton
Stanthorpe
Yarra
Huon
Probability
1.00
0.75
0.50
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SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG
Month

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Appendix 1 Sources of climate data

Daily temperature and rainfall data were obtained from the US National Climate Data Center (NCDC) Global Surface Summary of the Day (GSOD) database (http://www.ncdc.noaa/gov/pub/data/globalsod/gsod.html). Weather stations were selected to represent regions in Chile, the UK and the US where European canker has a high prevalence (Appendix 2). Daily maximum and minimum temperature were used to calculate the number of hours between 11 and 16^{o}C. Hourly temperature (T) at a given hour (H) was estimated using the WAVE method as follows (Reicosky *et al.* 1989):

$T = T_{AVE} - T_{AMP}*\cos[□H-H_{RISE})/ (H_{MAX}-H_{RISE})]$

if $H_{RISE} < H < H_{MAX}$, and

$T = T_{AVEN} + T_{AMPN}*\cos[□H'/ (10+H_{RISE})]$

If $H > H_{MAX}$, where H_{RISE} = the time of sunrise, H_{MAX} = the hour at which maximum temperature occurs in a day, and $H' = H - H_{MAX}$. The value of H_{RISE} and H_{MAX} varied by months as listed in Table A2. T_{AVE} and T_{AMP} are average and amplitude of temperature in a day, which was calculated as follows:

$T_{AVE} = (T_{MAX} + T_{MIN})/2$

and

$T_{AMP} = (T_{MAX} – T_{MIN})/2$,

where T_{MAX} and T_{MIN} are daily maximum and minimum temperature. T_{AVEN} and T_{AMPN} are average and amplitude of daily temperature using maximum temperature in a day and minimum temperature in the next day. T was estimated from H_{RISE} for 24 hours and the hour between 11 and 16C were counted in each minute. Because timing of sunrise and daily maximum temperature varies by seasons, different values for H_{RISE} and H_{MAX} were used as listed in Appendix 3 (Chow and Levermore, 2007).

The GSOD dataset contains precipitation and rain day index variables. In some cases, precipitation data were missing yet rain day index was available. It was also found that rain day index indicated rainfall occurred even though the value of precipitation was zero. To compile all rain day information, it was assumed that rain occurred when precipitation was > 0.01 and no snow index was flagged in the day. When precipitation value was zero or missing, rain day index was used to indicate whether rainfall occurred on the day.

In some years, the number of missing data was large enough to fail to represent weather conditions in the month. When more than a week of data were missing in a month, the month was removed from our dataset. Thus 8% of data, in total, were removed.

Appendix 2. Locations of weather stations extracted from the Global Summary Of Day database

Locality	Code	Country	USAF[a]	WBAN[b]	Data Range	latitude	longitude	Station name
East Malling	Ea	UK	037840	99999	1996-2007	51.47	0.3	GRAVESEND-BROADNESS
East Malling	Ea	UK	037900	99999	1994-1995	51.28	0.45	EAST MALLING (AUT)
Loughgall	Lo	UK	039230	99999	1985-2007	54.23	-6.5	GLENANNE
Sonoma	So	US	724957	23213	2000-2007	38.52	-122.82	SANTA ROSA (AWOS)
Sonoma	So	US	724957	99999	1973-1999	38.52	-122.82	SANTA ROSA (AWOS)
Talca	Ta	Chile	856290	99999	1973-2007	-34.97	-71.23	CURICO
Auckland	Au	New Zealand	931190	99999	1973-2007	-37.02	174.8	AUCKLAND AIRPORT
Hawkes Bay	Ha	New Zealand	933720	99999	1973-1988	-39.47	176.87	NAPIER/AIRPORT
Hawkes Bay	Ha	New Zealand	933730	99999	1992-2007	-39.45	176.85	NAPIER AERODROME AW
Nelson	Ne	New Zealand	935450	99999	1973-1991	-41.3	173.22	NELSON AERODROME
Nelson	Ne	New Zealand	935460	99999	1992-2007	-41.3	173.22	NELSON AERODROME AW
Gisborne	Gi	New Zealand	932910	99999	1973-1991	-38.67	177.98	GISBORNE AERODROME
Gisborne	Gi	New Zealand	932920	99999	1992-2007	-38.65	177.98	GISBORNE AERODROME
Batlow	Ba	Australia	959160	99999	1998-2007	-35.93	148.38	CABRAMURRA SMHEA
Orange	Or	Australia	947260	99999	1990-1997	-33.38	149.12	ORANGE AIRPORT COMP
Orange	Or	Australia	957260	99999	1998-2007	-33.38	149.13	ORANGE AIRPORT
Manjimup	Ma	Australia	946160	99999	1990-1998	-33.95	116.13	BRIDGETOWN POST OFF
Manjimup	Ma	Australia	946170	99999	2000-2007	-34.25	116.15	MANJIMUP
Sheffield	SF	Australia	949550	99999	1997-2007	-41.38	146.31	SHEFFIELD SCHOOL FA
Huon Valley	Hu	Australia	959770	99999	2004-2007	-42.98	147.07	GROVE RESEARCH STAT
Huon Valley	Hu	Australia	959790	99999	1990-2004	-42.88	147.23	MT WELLINGTON
Adelaide Hills	Ad	Australia	946780	99999	1997-2007	-34.73	138.93	TOWER HILL
Shepparton	Sh	Australia	948750	99999	1998-2007	-36.43	145.4	SHEPPARTON AIRPORT
Stanthorpe	St	Australia	945500	99999	1994-1998	-28.67	151.93	STANTHORPE
Stanthorpe	St	Australia	945530	99999	1998-2007	-28.62	151.95	APPLETHORPE GBHRS A
Yarra Valley	Ya	Australia	948640	99999	1995-2007	-37.733	145.4	GOLDSTREAM

a. US Air Force Datsav3 station number
b. NCDC WBAN number

Appendix 3. Time of sunrise (H_{RISE}) and daily maximum temperature (H_{MAX}) listed in Chow and Levermore (2007)

Month (Southern Hemisphere)		H_{RISE}	H_{MAX}
January	(July)	6	14
February	(August)	6	14
March	(September)	5	14
April	(October)	5	15
May	(November)	4	15
June	(December)	4	16
July	(January)	4	15
August	(February)	5	15
September	(March)	5	15
October	(April)	6	14
November	(May)	6	14
December	(June)	7	14

ANNEX 4
FURTHER INFORMATION ON RISK ANALYSIS: CHOOSING DISTRIBUTIONS TO MODEL RISK, AND THE UNCERTAINTY AROUND IT

International trade, uncertainty and risk analysis

International trade in plants and animals, or commodities derived from them, cannot occur without some element of risk to importing countries. Risk analysis can be defined as:

> a body of knowledge that evaluates and derives a probability of an adverse effect of an agent (chemical, physical or other), industrial process, technology or natural process[478]

Uncertainty is inherent in all risk analyses. If there were no uncertainty there would be no need to estimate the risk. The task of a risk analyst is to "use whatever information is available" to estimate risk "with as much precision as possible, together with an estimate of the imprecision".[479]

One or more parameters are needed to model uncertainty in a particular variable. These parameters commonly include a maximum value, a minimum value and, except in the crudest of circumstances, a "most likely" value as well. These estimates may be used to construct a probability distribution for each of the variables used to represent events in the model. Computer simulations representing the probability for the entire scenario of events can be run based on combining samples from each distribution.

There are many types of probability distributions that can be used to model uncertainty in a variable. Different types of distributions are appropriate for different types of variables. For instance, probabilities take values from 0 to 1; counts of items take values of 0, 1, 2, and so on. The choice of distribution can significantly affect the overall output from a

[478] Molak V (ed) (1997) *Fundamentals of risk analysis and risk management*, CRC Lewis Publishers, pp. 1-10.

[479] Wilson R and Shlyakhter A (1997) "Uncertainty and variability in risk analysis", *Fundamentals of risk analysis and risk management*, CRC Lewis Publishers, pp. 33-44.

risk assessment model. The IRA team used uniform distributions or triangular distributions for most variables, and a pert distribution to model the number of apples likely to be exported in a year.

The process for eliciting expert opinion to inform judgments about the parameters used is critical in risk analysis. The OIE notes that "… accurate subjective judgments cannot be elicited simply by asking an individual to provide a probability"[480] and recommends a detailed workshop method[481] to avoid bias in eliciting expert opinion. The OIE further notes that: "Biases may be introduced if the choice of experts is motivated by, for example, political or commercial reasons."[482]

The Uniform distribution

The uniform distribution (see Figure 1 below) is the crudest probability distribution available for modelling a range of values in risk analysis. In this distribution every value between the maximum and minimum extremes is equally likely to occur. There is no "most likely" value.

The implications of the uniform distribution for biological risk analysis have been summarised by Vose (1997):

> The uniform distribution is generally a very poor modeller of expert opinion, since all values within its range have equal probability density, but that density falls sharply to zero at the minimum and maximum in an unnatural way.

Vose continues:

> It is rare indeed that the expert will be able to define the minimum and maximum, but have no opinion to offer on central tendency [most likely value].

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[480] OIE (2004) *Handbook on Import Risk Analysis for Animals and Animal Products*, Volume 2, Quantitative risk assessment, p. 74.

[481] OIE (2004) *Handbook on Import Risk Analysis for Animals and Animal Products*, Volume 2, Quantitative risk assessment, p. 75.

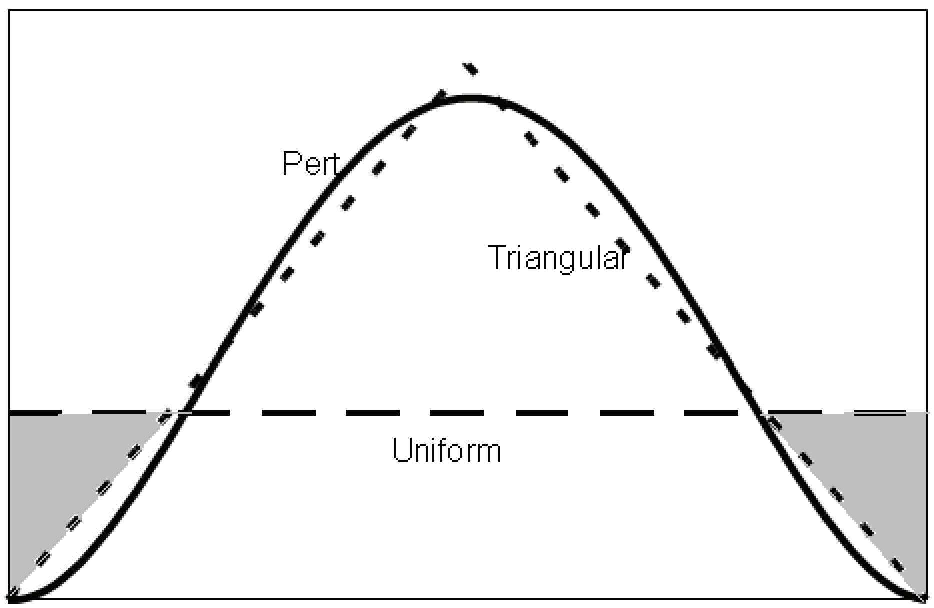
[482] OIE (2004) *Handbook on Import Risk Analysis for Animals and Animal Products*, Volume 2. Quantitative risk assessment, p. 75.

Vose concludes that:

> The uniform distribution does, however, have a couple of uses:
>
> - To highlight or exaggerate the fact that little is known about the variable
> - To model circular variables (like the direction of the wind from 0 to 2Π [360 degrees]).[483]

As indicated by Vose, in most cases, where variables are determined through a process that appropriately elicits expert opinion, it will be possible to estimate a "most likely" value. This "most likely" value can be used to create a more realistic and useful model of probability that favours the "most likely" value.

FIGURE 1: Comparing a uniform, triangular and pert distribution



[483] Vose D (1997) "Monte Carlo risk analysis modelling", *Fundamentals of risk analysis and risk management*, Molak V (ed), CRC Lewis Publishers, pp. 45-66.

The triangular distribution

One distribution that favours the "most likely" value is the triangular distribution (see Figure 1 above), with the apex of the triangle being the "most likely" value. Unlike the uniform distribution, the triangular distribution reduces the frequency with which less likely values, representing extreme situations, occur in the distribution. The shaded areas indicate the extent to which extreme values are over-represented by using the uniform distribution compared with the triangular distribution with the same "most likely value".

The triangular distribution does not have to be symmetrical about the most likely value; its shape can be skewed to the minimum (left) or maximum (right) according to the outcome of the process of eliciting expert opinion (see further below, under "Example").

The triangular distribution is commonly used in risk analysis to model expert opinion and is easy to generate and use.[484] Its main drawback in risk analysis is its shape about the "most likely" value which places more emphasis (relative to the pert distribution) on values at the extremes of the distribution (the maximum and minimum values) while underemphasising values close to that selected as "most likely".

The pert distribution

The pert distribution (see Figure 1) also uses a minimum, maximum and "most likely" value but is designed to generate a distribution that more closely models real-world biological situations.

Like the triangular distribution, the pert distribution emphasises the "most likely" value over the estimates for the maximum and minimum extremes. However, unlike the triangular distribution, the pert distribution constructs a smooth curve which places progressively more emphasis on values near the "most likely". It also de-emphasises values at the extremes of the distribution, even more so than the triangular distribution.

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[484] Vose D (1997) "Monte Carlo risk analysis modelling", *Fundamentals of risk analysis and risk management*, Molak V (ed), CRC Lewis Publishers, pp. 45-66; OIE (2004) *Handbook on Import Risk Analysis for Animals and Animal Products,* Volume 2, Quantitative Risk Assessment, OIE, Paris, 126 pp.

Like the triangular distribution, the pert distribution is also a useful distribution for modelling expert opinion in risk analyses.[485] Most real-world biological phenomena are approximately normally distributed (i.e. values near the extremes of the chosen range are less likely than values between the extremes). The appeal of the pert distribution is that it can produce approximately normal distributions without the analyst having to know the precise parameters of the related normal distribution. It can also produce a skewed distribution depending on the choice of the "most likely" value. These attributes make the pert distribution a good distribution for modelling biological data where, in assuming that a variable is contained within a particular range, the chance of the variable actually equalling either extreme is considered relatively unlikely, compared with it taking a more central value. The pert distribution also does not suffer to the same extent the potential systematic bias problems of the triangular distribution, that is in producing too great a value for the mean of the risk analysis results where the maximum for the distribution is very large.[486]

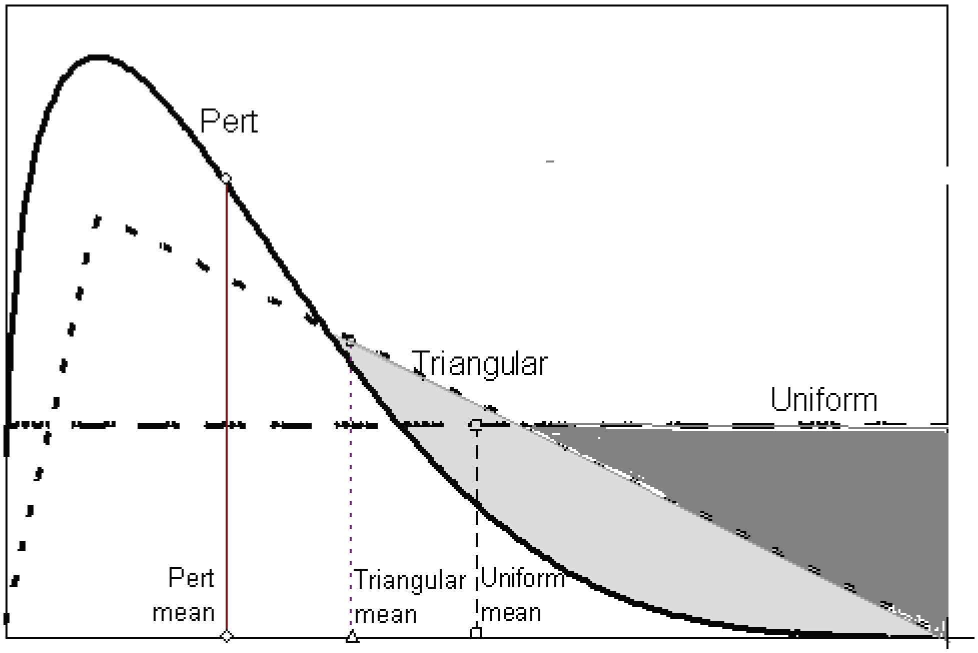
Example

The practical effect of the choice of distribution can be demonstrated graphically. Since the triangular and pert distributions require the selection of a "most likely" value between the maximum and minimum values, in the graph (Figure 2, overleaf), the "most likely" value has been set at 1 x 10^{-7} (one in ten million).

[485] OIE (2004) *Handbook on Import Risk Analysis for Animals and Animal Products,* Volume 2, Quantitative Risk Assessment, OIE, Paris, 126 pp.

[486] Vose D (2000) *Risk analysis, a quantitative guide*, 2nd ed, John Wiley & Sons, England, p. 276.

FIGURE 2: Comparison of the uniform, triangular and pert distributions



4.564 These three distributions all have the same minimum (0) and maximum (10^{-6}) values; however, the choice of 10^{-7} as the "most likely" value for the pert and triangular distributions skews the distribution towards zero. This has a direct impact on the distribution means: the mean of the uniform distribution is 5 x 10^{-7}, while the mean of the triangular distribution is lower at 3.7 x 10^{-7} and the mean of the pert distribution is lower still at 2.3 x 10^{-7}.

4.565 The choice of distribution also significantly influences the likelihood that values at the higher end of the distribution will be chosen. With the uniform distribution, values close to 10^{-6} (the upper end of the distribution) are equally as likely as values at the lower end. With the pert and triangular distributions, however, values at the upper end are much less likely to occur. As noted above, such distributions more closely model natural situations, where extreme events occur infrequently. In assuming that a value is contained within a particular range, the usual expectation would be that the value would be unlikely to fall at either end of the chosen range. Use of the uniform distribution does not account for this, resulting in a distorted view of the actual likelihood of an event, particularly when a number of uniform distributions are multiplied together. Figure 2 illustrates the over-emphasis both the uniform and triangular distribution give to the probability of extreme events occurring. The area shaded in dark grey illustrates how heavily the uniform distribution emphasises high values compared to the triangular distribution. The light grey area shows how the triangular distribution over-emphasises the values compared with the pert distribution.

The graph above demonstrates that, when an expert judgement is made that the "most likely" value of an event occurring is closer to the minimum than the maximum, as would be the case for an event "that almost certainly would not occur', the mean of a pert or a triangular distribution is lower than that of the uniform distribution for the same range between the minimum and maximum values.

ANNEX 5
TASMANIAN APPLE PRODUCTION DATA

Table 1 presents the total apple production for the state of Tasmania between the seasons of 1919/20 and 1975/76. The data were sourced from the *Statistics of the State of Tasmania* yearly publications, Grant, J (1977) *Statistics of the Tasmanian Apple and Pear Industry (1961-76)* and the *Tasmanian Yearbook.*

Table 1. Tasmanian Apple Production

Year	Production ('000 bushels)	Production (tonnes)[a]
1919/20	2,352	42,410
1920/21	2,359	42,539
1921/22	2,991	53,925
1922/23	3,128	56,395
1923/24	1,890	34,077
1924/25	2,210	39,850
1925/26	4,132	74,508
1926/27	2,000	36,064
1927/28	4,673	84,263
1928/29	2,500	45,080
1929/30	3,950	71,226
1930/31	3,800	68,521
1931/32	5,844	105,378
1932/33	4,410	79,521
1933/34	4,953	89,312
1934/35	3,934	70,937
1935/36	3,950	71,226
1936/37	4,611	83,145
1937/38	4,792	86,409
1938/39	5,724	103,214
1939/40	5,148	92,828
1940/41	5,946	107,217
1941/42	6,357	114,625
1942/43	5,743	103,553
1943/44	8,023	144,666
1944/45	6,570	118,466
1945/46	8,522	153,671
1946/47	4,228	76,242
1947/48	7,894	142,351
1948/49	2,563	46,208
1949/50	4,794	86,445
1950/51	4,848	87,418
1951/52	4,930	88,897
1952/53	3,757	67,746
1953/54	5,304	95,641
1954/55	5,009	90,322

1955/56	5,926	106,857
1956/57	3,401	61,332
1957/58	6,635	119,641
1958/59	4,983	89,858
1959/60	5,473	98,688
1960/61	5,594	100,870
1961/62	7,844	141,442
1962/63	6,262	112,916
1963/64	8,545	154,082
1964/65	6,207	111,924
1965/66	8,364	150,819
1966/67	6,301	113,619
1967/68	7,943	143,227
1968/69	7,138	128,711
1969/70	7,400	133,436
1970/71	7,373	132,949
1971/72	5,873	105,901
1972/73	7,024	126,656
1973/74	5,948	107,254
1974/75	5,013	90,394
1975/76	3,817	68,828

[a] Converted to tonnage at 55.45738 bushels per tonne.

Table 4 is based on data for the years 1970-1976 which were obtained from production cards housed in the Tasmanian Archives.

Table 4. Spreyton Apple Production by Year from Producer Cards (tonnes)[a]

Year	Sept. Production Returns	Shipped Internationally	Shipped to Mainland	Processing	Tasmanian Sales	Cool Store
1970	3,413	2,204	145	334	776	138
1971	3,586	2,625	0	133	775	160
1972	3,376	2,033	167	268	705	159
1973	4,919	3,353	16	397	863	225
1974	3,834	2,104	326	393	1,120	178
1975	4,329	1,962	0	960	863	221
1976	3,917	1,549	406	873	982	132

[a] Converted to tonnage at 55.45738 bushels per tonne.