

## CURRENT PLANTINGS

The current plantings in Gisborne are generally made up of older Parent or Carter navels. Recently however there has been a huge interest in the planting of new varieties of navels. This interest has generally been fuelled by an anticipated lift in demand for export navels out of New Zealand to Asia and potentially the USA. Production levels based on current plantings in Gisborne are set to rise dramatically over the next 5 years.

New Varieties are as follows

### **Early Maturing** - Newhall and Navelina

Comments: It is likely that these varieties will reach internal maturity around 2-3 weeks earlier than the standard Parent navel

### **Late Maturing** - Autumn Gold, Barnfield, and Powell

Comments: These are Australian selections. Cultivar trials by Hort Research indicate potential for some of these late harvest varieties. Harvest dates for these later varieties will likely be from late August onwards but ideally they can be hung on the tree until December without any deterioration in fruit quality.

For the latest cultivar trial report contact NZCGI or Alistar Currie at Hort Research in Kerikeri.

- ☐ Parent navels are the industry standard for navel plantings in Gisborne and some of the new plantings, which are occurring, are still blocks of Parent navels. Production levels on a well managed Parent navel block are quite favourable and of all the varieties are showing up to be the least vulnerable to alternate bearing problems.

## ROOTSTOCKS



The majority of older plantings of Parent and Carter navels are on *trifoliata* rootstock. It is a good performer given the NZ soil types and tends to produce a medium size navel tree with medium size fruit. Internal fruit quality is generally of a high standard providing a good management programme is being followed.

Many of the older plantings of navels on tri were planted on the 'high density' system. While the trees were in their youth very high production levels were achieved of good quality fruit however as the trees reach the mature phase it becomes more difficult to produce large, fully coloured, consistent tasting fruit mainly because of overcrowding of trees and shading in the internal canopy.

Trifoliata Rootstocks show a strong resistance to the disease *phytophthora* which can occur in heavy wet soil conditions. This is important given the heavier soil types in Poverty Bay.

Alternative rootstocks are being trailed for navel production in NZ. The citrange C35 is a trifoliolate hybrid that is gaining favour as an alternative rootstock to tri. In Australia it is reported to be tolerant to phytophthora root rot as well as being nematode and frost resistant. Yield efficiency (kilograms of fruit per cubic metre of canopy) is typically high however final tree size is at least 30% larger than the same cultivar on tri. There is some debate about internal fruit quality levels being slightly less on C35 than on tri. Another possible rootstock option, which is showing promise at trial stage, is Benton which is a vigorous rootstock with high yield efficiency.

### Recommendation

- ☐ **If considering planting navels take care when deciding on tree spacings.**

### Suggested spacings

Navels on Trifoliata	Navels on C35
5.5m x 2.5m	6m x 3.5m
730 trees/hectare	480 trees/hectare

**One of the common problems with many plantings in Gisborne is that trees have been spaced too close together at planting time.**

## **CANOPY MANAGEMENT**

As a company we have been promoting the need to develop more open canopies in many of the local citrus blocks. To try and help achieve this we have put on several pruning workshops over the past few seasons. We have promoted the need to modify tree shape on mature blocks of navels so the trees can maximise light interception in the inner part of the canopy. Selective hand pruning has been shown to be a valuable tool with regard to improving the quality of fruiting wood.

Several older blocks of navels are still producing fruit with less than optimum size. We are working closely with our suppliers to improve the standard of wood in their trees.

### **Pruning Recommendations**

- ☐ **The type of pruning carried out on a tree should be dependant on the aims, the current tree shape, and the condition of the tree.**
- ☐ **No more than a third of a tree canopy should be removed each year.**
- ☐ **Removing too much canopy at one time can cause an over – vigorous response and reduce yields.**
- ☐ **Pruning is an annual task. Timing is important. Summer shoot rubbing is a valuable tool for reducing the amount of winter pruning**

<b>SELECTIVE HAND PRUNING</b>	STRUCTURAL PRUNING	BRANCH PRUNING
FEATURES	ACTIONS	ACTIONS
Correct pruning can produce bigger fruit size and higher returns for growers	<b>Step 1:</b> Identify the desired tree shape. Aim to create a series of evenly spaced limbs	<b>Step1:</b> Removal of unproductive branches and shoots that produce small, poor quality fruit.
Improved pest and disease control	<b>Step 2:</b> Remove damaged or broken limbs. If a limb is incorrectly positioned,	<b>Step 2:</b> Thin out overcrowded branches. Create a layered approach of fruiting

	then remove the whole limb at its point of origin.	branches which will promote better light interception
Cleaner fruit from less dead wood	<b>Step 3:</b> Remove central upright limbs. Fruit high in the canopy is difficult to manage and harvest	
More fruit within the canopy	<b>Step 4:</b> Remove crossover limbs. These limbs cause access, rubbing and shading problems.	
Easier picking with more fruit being produced at a convenient height		

## CROP REGULATION

A common problem with navel production in Gisborne is that many trees are carrying excessive fruit numbers and this is resulting in poor fruit size at harvest time. It is critical trees are not overloaded as alternate bearing problems will almost certainly develop. Young trees should be allowed to come into production gradually. Annual pruning from a young age will help prevent overcropping but *fruit thinning* needs to be practised if excessive fruitlets are allowed to be set on the tree.

**Hand Thinning** is the usual form of reducing crop loads but unless this is done at the correct time and to correct degree results can often be disappointing. Hand thinning needs to take place as soon as possible after natural fruit drop has finished. This is usually around early to mid January.

**Australian trial work has demonstrated that increase in returns of up to 25% can be achieved by hand thinning navel trees in a heavy cropping year.**

An effective way of gauging how much fruit you should target for removal is to use a 0.5m cube frame similar to the one we used at our orchard demonstration earlier this year. My suggestions for crop loading are as follows.

### Recommendations

- ☐ **If in early January growers are getting frame counts above 10 fruit/frame they need to consider hand thinning as a management tool.**

- ☐ **The later hand thinning is left the less effect thinning will have on fruit size.**
- ☐ **Care should be taken not to over thin a tree that only has a moderate crop load as it is likely you are throwing away potentially good sized fruit**
- ☐ **Growers should start hand thinning when fruit size is averaging 25-30 mm.**
- ☐ **NZ trial work has shown that fruitlets that are smaller than 35 mm by mid February are unlikely to reach 70mm at harvest time and should be thinned off.**

## **Chemical Thinning**

This season we have conducted chemical thinning work on two navel blocks using the plant growth regulator NAA (ANA). In past seasons we have had a favourable response with this product for chemical thinning of Satsuma and Encore mandarins.

When ANA is applied to citrus fruitlets in the size range of 12-18 mm it has the effect of selectively removing a percentage of the total fruitlets. This obviously provides a crop thinning effect and will enable a smaller number of remaining fruit to reach a larger size providing all other management practises are followed such as fertilising, pruning and irrigating.

Below is a summary of this season's work. A full report is available on request.

### **CHEMICAL THINNING TRIAL NAVELS PLANT GROWTH REGULATOR NAA**



#### Purpose of Trial

To determine the effect of the plant growth regulator NAA on fruit drop and fruit sizing on navels.

### Trial Locations

The trial is located on two different properties. Firstly at Peter McIntyre's block at Manutuke with the second site being at Clive and Amanda Lewis's orchard at Matawhero.

### Trial Description

Previous work with this product on navels has shown an increased level of fruit drop in the Late December / Early January period compared to control trees. We want to determine what effect one application of ANA would have on final fruit size at packing time.

The ideal timing for applying this auxin appears to be when the fruit size is approximately in the range of 16-20mm which is usually around the end of December. It appears through previous work on other citrus varieties that temperatures during and immediately following application play an important part in the successful application of this chemical.

### **Trial Data is summarised below**

	<b>TRIAL SITE 1</b>	<b>TRIAL SITE 2</b>
Date of application	Dec 18	Dec 19
Method of application	Airblast sprayer	Airblast sprayer
ANA Rate	300ppm	300pm
Average fruit size at application	18mm	16mm
Temperatures following application	optimum	optimum
Tree Description/ Management	15 year old trees, no hand pruning, hedge system	30 year old trees, hand pruned annually, open canopy
Tree Density	1100 trees/ hectare	600 trees/ hectare

### **Cumulative Fruit Drop Data**

Fruitlets from both sites were collected over three dates in January and weighed to give the following results

<b>TRIAL SITE 1</b>		<b>TRIAL SITE 2</b>	
<b>ANA (10 TREES)</b>	<b>CONTROL (10 TREES)</b>	<b>ANA (5 TREES)</b>	<b>CONTROL (5 TREES)</b>
10.37 KG	7.54 KG	4.95 KG	3.59 KG

Fruit from TRIAL SITE 1 was packed as two separate lines to evaluate any differences between the sprayed and unsprayed treatments.

Fruit sizing was monitored fortnightly at TRIAL SITE 2 ONLY until harvest and fruit was packed as separate lines for evaluation.

### **TRIAL SITE 1**

	<b>ANA</b>	<b>CONTROL</b>
<b>AV FRUIT SIZE CHOICE</b>	73.6MM	73.2MM
<b>TOTAL KG HARVESTED</b>	721	833
<b>JUICE KG</b>	35	67

At TRIAL SITE 1 there was very little difference in final fruit size at packing time. There were more kilograms of fruit harvested from the 10 control trees compared to the 10 sprayed trees.

### **TRIAL SITE 2**

Clive and Amanda Lewis's property at Matawhero

	<b>ANA</b>	<b>CONTROL</b>
<b>AV FRUIT SIZE EXPORT</b>	77.2MM	74.8MM
<b>AV FRUIT SIZE CHOICE</b>	74.0MM	72.2MM
<b>AV FRUIT SIZE SELECT</b>	76.9MM	77.3MM
<b>AV KG PER TREE</b>	90.1	99.0
<b>TOTAL KG HARVESTED</b>	676	748
<b>JUICE KG</b>	18	95

Based on the performance of the two treatments the ratios for each grade are as follows

	<b>ANA</b>	<b>CONTROL</b>
<b>EXPORT</b>	45.3%	29.5%
<b>CHOICE</b>	26.0%	34.9%
<b>SELECT</b>	22.3%	19.5%

In financial terms the returns on the fruit for the ANA fruit were 10 cents/kilogram higher than the unsprayed trees. Based on a crop of 45Tonne/Hectare that represents a difference of \$4000 per hectare once the cost of the product has been deducted.

A secondary benefit may also be a better return crop this season. We will be continuing with this trial this season to evaluate the return crop on both treatments.

### **Trial Comments**

The results from each trial site have been quite different. The reason we choose two sites is because we wanted to compare two different management systems. At TRIAL SITE 1 the control trees provided a more favourable result than the sprayed trees. Average fruit size was almost the same but there was 16% more fruit harvested from the control trees.

The ANA application has not proven to be effective at this site possibly because of the density of the trees. The high density hedge system, which has largely been unpruned (apart from a small amount of light machine trimming) was carrying its crop load on a lot of older unproductive fruiting wood. The inside of the trees were receiving very little sunlight and the block has a history of alternate bearing.

At TRIAL SITE 2 we had a very different result. The trees at this site are a lot older than at TRIAL SITE 1 but the grower has embarked on an extensive hand pruning programme over the past few seasons. This has created very open trees with the average age of the fruiting wood being a lot younger than at TRIAL SITE 1.

Fortnightly fruit size monitoring from February onwards consistently resulted in the fruit from the sprayed trees being on average 4mm larger than the unsprayed fruit.

A secondary finding was that fruit from the sunny side of the trees at TRIAL SITE 2 were consistently larger by approximately 3 mm than fruit produced on the shady side of the tree.

Fruit Brix levels on the sprayed fruit were slightly higher than the control which was also favourable. Acid levels were identical.

We will keep growers updated with further updates this coming season.



## CANOPY MANAGEMENT



Photo 1

First Fresh in conjunction with a local navel supplier has been involved with a pilot pruning programme, which began in September 2002.

The block of navels which were typical of other mature blocks of citrus in the district. Generally producing small to medium size fruit with high levels of rind blemish and creasing.

It was decided to prune the trees severely as photo 1 indicates with the aim of bringing the block into production again with good sized, clean, high returning fruit. Care was taken to protect the trees from Lemon tree borer and we used a protective paint with a small amount of the insecticide ripcord to cover all cuts.



Photo 2



Photo 3

Photos 2 and 3 show the trees after 12 months growth. Two rounds of shoot rubbing took place during the 1<sup>st</sup> growing season. This was very fast and cost around 50 cents per tree each time. A light but consistent flowering occurred last October and this season the trees carried a light crop of approximately 4 kilograms of fruit per tree.

Following this year's harvest the trees were given a light pruning to define some main structural branches. (See photo 4) The trees have already filled 70 % of their allotted space. Excessive internal upright wood was removed with secateurs. Internal quality of last season's crop was excellent, as was fruit colour. As expected fruit size was large with an average packed size of 78mm.

Last week the trees were observed to have heavy flower bud numbers. This season's crop will be thinned to carry approximately 12 kilograms of large fruit. Tree health is excellent with spring flush well underway. A comprehensive foliar feed programme will begin soon consisting of regular applications of Magnesium, Zinc and Calcium.

We will be hosting a grower field day early next summer to show growers progress to date.





Photo 4

## **RIND STRENGTHENING**

The use of GA sprays is now a common practise on many navel blocks. One of the reasons GA is used is to assist with the strengthening of the rind on the developing fruit. GA can be applied to navels from the period Late February till Late April. Applications over this period will give good rind strengthening results. The albedo of sprayed fruit remains firm and there is a marked reduction in the percentage of fruit with creasing and sagging. The development of fruit with a slight green tinge at the navel end is quite normal with fruit that has been sprayed with GA. Far less fruit drop is experienced in blocks that have been sprayed with GA. It appears GA enhances the effect of the 'cling spray' 2,4-D. Foliar Calcium applications are also being used to assist with rind strengthening on many citrus varieties. These are usually in the form of calcium chloride or calcium nitrate. Work completed in NZ indicates that calcium chloride is giving better control of rind breakdown.

### **Recommendations**

- ☐ **GA applications should be made to all blocks of export navels that are likely to be picked in the September till November window.**
- ☐ **The ideal rate is 20 ppm**
- ☐ **Thorough coverage is critical. For large, dense canopies water rates need to be around 3500-4000 litres /hectare.**
- ☐ **Ideal timing is when the fruit size is around golf ball size, which is usually around mid February.**
- ☐ **Do not apply GA to early market navels as it is likely fruit will not be of an acceptable colour standard at harvest time. Foliar calcium applications can be substituted instead of GA.**
- ☐ **Calcium applications should commence from petal fall onwards.**

## **CLING SPRAYS**

The most effective chemical option for 'cling sprays' is still proving to be 2,4-D amine (Stop Drop). The timing for applying 2, 4-D is important. Internal colour change is a better indicator for the first cling spray. This is usually around Late April/Early May. For late harvest local market navels a second application can be made in late June.

### **Recommendations**

- ☐ **Thorough coverage is critical for success.**
- ☐ **Stop Drop should be applied at the rate of 20ppm.**
- ☐ **Stop Drop should be applied between early April and mid June for the best result.**

## **SPRAY APPLICATION**



Over the past 2 seasons there has been a lot of research done with evaluating the way common spray rigs are working in our orchards. Work was done locally on different size trees, which ranged in canopy densities. Regardless of sprayer type, it was demonstrated that spray coverage is improved on

older trees after they have been pruned. What stood out was the fact that coverage and spray deposits were extremely variable depending on sprayer set up and type of canopy. For successful Pest and Disease control it is critical the chemical you are applying is able to reach its target. Ideally spray

coverage should be uniform through all parts of the tree canopy. Your sprayer needs to be calibrated to suit different applications. One spray rate does not suit all applications. Sprayer limitations become more apparent in larger canopies.

### **Recommendations**

- ☐ **Have your spray rig calibrated at least every 2 years.**
- ☐ **Know the limitations of your sprayer**
- ☐ **Adjust your spray water rates to suit your requirements.**
- ☐ **Pruning and thinning are valuable tools for improving spray coverage.**
- ☐ **Become familiar with the mode of action of the chemicals you are using.**

## **PEST AND DISEASE MANAGEMENT/CROP MONITORING**

### Key Pests

The key pests that cause damage to citrus crops in Gisborne and cost growers money at packing time are the following

Kelly Citrus Thrip  
Greenhouse Thrip  
Citrus Red Mite  
Bud Mite Rust Mite  
Katydid  
Scales  
Mealy Bug

Through the practise of crop monitoring growers can now assess the influence of these and other minor pests on their crops. Some varieties are more prone to damage than others. For example due to the multiple flower periods for lemons the risk of damage from KCT is higher on this variety and a different management approach needs to be implemented to cater for this. Some of our pests are classed as *induced pests*. These are pests like soft wax scale and mealy bug which can quite successfully be kept under control by

the host of beneficial predators and parasitoids providing control is not disrupted with the use of insecticides targeting other pests such as KCT.

First Fresh is now operating an 'in house' pest monitoring service. This season two scouts will be regularly checking blocks for the presence of pests and also beneficial insects. It is important to determine what the ratio of good to bad bug is. My recommendations will be based on thresholds reached and product selection may change depending on what pressure there is in each block. I will be finalizing spray programmes over the next month once all trial data has been analysed and discussion with chemical manufactures and overseas buyers are complete. A big issue is residues on fruit. As a company we have to provide fruit to the market which dose not exceed set MRL's.

Here are some chemical options that may be recommended during the cause of the season.

<b>Active Ingredient</b>	<b>Common Name</b>	<b>Primary Targets</b>	<b>Comments</b>
Buprofezin	Ovation/Applaud	Scales, Mealy Bug	Selective, bee safe, use with oil or spreader
Mineral Oils	D-C Tron NR Excel Oil	Mites, Scales	Timing critical, very high water rates required
Abamectin	Avid	Mites, Thrips	Unregistered on citrus. Toxic to bees
Spinosad	Success Naturalyte	Thrips, Leafroller	Spreader required Tight spray intervals required
Acephate	Orthene WSG	Thrips, Aphids, Leafroller	Toxic to bees and most beneficials. Provides 3-5 weeks thrip control. Suitable for lemon blocks
Diazinon	Diazinon 50 W	Thrips, Aphids	Moderately harmful to beneficials