

Future Orchard 2012 – Batlow, NSW

Orchard Walk 15 November 2006

Report from Julie Dart, Batlow area facilitator.

The second walk in the series was held at “Muralappi Orchard” and was hosted by James Oag and his family.

At the start of the event 17 growers were present, this increased to 21 as the talk progressed. 13 growers filled in the attendance sheet, there were 2 apologies. It was a good turn out considering the adverse weather (freezing cold and wet, with snow later that day!).

John Wilton (AgFirst) - Tree Architecture & training

Objectives:

- High and early yields
- Cost efficiencies
- Consistency
- Quality fruit

We need to decide on a system, but be able to visualise the tree form. There are many systems.

Solaxe: Popular in France & Chile, it is a wide spaced central leader system (Up to 2m between trees) where the tops are bent to control vigour. John doesn't like the tops, there's too much summer pruning needed to get good colour. A dominant leader would be better.

Slender spindle: Popular in Italy. High tree densities, a system with pendant (below horizontal) branches. Small, simple branches. Trees are tall to maximise light interception. Tree height = row width.
High Density, More training, simple fruiting units.

Which tree form?

As systems have evolved and trees grown closer, the branch structure has simplified so trees fit their space. High density trees are now basically rods with spurs

- Decide early (when planning the orchard)
- Visualise the mature trees in detail
- Deliver the system consistently along the row and within the block

Principles – understand the process

- Pruning influences vigour and crop load
- Renewal pruning- aims to grow new wood. The harder you cut back the greater the vigour
- Long pruning: aim to keep fruiting branches simple and light
- Branch training: The angle of the branch will determine its vigour and fruitfulness. Pendant branches are more fruitful and will throw less water shoots that need to be summer pruned.

Fruiting branches

- Keep simple (long pruning)
- Should be the same from top to bottom
- Pyramid shaped trees
- Simple maths (for judging crop load), easy to control what pruners/thinners do
- Consistent light=consistent quality
- Create branches by training and pruning

CREATE A SYSTEM, APPLY IT CONSISTENTLY

- high tree density
- simple branches
- simple management

Setting crop targets:

- history – easy for older trees, but need to follow some rules for young trees
- visualise what the crop will look like on the tree
- calculate (fruit numbers)

Thinning- need space for fruit to grow and hang properly

Visualise the crop load on the branch, then branches per tree, then trees per hectare

Trunk Cross sectional Area (TCA)

$$\text{TCA} = (1/2 \text{ diameter})^2 \times 3.142$$

- Use to estimate fruit numbers for young trees until they fill their canopy space
- 7-10 fruit per cm² of TCA (for the tree)
- You need high vigour and good conditions to grow quality fruits above 10 per cm² !
- For most growers a target of between 8 and 10 fruits per cm² is reasonable
- Growers should consider setting up different loads to see what happens in a small area

Achieving Consistency

- Simple systems
- Supervise & count
- Can use branch diameter for crop load (French system)

NZ growers are now starting to prune to bud numbers, like they do in wine grapes to control fruit size and thinning costs

John Wilton then called for questions:

PW: Do pendant branches in trees such as the solaxe create shading problems?

JW- yes potentially, so the French growers prune out laterals near the trunk to create a “light chimney”. John thinks that this is a faulty system and that solaxe is really not ideal closer than 2m between trees.

SB: Does the rootstock used affect the calculations for crop load using TCA?

JW: no not really, using TCA is a good system for setting crop loads for young trees, but it should be developed more for local conditions, through trial.

ORCHARD WALK: Hosted by James Oag

Pink Lady block, 5m x 2m, 1000 trees/ha



James: The reason we are looking at this block today is to discuss trellis issues. We really need to get it right here and in the district in general.

JW: If we are to grow a 70 T/ha crop on 3.5m wide rows, this means that the trellis carries 25kg of fruit per meter of row. For every 100m this equals 2.5T
We cannot underestimate the importance of proper trellis design to carry the crop to maturity

JO: This block has carried a 50T crop before, and was a real worry! The most I would crop again is 45 to 50T. The trellis (15m between posts) really can't support more than this. If I had the chance to re-design the block I would have made the posts taller, and put the posts closer.

JW: I can see a big thinning job ahead (James has left a lot of fruit in case of frost & hail. It's a bigger hand thinning job, but at least fruit with faults can be removed- there was hail here 2 days ago. If he had gone in hard with chemical thinners there wouldn't be much to salvage).

JO: as you can see here, the trellis wasn't made tall enough for the trees, and the tops are falling over. James ties them down rather than cutting.

JW: That is fine for now, but might be a problem later. Prefer replacing the leader with a weaker shoot. Growers MUST remove heavy wood up in the tree; it's harder to make thinning sprays work in the tops of the trees due to plant hormones. To overcome this, you need to carry less bud high in the tree. Low branches in the canopy here are too low and need to be progressively removed.

For this block (5m x 2m) a 50 tonne/ha crop would be equal to 50kg of fruit per tree.

JO: We are trying to get 180g fruit, they should size easily, but there have been problems getting colour. Will thin to singles to get 280 fruit per tree.

JW: With singles, well spaced fruit is the aim, your best quality fruit grows on spurs and terminals. 1 year old wood produces lesser quality, it's often smaller and later. With a variety like Jazz, fruit on older wood is up to 30% larger than fruit on 1 year wood. Only leave 1 year wood as replacements during winter pruning. In NZ fruit on 1 year wood is hard to chemically thin, PRUNE IT OUT and save yourself the hassle.

Branch length and thickness- take care with the 3:1 rule:

There are a few "rules" out there for deciding which branches to keep during winter pruning. Using the 3:1 rule too rigidly can cause growers to remove cropping branches too early. JW uses a different approach to judging branch thickness. This "rule" states that the diameter of a fruiting branch at the trunk should be no more than 3cm diameter for each meter of branch length. Eg 1m= 3cm. 2m=6cm etc. If you allow branches to grow thicker, then they are more likely to throw lots of water shoots and should then be removed completely.

The 3:1 rule (where branches should be no thicker than $1/3^{\text{rd}}$ of the trunk diameter) can be over used. If you can manage a big branch lower in the canopy by tying it down.

The strength (vigour) of a branch is driven by the number of leaves it carries. The more leaves, the quicker it will thicken up. This is another argument for pruning out 1 year old wood- it's not going to grow quality fruit and will only thicken the branch up. Most shade problems are not caused by excess branches, but too much growth on the branches

JD: *Will removing 1 year shoots increase the risk of sunburn?*

JW: No, not if there are lots of light, simple fruiting branches. If sunburn is a concern then growers can tie branches down to where they will hang with fully grown fruit ahead of time. This way the fruit will be in a protected position before it gets too hot.

Water shoots are best removed now when they are soft. John prefers to rip them out rather than cutting, because this also removes some of the buds at the base that could re-shoot. Do it now between thinning sprays. It's too much for workers to do by hand thinning time.

Thinning:

What to do when there are not enough choices (eg after frost or hail)?

JW: In this situation, where fruit is limited, it's best to hang doubles on bourse shoots and make the rest singles.

What is the optimum time to thin for maximum size?

JW: Cell division occurs up to 5-6 weeks after full bloom. You potentially lose 10g fruit weight for every week you wait after full bloom. You can't hand thin until final drop from chemical thinners, otherwise you will over thin as fruit you wanted to keep falls off.

If you are not using chemicals then thin at blossom for the best size (this is risky though in frosty areas)

JO: I've only used Carbaryl/Thiram on this block- no primary thinners for the last 5 years. For some reason this block drops fruit really easily.

JW: this is mostly related to tree vigour.

Focus on pruning as the first stage of thinning. Use thinning cuts instead of shortening cuts.

Young Ruby Pink (CP strain) block 4m x 1m, Bud 9 Rootstock. (2005-2006)

This block was originally set up 2m between trees, but James realised the mistake and inter-planted the following year.



JW: Budagovsky 9 is 10% less vigorous than M9

JO: I would plant this block with 3.5m rows if I had another chance. 4m is too wide for the terrain. To get the trees to grow I have been fertirrigating fortnightly with Cal Nitrate, irrigating every 2nd day. The drippers are 2.3L spaced 500mm apart.

I want to put in another 2 wires, and next time I would use bamboo poles rather than string. It costs 10c per string and 20c for bamboo. When I was tying up the inter-planted trees the pressure on the wires made the older trees strings loosen off, and it's less supportive.

JW: 70cm between wires is too wide, 50cm is much better. For young trees you need a minimum of 3 wires. Alternate the wires on either side of the trees. In NZ we staple the trees to the wires using 14mm and 19mm staples. The trees end up growing over the staple, firmly attaching them to the trellis.

Add your wires as the trees grow. Otherwise the growing points can get knocked off in the wind.

Posts really need to be spaced every 7-8 trees. In this block where the posts are 15m apart, you really need to drop in more half way to be able to support a big crop.

Growing young trees & fruit

JO: I was planning to knock off all the fruit this year to get the trees to grow.

JW: There's a new school of thought that suggests that it's beneficial to leave some of the fruit on young trees. If you take off the fruit and are fertigating, the young leaves can become overloaded with carbohydrates (there's nowhere else for it to go). Once this happens the leaves go purple and the trees stop growing.

Leaving some fruit on the tree soaks up the excess carbohydrates. Gibberellins produced by the seeds also have a positive effect on tree growth by helping shoot elongation.

You need to keep the leader growing. Use mulch! Especially in hot climates with young trees.

Replant Disease: James did not consider this site really to be replant because the previous apple trees had only been there 10 years.

JW: You can get replant after 2 years. It's linked to the amount of roots left in the soil. Some of the worst replant problems I have seen have been in nursery blocks.

Fumigation with chloropicrin sometimes can make an underlying Phytophthora problem worse, as it's often the first fungi to grow back. MM106 is extremely poor in replant situations where there is Phytophthora.

The group went back to the shed for the other talks as the weather closed in.

Henry Schneider, DPI VIC: Water Issues in Drought

Henry is a District Horticulturist in the Cobram area in Victoria.

Water issues are huge in the Goulburn Valley at the moment, as most growers have little if any irrigation allocation for this season, also most growers need to balance tree health with the recent frost damage.

Unlike stone fruits, the growth curve for apples is pretty much a straight line, with growth increasing evenly over time. This means that there are no real slow phases in the growth that can be used to reduce the amount of irrigation. If an apple tree is water stressed, the curve will just drop, meaning lower potential production.

So how can apple growers manage a crop on limited water?

- Trees on dwarf rootstocks are likely to be the biggest problem in a drought as they have a limited root zone and are much more dependent on irrigation.
- Water decisions need to be early- growers need a plan
- You need to focus your available water resources on the most profitable blocks in the orchard
- Prioritise water to keep young trees growing. Too often an investment in a new block is lost when young high density plantings are given the lowest water priority. It's difficult to get young trees to grow after they have been stressed. The economic advantage of high intensity plantings is early production, growers need to remember this.
- Growers should look at the length of irrigation events, some trees (on more vigorous stocks) will be better off with less frequent but deeper irrigation.
- Ethrel can be used early to drop a crop in NSW, but growers also need to reduce fertilizer and water inputs to stop the trees putting on too much leafy growth. Ethrel works well on granny smith for removing unwanted crops.
- Use mulch! If possible use a mower that throws clippings to the side, under the tree row.
- In the Goulburn valley round bales of straw are being used with a machine that chops the straw and throws it under the rows.
- Irrigation needs to be adjusted to accommodate mulch, to make sure that water gets into the soil and doesn't just keep the mulch wet. Growers with drip irrigation should think about dropping the lines on the ground and then applying mulch. This allows the water to get to the soil straight away and the mulch reduces evaporation.

John Wilton: it's also likely that it will be difficult to get good colour in water stressed fruit.

Growers need to assess now how much water they have now, and make a water budget.

John Wilton: Getting New Plantings to Grow

- Aim to fill the canopy with fruiting wood quickly
- Capture at least 60% of the light
- Tree height = row spacing *
- For maximum yields, TCA/ha needs to be more than 50, 000cm²

**Recent Australian research by Simon Middleton (QDPI) promotes tree height= 75% of row space under Australian light conditions, maybe this issue needs more research? The different recommendations could be due to different latitudes at which fruits are grown in Aus & NZ (NZ potentially has less solar radiation than here, which would need an increased canopy to capture the light)*

Limiting Factors

Things that need to be corrected before planting:

- Trees- must have high health status (use virus free material)
- Trees must be true to type (Bud wood taken from fruiting trees)
- Tree size
- Soil type- work it out (EM scans etc), as it can be variable
- Previous crop history with nematodes and other soil diseases
- Test for nutrients in the soil and correct any problems

Replant sites:

Specific Apple Replant Disease (SARD). This causes poor tree growth and can also reduce fruit size.

- Severity depends on many factors, including the amount of roots left in the soil, length of fallow
- The causes of SARD are still poorly understood, there is more than one factor involved
- It's best to assume that SARD will be a problem on replant ground.

Treatments include:

- Pre-plant fumigation with a fumigant that kills fungi eg: Chloropicrin
- Remove root debris
- Fallow
- Increase tree density by 50%
- Maintain root zone fertility
- NO WATER STRESS!

Mono-Ammonium Phosphate (MAP) fertilizers can be beneficial on replant sites. Use 100-200g per tree, but make sure that it is not in contact with tree roots or it will burn them. It needs to be well mixed with soil if used in the planting hole.

Planting

- Open friable soil
- Ridge shallow soils if needed
- Drainage for heavy soils
- Do not plant into wet soil
- Do not allow roots to dry out before planting (results in poor growth in patches where the trees were in the same bundle. Soak dry bundles for 24 hours in water per-plant
- Irrigate immediately after planting if soil is dry

- Avoid scion rooting. The graft union needs to be a minimum 10cm, above the soil. 15-20cm is better especially if trees are planted by machine into freshly ripped soil; they tend to sink as the soil settles again.

After planting

- Secure trees to the support structure
- Irrigation ready to go before buds move.

Tree Support

- within 0.5m of ultimate tree height
- posts 8 trees apart (max 10m between posts)
- trees firmly attaches to the trellis from day one
- 3 wires are needed for 1st year trees
- alternate wire on each side of the trunk
- Don't put a wire above the tops of the trees, wait until the shoot tips have grown past where the wire needs to go, and then put up the wire. It stops the tips getting knocked off.
- Using staples: tree 12mm diameter = 14mm staple
Tree 20mm = 18mm staple
Tie smaller diameter trunks with electrical tape until they are big enough for a staple

Getting tree height quickly is the key to early/ high productivity

Balance:

- Remove low feathers
- Remove strong side branches
- Where development is poor bring the tree back to a rod

Irrigation:

- Water stress stops growth
- Maintain optimum water in the top 30cm of the soil
- Mulch is important

Fertilizers:

- Strategies need to be different for young trees
- Higher N needed (side dressing 20-25kg N/ha applied monthly)
- Magnesium & Potassium. Potassium not really needed in young trees unless soil test indicates a deficiency

Pest & Disease

- Must control in young trees
- diseases like powdery mildew reduce growth
- Bark chewing bug are also bad news

Cropping

- Trees on M9 and M26 will make better growth with a light crop. You can put on up to 7 fruit per cm² TCA, and grow the tree faster than with no crop at all (for reasons discussed during the walk).

The session concluded at 12pm with evaluation sheets (16 were returned).

Involvement of local DPI and Researchers

State Ag Dept: At this meeting local NSW DPI was represented by Julie Dart (Facilitator).

I am the local District Horticulturist for the region and the only local person who deals with industry on technical issues. There are other DPI researchers based in the following areas:
Plant pathology (Shane Hetherington) Orange Ag Institute (4 hours drive)
Entomology (Gus Campbell) Bathurst
Irrigation extension can be delivered by Robert Hoogers at Yanco.

Local consultants /researchers: Ron Gordon is the local private industry consultant (also a monitor block member). At this meeting Ron was away overseas, but is likely to attend future events. Ron coordinates the IPM monitoring programmes provided by the Batlow Co-op for monitoring services clients.