Crop load management in stonefruit

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Flower and fruit thinning are agronomic practices aimed at changing the ratio of carbon partitioning between leaves and fruits.

Thinning dictates the number of fruit per tree and directly influences tree growth and development, yield and fruit quality outcomes.

Thinning activities contribute to the cost of orchard production via labour required; however, optimal crop loads can save $ through reduced picking, packing and transport costs.

Excessive crop loads result in small fruit size, delayed maturity and poor fruit quality despite yielding higher. Therefore, optimal crop load management is required to achieve high marketable yield and good quality fruit outcomes whilst maintaining sufficient vigour and return bloom to sustain long-term yield.

Research into crop load management on peach, nectarine, plum and apricot at Tatura has found average fruit weight and fruit sweetness (°Brix) decreases rapidly with increasing crop load. Fruit maturity (flesh firmness, colour development) is delayed under high crop load. Low fruiting levels increase tree vigour (shoot length, pruning weight, trunk diameter).

Why thin flowers and fruit?

Stonefruit trees set more fruit than they can support to full maturity. Flowers and fruits naturally thin themselves (known as fruit drop); however, stonefruit crops (peach, nectarine, plum and apricot) require thinning for improved horticultural outcomes: yield, fruit quality and tree health.

Excessive fruit numbers result in greater fruit competition for limited available energy (carbohydrates), poor production outcomes such as low fruit weight and reduced quality, limb breakage, biennial bearing and ultimately tree health is reduced.

Thinning methods

Flower thinning is usually down mechanically (e.g. Darwin string thinners) and fruit thinning is most often down by hand. Hand thinning of fruit is more precise but has higher labour costs. Winter pruning is also a form of fruit thinning as it sets the level of tree fruiting structures for each season.

Canopy accessibility by the string thinner can be improved by pruning to eliminate excessively long or short fruiting laterals, removal of shoots in less accessible regions of the canopy, and by tree training to maintain straight scaffold.

The recommended time for mechanical flower thinning is prior to full bloom (i.e. 60 – 80 % bloom) to allow for possible fruit losses due to frost damage. Mechanical flowering thinning aims to remove approximately 30 % of flowers. The speed of rotation (RPM) of the string thinner and the tractor speed can be set to upscale or downscale the number of flowers removed. Similarly, handheld sting-type blossom thinning equipment has a variable speed option.

Recommend time for precision hand thinning of fruit is 30 – 45 days after full bloom when fruit size is 19 – 25 mm. Precision hand thinning is undertaken by the initial removal of fruit from end of branches, 'doubles', small, disfigured and damaged fruit followed by even thinning of remaining fruitlets to the desired crop load target.

Crop load target

Optimal fruiting levels or 'crop load targets' are aimed at maximising fruit size and fruit sweetness. Crop load targets depend on crop type, spring pollination conditions and tree size.

Plums and apricots, having smaller fruit are thinned differently to peaches and nectarines. Heavy flowering in spring (i.e. minimal frost incidence, high

bee activity, optimal vegetative growth conditions) may require greater thinning. Larger trees (canopy size) have capacity to grow and yield more high-quality fruit.

For plum and apricot, a cropping level of ~ 1 fruit per 5 – 8 cm of fruiting lateral is recommended to maximise cell number and final fruit size and sweetness.

For peach and nectarine, a cropping level of ~ 1 fruit per 10 cm of fruiting lateral is recommended to maximise cell number and final fruit size and sweetness.

For peach and nectarine, a target vertical spacing of fruiting laterals of approximately 20 cm is recommended to avoid the deleterious effects of internal shading and limb rub of fruit. For plum and apricot, approximately 10 cm lateral spacing is recommended.

Consideration should be given to varying crop load within a tree. Better quality fruit is produced where more light (interception) occurs in the canopy. Larger fruit size, sweeter fruit and increased in colour intensity and coverage are produced on the upper canopy zones that are exposed to high light regimes.

Crop load management: yield and fruit quality

Overall, crop load studies at Tatura on peach, nectarine, plum and apricot have shown excessive crop load results in high yield but low marketable yield due to small fruit size and poor fruit quality (i.e. low sugar). High crop load has also been shown to delay fruit maturity.

On an early-season nectarine and a late-season peach under vase canopy architecture (1,111 trees/ha), high crop loads delayed fruit maturity and lowered marketable yield due to small size fruit with reduced sweetness.

For high-density (2,222 trees/ha) blocks of mid-season peach and nectarine, under Tatura Trellis and Vertical Leader planting systems, high fruit loads produced poor fruit quality; reduced fruit weight and lowered sweetness (°Brix).

Similarly, for plum and apricot, irrespective of canopy architecture (vase, Tatura Trellis), low fruiting levels produced large sweet fruit while excessive crop loads reduced fruit weight, decreased sweetness and delayed fruit maturity.

Crop load management: tree vigour

Tree growth and vegetative vigour responses under different crop load regimes have been measured at Tatura on peach, nectarine, plum and apricot.

On an early-season nectarine under vase canopy architecture, excessive crop loads resulted in lower main branch size, reduced shoot length, less pruning biomass and increased suckering. Similarly, on a late-season peach under vase canopy architecture, high crop loads reduced main branch size.

For both peach and nectarine under high-density Tatura Trellis and Vertical Leader systems, crop load management did not impact vegetative growth.

For plum, irrespective of canopy architecture (vase, Tatura Trellis), low fruiting levels partitioned more assimilates into vegetative growth and produced higher levels of pruning biomass and grew larger trunks. For apricot (vase, Tatura Trellis), trunk size was not impacted by crop load; however, increased pruning weight occurred under low fruiting levels.

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