Future Orchards 2012 – Stanthorpe, Queensland
Orchard Walk January 2007

The "Orchard Walk" programme commenced at the DPI&F Applethorpe conference room at 11:15am with presentations made by guest speaker Professor Terence Robinson (Cornell University- New York State Agricultural Experiment Station) and John Wilton (AgFirst Consultant). This part of the program was attended by 25 people and concluded at 12:30pm with a BBQ lunch (sponsored by Mr Wade Krawczyk – Commonwealth Bank). Luke Millet of "Insignia labelling & coding" (sponsored OW Advertisement) also had a display in the meeting room.

After the lunch break, participants were asked to make their way to Rizzato's orchard located at Amiens Road Pozieres for the Orchard Walk (Gala Block). The programme recommenced at about 1:30pm within the orchard block led by John Wilton and Terence Robinson. This part of the programme also had about 25 people attending with a few new people turning up to offset those lost at the lunch break. The Orchard Walk programme continued until 3:00pm. The programme was promptly closed by Allan McWaters (DPI&F/Facilitator) to maintain the speakers travel schedule and to allow for the MB proprietors meeting at 3:15pm. Some of the growers inspected orchard blocks with the Orchard Walk host (Dino Rizzato) along with Terence Robinson and John Wilton. A brief MB proprietors meeting then took place which concluded at 4:00pm.

Terence Robinson Presentation:

"The Evolution Towards More Competitive Apple Orchard Systems in the USA."

- Steady increase in tree planting density over the last 50 yrs (from 70 trees/ha to the extreme of 6000 trees /ha).
- Discussed the evolution in orchard planting systems in the USA and trend to increasing tree densities.
- Development of the Central Leader system (1975) with 300-700 trees/ha using semi-dwarfing rootstocks.
- Use of Slender Spindle in the late 1970s to early 1980s (on M9 rootstock) with planting densities of 1000-1500 trees/ha. Small trees (2m) and moderate planting densities resulted in moderate mature yields and dense canopies.
- By late 1980s some growers attempted to increase planting densities of Slender Spindle trees above 2000 trees/ha by planting double and triple row systems (not successful due to excess vigour and management problems).
- In late 1980s, growers had more success with growing taller trees using the Vertical Axis system with trees planted at 1000-1500 trees/ha and grown to 3-4m tall. Renewal pruning of large upper branches to maintain a conic tree shape and improve light exposure in the tree canopy. Increases in yield and fruit quality with this system over Slender Spindle trees due to the space between branches and better light distribution.
- Development of V trellis systems in the 1990s. Varying densities with the aim of positioning part of the tree canopy over the tractor alleyways and increasing light interception (>70%). Testing of tree densities of 4000-6000 trees/ha planted as single rows in either a Vertical or V tree shape. The Super Spindle was a narrow tree form with a canopy diameter of 45-60cm and a tree height of 2m. While high early yields and good fruit quality were achieved, this was not sufficient to cover the high establishment costs.

- Use of highly feathered trees to obtain good yields in the second year after planting. Though many of these had the first tier of branches too low (50cm).
- Current opinion still divided over planting systems and densities. Mainstream planting are in the middle of the planting density range at about 2500 trees/ha.

Comparing orchard systems:

- During the first 2-3 years after planting cumulative yield is directly related to planting density (linear relationship). Higher densities equal higher yields. As trees mature the relationship between cumulative yield and tree density is more complex. At lower densities the relationship is almost linear while at higher densities the cumulative yield increase tends to drop off. "The law of diminishing returns" kicks in. As tree densities continue to increase, eventually the cost of additional trees is not covered by increases in yields.
- Optimum planting densities are an economic question. Economics dictate that the optimum planting density will be less than the density with the highest yield. Planting densities in the range of 2800 to 3800 trees/ha are most favoured. Three reasons: (1) "The law of diminishing returns", (2) managing excessive tree vigour and (3) Increased risk due to high establishment costs for very high density plantings.
- The price received for a given variety has an impact on the profitability of an orchard system. Higher planting densities are more sensitive to lower fruit prices due to higher establishment costs. A range of fruit prices and optimum planting densities were presented (ie low 25c/kg – 2400 trees/ha, moderately high price of 35c/kg – 2800 trees/ha). At very high fruit prices, the optimum planting density could be above 5500 trees/ha.
- Economic analysis using "Net Present Value" (NPV) converts future cash flows to current dollar values for comparisons of profitability. Comparisons were shown in graph form of NPV ($/ha)/Tree Density; NPV ($/$10,000 invested/Tree density; NPV ($/ha) fruit price/Tree density; NPV ($/ha) tree cost/Tree Density and NPV ($/ha) effect of tree quality (feathered, whip, graft etc). These figures all demonstrate that optimum planting densities exist within a range between 2500 and 3000 trees/ha for the different measures presented.
- Their economic study lead to the development of the "Tall Spindle" system. An amalgamation of the slender spindle, the vertical axis and super spindle systems. High density plantings, with tall trees and a narrow tree canopy. Planted with feathered trees (10-15 feathers). Small pendant branches with no permanent scaffold branches. Cropping in the second year allows natural bending of branches to reduce vigour. Densities vary from 2300 to 3700 trees/ha. They have successfully used M.9, B.9 and the fire blight resistant Geneva® G.16, G.11 and G.41 rootstocks.
- Reducing costs. Mention made of seeking cheaper planting systems (ie cost of trees and trellising). Mechanization to reduce orchard costs.
- Rootstocks. M.9 most planted stock in the world. Performance varies with the different clones available. Growers should not accept just M.9 and find out which clone it is. M.26 performance throughout the world is variable but has been used successfully. The benefits of various Geneva rootstocks were outlined with comparison to M.9 and M.26 vigour (see printed notes).

Conclusions:

- Apple growers in the USA are seeking improved orchard systems that have improved yield, improved fruit quality and reduced costs per unit of production.

- Optimum planting densities in New York State is 2500-3000 trees/ha based on economic analysis.
- Profitability (competitiveness) can be improved more by planting high priced varieties than by reducing costs.
- Profits can be improved more by improving fruit quality and producing desired fruit sizes than by reducing costs.
- The Tall Spindle is designed to achieve these objectives. High density, planting feathered trees, small fruiting branches. The system can reduce costs significantly.
- Use of fire blight resistant rootstocks.
- Increased mechanization.

"How to Grow Large Gala Apples"

- The fresh apple market in the USA has a significant premium for large Gala fruit (count 80-88). However, this is difficult to achieve because Gala fruit is "genetically small" and the trees set very heavy crops which leads to small fruit size.
- Management strategies to achieve the desired size range of Gala fruit include pruning, crop load management (thinning), fertilization and irrigation.
- Pruning trials included: limb renewal – taking out 2-3 large limbs, spur pruning to remove a ? of spurs on branches, "stubbing back" – cutting back fruiting branches by ¼ to ? . Stubbing back is an efficient technique to reduce fruiting wood and maintain a narrow canopy.
- Thinning combinations with NAA + Carbaryl, BA + Carbaryl and ATS. Three spray approach of ATS at full bloom, Carbaryl at petal fall and BA + Carbaryl at 10mm fruit size.
- Nitrogen fertilization in spring increased yield but not fruit size.
- Irrigation not significant where the trials were done because of good rains throughout the season. Positive effect in one dry year.

- Combined effects of these treatments are independent and additive. The best treatments involved aggressive pruning (including stubbing back), Nitrogen fertilization and thinning with BA+Carbaryl. These treatments can achieve an average fruit size of 190g (count 80).
- However, the pruning and thinning treatments reduce yield to achieve an increase in fruit size. Their economic studies found that the higher prices achieved for the larger Gala fruit counts did not compensate for the overall reduction in yield. Crop value appears to be optimized in the 161-169 g fruit size (count 113-100).

John Wilton Presentation:

John showed a reduced selection of his slides to allow Terence Robinson more time for his presentation.

- Outlined what is top quality product. Good eating experience, premium size range for the market, uniform production and the product must tolerate commercial handling abuse.
- Crop load affects fruit quality. Overcropping delays harvest, suppresses colour development, reduces fruit size, lowers fruit firmness and brix levels. Undercropping increases risk of post-harvest disorders including “bitter pit” and internal breakdown disorders.
- The optimum maturity stage for harvest will depend on storage procedures and market requirements. Assess maturity using starch iodine patterns, fruit firmness by pressure testing, sugar levels by brix testing of juice using a refractometer, and assessing background colour (green/yellow swatches for comparison).
- Maturity testing should take place around 14 days before anticipated harvest.
- Royal Gala needs frequent selective picking to maximise potential (3-4 day turnaround).
- Royal Gala fruit firmness declines through harvest and storage. Past optimum maturity the decline is 7% for a week late, 14% for 2 weeks and 18% softer after 3 weeks past optimum maturity.
- Gala fruit colour may not be as advanced as internal maturity.
- Royal Gala loses 20 to 30% of harvest pressure in storage.
- Delaying harvest maturity by applying Retain® 3-4 weeks prior to anticipated harvest is a useful tool for managing Gala harvesting. Delays maturity by 7-10 days.
- SmartFresh™ is an ethylene blocker which slows down fruit ripening post harvest enabling fruit to maintain firmness and juicy texture throughout storage and marketing. Maturity at harvest is important because treated fruit will not ripen if too immature. Very useful as a marketing tool for Gala fruit.

Orchard Walk – Rizzato Orchard – Pozieres.

John Wilton and Terence Robinson speak to growers in a Gala block.

John Wilton and Terence Robinson shared speaking roles in the orchard and answered grower questions.

- They discussed crop loading for Gala which included tree training, pruning strategies and fruit thinning. The overall aim is to regulate crop load to achieve optimum fruit size, colour and maturity.
- Growers can thin with the "secateurs". Terence Robinson spoke about "stubbing back" fruiting branches (cut off a ¼ to a ? of branch length) to reduce crop load (when fruit 12mm in diameter). Take out large fruiting limbs and encourage small fruiting branches that bend and are naturally pendant. Removing overhanging branches high in the canopy to improve light distribution and fruit quality. Can remove 2 lower scaffold branches per dormant season on large established trees. A tall narrow tree profile with small fruiting branches desirable.
- Use chemical thinners from blossoming onwards and follow up with hand thinning. Terence Robinson mentioned the three spray approach of ATS at full bloom, Carbaryl at petal fall and BA + Carbaryl at 10mm fruit size.
- John Wilton spoke about harvesting strategies for Gala and maturity testing. Gala requires a number of picks. Retain® can be used to delay maturity of some blocks to help manage harvesting fruit at optimum maturity. Starch iodine only measuring "residuals". Brix affected by crop load and fruit size (large crop = lower Brix). Fruit firmness declines as fruit ripens. Background colour is not always a good guide to internal fruit maturity.
- Terence Robinson made the observation that during the district tour he had not observed very many orchards with trellis structures. He reasoned that some of the hail netting posts could be utilised to support trees on a trellis without too much extra cost. Trellis with 4-5 wires 70cm apart. Depends on the variety. In New Zealand Gala can have support to within 1m of the tree top whereas Fuji requires support to the top of the tree.
- Replanting was discussed along with roostocks. Terence Robinson suggested that clones of M.9 such as Nic 29 or Pajam 2 should be used over just accepting M.9. Tree support necessary for trees on M.9. He spoke about Geneva rootstocks and mentioned Geneva 202 as being a good alternative to M.9 and M.26. Well feathered trees from the nursery are necessary for early cropping (10-15 feathers). Feathers may need to be tied down. Strong upright growths need to be removed.
- Propagating material should be from bearing trees to ensure that clones are true to type.

Growers attending the Orchard Walk at Rizzato's Orchard – Pozieres.

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Stanthorpe

Event Promotion

- Growcom write and distribute press releases to the media and their members.
- Press release and accompanying advertisement placed in the Stanthorpe Border Post on Tuesday January 23.
- DPI & F staff faxed out a two page notice regarding the Orchard Walk programme which included cuttings from the Border Post (the press release and advertisement) to all growers and Agribusiness representatives in the district.
- Alice Plate from ABC radio did interviews some of the apple growers during the lunch break at the DPI&F Applethorpe Research Station.
- Louise Donges from the Queensland Country Life attended the Orchard Walk at Rizzato's and took photos.

DPI&F Involvement

- Allan McWaters and Clinton McGrath act in the facilitator's role on behalf of Growcom.
- Eight DPI&F staff participated in the Orchard Walk programme for the day. This included 3 staff members cooking the BBQ lunch as shown in the photo below.

DPI&F staff cooking the BBQ lunch as part of the Stanthorpe Orchard Walk.