

Future Orchards Trial: Final Report

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| Project title: | Precision Pruning to Bud Numbers |
| Region: | Manjimup WA |
| Contact: | Susie Murphy White |
| Projective Objective: | Precision pruning to bud numbers to better predict the fruit numbers. Determining which buds were floral and which are vegetative from the buds removed. |

Method

1. From 4 trees, measured TCA (trunk diameter) of each tree. Selected 2 branches.
2. Measured branch diameter, pre-pruning bud count, pruned to 4 buds per branch post pruning bud count on branch 1.
3. Measured branch diameter, pre-pruning bud count, pruned to 2 buds per branch post pruning bud count and 4 buds per branch.
 - a. Buds removed were dissected to determine if floral or vegetative.
4. Count number of flower clusters/flowers on branch 1 & 2 before thinning.
5. Count number of fruit pre-thinning.
6. Count number of fruit pre-harvest.

Kanzi apples typically are known to be biennial bearing but in this case this block produces very well every year. So much so that chemical and hand thinning are always required. This trial sets out to prune selected branches/trees to 2 buds per fruit and 4 buds per fruit. To investigate if flower and fruit numbers are reduced to the targeted crop load.

The second part of this trial is to dissect the Kanzi buds that were removed to determine if they were floral or vegetative buds. Knowing what proportion of buds contain flower or vegetative (leaf) parts can help growers plan how to prune and achieve the desired crop load. Bud dissection, using a sharp blade to slice the buds and expose flower parts, can be used to determine if buds are floral or vegetative. Dormant wood was collected from 4 trees in mid-August 2020. In the laboratory, buds were dissected with razor blades and examined under a 40 X stereo binocular microscope to determine if they contained developing flowers or vegetative primordia.

● Round bullets indicate actual production. ■ Square bullets indicate estimated production.

chart by amcharts.com

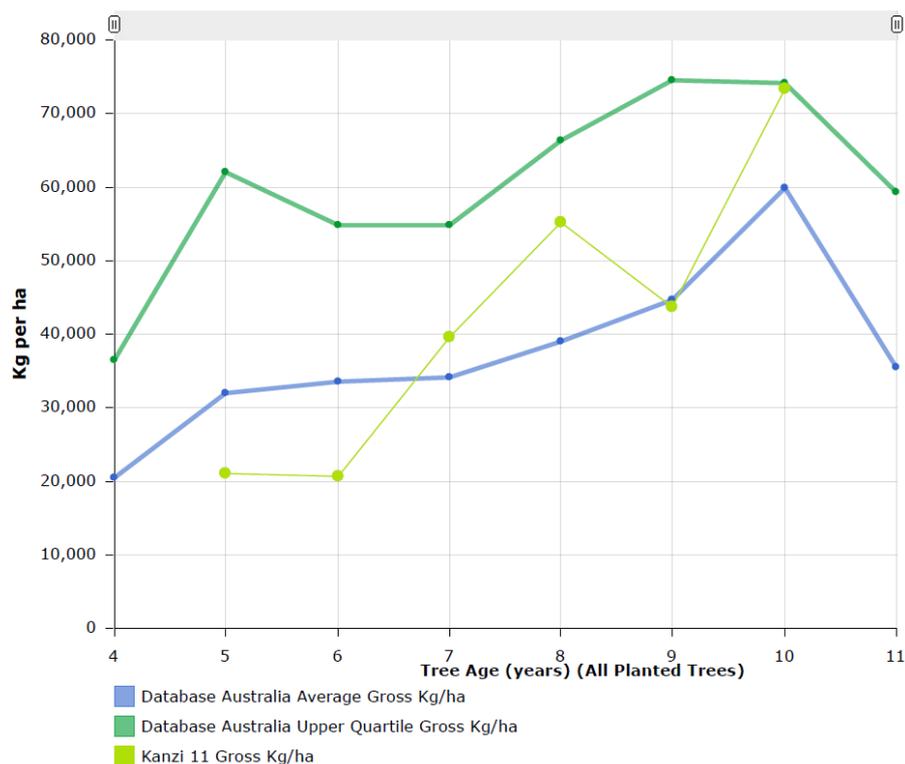


Figure 1. Orchard Net Yield for the last seven years.

Results

Precision pruning is a process of reducing the number of flower buds to a predetermined number of flowering buds through pruning using the rules of tall spindle pruning and then spur extinction pruning. The first step in precision pruning is to establish a target of final fruit number at harvest. In this case the target number of fruit was 200 fruit per tree, tree 1 and 2 were pruned to 4 buds per fruit and tree 3 and 4 were pruned to 2 buds per fruit. The pruning strategy resulted in slightly less fruit per tree in the trees pruned to 2 buds per branch.

Table 2. Pruning to bud numbers

| Block | TCA (trunk diameter mm) | Bud Target | Buds Pre Prune | Buds Post Prune | Fruit Target | Fruit Post Thin |
|--------|----------------------------|---------------|-------------------|--------------------|-----------------|--------------------|
| Tree 1 | 87.15 | 800 | 1207 | 908 | 200 | 184 |
| Tree 2 | 89.7 | 800 | 1713 | 1150 | 200 | 253 |
| Tree 3 | 77.5 | 400 | 765 | 480 | 200 | 105 |
| Tree 4 | 99.3 | 400 | 1368 | 747 | 200 | 161 |

Making accurate fruiting bud counts requires an investment in time, but this is a practice, which can provide an immediate return on the investment of time. Determining the number of buds per tree depends both on the yield, fruit size, climate and the bearing capacity of the trees. However, the optimum number of buds also depends on the level of risk the grower is willing to accept. Although some growers prune aggressively leaving only the exact number of buds needed assuming 1 fruit per flower bud, most growers prefer to keep extra “insurance” buds to account for natural factors that

cause buds not to set a fruit such as poor pollination conditions. The exact number of extra buds to leave has been unclear. The objective of this trial was to determine a bud load to optimize number of fruit and reduce the time required for hand thinning.

Precision pruning allows pre-thinning of the tree so that chemical thinning is more successful and less hand thinning required to reach the optimal number of fruit per tree.



Figure 2. Kanzi buds in trial block.

Kanzi Bud Dissection

Recommendations from AgFirst is “that a normal floral percentage is likely to be 70–90 per cent depending on the variety, and anything below 70 per cent might require pruning adjustment. If below 50 per cent it may be prudent to prune when flowers are visible.” The results from this Kanzi block indicate this block had a high percentage of floral buds 80.5% and hence no problem in producing a heavy crop load, so pruning to fewer buds per fruit would be advisable.

Table 1. Kanzi Bud dissection

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| Total Buds Dissected | 139 |
| Total Floral Buds | 112 |
| Percentage Floral | 80.58% |



Figure 3. Kanzi floral bud at x40 magnification.

References

Robinson, T.L., Francescatto P. and Lordan J. 2019. Precision Pruning of Gala Apples. Horticulture Section, School of Integrative Plant Science, Cornell AgriTech, Cornell University, Geneva, NY, USA

Tustin, S. van Hooijdonk, B. Breen, K., Middleton, S. Wilkie, J., Parkes, H. Tabing, O. Close D. and Bound, S. 2014. Spur Extinction – a natural process leading to a new crop management technology. Australian Fruit Grower Magazine APAL.