NSW Agriculture

TECHNICAL REVIEW OF THE IMPORT RISK ANALYSIS FOR THE IMPORTATION OF NEW ZEALAND APPLES

Introduction

NSW Agriculture has submitted a technical review of the above document in response to a request from Agriculture, Fisheries and Forestry – Australia. The review has been prepared by a team of scientific experts to examine the proposed basis for the importation of apples from New Zealand. The team considered approximately 400 insect and disease species, and the management protocols designed to reduce the risk of importing these into Australia.

This review needs to be read in conjunction with the draft IRA, available from AFFA's web site: http//www.affa.gov.au/docs/market_access/biosecurity/appnzira.html

The following comments have been grouped under several headings because of the pest and disease complex that needs to be considered.

1. Risk estimation methodology

An area of concern in the general material is that of the 'Method for estimating risk' (p 48). Table 9 'Risk estimation matrix' is used as the basis for determination of overall risk from the combination of risks at individual points in the import pathway both in general terms and for the apple IRA. Whilst the methodology may be sound from a mathematical point of view, the overall probability of each event is ultimately based on a subjective determination, frequently made with scant scientific data, of the probabilities of the various events. The determination of the overall probability based on the risk matrix may tend to place an apparently objective estimate on an event, where the probabilities of the underlying events have been subjectively determined.

2. Insects and Mites

Details of various issues considered by the IRA are included in the attached table.

The emphasis of the IRA has been to review the exotic insects and mites on the basis of their individual pest risk. While there may be some controversy in the allocation of the respective probabilities applied to the entry, establishment and spread of insects, it is considered the estimates are reasonable and reflect the unrestricted risk estimate for imported New Zealand apples. Many of the pests that are included are also pests of a range of produce such as cut flowers and stone fruit that is currently introduced from New Zealand to Australia.

The major deficiencies in the IRA relate to:

- the omission of at least one and possibly two mite species which occur on apple and are exotic to Australia *Calepitrimerus baileyi* Keifer and *Diptacus gigantorhynchus* (Nalepa); and

- inadequate consideration of the role of insects or mites (either exotic or endemic to Australia) that infest and can persist in the calyx or stalk of imported apples which might carry fire blight bacteria that are in the calyx to a receptive host blossom.

Fire blight bacterial cells can be carried mechanically from infested blossom by many different species of insect and mites, but most commonly bees or other pollinating agents. Bacterial cells are picked up by the insect or mite on infested blossoms and dislodged onto other blossoms. Bacterial multiplication can occur in this nutrient rich environment of the blossom increasing the likelihood for further spread. Several of the exotic insect and mite species considered in the IRA have the potential to infest the calyx. Those most likely to transmit the bacteria would be those that persist in the calyx at a stage where they would move directly to another plant when they emerge from the calyx. The most notable of these are *Carpophilus spp* (Dried fruit beetle), *Dasineura mali* (Apple leafcurling midge), Pseudococcidae (Mealybug), *Thrips obscuratus* (Flower thrips) and *Eriophytes mali* (Apple blister mite). Insect species, which pass through a further stage after emerging from an infested calyx, like the leafrollers, may be less likely to transmit the bacteria.

The high risk calyx infesting group identified above could not only persist in the calyx of the fruit but would also be difficult to detect. Therefore the risk for importation of these species remains undetermined, as these species have the potential to act as vectors for the spread of fire blight. The proposed disinfestation process is unlikely to control these insects and mites, because of the air bubbles in the calyx. There is insufficient information to determine what the level of risk these insects and mites pose.

However, as any calyx infesting species may have the potential to transfer bacteria cells from the calyx, the risk assessment should not only be applied to quarantine pests in this category, but to all species of insects and mites which have the capacity to survive in the calyx and transfer fire blight bacterial cells from the calyx to plant blossoms. If this was accepted then orchard inspections are likely to have no or limited application.

If an enhanced inspection as described in the IRA required inspection of 600 fruits then conservatively inspection could take in excess of 6 hours. Even where a strict program of quality control was applied, it could be questionable if these inspections would be consistently and effectively undertaken. Rejections of New Zealand consignments of apples in Japan suggest that quality systems applied in New Zealand have been inadequate.

3. Bacteria and Fungi

Comments on these groups are given in detail in the attached table.

Further information

Contact Bob Paton, Policy Officer (Market Access), NSW Agriculture, by email: bob.paton@agric.nsw.gov.au for further details concerning the IRA process.

TABLE 1: COMMENTS ON SPECIFIC ASPECTS OF THE IMPORT RISK ANALYSIS FOR IMPORTATION OF NZ APPLES

PEST OR DISEASE	COMMENTS ON IRA	CONSIDERATIONS
INSECTS AND MITES LEPIDOPTERA *Ctenopseustis obliquana* (Walker) Brown-headed leafroller *Planototrix excessana* (Walker) Green-headed leafroller *Planotortrix octo* Dugdale Green-headed leafroller *Pyrgotis plagiatana* Walker Native leafroller	These species are considered as a group because of similar life cycles. All are primary pest of plant foliage but can infest fruit. A proportion of infested fruit will be removed through normal packing procedures. However, larvae in infested fruit could survive transport and storage to pupate and possibly lead to establishment in Australia.	The management procedures for the pests are based on Strategy 1 pre-harvest orchard surveys and Strategy 3 enhanced on-arrival inspection, or Strategy 2 phytosanitary inspection and Strategy 3 enhanced on-arrival inspection. It is not clear how the orchard program would operate or what correlations apply between pest populations in the orchard and the numbers of the pest infesting fruit. Since the pests can persist in the fruit, including the calyx which might be contaminated by fire blight cells, emerging larvae could carry these cells on their body. To establish in Australia the larvae would firstly need to pupate before emerging as an adult. How the bacteria would behave under these conditions as an epiphytic infestation is unknown.
DIPTERA *Dasineura mali* Keiffer Apple leafcurling midge	The midge attacks leaves and growing points of plants in the field. Relatively large populations occur on apples in New Zealand which leads to relatively high levels of infestation of apples, particularly in the calyx with larvae and pupae. Since these stages are small they would not be readily identified by normal inspection and could persist through transport and storage in Australia to emerge from	If adult emergence from the pupae occurred in the calyx there would be potential for those adults to carry the bacteria to a receptive host. If epiphytic growth on blossoms or other nutrient sources was not specific then this bacteria could multiply and be the source of inoculum carried by other insects which came into contact with it.

	infested fruit.	
MEALYBUGS Pseudococcidae	Life cycle could lead to infestation of the calyx with individuals persisting through harvest, transport and storage in Australia.	Overwintering individuals from the calyx would have the potential to carry bacterial cells to new hosts in Australia.
MITES *Eriophytes mali* Burts Apple blister mite *Calepitrimerus baileyi* Keifer *Diptacus gigantorhynchus* (Nalepa) Big-beaked plum mite	 Similar to that for mealybugs This species was not included. It is present in New Zealand but has not been found in Australia. The mite inhabits the lower leaf surface of apples, causes slight browning and rusting of leaves. It is not known if the species is present in Australia, but in the absence of definitive evidence it must be considered as exotic. The mite infests both apples and *Prunus* spp.	
THRIPS *Thrips obscuratus* (Crawford)	Similar to that for mealybugs	Individuals that emerge are likely to seek plant blossoms, as these are there preferred host. Flower blossoms could potentially provide the most likely site for epiphytic growth of bacterial cells and subsequent transfer of inoculum from any culture that develops.
BACTERIA AND FUNGI *Erwinia amylovora* Fire blight	**Unrestricted risk assessment for quarantine pests** In the Biosecurity IRA the unrestricted risk allocated to *Erwinia amylovora* (Ea) is ‘moderate’ (p 93). NSW Agriculture agrees that bacteria may be present in the calyx of symptomless fruit and that this occurrence is backed by scientific literature. Whilst NSW Agriculture concurs with This overall assessment there are some assessments for areas in the pathway with which there is disagreement. These are as follows.	

	In relation to the *fate of bacteria in the environment* (p85) it is agreed that desiccation, heat, competition, antagonism and production of antibiotics by other organisms may contribute to the reduction of bacteria numbers however, these factors are unlikely to eradicate all bacterial cells. In the material on *vectors and other means of transfer* (p86) the conclusion is reached that it is extremely unlikely that viable Ea would be transferred to an appropriate site on a susceptible host. However there is a lack of information on which to base this judgment either way. The *conclusion on distribution potential* (p86) is 'unlikely'. This is a subjective assessment considering the lack of precision where previously AQIS has estimated that the mechanical transfer from an apple core to a suitable host has a probability between 1 in 1000 and 1 in 10 000. The document concludes that the *overall probability of entry* is low based on the method using the probability matrix, which we discussed above, and our reservations therefore extend to this conclusion. The *expert opinion* is not definitive with regard to the risk of introducing Ea via trade in apple fruit. Recent opinion (p87) is that the risk is from nil to very low, however there are older reports (p115) which suggest that mature apples could be a pathway for long distance spread of Ea. Published *predictive models* have provided a very wide range of probabilities of the entry, establishment and spread of Ea. Because of the need to make assumptions for the	

	parameters used in the models, it is undesirable to place undue reliability on their conclusions. **Risk management for bacteria and fungi** The risk management proposals for Ea are for freedom from the disease within registered export blocks (REB) based on inspections, disinfestation by dipping, measures to prevent surface contamination of fruit after picking, together with administrative systems to ensure the integrity of the consignments and auditing of the quarantine agreement. <u>Strategy 1 Establishment of REBs free from fire blight disease</u>. It is acknowledged that fire blight inoculum which initiates infection in the spring is principally from overwintering cankers (p 113). It is proposed that to establish that an REB is free from Ea, it will require inspections at full bloom, fruitlet stage and 2 weeks before harvest, in each of two seasons (p116). These inspections are aimed at detecting all stages of the disease, including cankers, so that the chance of infection, or infestation of the fruit surface is reduced. Inspections would be carried out by walking down every row and visually examining trees on both sides (p117). <u>Strategy 2 Detection zones</u> The PRA calls for the establishment of a 50 metre 'detection' zone around the REB whilst stating there is no consensus on the exact purpose (p117).	NSW Agriculture is concerned as to the reliability of the detection of low levels of infection during these inspections, which may not detect the presence of Ea in the REB. The detection of small cankers during the full bloom and fruitlet stages while walking through the orchard would be difficult because of the amount of blossom/foliage present. The width of the detection zone at 500 metres is supported by the work of Clark et al (1993) who showed in New Zealand that bacteria were not detected in immature fruit harvested from orchards

	NSW Agriculture supports the establishment of these zones, although it is felt their role is as a buffer. It is acknowledged that insects can travel further than 50 metres, but point out that the number of insects bearing Ea bacteria will decline with any increase in the distance between the source of the bacteria and the REB. The requirement for removal of alternate hosts within the detection zone (p120) will decrease the amount of inoculum available to contaminate fruit within the REB. The requirement for three rows of apples adjoining the REB and within the detection zone (p120) may act as a screen to reduce wind and rain borne inoculum from entering the REB. <u>Strategy 4 Disinfestation of fruit</u> NSW Agriculture acknowledges that disinfestation of fruit with chlorine (p123) may assist in removal of bacteria from exposed areas of the fruit skin, but point out that it may not be effective against bacteria present in the calyx where the solution may not penetrate because of air bubbles. <u>Strategy 5 Sanitation of the packing line</u> It is stated that the packing line must be sanitised before packing fruit for Australia (p123).	free of fire blight, separated by a 500 metre zone with no hosts with fire blight symptoms (p118). This appears to be the only scientific data on buffer zones for fire blight conducted in an extensive field trial and provides support for the use of a 500m buffer zone. The setting of the detection zone at 50m is not supported by the scientific data. An extension of the detection zone is in line with HortResearch. The recommendation (p118) that all non-commercial alternative hosts within at least 100 metres around the perimeter of an orchard should be removed is supported, on the basis that non-commercial hosts may provide a source of inoculum. The proposed treatment will not eliminate the bacteria from the calyx of the fruit. Details need to be provided on how effective sanitation is achieved.

	Strategy 6 Sorting, grading and packing procedures Whilst NSW Agriculture agrees with the requirements in this section (p124) it is pointed out that the terms used (‘should be, ‘would be’) need to be replaced with ‘shall be’. Strategy 7 Phytosanitary inspection and certification In this section (p124), it is unclear as to what is being inspected for and what are the criteria for rejection.	If Ea or *Nectria galligena is* detected , NSW Agriculture considers that no further lots should be accepted from that REB for that season and the general condition requiring two seasons freedom from fire blight should be adhered to.
Nectria galligena European canker	**Unrestricted risk assessment** The life cycle of this fungus varies with location. Autumn infection predominates in California and in the Pacific North West of the USA, whereas in the United Kingdom infection occurs from budburst in the spring through to leaf abscission in the autumn. NSW Agriculture is not aware of the life cycle of this fungus in New Zealand, which may have bearing on the amount of fruit infection (both visible and latent) which occurs. NSW Agriculture agrees with the assessment that the unrestricted risk from this fungus is low in view of its limited geographic occurrence in New Zealand.	The need for inspection of fruit is acknowledged (p127), however NSW Agriculture considers that there is a need to inspect REBs for the presence of cankers during the dormant season.