

JULY 2022

Australian Avocado Canopy Management Survey

Queensland Department of Agriculture and Fisheries



Queensland
Government

**Hort
Innovation**
Strategic levy investment

**AVOCADO
FUND**



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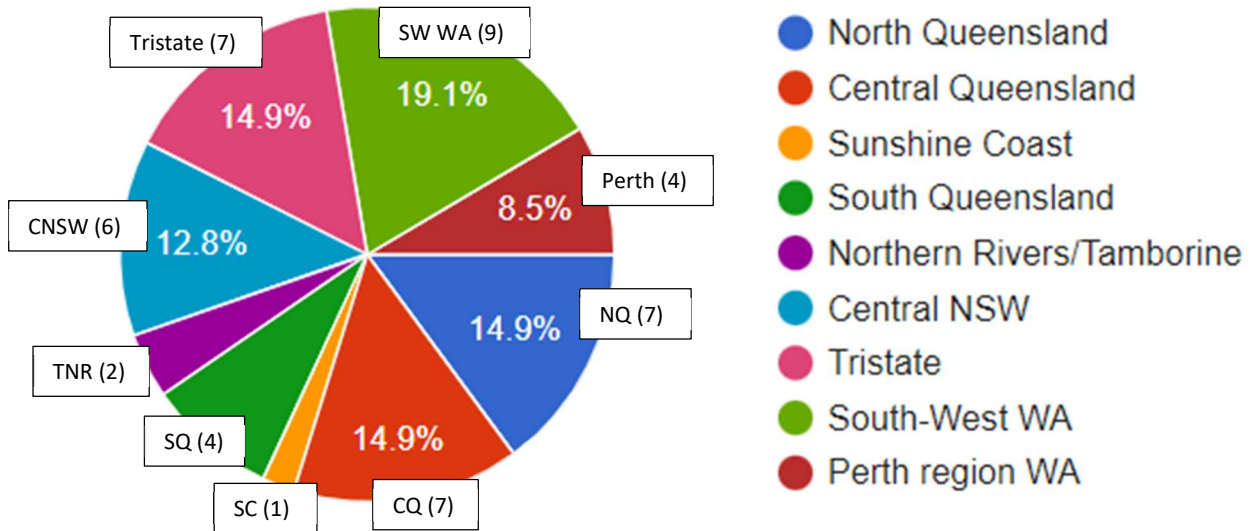
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BACKGROUND

REGIONS

Surveys received from each region. 47 answers received in total.

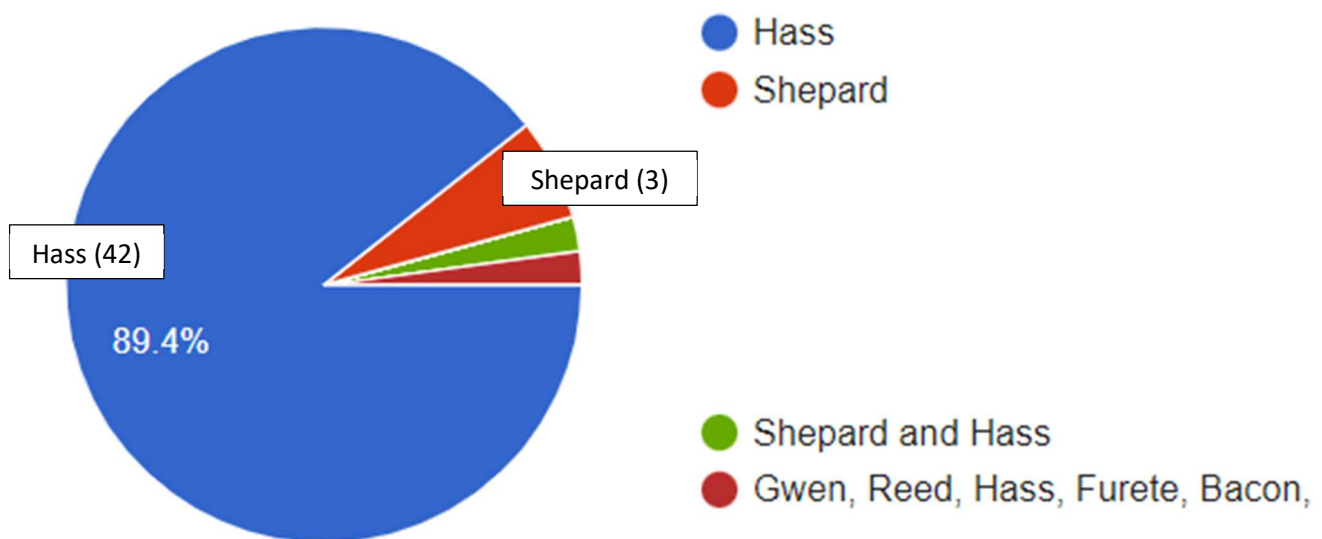


TREE AGE REPRESENTED

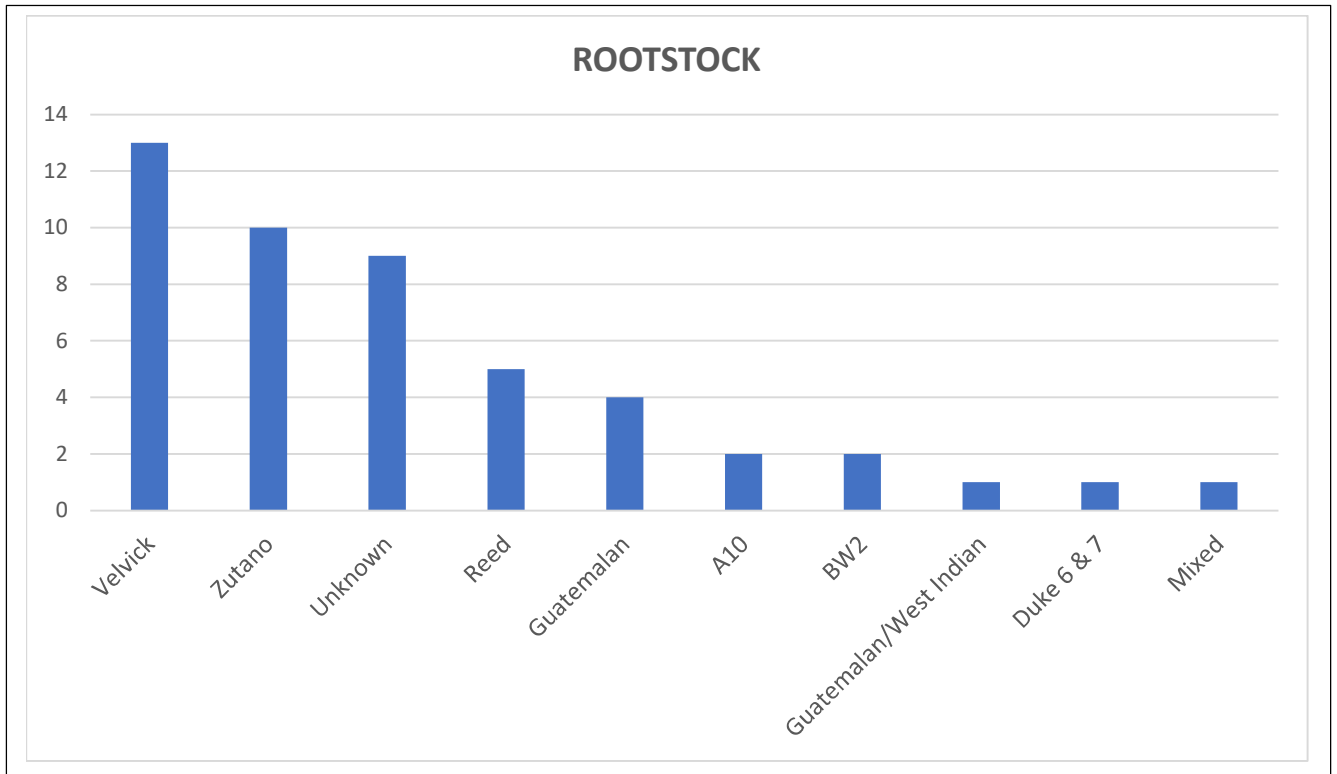
Ranged from 3 to 48 years old

VARIETIES

42 Hass, 3 Shepard, 1 Shepard/Hass, 1 mixed block

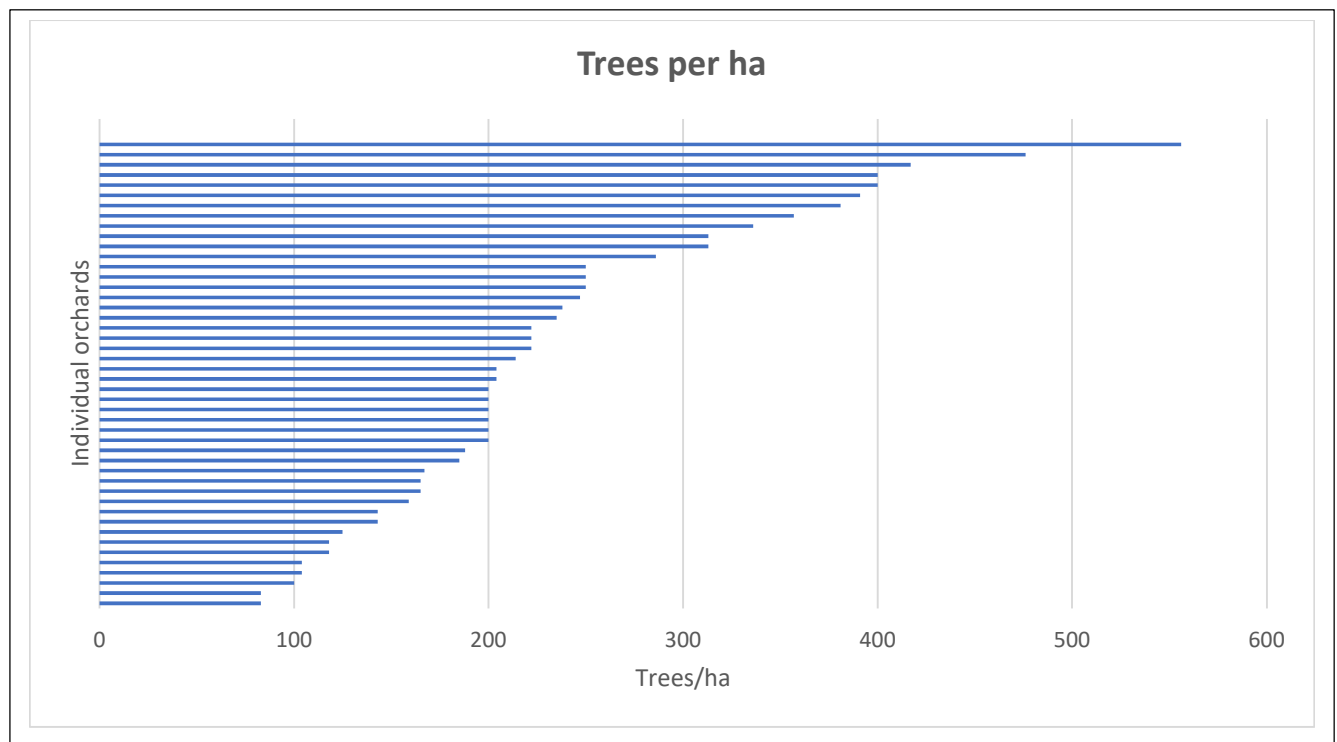


ROOTSTOCK



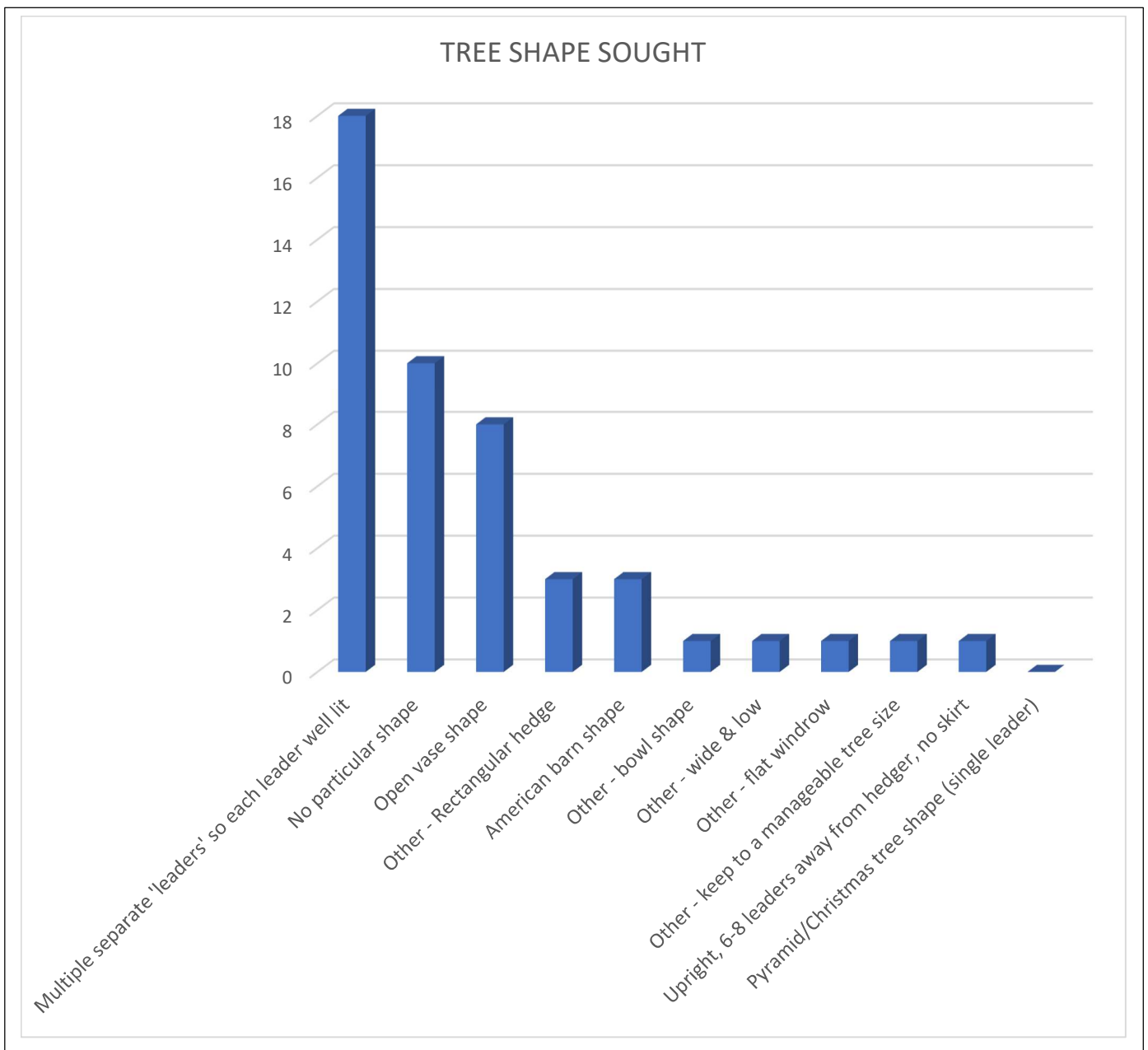
44 on seedling rootstocks, only 1 on clonal.

TREE SPACING

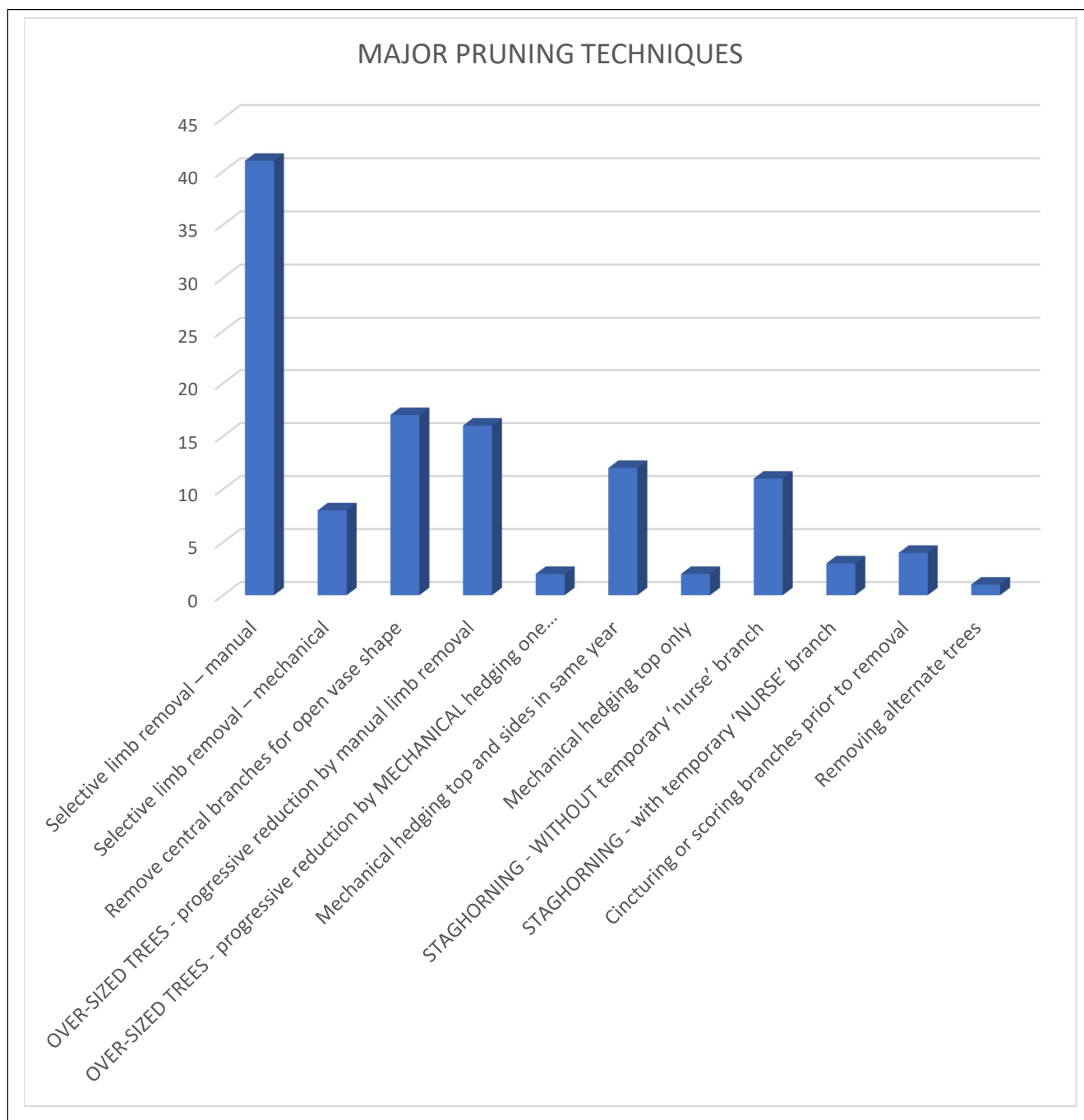


CANOPY MANAGEMENT

TREE SHAPE SOUGHT

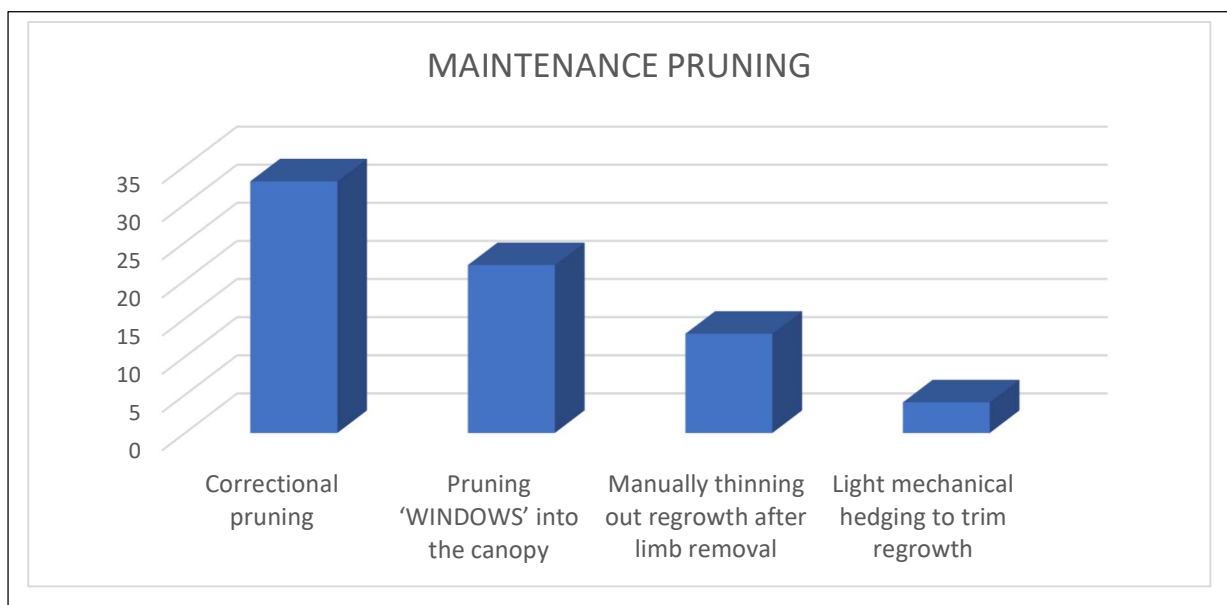


MAJOR PRUNING TECHNIQUES



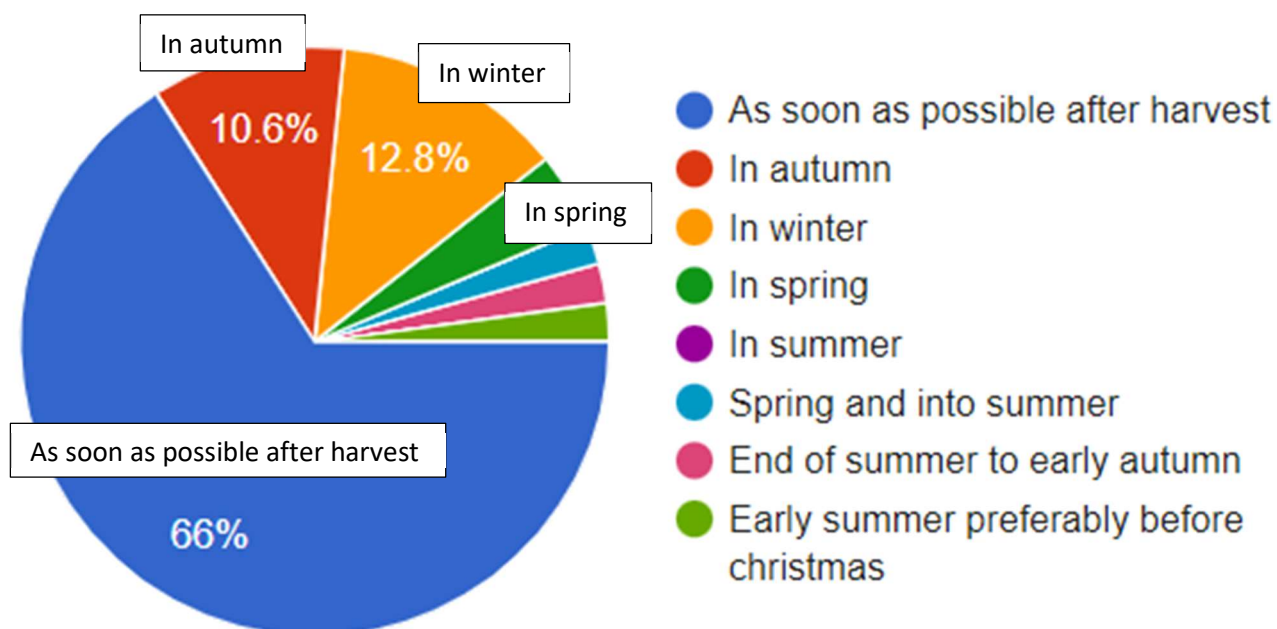
Selective limb removal – manual	41
“ “ “ – mechanical	8
Remove central branches for open vase shape	17
OVER-SIZED TREES - progressive reduction by manual limb removal	16
“ “ “ - progressive reduction by MECHANICAL hedging one face at a time	2
MECHANICAL HEDGING top and sides in same year	12
“ “ top only	2
STAGHORNING - WITHOUT temporary 'nurse' branch	11
“ - with temporary ' NURSE ' branch	3
Cincturing or scoring branches prior to removal	4
Removing alternate trees	1

MAINTENANCE PRUNING



Correctional pruning = removal of erratic branches, crossed over branches, water shoots, etc

TIMING OF MAJOR PRUNING



REASONS FOR TIMING OF MAJOR PRUNING

NQ Peak harvest time Shepard: Feb-Apr, Hass: May-Jul

- ASAP after harvest 4 = 57%
 - It is before flowering, and it is when labour is available as carryover from harvest.
 - Takes too long to clean up before flowering. Take into account farm size/time to get through.
 - Predominantly for row access for post-harvest activities
 - Time is the biggest factor. Getting everything done by the time the trees enter main flowering (Pruning, Mulching, Liming, Bees & Flies etc...). Time constraints when organising hedging and liming contractors. Sometimes pruning too early can promote flush, so usually we start with skirting trees and some one-limb selection and skirt removal.
- In winter 3 = 43%
 - To promote flowering and control tree shape.
 - Trees are settled and Flowering has initiated in many cases
 - Prune at earliest flowering so tree flowers instead of flushing

CQ Peak harvest time Shepard: Mar-Apr, Hass: May-Jul

- ASAP after harvest 3 = 43%
 - Allows tree to change to flowering mode
 - So we can set them up for next year and give them a rest over winter
 - Prior to flowering. Lower nutrient flows.
- In winter 2 = 29%
 - Less sunburn and flush re growth
 - No crop on the tree. Access for coming season
- In autumn 1 = 14%
 - Gives the tree time to settle down before flowering.
- In spring 1 = 14%
 - After picking

SC (Sunshine Coast) Peak harvest time: Oct-Jan

- ASAP after harvest 1 = 100%
 - Before summer growth

SQ Peak harvest time: Jul-Sep

- ASAP after harvest 2 = 50%
 - As it is the best time when we do not have fruit on the trees
 - To keep tree height under control. Fresh growth grows better fruit.
- Winter 1 = 25%
 - Post-harvest period is the only time which does not affect flowering and fruit set and gives predictable outcomes.
- Spring & inter summer 1 = 25%
 - After picking is completed

TNR Peak harvest time: Jul-Sep

- ASAP after harvest 2 = 100%
 - To fit in with the overall management program and labour availability
 - Best chance to get new epicormic shoots over summer and to reduce load of a heavy flowering.

CNSW Peak harvest time: Jul-Oct

- ASAP after harvest 4 = 67%

- I do not like cutting mature fruit off. Blocks I am planning to prune I harvest as early as possible so I can prune prior to flowering if possible.
- No loss of fruit
- Trying to remove branches that have fruit on them (refers to branches that were cinctured)
- Due to worker availability / reduce impact on harvest schedule
- In autumn 1 = 17%
 - Cooler
- In spring 1 = 17%
 - Pruning late winter early spring appears to favour fruit set and reduced regrowth vigour

Tristate Peak harvest time: Aug-Nov

- ASAP after harvest 6 = 86%
 - To give tree time to recover for following crop
 - In the Tri state timing is so hard due to there being quite often two crops on the tree at once. If harvest is delayed, then it becomes too hot to prune as trees will burn.
 - Practical, machines are already on hand after harvest i.e. cherry picker. Trees get opportunity to grow new vegetation in spring to protect the main limbs from sun burn in summer. Trees can put all their energy into the remaining limbs and flowers to achieve better fruit set.
 - Prevent fruit loss before next fruit set. Also suits orchard schedule.
 - Autumn would be preferable because regrowth would be less, but crop loss is a problem.
 - Place all the energy into gowning the next crop into the other branches.
- In autumn 1 = 14%
 - To avoid sunburn.

SW WA Peak harvest time depends on size of crop - "On" year: Aug-Feb, "Off" year: Sep-Jan

- ASAP after harvest 5 = 56%
 - Have the workforce and not wet for machinery if on a slope and some warmth for it to start shooting.
 - Best time with regard to fruiting cycle and slots into our seasonal work program
 - Immediately after harvest so that minimal flowers and fruits will be pruned off for the following years crop. Pruning is undertaken from August to December, with flowering in October November and fruit set in December.
 - Improves fruit set on branches that will remain. Also assists overall tree health.
 - Ideally October pick/November prune. Not usually feasible over large areas of orchard.
- Autumn 2 = 22%
 - We had finished harvest and sunburn risk was declining
 - Can have less regrowth competing with fruit trying to set, sunburn on limbs in summer with over pruning.
- End of summer to early autumn 1 = 11%
 - Flush is slowing down
- Early summer preferably before Christmas 1 = 11%
 - Growth exposed to light has time to flower and set fruit.

Perth Peak harvest time: Aug-Sep

- ASAP after harvest 4 = 100%
 - Can prune hard without cutting fruit off. Cooler so less chance sunburn.
 - I think pruning is best carried after fruit removal and fruit set for the next crop but before high summer temperatures.
 - The following season's crop has had limited development.
 - Load and fruit off tree

REASONS FOR CANOPY MANAGEMENT

NQ

- Reduce height to 5.5 metres and to open up the tree for light penetration and for chemical spray penetration and better distribution
- Control tree shape, remove dead and unproductive limbs, maintain light interception and spray penetration, assist efficient picking.
- Tree Size, Light, airflow
- To keep a manageable size and keep sun between rows & within branches, better spray penetration
- Aid light penetration, maintain access, limit height.
- Increase sunlight capture
- To refresh or rejuvenate the trees. Without good canopy management your percentage of premiums reduces. In the current market there is no point in growing Class 1s. Canopy management lets the light (50%) in which aides fruiting branches, also creating spaces and windows for the fruit to hang in. Better access for cherry pickers during the picking season and most importantly you get better spray coverage. This drives up the quality of the fruit.

CQ

- Productivity
- Maintaining tree height to suit 5m cherry pickers. Allowing light within the tree.
- Light/cropping then tree size and access
- To increase light in trees to aid in crop yield.
- Maintain tree height and shape for optimal harvesting. Better budding and flowering.
- Height control
- To let light in to get better fruit set and to keep the height down for better chemical application and tree health.

SC

- Contain tree size, maximise light.

SQ

- Tree size control
- To bring the height down and encourage more light into the trees assist with better coverage with our spraying programme
- For openness e.g. light and air flow helping fruit set and harvest access
- To keep light penetrating into the tree. Keep trees at a height that sunshine can get down both sides of tree to keep fruit generated lower to the ground for less cost of picking.

TNR

- Control excessive vertical growth and encourage sunlight penetration; improve spray penetration for disease and pest control; improve picking access; achieve highest possible premium production
- Tree height and productivity

CNSW

- To keep trees lower
- Allow light penetration. Keep both root and canopy growth as young as possible. Keep tree size down
- Manage height, improve yields
- Reduce tree height, better fruit quality, easier picking, more light better spray penetration
- Reduce tree size
- Reduce tree size & improve tree health

Tristate

- Open tree up, let light in, reduce tree height
- Control tree size, encourage vigour and maintain fruit quality.
- Trees a practical size to work with. Trees health. More sunlight. Increased yield. All round healthier orchard
- Reduce height and bring light into the orchard
- tree size management
- Allowing light into the canopy to encourage flowering and fruit set; controlling vigour; allowing machinery access
- Lower canopy with new fruiting wood

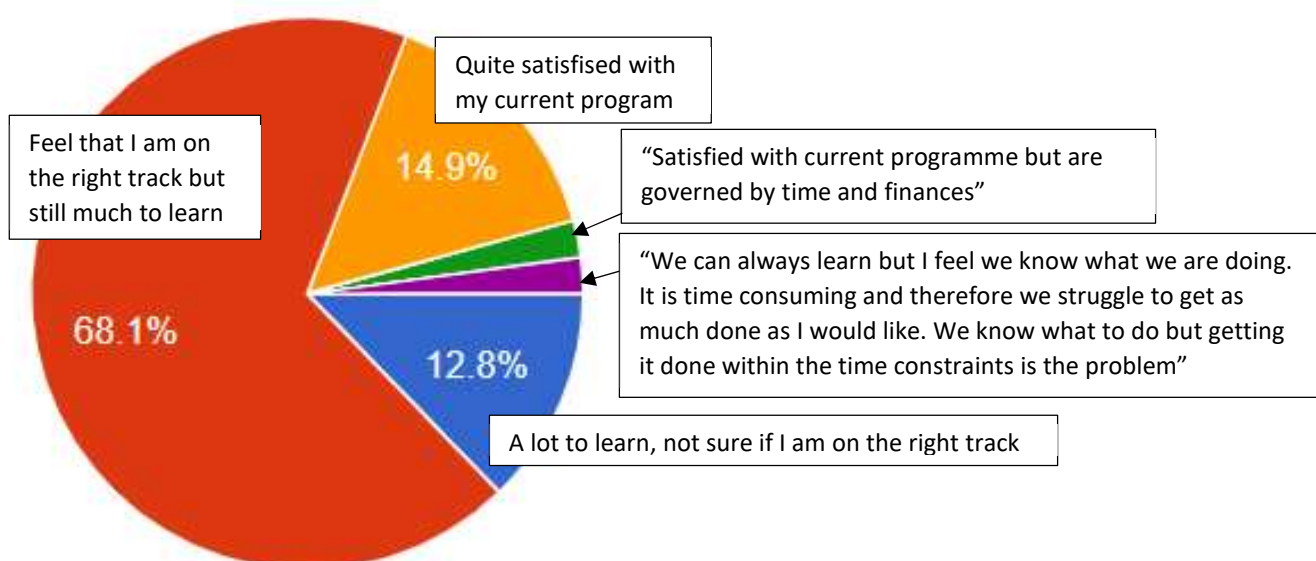
SW WA

- Efficiency and safety of picking, more surface area of light for fruit set
- maintain consistent fruiting (it reduces the severity of alternate bearing), maintain harvest access and height, maintain machinery access
- Trees had got too tall, and we were struggling to pick some of the fruit in the tops
- To control tree height to enable safe and efficient harvest with EWP. To maximize light penetration and photosynthesis, and therefore yields.
- Light
- Picking productivity, tree health with root to shoot ratio
- Reduce height and improve yields
- Tree height/ light interception / production
- Encourage light into the orchard

Perth

- Row access, better yield, minimise anthracnose
- Efficiency of harvest and disease control
- Harvest efficiency
- Access and fruit production

STAGE OF LEARNING ABOUT CANOPY MANAGEMENT



PREFERRED TREE AGE TO START MAJOR PRUNING

Note: Some respondents may not have noticed the question related to major pruning.

Overall average = 4.6 years old.

REGION	AGE RANGE	AVERAGE AGE	ADDITIONAL COMMENTS
NQ	2 to 5 years	3.5 years	<ul style="list-style-type: none"> • Earlier the better, but imperative when trees reach above 5.5 metres • Start (tree shaping) as early as possible, maybe 2 years.
CQ	1 to 5	3.5	
SC		2	
SQ	4 to 12	7.5	<ul style="list-style-type: none"> • Once hedgerows are formed or when tree height is about 60-70% of row width
TNR	3 to 8	5.5	
CNSW	2 to 10	6.5	<ul style="list-style-type: none"> • Earlier if rootstock is Velvick. • Dependent on tree size rather than age.
Tristate	1 to 10	5	<ul style="list-style-type: none"> • Approx between year 4-6 depending on vigour of tree
SW WA	1 to 8	4	<ul style="list-style-type: none"> • After first year remove at least central
Perth	0 to 5	3	
AVERAGE		4.6 years	

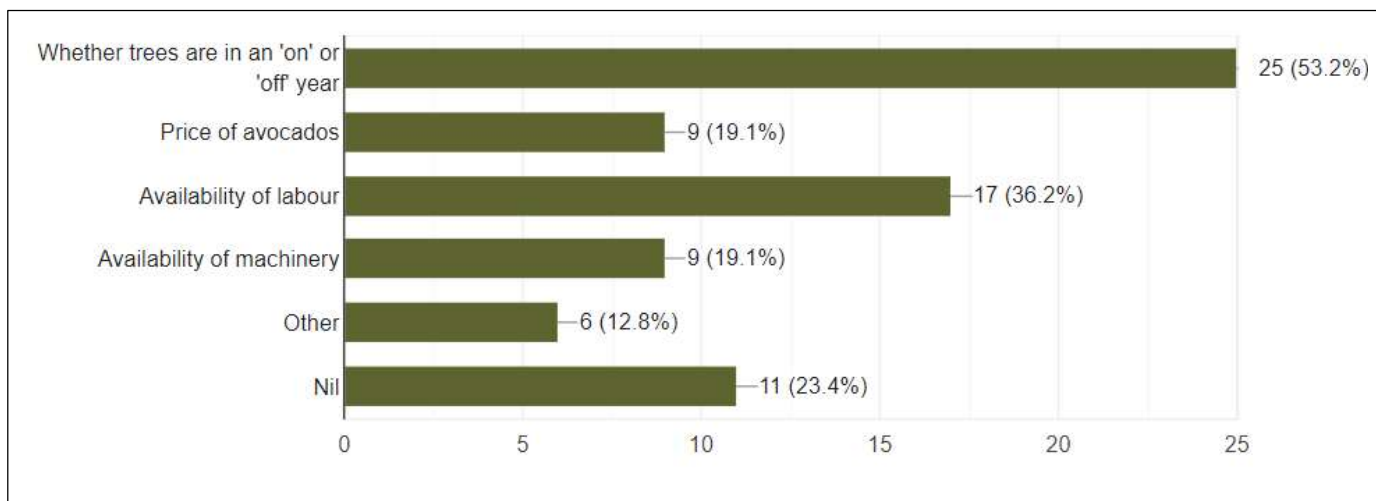
WHO CONDUCTS THE PRUNING

In-house - 37 growers

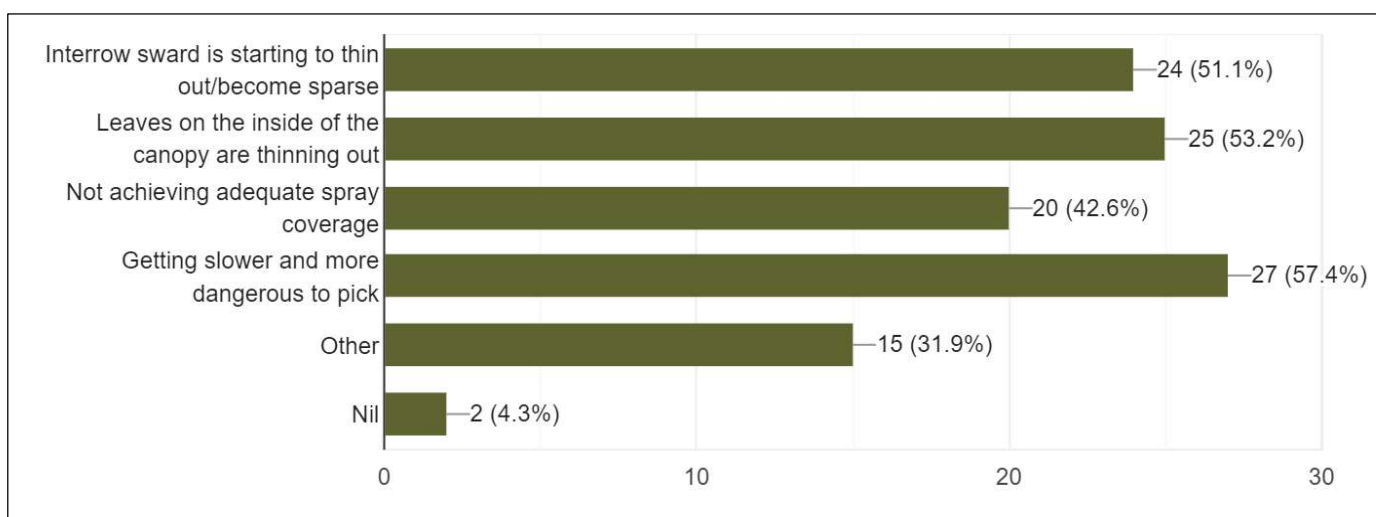
By contractor – 7

Combination of both - 3

OTHER FACTORS AFFECTING CANOPY MANAGEMENT DECISIONS



SIGNS THAT TREES NEED TO BE PRUNED

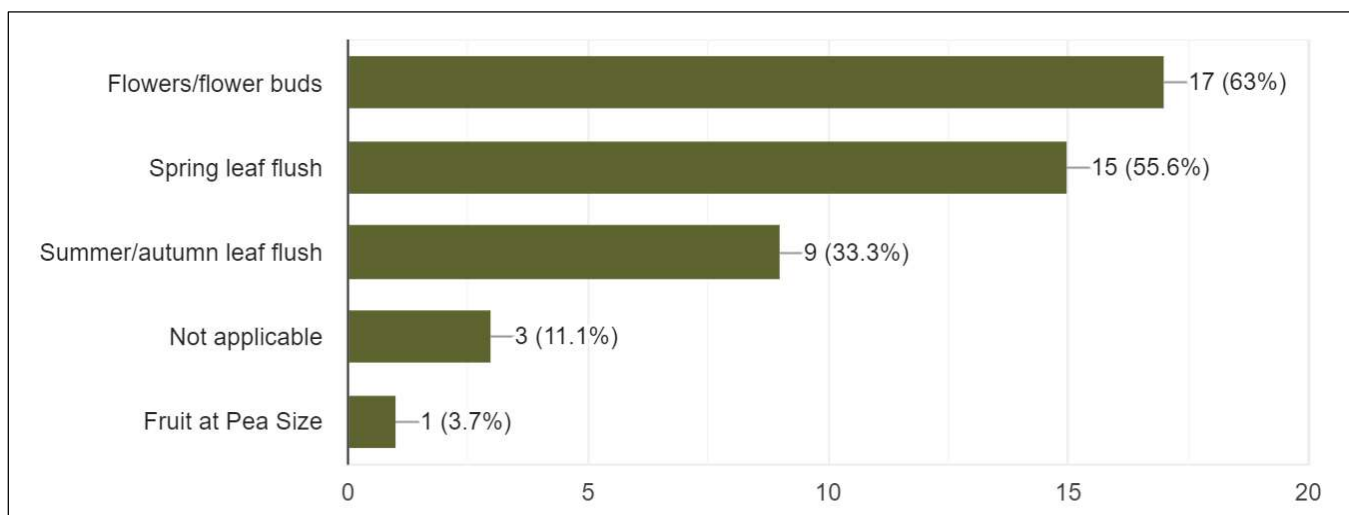


PGRs USED AS PART OF CANOPY MANAGEMENT PRACTICES

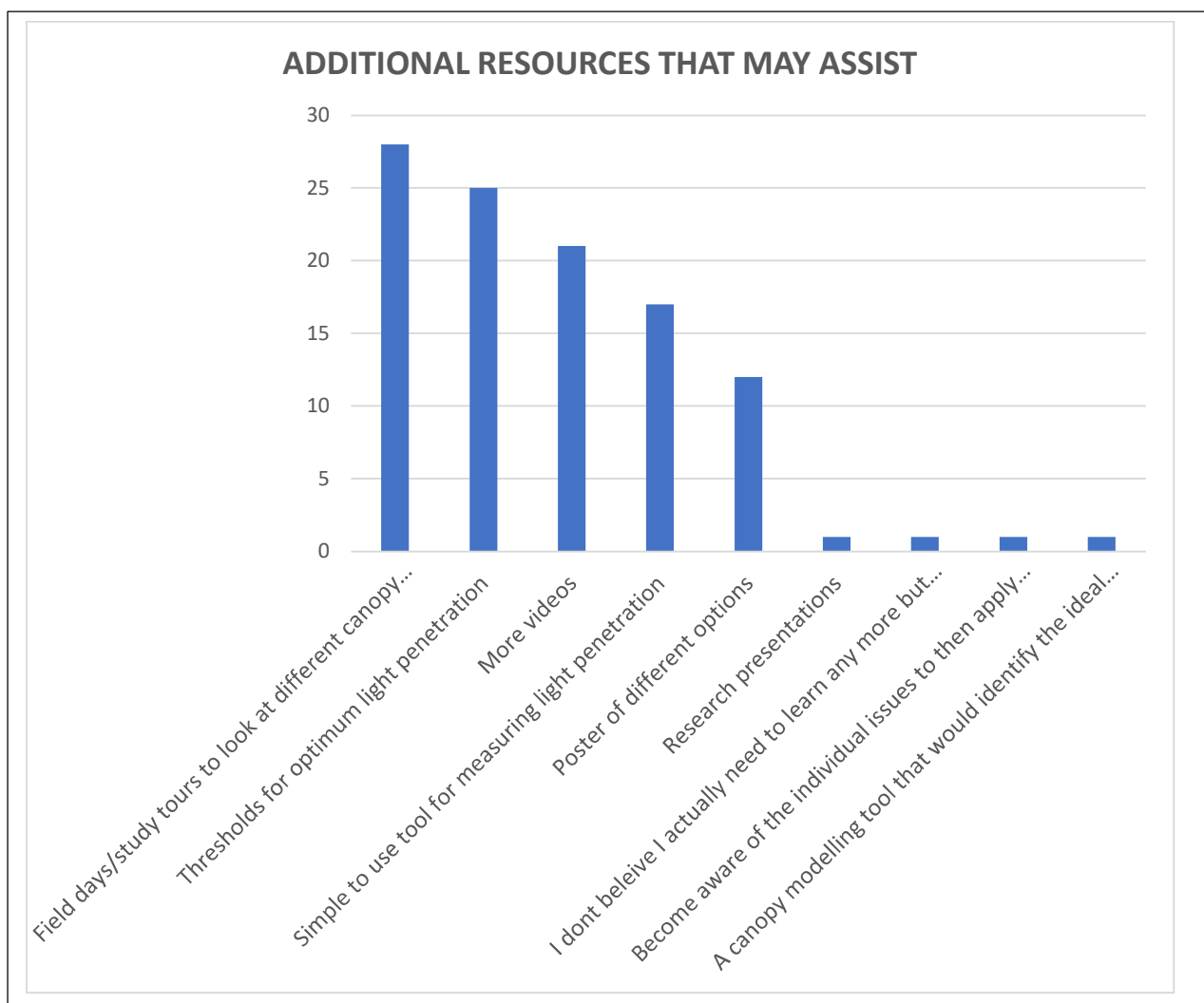
Yes – 51% of growers

No – 49%

PLANT PART TARGETTED BY PGRs



ADDITIONAL RESOURCES, EVENTS AND/OR INFORMATION THAT MAY HELP WITH CANOPY MANAGEMENT DECISIONS



Full text of additional suggestions:

- I don't believe I actually need to learn any more but just practically get it done. An interesting thought is that as the price decreases Tri state growers may be more open to pruning in autumn/winter as there isn't as much to lose. We have done that on some big old trees with good success recently. It enables you to prune very hard as there is no risk of sunburn and the trees bounce into spring full of energy and growth.
- Become aware of the individual issues to then apply management technology
- A canopy modelling tool that would identify the ideal canopy size and shape to maximize light penetration and tree interception for your specific orchard spacing and growing region.

FURTHER RESEARCH THAT MAY BE USEFUL

NQ

- Difficult. Canopy management changes depending on the age and growth habit of the tree depending on the region, the soil conditions, the regrowth or tree shape after the previous year's canopy management. The main thing is TO DO SOMETHING, REGULARLY
- Weighting influence of canopy management techniques in given conditions. For example, how much value is created/destroyed by pruning timing given differences in shoot development and how much does/will changing climate affect shoot and bud development.
- No. Need extension to encourage growers to prune.
- Light penetration effect on insect pests
- PGR uses in the tropics for 'Shepard'

CQ

- One system won't suit all farms. The science and availability of machinery and labour will determine the end result. I think the combination of several pruning systems may suit many growers.
- Study around balance of tree canopy removal vs cropping.
- A program of use of PGR 's and timing of bud.
- Look at trialling different pruning options for maximum fruit set. More research into PGR's and timing.

SQ

- The big argument is whether mechanical pruning is effective. In a period of labour shortages, it becomes necessary to prune mechanically. Some scientific data on this is required.
- Ongoing studies with information available of outcomes as an ongoing information base - John Leonardi did extensive research 12 - 15 years ago as an example, has there been follow up to his experimentation in field?
- Crop yield. Harvest access.
- Percentage of tree that can be cut before it turns vegetative. I know it could depend on weather and time. But has any work been done on this?

TNR

- Relate canopy management to tree layout (row/spacing width) from high density to wide tree spacing.
- My choice would be around medium and high density pruning but I understand this is quite specific to us.

CNSW

- The impact of PGR's could be more researched. Also, research on the best and most cost-effective way of dealing with the pruned wood would also be handy.
- Fields days, general info from other growers

Tristate

- Ground applications of PGR's and how to maintain tree size at a young age.
- Thinning out of regrowth.
- Low vigour rootstocks, nutrition programs which maximise flowering & fruit set and minimise vigour.

SW WA

- Where to cut a window into the canopy (orientation). What % of a canopy can be cut before triggering the tree into a strongly vegetative stage.
- A canopy and light modelling tool.
- The tipping point of pruning too much one year for the effects of next year's crop. Percentage that needs/if any to be cut out each year to keep trees in a fruiting cycle.
- Best method.
- Ability to manipulate summer /autumn flush into floral bud development for following year.

Perth

- Possibly DPIRD trimming trees differently and then monitoring yield in a trial over a few years.
- I think there is a lack of information on timing of pruning and the impact on yield.

Most cited:

- The effect of different pruning approaches on yield
- The effect of different timing of pruning on yield
- Information on PGR use