New South Wales

DEPARTMENT OF PRIMARY INDUSTRIES

DGO09/219

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23 MAR 2009

Dear Dr Grant

I refer to the release by Biosecurity Australia (BA) in January 2009 of the Draft Import Risk Analysis report for fresh apple fruit from the People's Republic of China, for which stakeholder comment was requested.

Technical review undertaken by experts in NSW Department of Primary Industries (NSW DPI) indicates that BA has underestimated the likelihood and consequences of risk that NSW would incur in some instances if apple fruit were to be imported into Australia from China. Exotic pest and disease introductions may still occur despite mitigation measures being imposed.

A detailed submission from NSW DPI is presented with this letter. Comments have been made on issues including

- the scope of the IRA
- accuracy in the use of references by BA
- pest species such as mites and insects
- pest management practices including use of predators, broad spectrum pesticides and pressurised air blasting
- pathogens such as exotic apple brown rot and European canker
- IRA processes such as considering a suite of fungi as one complex and whether recent knowledge regarding seed transmission of disease should trigger a review of policy
- incompatibilities in ranking of risks in the IRA compared with Australia's incursion detection and response capabilities
- assessment of risk on the basis of estimated equivalence of volume of trade rather than from technical or scientific reasons.

When the final IRA is released, I ask that Biosecurity Australia provide an itemised synopsis of the points raised by the NSW DPI submission and your response to each as you progress assessment of the risks to Australia from the importation of fresh apple fruit from China.

Yours sincerely

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Comments on the draft Import Risk Analysis report: Fresh apple fruit from the People's Republic of China

March 2009

Submission to Biosecurity Australia

by NSW Department of Primary Industries

NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Title: Comments on the draft Import Risk Analysis report for fresh apple fruit from the People's Republic of China

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Disclaimer:
The information contained in this publication is based on knowledge and understanding at the time of writing (March 2009). However, because of advances in knowledge, users are reminded of the need to ensure that information on which they rely is up to date and to check the currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent advisor.

File reference: TRIM 2008/02516 DGO09/219 INT09/12939

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General summary

NSW Department of Primary Industries has technical objections to the recommendation that fresh apple fruit from the People's Republic of China be permitted into Australia.

Some of the concerns raised in the submission are summarised below.

Stakeholder resources

- A footnote in this IRA mentioned that BA misinterpreted one of the texts quoted in a previous IRA. This is significant because, on the whole, stakeholders accept that references summarised in the IRA will accurately report the research and the emphases of the authors cited in the papers. Unfortunately, at times when references have been checked, this has not always been the case. Stakeholders do not have personnel, resources or time available in the comment period to check the accuracy of every reference.

- There seems to be a disconnect between the level of concern nationally regarding certain exotic pests and diseases and trade recommendations which underestimate biosecurity risks to Australia. Federal and state governments have committed considerable expenditure to eradication of exotic pests and diseases and to biosecurity preparedness, training and awareness. Industry organisations are also expected to meet their share of these significant financial obligations. The capacity of Australia to respond incursions is being tested in terms of present and future skills, resources and funding. Eradication programs are long term investments.

Pests

- NSW Department of Primary Industries was instrumental in developing the use of predatory mites to control endemic pest mites in apples. Introductions of new pest mite species threaten the effectiveness of current programs. In contrast to random introductions through trade and quarantine breaches if risks are understated and mitigation is ineffective, any deliberate release into the Australian environment is constrained by regulations and controls which require thorough prior research.

- Integrated pest management programs usually target specific pests rather than a spectrum of pests. Consequently the suggestion that the effects of an exotic moth with potentially high levels of establishment and spread could be mitigated by established integrated pest management programs is unrealistic and unable to be substantiated technically.

- Availability of broad spectrum insecticides is mentioned as a reason for downgrading the consideration of risk for some exotic insects that may be introduced into Australia on the fresh apple pathway. This argument is contrary to farming practices in many agricultural enterprises, including orcharding, where broad spectrum pesticide application has been minimised in favour of using beneficial arthropods and softer, narrow spectrum chemicals that are generally more pest specific, efficacious and contain less toxic insecticides with lower rates of active ingredients.

- Rigorous identification of mites to species level must occur according to accepted taxonomic standards. In the absence of careful assessment, exotic pest mites could be misidentified as endemic species. Australia has limited expertise in mite identification. Evidence of the risk has recently been demonstrated with the detection of an exotic species which is very similar to a common and established pest and which may have been misidentified in the past.

- Proposed orchard management risk mitigation measures for small, cryptic exotic pests include fruit bagging and pressurised air blasting. No evidence has been presented to substantiate the efficacy of air blasting to remove insects from the calyx, to prevent re-infestation of clean fruit or to show whether insects are killed or remain viable when removed by air blasting.

Pathogens

- Exotic apple brown rot has a similar epidemiology to endemic species but the exotic species has a much greater propensity to infect apple fruit. Normal packing house fungal disinfestation procedures are unreliable because brown rot can establish latent infections within fruit. Fruit which appears healthy when packed may arrive at market heavily diseased. The dry, air-borne spores can easily be dispersed when packaging is opened. Resistance to effective fungicides has been increasing world-wide.

- More than a dozen genera of sooty blotch and flyspeck fungi have been lumped together for pest risk assessment. Their treatment as a group assumes that because the fungi have a similar aetiology they pose an equivalent biosecurity risk and that an incursion of any of them would have identical consequences. Separate risk analyses should be carried out for this group of fungi to deal with the likely existence of variations in virulence.

- Scientific knowledge is scanty for pathogens causing the diseases apple scar skin and apple dapple. Examples of knowledge gaps admitted in the IRA relate to seed transmission and to a "rare natural transmission by unknown means" and to natural transmission between neighbouring trees "by an unknown mechanism".

- The presumption that apple scar skin viroid was not able to be transmitted in the seed was used to support importation of pears from China. The IRA noted that seed transmission has now been shown to occur. This raises questions about the process for policy review when technical knowledge changes.

- European canker was mentioned by NSW DPI as a pathogen of concern when reviewing the IRA for apples from New Zealand. Symptomless latent infections of European canker in apple fruit remain a potential pathway for the introduction of this exotic disease to Australia where the wide host range of commercial and amenity trees would encourage establishment and spread. Area freedom, the proposed criterion for risk mitigation, is an unrealistic benchmark for a pathogen that can have symptomless infections.

Scope

Different messages are being conveyed for the scope of this draft IRA

- The People's Republic of China is the scope encompassed by the title.
- Chapter 3, the presentation of China's commercial apple production practices, specifies the scope as the "main apple growing provinces of China", being Beijing, Gansu, Hebei, Henan, Liaoning, Ningxia, Shaanxi, Shandong and Shanxi.
- In contrast, the Issues paper listed nine provinces and included the more northerly coastal province of Jilin. This province has been deleted from the list although no explanation has been given.
- The question raised in NSW Department of Primary Industries' response to the Issues paper remains unanswered: if approval is given for all China even though the risk assessment applies to the northern apple production regions, will apples from any area of China be allowed entry without further risk analysis even though the pest pressures may be different from those considered in this IRA?

Some of the pest risk assessments mention that a particular pest can enter "the endangered area". This term is imprecise and inaccurate because the IRA should be addressing the impacts of exotic pests and diseases on the fresh apple fruit pathway into Australia, not an unspecified sub-area, whether geographic or production based. Furthermore, the IRA acknowledges that "hosts such as apples, pears and stone fruit are widely distributed throughout Australia in domestic, commercial and wild environments".

Another aspect to be considered under the scope of this IRA is that China, unlike New Zealand and Australia, is not an island.

- Has the IRA considered pests and pathogens that may not, as yet, be in China but are present in neighbouring countries, especially those sharing a common land border?

If an incursion of an exotic pest or disease occurs as a direct result of trade, contrary to the comments and concerns of stakeholders, the federal government should be held accountable for costs.

Issues paper

Comments from NSW Department of Primary Industries' submission on the Issues paper were specifically mentioned in a footnote to Appendix A. This footnote correctly recognises that NSW Department of Primary Industries mismatched species names in the genus *Nezara*.

The footnote also mentions that Biosecurity Australia misinterpreted one of the texts quoted in a previous IRA. This is significant because, on the whole, stakeholders accept that references summarised in the IRA will accurately report the research and the emphases of the authors cited in the papers. Unfortunately, at times when references have been checked, this has not always been the case, but stakeholders do not have personnel, resources or time available in the comment period to check the accuracy of every reference.

Mites

The IRA has addressed two important mite species, namely Hawthorn spider mite, *Amphitetranychus viennensis*, and flat scarlet mite, *Cenopalpus pulcher*.

- What is the situation for considering other pest mite species that have been recorded as present in China, although not on apples, even though apple is a known host elsewhere in the world?
  It may be possible that these unmitigated pest mites may be able to establish on apple if they were introduced to Australia, where potentially climate, hosts, crop management and natural and introduced species interactions may all interplay differently from the circumstances in China.

Each of the mites is described as "a small, eight-legged mite". This statement is hardly significant as all mites are small and all adults are eight-legged. The significant characteristic of mites is that they are difficult to detect and Australia has limited capabilities in mite taxonomy. If introduced and established in Australia, it is likely that exotic mites would only be detected in field situations once the population has increased to such an extent that eradication is not a feasible option.

Flat scarlet mite

A number of species in different families, including widespread amenity trees are hosts of flat scarlet mite.

It is possible that *Cenopalpus pulcher* may prefer Australian conditions more than environmental conditions in China. This possibility is indicated by the comment that three generations per year have been reported in areas such as the Middle East, which may be more similar to Australia, than China where only one generation per year is reported. This increases the potential risk for Australia. Due to the time of year when apples would be imported, any flat scarlet mites on the fresh fruit pathway would be mated females and therefore pose a real threat for establishment. Cold storage prior to and during transport to Australia would be unlikely to kill mites which, the IRA states, are able to survive temperatures of –30 °C.

NSW Department of Primary Industries was instrumental in developing the use of predatory mites to control pest mites in apples. The introduction of a new mite threatens the effectiveness of this program. A number of predators which feed on various life stages of flat scarlet mite have been reported in international literature but many of these are not yet known in Australia.

Some examples of predatory mites against *C. pulcher* that are not known in Australia are

- *Agistemus exsertus* which preys on the eggs of flat scarlet mite
- *Euseius vignus* which feeds on flat scarlet mite, and
- *Amblyseius swirskii* and *Pronematus ubiquitus* which appear to control numbers of tenuipalpids.

In contrast to random introductions through trade and quarantine breaches, any deliberate introduction or release into the Australian environment is constrained by regulations and controls which require thorough research prior to such an introduction occurring.

Rigorous identification of mites to species level must occur. In the absence of careful assessment, *Cenopalpus pulcher* could be misidentified as a different genus of false spider mites, such as *Brevipalpus*.

Hawthorn spider mite

Amphitetranychus viennensis poses a definite risk as it is polyphagous and its chances of being imported and of becoming established in Australia are high. Reportedly, this species reduces cropping levels by 10% in the first year and up to 80% in the second year because of its impact on flower set.

The chance that hawthorn spider mite may remain undetected through quarantine examination is probably greater than many other arthropods. Apple exports to Canada from Shaanxi province were halted during the second year of trade because hawthorn spider mites were found in the shipments. The IRA demonstrates that the species is likely to imported, has a sufficiently wide host range to spread within Australia and has a reproductive rate sufficient to establish in orchards in Australia.

Additional concerns are

- the impacts of hawthorn spider mite are more of a problem in dry years. Dry conditions are a feature of most years in apple production areas in Australia.
- hawthorn spider mite has developed resistance to organophosphate pesticides.
- hawthorn spider mite may not be successfully predated by the suite of biological control agents present in Australia.

Insects

Rhynchites weevils

Probability of entry of *Rhynchites auratus* and *R. heros* are rated Very low. Included among the reasons is the statement that "after laying eggs in the fruit, adult females often sever the stalk causing much of the infested fruit to drop". The statement appears to be based on observations published in 1963.

- Has research been undertaken to validate this observation?
- Is there evidence to extrapolate that the behaviour some *R. heros* females is typical of the species and, further, is typical of the genus?
- Are figures available to clarify the frequency of this reported action?

The IRA notes that *R. auratus* has only been reported from Xinjiang Uygur Autonomous Region. This province was not listed as one from which export apples will be sourced, although it shares a common border with Gansu. When the existing policy for pears from the People's Republic of China was extended in 2005 to include fragrant pears from Xinjiang Uygur Autonomous Region, differences in climate, topography, production practices and pest risks were noted. Nevertheless, the application was considered as an extension of policy.

- Does the inclusion of *R. auratus* in the current IRA flag the future likelihood that China will request further extensions of the provinces exporting apples?

In the absence of internal movement controls in China all provinces should be accorded similar pest status. This rule is applied domestically in Australia and should equally apply for China and be factored into the IRA.

In China, *R. heros* is a more common and widespread species than *R. auratus* and so presents a greater risk. The IRA suggests that "broad spectrum pesticide application" is an existing control program in Australia which could be effective for preventing establishment of *R. heros* on some hosts.

- The IRA acknowledges gaps which undermine the effectiveness of the proposal, such as that broad spectrum pesticides are not "routinely applied to all hosts or all host habitats and may not be applied to hosts in the wild or on roadsides".
- An important factor which was not mentioned is that the use of broad spectrum pesticide application is now minimised in most apple orchards because the major local pest, codling moth, for which these insecticides were originally used, is now mainly controlled using pheromone disruption techniques.

- A more effective means of preventing the establishment of *R. heros* in Australia would be to ensure that its risk of entry is effectively mitigated.

Oriental Fruit Fly

Oriental fruit fly constitutes the most serious exotic fruit fly threat to Australia because of its short life cycle, wide host range and widespread distribution. There has been a considerable commitment of resources by federal and state jurisdictions over many years to ensure this pest is excluded from Australia and that rapid detection is made if breaches occur.

The IRA notes that oriental fruit fly is geographically restricted in China but, in the absence of internal movement controls all provinces should be deemed to have similar pest status. The probability of entry should be reassessed on that basis.

Presentation of the material in sections 4.5.3 and 4.5.4 is confusing and counter-intuitive because the first step, probability of importation, rated Moderate, may be overlooked. When overlooked, the matrix (Table 2.2) shows that High x High = High, rather than Moderate x High = Moderate.

- Continuing the pattern, should the unrestricted risk estimate also be Moderate rather than High, because, at each step in the table, a ranking of Moderate is set against a ranking of High?

Although the outcome is unchanged (i.e. the risk exceeds Australia's ALOP) the credibility of the assessment method is brought into question.

Mealybugs

Even though mealybugs are sessile as adults and generally have poor powers of dispersal, they have spread around the world from their locations of origin. Mealybugs are small, cryptic in habit and able to colonise a wide range of host plants so human assisted dispersal must account for their international spread.

While still exotic to Australia, both Comstock's mealybug, *Pseudococcus comstocki*, and apple mealybug, *Phenacoccus aceris*, have the potential to establish in Australia and are likely to remain undetected during quarantine inspection.

Proposed orchard management risk mitigation measures include fruit bagging and pressurised air blasting as components of the systems approach to be implemented to enable apple trade to Australia.

The IRA acknowledges that the advantages gained by fruit bagging to reduce the impact of other pests may not apply to Comstock's mealybug and apple mealybug. Two studies have been cited in the IRA to indicate that bagging actually encourages rather than prevents Comstock's mealybug feeding on apple fruit. No studies have been reported for apple mealybug.

Similarly, no evidence has been presented to

- substantiate the efficacy of air blasting to remove small cryptic pests from the calyx
- prevent re-infestation of clean fruit by mealybugs removed by air blasting
- show whether mealybugs are killed or remain viable when removed by air blasting.

Moths

NSW Department of Primary Industries agrees with the IRA comments that broad spectrum pesticides are an unreliable method to prevent or mitigate the risk of exotic pest moths establishing in Australian orchards. Broad spectrum pesticides are

- not routinely used in many orchards,
- even if they are being used, they may not be applied at a time in the moth lifecycle to be effective, and
- some pest species, such as *Adoxophyes orana,* are developing resistance.

Both summer fruit tortix moth and peach fruit moth are mentioned as being capable of diapausing as larvae and being capable of surviving low temperatures and long periods in stored fruits. Chapter 3 discussed commercial apple production practices in China and concluded with the comment that most export apples will be kept in cold storage and may be processed for export up to 12 months after harvest. When read with the comment that interceptions of peach fruit moth are made almost every year on fresh apple fruit, and that the entry point of peach fruit moth larvae into fruit is concealed within the calyx, the potential for the introduction of viable exotic pest moths is real. The risk of establishment is also real because the proposed extended marketing of apples from China makes it likely that the presence of imports will coincide with periods of apple tree growth in Australia rather than with senescence and the Australian off-season.

Peach fruit moth does not require immediate contact with a host plant for survival. Larvae of this species are able to survive in soil where they can then pupate and emerge as an adult moth which is capable of dispersing to find suitable hosts. Fruit discarded because of the discovery of a larva in it does not

need to be discarded near an apple orchard in order for the species to become established in Australia.

Manchurian fruit moth is a species with widespread distribution in China. Its distribution covers a range of climatic conditions so it has the potential to easily establish in Australia if it were introduced. In discussing this species, the IRA comments that integrated pest management programs are practiced in Australian orchards and that measures taken against codling moth and light brown apple moth may have some impact on the establishment of Manchurian fruit moth. This argument is invalid because integrated pest management programs are designed to target specific pests. Integrated pest management programs designed to mitigate impacts of light brown apple moth and codling moth cannot be extrapolated to other species, and especially not to an exotic pest where the behaviour of the pest in Australia is unknown.

Other insect species

Appendix A lists a number of species which may be associated with fruit. For some of these species, information has not been provided about where eggs are laid or alternatively, undocumented assumptions are made that eggs are laid on leaves.
For example

- *Arboridia apicalis* nymphs and adults are parenchyma feeders, sucking the cell contents from leaves. It is presumed that eggs are also laid on or into leaves but this is not documented here or elsewhere.
- Stink bug *Dolycoris baccharum* feeds on leaves, young shoots and fruit. Where are the eggs laid?
- The same comment applies to *Halyomorpha halys, Halyomorpha picus, Homalogonia obtusa, Lygus lucorum, Nezara antennata, Plautia stali, Riptortus pedestris, Urochela luteovaria* and all five species of Orthoptera which are listed.
- *Amsacta lactinea* is known to feed on fruit. Larvae and egg laying sites need to be considered.

Ovatus malisuctus is an aphid associated with apples. It was assessed as not being on the pathway for Fuji apples from Japan but it needs to be assessed again in reference to apples from China to ensure that the pathway from China does not differ significantly from that from Japan.

Taxonomic notes

- *Homalogonia obtusa* is not "cogeneric" with *Halyomorpha halys*
- "*Lycorma delicat*" – correct name is *Lycorma delicatula*

Pathogens

Apple brown rot

The exotic apple brown rot, *Monilinia fructigena,* has been designated a key exotic disease threat to Australia. The Office of the Chief Plant Protection Officer has funded a scholarship program for a plant pathologist to enhance Australia's diagnostic capabilities for this fungus.

Monilinia fructigena is acknowledged as being a "significant disease" of most major apple growing areas in China. *M. fructigena* has a similar epidemiology to the endemic species, *M. fructicola* and *M. laxa,* but has a greater propensity to infect apple fruit. Even so, the risk is real that *M. fructigena* could be confused with other brown rot species and become well established before detection.

In Australia, apple is an incidental host for endemic species of brown rot and very specific conditions are required for infection to occur. Such conditions may occur when there is high humidity and fruit which has been damaged by hail is growing near badly infected late-season stone fruit. In contrast, the exotic apple brown rot, *M. fructigena*, is more likely to infect apples and directly impact apple production enterprises.

Australian research by Wade and Cruickshank (1992)[1], not reported in the IRA, demonstrated that *Monilinia* species are able to establish latent infections within fruit, rather than the simply superficial or epiphytic latent phases as of other pathogens. This characteristic makes normal packing house disinfestation procedures for treatment of *M. fructigena* unreliable. The commercial implication is that fruit which is packed healthy may arrive at market heavily diseased. Fruit damage, a prerequisite to disease development, may be facilitated through shock, vibration and fruit-to-fruit contact during transport or occur during post-arrival distribution, retail display or consumer handling at and beyond the point of sale.

In the context of imported fruit

- The disease's broad host range and effective dispersal would allow latent infections to come from a variety of sources including nearby pome, stone, grape and hazel plants. Establishment of buffer zones would be difficult.
- Latent infections could occur at almost any phase of crop development making effective pre-harvest inspection difficult.

[1] Wade GC and Cruickshank RH (1992) The establishment and structure of latent infections with *Monilinia fructicola* on apricots. *Journal of Phytopathology* **136**, 95-106.

- Endophytic latent infections can remain undetected despite grading and packing house sanitation. Sodium chloride at 500 parts per million would be ineffective; indeed this has been the experience of Australian commercial stone fruit packers.
- While in transit, given fruit damage and appropriate environmental conditions, the disease can spread quickly. There is a high probability that on opening a consignment there could be large numbers of massively sporulating, rotting apples. *Monilinia* spores are readily dispersed by air.
- Latent infections of other *Monilinia* species can occur following foliar infection. If this is the case for *M. fructigena*, bagging fruit when it is 2.5 cm in diameter as proposed as a risk management measure would not be effective.

Consequences

The consequences rating of Moderate underestimates the potential significance of *M. fructigena* if it were introduced into Australia. Endemic species of *Monilinia* are believed to be the most serious diseases of Australian stone fruit. Brown rot impacts directly on harvested fruit and, as harvested fruit has the highest value, impacts of the disease can be disproportionate to the incidence of the disease. Losses of 25-50% of packed fruit have been reported in the IRA. The risk assessment also acknowledges that "the introduction of *M. fructigena* has the potential to result in an epidemic".

World-wide, *Monilinia* has developed resistance to many of the demethylation ergosterol-biosynthesis-inhibiting fungicides. Evidence is available which indicates that this has happened in Australia. If an incursion occurs, the resistance profile which has developed would make eradication attempts or subsequent management controls using fungicides more difficult.

In the consequences table for *M. fructigena,* the comment is made that "the presence of the disease in apple production areas in Australia would have impacts on the export of Australia's fresh apples and pears to countries where this pathogen is not present".

- It seems anomalous that Australia is likely to approve importation of fresh apples, as it has, in the past, approved importation of fresh pears, from a country which has these diseases and by doing so is prepared to risk its own prospects for international export trade. Surely, in such a case, the significance of loss of export potential is greater than D – significant at the district level?

Similar comments are relevant for the fungal pathogens *Diplocarpon mali* and *Gymnosporangium yamadae*. For both these diseases, the consequences for international trade are rated E – significant at the regional level.

- Why is Australia likely to accept fruit from countries where such pathogens are endemic when the point is made, specifically for *G. yamadae* that its "presence in commercial apple production areas in Australia would limit market access for Australian apples to overseas markets which lack this pest"?

Sooty blotch and flyspeck complex

The lumping of sooty blotch and flyspeck fungi together is a concern. It is not totally clear from the introductory section to the complex exactly what the final list entails but there are at least a dozen genera mentioned.

The treatment of this group assumes, probably invalidly, that because a group of fungi has a similar aetiology, each organism poses an equivalent biosecurity risk and incursions would have identical consequences. Separate risk analyses should be carried out for the species listed in the IRA to deal with the likely existence of variations in virulence.

The IRA notes that endemic species of the sooty blotch and flyspeck fungi in Australia, *Gloeodes pomigena* and *Schizothyrium pomi*, appear to cause minor diseases. In contrast, international reports of exotic species indicate significant losses "even with the use of fungicides". Figures of up to 90% are cited in the IRA for the USA. The IRA provides no explanation for this disparity and it is plausible that virulence varies between species comprising the sooty blotch and flyspeck fungal complex. Exotic members of this complex should be dealt with independently within the IRA; they should not be lumped. The possible existence of species which are more virulent could have an effect upon the analysis of consequences and may increase the unrestricted risk rating.

The IRA understates the significance of an incursion of a virulent species among this fungal complex. Existing integrated disease management relies on application of ergosterol-biosynthesis-inhibiting fungicides for control of apple black spot and powdery mildew. One author cited in the IRA noted that these fungicides are relatively ineffective in controlling sooty blotch and flyspeck fungi. If an incursion were to occur, growers would most likely to be forced to add more broad spectrum fungicides to their management programs or to revert to greater use of benzimadazole fungicides which are prone to causing disease resistance.

The systems approach of risk mitigation measures for these fungi includes orchard control and surveillance, fruit bagging, disinfection treatments and visual inspection. However, for a systems approach to be effective, each of the components should have some level of effectiveness against the target pathogen. This has not been fully demonstrated.

For example

- While bagging of fruit could be relatively effective, it may not entirely prevent fruit infection.
  Has the incidence of infection with and without bagging and the timing of bagging been validated by research?
- Disinfestation with sodium hypochlorite is more likely to be effective against sooty blotch and flyspeck fungi than is the case for *M. fructigena* because these fungi are only present on the surface of fruit. Even so, small colonies may survive in humid micro-climates such as in the calyx where air pockets may protect against contact with disinfectants. These remnant colonies would be difficult to detect by visual inspection.

Apple scar skin viroid

Scientific knowledge is scanty for pathogens causing the diseases apple scar skin and apple dapple. Examples of knowledge gaps admitted in the IRA refer to seed transmission and to a "rare natural transmission by unknown means" and to natural transmission between neighbouring trees "by an unknown mechanism".

While it is difficult to present enough scientific evidence to offer a valid rebuttal, there is equally not enough scientific evidence to substantiate that the risks posed by this viroid are Negligible. Precautionary principles should apply. Standards of equivalence should also apply. For example, apple plants entering a post entry quarantine facility undergo rigorous testing for pests and diseases.

- What rigorous post entry quarantine equivalence is to be applied to infected seed in imported fruit?

The presumption that apple scar skin viroid was not able to be transmitted in the seed was used to support importation of pears from China. Seed transmission has now been shown to occur. This raises an interesting principle.

- What are the triggers and what is the process by which policy determinations for trade are revised and adjusted when decisions which were based on incomplete knowledge have new scientific evidence to consider?
- Should trade be suspended until safety is verified?
- Should stakeholders be consulted?

- In the specific case of importation of pears from China where access was granted with support from incomplete knowledge, how does the finding that the viroid can be transmitted by seed affect the policy determination?

The status of apple scar skin viroid in Chinese apple orchards is enigmatic. While it was one of the most damaging apple diseases in the 1960s, with more than 50% of apples infected, the IRA asserts that it is not common in China now. Perhaps the widespread use of more tolerant modern varieties is resulting in symptomless infection.

The probability of establishment rating may be higher than Moderate. Using the data provided in the risk assessment, up to 50% of apple trees from some parts of China may have symptomless infections and 7.7% of apple seedlings germinated from apple scar skin viroid-positive fruit were infected. The risk becomes significant, if, for example imported apples or apple cores are discarded on roadsides in Australian apple production regions.

The probability of spread also seems to be underestimated. The IRA claims evidence that 'transmission by grazing animals' can result in long distance dispersal of the viroid. A conservative appraisal would assume that this occurs and that vectors may exist in Australia.

European canker

European canker, a fungal pathogen named, *Neonectria ditissima* in this IRA, was assessed as *Nectria galligena* in the Revised IRA report for apples from New Zealand.

The IRA report for apples from New Zealand noted that European canker was detected in four orchards in Spreyton, Tasmania in 1954 but was eradicated by 1991. The report did not include any indication of costs of the eradication program, but, if the time required to achieve eradication is taken as a benchmark, the costs span many years and would be large. These eradication costs become a significant risk factor for this pathogen and should be considered in this risk analysis.

In responding to the IRA for apples from New Zealand, NSW Department of Primary Industries raised concerns that

- this pathogen has a latent phase in both fruit and twigs where it can remain symptomless for up to four years
- symptomless latent infection in fruit would shield the pathogen from disinfestation and detection at inspection

- the pathogen also has effective long distance non-vectored dispersal spore mechanisms which are readily produced in infected fruit
- there are no cost-effective means of detecting infected but symptomless host material, and
- European canker has an extensive host range which will have serious implications for urban and residential landscapes were it to establish in Australia.

The NSW Department of Primary Industries submission noted that European canker poses a particular threat to NSW. NSW has an elevated risk of incursion primarily because climates in the NSW apple production areas are conducive to the establishment and spread of the pathogen. Changes in the fungicide use spectrum in NSW orchards, consistent with integrated fruit production practices, also increase the level of risk.

The IRA assesses European canker as having an unrestricted risk rating of Low. This finding is contrary to the risk analysis presented on the PaDIL Plant Biosecurity Toolbox website which rates the risk as Moderate to High. Reasons given are that

- the fungus exhibits a wide spectrum of host diversity, affecting more than 60 tree and shrub species from more than 20 genera
- dispersal can occur by wind, water and pruning tools
- European canker is potentially present in all commercial apple and pear plantations from all temperate growing regions in the world, except Australia, and can cause crop losses of 10-60%
- latent infections can occur in fresh fruit, with entry sites particularly through the calyx.

Risk mitigation for European canker on fresh apples relies on area freedom because the pathway of greatest concern is "symptomless infection of fruit that cannot be detected by inspection". For a pathogen such as *N. ditissima*, areas of low pest prevalence should not even be considered as an option. This would, in effect, potentially reduce the Australian industry to the lowest common denominator of accepting the presence of the disease rather than maintaining the clear biosecurity benchmark that currently exists in Australia, notably freedom from disease.

Furthermore, it seems unlikely that pest free areas or pest free places of production could be guaranteed. Among the reasons are that

- the provinces in China from which *N. ditissima* have been confirmed span the apple growing regions of China highlighted in this IRA
- spores of *N. ditissima* are wind borne and can be widespread

- there are no restrictions on the movement of planting stock within China
- there are no internal product movement restrictions in China so all provinces should be accorded equivalent disease status.

The final IRA report for apples from New Zealand mentioned that spores of *N. ditissima* have been collected from non-host species in New Zealand. The report also noted that "although the disease is not common in environmental species in New Zealand, the situation could be different in Australia". In addition, the comment was made that "opportunities for damage are likely to be greater in a stressed environment". The validity of these comments and areas of uncertainty equally apply to the disease risks for Australia of European canker from China.

It is interesting that Biosecurity Australia has assessed the risk posed by European canker for apples from China to be similar to that for apples from New Zealand on the basis of estimated equivalence of volume of trade rather than from technical or scientific reasons.

- Does this mean that despite the rhetoric that an IRA is an impartial and scientifically-based document, the underlying reasons for the recommendations are determined by issues of trade?

Pest Risk Management

General framework

A general framework of pest risk management for those pests identified as exceeding Australia's Appropriate Level of Protection (ALOP) has been presented in the IRA (section 5.1). Table 5.1, a summary of phytosanitary measures proposed for the quarantine pests requiring mitigation treatments, is a helpful inclusion.

While the presentation of a baseline is important, China's consistency in achieving set standards has been recently questioned. Associate Professor Frank Zumbo, University of NSW, was reported to have said that "the level of food and farm production safety in China was 'patchy', and while there may be quality and safety regulations, they were often not enforced"[1]. This uncertainty must be addressed by AQIS and stakeholders must be assured that conditions which are set will be fully met.

In the past, stakeholders have not been informed of breaches of import conditions. Understanding this information would assist stakeholders, and BA, to establish realistic levels of risk. In some instances there has been a discontinuity between theoretical proposals in IRAs and the standards which are achievable in practice. Stakeholders are constrained to assess an IRA on the standard presented, and, when this is greater than what can be achieved in practice, the actual risk may be greater than the assessed risk.

Operational systems

Wording under each of the components of the section 'Operational systems for maintenance and verification of phytosanitary status' (section 5.4), has shifted the emphasis from general clauses to "the objectives of the proposed requirements". This change helps to indicate that under current procedures, detailed development of operational systems is subsequent to the IRA process and is to be determined by agreement between quarantine agencies in each country. Stakeholder expertise should be also be consulted.

While this approach might show that operational issues have been considered to some extent in the preparation of the draft IRA it still does not provide a clear position by which stakeholders can assess risks. The input of industry expertise should underpin the development and review of import conditions and these should be presented for consideration in the IRA and scrutiny by all stakeholders.

[1] Skuthorp L (2009) China's menacing menu. *The Land* January 22, 8

Inspection and monitoring

Details concerning inspection and monitoring by AQIS should be presented in the IRA so that the effectiveness of mitigation measures can be realistically assessed.

- For example, does visual inspection for mites mean by eye or using a microscope, or is this a discretionary decision of the inspector?
- How realistic is it to thoroughly inspect a 600 unit sample for mites?
- Does AQIS have sufficient taxonomic resources in mite identification to ensure mites which are detected are accurately identified?

Mite identification to species level requires good quality slidemounts of male specimens. Mites can easily be overlooked on plant surfaces or misdiagnosed in the absence of slide-making.

- Are inspection and identification procedures available for review by relevant experts and stakeholders?
- What are the criteria and specific standards that will be used?
- Is every mite which is detected on inspection identified to species level?

Exotic *Tetranychus* spider mites could potentially be confused with species which are established in Australia and be disregarded at the border. A pertinent example has recently occurred in Northern Territory.

Orchard management

This draft import risk analysis report for fresh apple fruit from China draws on the 1998 final import risk analysis of the importation of fruit of Fuji apple from Aomori Prefecture in Japan. If previous IRAs are used to support the proposal under consideration, the application of control measures has to be consistent.

- For example, it seems that citation of the Fuji apple report has been selective with regard to the pathogen *Gymnosporangium yamadae.*

The current IRA states, in the context of the Japanese IRA, removal of telial hosts for a two kilometre radius from export orchards "was recommended for management of *G. yamadae*, for the import of apples from Japan". It also explains that an alternative was requested by quarantine officials in China because of concern at removing old *Juniperus* species amenity trees.

A chemical control program was suggested and substantiated on the basis that it matched conditions recommended for Japan. However, in the case of Japan, a number of additional requirements were imposed specifically for *G. yamadae*

- Japan has to "ensure that all export orchards and the closest non-export orchard are inspected for symptoms of Japanese apple rust"

- Japan has to test fruit for latent infections. "Testing will be done on fruit for symptoms that may develop from latent infections. This will occur at the time of harvest".

Availability of broad spectrum insecticides is mentioned as a reason for downgrading the consideration of risk for some exotic insects that may be introduced into Australia on the fresh apple pathway. This argument is contrary to farming practices in many agricultural enterprises, including orcharding, where broad spectrum pesticide application has been minimised in favour of using beneficial arthropods and softer, narrow spectrum chemicals that are generally more pest specific, efficacious and contain less toxic insecticides with lower rates of active ingredients. NSW Department of Primary Industries research and extension services promote integrated pest and disease management principles in orchards, glasshouse horticulture, field horticulture and broadacre cropping.

Integrated pest management

NSW Department of Primary Industries was instrumental in developing the use of predators for control of two-spotted mite and red mite in commercial apple orchards. This program has resulted in a dramatic fall in the use of chemical sprays and in the levels of infestation, which are said to be a quarter of what they were before the widespread application of the integrated pest management program. The risk of introduction of exotic mites threatens this success as exotic mites might not be considered prey by the current predators and considerable resources would have to be expended to develop a new suite of predators.

The development of pesticide resistance by pest insects and mites is a major concern for many agricultural enterprises. Considerable risks relate to the chemical resistance profiles of pest insects and mites that may be introduced on foreign commodities. The issue is not simply whether the species of the pest is exotic but what chemical controls have been applied and whether the resistance that has built up in those organisms from other countries is different from the resistance profile of that species in Australia. If so, the introduction of those exotic pests would override Australia's chemical control options for the pest.

Pressurised air blasting

Pressurised air blasting has been introduced as a procedure to mitigate the risk of mealybugs and mites. There are a number of assumptions made and concerns arising relating to the adoption of the practice as noted in the IRA.

Points requiring clarification are the

- statement that bagging actually encourages rather than prevents some mealybugs from feeding on apples.
  Have studies been undertaken to assess the impact of bagging, not only on occurrence but also on mite feeding and reproduction?
- acknowledgement that "there is no information available" with regard to the impact of bagging on organisms other than *Pseudococcus comstocki.*
  When will validating research be conducted on other organisms?
- assumption that "pressurised air blasting ... *would* ... dislodge and remove mealybugs from the calyx and stem cavity of the fruit.
  Has research been undertaken to substantiate this claim?
- knowledge gap regarding whether mealybugs dislodged by pressurised air blasting circulate in the air stream within the packing house and are able to lodge on and re-infest clean fruit.
  Has the air stream within packing houses been sampled and analysed?
- validation of effectiveness of pressurised air blasting by visual inspection of fruit. Spider mites, for example, are small in size (about 0.5 mm long) and can easily be overlooked, especially in the calyx.
  What procedures are used for inspecting fruit?

Similarly, the statement that "opinions differ on the benefits and disadvantages of this process [that is, pressurised air blasting as a mitigation measure for mealybugs and mites] compared with washing."

- This requires urgent and peer reviewed validation by relevant research.

Small, cryptic organisms hiding around the stem or calyx of fruit may well be protected from pressurised air blasting treatments. There is also the possibility of re-infestation by small, light arthropods drifting around the packing house. Mites, mealybugs and scale insect nymphs could easily escape visual inspection.

Washing, especially when combined with detergents, heat or pesticides, has been shown to remove a range of pests from fruit. Even so, washing is not totally effective against all surface pests.

- Has research been done, or is it being done to verify the effectiveness of the pressurised air blasting procedures and of these procedures in comparison with other procedures?

Pressurised air blasting has been structured into the systems approach to mitigate the risks of exotic mites and mealybugs entering Australia on the fresh apple fruit pathway. It is therefore essential that the research is completed before any recommendations to approve importation are made.

Cold storage

Cold storage is mentioned as a component of post-harvest procedures in China for apples designated for export. Cold storage is recognised as an effective mitigation measure for some pests. However, concurrent with part of the period allowed for stakeholder comments on this IRA, Biosecurity Australia has requested comment on a proposal from China for recognition of pest free areas for fruit fly. If both the IRA recommendation and the pest free area recommendation are approved, the export conditions that result may not match those presented in the IRA. If this occurs the IRA should be revised and recirculated for stakeholder comment.

Packing

Clarification is required for the

- comment that "the packing houses observed by Biosecurity Australia in China followed good sanitary practices".
  Were these packing houses randomly selected to ensure that they were not showcase premises?
  Did the inspections span the range of apple production areas so that an accurate representation of all packing houses could be gauged?
- statement that "Alternately, ventilation holes are covered with insect proof mesh screens ...".
  How is "alternately" applied in this context?
  What happens to the other ventilation holes and does this provide an opportunity for contaminating pests to enter?
  A number of species of tramp ants with high invasive potential as contaminating pests, such as tropical fire ant (*Solenopsis geminata*), yellow crazy ant (*Anoplolepis gracilipes*) and red imported fire ant (*Solenopsis invicta*) are distributed in China and are of concern to Australia.
- procedural gap which did not mention trapping, using light or pheromone traps, for lepidopteran pests in packing sheds as a requirement of packing house management.

If the recommendation to allow trade in apples from China is progressed, all fruit packed for export to Australia should be clearly labelled. Contrary to the suggestion that all cartons should be labelled "For Australia", the information which is to be provided and how it should be presented should be discussed by stakeholders. A minimum starting point would be country of origin and harvest date. This information should be available at all stages of the export chain, including retail marketing, to allow each consumer at point of sale the opportunity to undertake their own 'risk assessment' of the commodity and to consider safe methods of disposal of waste if the commodity is purchased.