Trip Report

Apple production practices in Hawke's Bay and Nelson, New Zealand

March 6–11, 2011

Orchard 1 - [redacted]

The site was a 40 hectare property, compared with the average in the region of 15–20 hectares. Examination was made initially of a 2005 planting of Jazz, and secondly a Royal Gala planting.

Expected yields from the orchard are 180 bins per hectare, or around 85 tonnes per hectare. Recently, the Royal Gala block has been yielding 212 bins (100 tonnes).

Fire blight was not considered a management issue in the established plantings. The fire blight prediction model provided by PipFruit New Zealand was used to target control measures. Blossom Bless was used as the primary control, with streptomycin utilised occasionally, but not every year.

Both the apple varieties, with specific reference to Jazz, and the rootstocks used are considered to be susceptible to fire blight. The orchard manager did not avoid planting susceptible varieties and noted that the occurrence of fire blight in the block was negligible.

In a typical year, two applications of Blossom Bless would be made to manage fire blight, according to recommendations of the management model.

The BSG team enquired about the management of frosts in the orchard, with particular regard to European canker risks. This site was only 1km from the coast and frosts did not occur at that site. Speaking more broadly about the Hawke's Bay production region, frosts were considered rare. European canker was not reported from this orchard or, more broadly, the region.

Apple leaf curling midge, was not considered a significant pest in the orchard, based on monitoring activities.

Management of the orchard was based on a number of small "sectors", with individual orchard managers each being responsible for around 10 hectares. The "senior" manager [redacted] was responsible for 8 orchard managers, and a total of around 60 hectares.

Within the groves, individual Granny Smith and crabapple trees were observed. These were noted at the end of every (approximately) six rows. As described by the orchard staff, these are present to maximise pollination of these early flowering varieties (Jazz and Royal Gala) and are planted at a rate of 1 in 20 trees.

Harvest

Pre-harvest maturity testing was conducted in the orchard, including weekly tests for each block (as it came close to harvest) to determine how quickly maturity is advancing. The intent was to harvest fruit at the ideal level of maturity which will allow extended cold storage. As maturity advanced, the cold storability of fruit was considered to be reduced and fruit would be sent straight to market.

Once maturity had been determined, fruit was harvested initially into picking packs and then transferred into field bins that each hold approximately 400 kg of fruit. These bins are tagged to allow trackback. Bins are aggregated at the orchard prior to being sent to the packing house.

When fruit arrives in the packing house by truck, it will be tested again for maturity. The tests (for both arriving trucks and weekly tests from the orchard) included colour testing, specific to the variety, starch pattern index (SPI) and soluble sugars (brix).

As an initial, voluntary) check, the orchard has the Independent Verification Agency conducts a daily check for evidence of pests in bins. This involves sampling 600 fruit from 32 bins (18–20 fruit per bin) for pests. Packing house grading further removes damaged or symptomatic fruit.

For trackback purposes, the Jazz plantings within the orchard were divided into 6 separate blocks. Within the orchard, the fourth pick was currently underway, though as many as four picks was not considered common.

During harvest, field grading of fruit by packers was looking for evidence of damage (cuts, bruises, tractor damage) and evidence of quarantine/quality "pests" such as black spot and russet.

Orchard 2 – [redacted]

Management of this orchard has only recently been taken over by the current manager – 2 years ago.

Initial discussion focussed on apple leaf curling midge. Monitoring results have not indicated large populations and as a result application of diazinon has not been required. The other insect pest, leafrollers, are controlled with insect growth regulators (IGRs) when recommended by monitoring results. For apple leaf curling midge, the primary control action is to hold off on irrigation until new leaves harden off (ALCM is a pest of new, flush growth).

Rootstocks in the orchard were noted as being susceptible to fire blight infection, though not as susceptible as some used in the areas. Regardless, fire blight was not known from the orchard.

Overhead sprinklers were observed in the orchard and they were described as being a legacy of the block. They were used for frost control and also to prevent sunburn. Irrigation was provided at ground level.

BSG officers noted some ALCM leaf rolls within the orchard, but only on old growth. Of fifty leaf rolls inspected by BSG within the orchard – only one contained a cocoon. The cocoon was not occupied. In discussing management of apple leaf curling midge, the pest control consultant noted that emphasis is given to new plantings where damage to terminal growth could stunt trees. In established orchards, damage did not result in stunting of trees and the pest was effectively managed by natural enemies

The team moved to a second block (Fuji) where disease management was discussed.

The orchard manager indicated that the fire blight model had indicated a potential infection risk during this season. To address this, the orchard took the option of applying a prophylactic spray of streptomycin just before a thinning spray was applied. This spray was applied late in the day to minimise degradation (it is sensitive to UV light). Regardless, the orchard manager noted that there has been no history of fire blight in the orchard. Fire blight infection risk was also managed by the use of ATS (Ammonium thiosulfate, typically a fertiliser) which is used to burn off flowers once pollination is completed.

All pest and disease risk advice was provided through professional consultants who provide up to date information to the orchard managers by SMS. The use of consultants was considered valuable as it included a perspective across the "region as a whole".

BSG officers queried management of European canker. The orchard manager noted that it has not been seen in the orchard.

Maturity testing in the orchard was described as for the first orchard. Additional details included that the first in-orchard sampling was conducted three weeks prior to the expected harvest. Twenty fruit were sampled and provided to the laboratory for testing SPI, brix, firmness and colour.

Total production at the orchard was around 44 000 bins (each 400kg)

Packing house 1 – [redacted]

The visit started with the truck receival inspection. The packing house recorded the supplier, grower number, and variety of the apple. Braeburn apples (as a particular case) also received a calcium spray/drench Start with truck receival inspection – record supplier, grower #, variety. Braeburn apples also get a calcium spray/drench to mitigate risks of bitter pit (a physiological disorder).

Spray diaries (to manage resides and withholding periods) are entered by the IVA system. A certificate is then sent through to the packing house. Fruit cannot be processed until this certificate has been received. Residues are managed per market.

A sample of fruit was taken from the truck for maturity testing and sent directly to the on-site laboratory. All recorded information was entered into the computer systems and fruit was placed in the receivals coolstore. Within the coolstore, fruit was tracked by grower (RPIN), number of bins and the individual submission number.

A total of 25 fruit from each of 4 bins is tested at receival for maturity (SPI), size, brix, and pressure. Once in the database, this allows a packing run to pre-configured for efficiency.

The first step in the packing process was removing fruit from the field crates by dumping into a water dump. The water dump was sanitised with Nylate. Both concentration and pH was monitored electronically and adjusted as necessary. Fruit was then passed to high pressure sprays and beds of brushes before entering the packing shed. The first step within the shed was grading out of symptomatic or damaged fruit, by hand. Fruit was then moved to optical grading equipment for sorting and packing.

This packing house does not pre-size fruit, all fruit is packed directly into boxes for specific markets. It was stated that this is the normal practice for New Zealand.

Quality and quarantine sampling is done by a "random drop" process in each packing run, with the quarantine sample being taken for every 300 cartons packed. There is slight variation between varieties, but with the example of Braeburn, there are 18 apples per tray and 110 apples per carton. This equates to around 33 000 apples per 300 cartons.

Records of all detections (both quarantine and quality) are maintained on dedicated computer systems that determine what markets (based on specific requirements) a specific packing run is eligible for.

Orchard 3 - [redacted]

The company has around 850 hectares of planted apples, and the orchard visited was one of 12 managed by the company. Total size at this site was 100 hectares. The company both owns orchards, and manages orchards on other growers/owners behalf.

For management, the orchard is divided into "bays" and it is possible to trace back any box of fruit to a specific bay. A bay is a single grouping of one variety of apple.

At the larger scale, orchards are divided into PCR (pest control region?) which group a number of bays. PCR areas are managed and trapped as a single unit.

Fire blight management was discussed and the orchard manager described the use of bud break sprays to condense the budding period and thereby minimise the period of time that flower were present. Application of sprays was based on the recommendation of the fire blight spray model outputs. Streptomycin is applied as a single spray applied it 12-24 hours before a rain event.

While some fire blight does occur in the orchard (and were observed by BSG at a low incidence), the orchard manager described the low incidence as not affecting production or quality of fruit.

The orchard manager described that fire blight tended to occur at a specific site/area. These site were attributed to factors such as the movement of bee hives and presence of alternate hosts. Hail events occur occasionally in the areas, but have never been seen to result in fire blight strikes.

[redacted]

For managing chemical application, inventory and withholding periods, the SprayMax program is used.

BSG officers were taken to a block of Royal Gala apples, at the edge of the property, where fire blight had been seen this season. BSG officers saw up to five affected twigs on a few trees, but adjacent trees and those in the general vicinity had either affected twig or no symptoms at all. The orchard manager described the incidence as "about as bad as they have been seen", but had not affected yield or quality of fruit and a yield of 70-85 tonnes/hectare was expected. Inspection of affected twigs did not reveal any signs of bacterial oozes.

The adjacent royal Gala block, 10 meters away, had no visible symptoms in six rows inspected. The orchard managers attributed the difference to the use of a bloom promotion spray in the second block that reduced the bloom period (time span that blossoms would be available).

A small number of leaves symptomatic for apple leaf curling midge damage were observed, but no larvae or cocoons were able to be recovered.

Packing house 2 - [redacted]

Fruit receival, maturity testing and general processing was very similar packing house 1. As for the first packing house, grading by hand was conducted for all quality and phytosanitary issues and then fruit is sent for optical colour grading.

Orchard 4 - [redacted]

The orchard visited was monitored for pest and disease incidence on a weekly cycle. This process was driven by their packing house with a random sample of fruit - the fruit was not selected by the orchard manager.

Fire blight management was discussed. The orchard uses multiple Blossom Bless applications, typically two sprays, but in some seasons 3 or 4. Targeted periods are at 10%, 50% and 80% bloom.

The highest rate of infection observed by the orchard manager was about 1 strike per tree, but incidence was considered to be only sporadic.

Yields in the orchard varied from 60-100 t/ha, with fluctuation from year to year. The orchard is still cropping older trees on 5x2.5m plan – not the contemporary dwarfing rootstock and high intensity planting.

Being located south of Hastings, the orchard manager stated that were occasional frosts and therefore some use of overhead sprinklers and windmills to manage these climatic events. However, it was also noted that frost is more of an issue for grapes in the area as apples can handle some light frosts. European canker was not known from the orchard.

On a recently planted block that was just reaching maturity, a number of leaf rolls were inspected. Of a few dozen rolls inspected only one was found to contain a single bright orange larva. None of the apples on the tree were observed to contain evidence of apple leaf curling midge.

Packing house 3 – [redacted]

Receival, maturity testing, grading and general packing processes were consistent with the observed practices in other packing houses.

Different from the methods of the other packinghouses was the quarantine sampling and inspection which was conducted after packing, rather than using the "in-line" random drop methods. Boxes were selected randomly by computer and specially labelled to alert the quality control and inspection staff. The basis of inspection (a lot) was per grower, per variety block, per pick.

The packing house staff also noted that during the packing runs underway, any especially large apples (that were oversize for most markets) were returned to bins and sent to cold store. These apples were being held for later market opportunities for this large fruit to open up. It was stated that this fruit would be passed through the packing line again, prior to being sent to market.

For packing operations, a work order (for example 100 bins) is a single group identifiable by grower, by block, by variety, by RPIN. The 100 bins are then be split into multiple work order lots of 600 cartons packed.

Orchard 5 - [redacted]

The owner of this site has around 35 hectares in four separate blocks in the area. they described the primary varieties grown in Nelson as being the 'Pacific' series and Royal Gala.

The orchard inspected was a 1993 planting. The orchard manager noted that fire blight could be found, but that it was sporadic within the orchard and did not affect production. The same comments were applied to European canker which could also be found if one were to look hard enough, but was present only in low levels.

The main pest pressures reported for the orchard were black spot, powdery mildew, leafrollers, codling moth.

To manage European canker, any detections are painted with a solution containing carbenzadine – which was considered an effective strategy.

In recent years, specific controls for fire blight have not been required as the critical 16 hours of wet conditions and necessary warm temperatures have not occurred.

Apple leaf curling midge was associated with vigorous growth. Young trees on dwarfing rootstocks had their growth well managed. None of the leaves inspected had evidence of apple leaf curling midge infestation.

At harvest, picking bins are linked to orchard block and picker. Yields were reported as being high, in top 10% of the industry – the slightly more temperate climate than Hawke's Bay is favourable for fruit production. Examples included the 10 year old Braeburn block (5000 cartons/hectare = 120 tonnes/hectare, with close to 6300 carton equivalents sent to the packing house). The Royal Gala block in the orchard packed closer to 3500 cartons/hectare.

Downgrading of fruit during harvest and packing was attributed primarily to russet, shape and colour, though packout rates this season were reported as being 'above average'.

BSG officers also inspected an adjacent pear block with fire blight symptoms. This block was adjacent to a recently planted (two year old) apple block. Despite the proximity, there were no symptoms of fire blight in the young and rapidly growing apple planting.

Packing house 4 - [redacted]

As for previous packing houses, inward received bins are cool stored and pulled when ready to pack.

The water dump baths included Nylate as a sanitiser. Both Nylate concentration and pH were constantly monitored.

Maturity testing for apples, followed the procedures seen earlier, with the inclusion of testing from both sides of the apples. The intent was to test both maximum and minimum colour areas (colour, pressure, brix).

BSG officers discussed the detection of quarantine pests and quality issues with the quality control staff on the packing line. The staff described the detection of apple leaf curling midge as a rare event, "it is seen occasionally, but has not been seen yet this year".

Some packing of fruit into bulk bins was noted at this packing house (the first evidence of this during the visit). Bins were labelled consistently with carton fruit, with all trace back information available. In addition, the bins included a size description, linked back to the count of fruit (had it been packed into cartons). The packing house manager stated that there is limited packing into bins and the bins observed were likely to go to Europe. The market requirements in that case were for specific packaging that the packing house could not supply (such as 'clam shells'), so it would be packed by the receiver. The bins were new timber and included a heat treated ISPM15 marking.

Orchard 6 - [redacted]

The orchard inspected was part of 90ha of mostly young plantings (less than 6 years old). Planting was mostly of less typical varieties, including Sonya, Eve, Temptation, Breeze, and Cox Orange. Orchard yields are in the range of 85–100 tonnes per hectare.

The specific section of the orchard visited was 40 hectares, with each "block" about 1 hectare. Each block is a single variety of fruit and is the basis for trace back.

A 4 year old Sonya block was inspected. The orchard manager described a low fire blight pressure – attributed to not getting the necessary warmer temperatures when susceptible infection sites are available. The orchard has not applied either Blossom Bless or streptomycin.

European canker has been seen in 1 tree on the 40 hectare section in the last 5 years. Experience of the orchard manager is that it will usually be observed in an isolated place and will radiate from there and is linked to introduction of nursery stock. Symptomatic material is pruned out. When queried, the orchard manager was not aware of any neighbours with an incidence of European canker.

Other fungal pests were described as the key issue faced by orchards, including black spot.

Apple leaf curling midge, whilst present, is effectively managed by use of dwarf rootstock that limit canopy growth.

A second block was inspected – a Royal Gala planting. Woolly apple aphid (a non-quarantine pests for Australia) was seen in the orchard and a high proportion were parasitized.

Packing house 5 - [redacted]

The packing house visit was not part of the planned itinerary, but was offered by the orchard managers. Whilst slightly smaller than some of the previous facilities seen, particularly in Hawke's Bay, the operations were consistent with all previous packing houses.

The packing house was stated as packing between 550 000 and 600 000 cartons per year.

Quarantine inspection, as for packing house 3, was done by random sampling of packed cartons.