

So What's New!



The Cutting Edge is a regular article written by Dr Jonathan Cutting for the New Zealand avocado industry magazine, AvoScene.

About two months ago a grower (obviously rifling through a drawer somewhere and looking for something else) provided me with an article written by Bill Fletcher in June 1976 titled ***Avocado growing in New Zealand***. It made great reading and actually impressed me so much that I thought it would make a great ***Cutting Edge*** topic. It is really important that we put this into time perspective, and to explain what I mean we need to realize that this article was written almost 30 years ago, 7 years before phosphorus acid injection to control Phytophthora root rot was first reported and almost 11 years before the first World Avocado Conference in South Africa. Also, and most important, there were only about 50 hectares of avocados in New Zealand. This article was clearly written when our industry was truly just beginning. It is also important to recognize that the New Zealand avocado industry, at least from a commercial sense, is less than 30 years old.

The article is in the AGA technical library and growers are encouraged to try to obtain a copy and read it. The article was not copyright protected so we have re-typed it and placed it on the industry website as a reference (www.nzavocado.co.nz in the news section).

So what did intrigue me to the point that I believe we could all learn something from an article that is almost 30 years old? Well it goes back to the previous ***Cutting Edge*** topic "***What happened to yield?***" What it really highlighted to me was that **good horticultural principles are timeless**. Surely enough new technology and innovation occurs, and does have impact on production, but none the less, it does not alter good horticultural principles.

Let's have a good look at some key issues that Bill Fletcher raised back in 1976 and determine how appropriate the guidance given then is still today. I have taken key points out of the article which I believe still have significance now and from which we can both learn and refresh our memories.

Climatic requirements: There were three excerpts in this section that are important:

- *Avocados can only stand very light frosts.*
- *Good fruit production is also dependent on favourable climatic conditions during blossoming. Even when air temperatures are hardly down to freezing they can kill or damage dormant buds as well as opening buds and flowers and thus dramatically reduce the setting of a crop.*
- *Spring conditions in New Zealand are generally wet and cold and thus can be adverse for good setting of avocado crops. This would be the main climatic factor which is marginal for growing avocados in New Zealand. Our cooler climate also appears to delay the time of ripening of different varieties here compared with areas overseas but, unlike*

with citrus, lower temperatures do not affect avocado fruit quality. Avocados of excellent quality and flavour are produced in this country. Because of our marginal climate however it is important to choose the warmest possible sites for planting avocados to minimize crop losses and tree damage.

Well when it comes to climatic requirements nothing has changed in the 30 years since Bill Fletcher made his observations. What has changed is the desire, on the part of a significant number of growers, to incur more risk in terms of microclimate and site selection. And some growers and orchard developers have indeed incurred more risk. This is obvious from just driving around the Bay of Plenty or Whangarei and observing the number of avocado plantings facing south or west and on flat ground low down near to water courses or on land that is far too steep with very thin top soil horizons. The other disturbing trend is the amount of trees planted at too high an elevation beyond what many industry "old heads" would consider safe.

We now do know and understand a lot more about temperature and fruit set than was known in 1976. **Some of the very general advice that Bill provided has been superceded by more specific knowledge we now have in terms climatic requirements and the role of temperature in pollination but the key principle of good site selection remains fundamental for long term orchard success.**

Shelter: There are some absolute "gems" in the short section on shelter. I have collected some of the valuable and timeless pieces of information Bill offered growers back in 1976.

- *The importance of excellent orchard shelter for successful avocado culture cannot be expressed too strongly.*
- *Cool, prevailing winds in spring may keep the daytime temperatures too low for good fruit*

setting. Shelter belts help keep the air in the orchard still enough to permit flowers, fruits and twigs to hold some of the heat they absorb in the sunlight, and so have a temperature that may be more favourable for setting and fruit production.

- *Care is needed however when planting wind breaks to avoid unduly restricting drainage of cold air from the orchard which may increase frost problems.*

There is a new trend to developing orchards at the same time as planting shelter. Nearly all new orchard owners can and do fall into this trap. That in itself is not a concern but everyone needs to be aware of the increased risk of fruit set failure. What the advice is saying is that young, only partially or inadequately sheltered, orchards may experience additional risk in terms of fruit setting some years when springs are cooler. Equally important is that as shelter grows and develops it may progressively increase frost damage in the orchard if there is a restriction to cold air drainage. This is best catered for through good planning and block layout and later on in the orchard life through regular shelter maintenance. **More recent advice is to use dense evergreen shelter on the southern and western boundaries but again the principle of good shelter is a key today as it was in 1976** (see the **Whats Hot!** column in the March 2003 AvoScene).

Soils: The principles of good soil selection has not changed one iota in the past 30 years and the advice given then is identical to the advice generally given today.

- *Avocado trees will grow well on a rather wide range of soil types but perfect surface and subsoil drainage is essential.*
- *A light to medium soil, at least 1 meter deep, is best. Shallow hardpan and clay soils are unsuitable.*

It is important to remember that this advice was given 7-8 years before phosphorus acid injection to control *Phytophthora* root rot was reported. There are still three important aspects to root performance through root activity, a strong aerobic environment, avocado root intolerance of “drowning” conditions and root susceptibility to *Phytophthora* root rot. Phosphorous acid only addresses the root rot issues, not the other aspects. **Therefore soil type selection remains the single most important decision that a grower can make and will play the most important part in long term orchard success assuming temperatures are not limiting.**

Fruit set: The issues around fruit set have come to a head in the past two years as some orchards have continued to crop, some have missed cropping for several years and other orchards remain trapped in a strong and relentless alternate bearing cycle. There are widely differing, and often unsubstantiated, reasons proposed by various industry technical people. The lack of agreement and the inability to move closer around some central themes is polarizing and is confusing growers. Growers are understandably searching for answers. So let’s consider what the advice was in 1976!

- *Its is not certain however what practical significance this general pattern of flower function (A and B type flower opening) has in pollination and fruit set in New Zealand. This is because under our cool growing conditions daily openings of the flowers become delayed and irregular.*
- *Enormous numbers of fruit are borne by an avocado tree and usually no more than one fruit for about every 500 flowers needs to set to produce a good crop.*
- *Most commercial varieties of avocado (including those grown in New Zealand) are self fruitful but cross pollination may improve fruit set.*

- *Honey bees are the main pollinators of avocados and introducing hives into an orchard over the blossom period may increase yields. Avocado flowers are rich in nectar and attractive to bees (more recent research has quantified this as relative to other flowering crops)*
- *Ample light is also important for fruit set, so excessive crowding and shading of trees in the orchard must be avoided or production of fruit may be restricted to only the exposed tops of the trees.*

I truly believe that we are all lot more empowered in the specifics in relation to fruit set relative to what was available in 1976. Clearly temperature, pollinator varieties, bees, exposure to full light, nutrition and soil water all play a part. More concerning is that despite knowing more about fruit set there is a general lack of agreement as to the most limiting factors affecting fruit set in New Zealand.

Fertilisers: Bill refers to what we call nutrition today as “fertilizers”. Again this is another topic with more views and opinions than practically anything else in the growing of avocados. Again lets consider the advice given in 1976 and see what we have learned in the intervening years!

- *The chief nutrient needed by avocados is nitrogen, but under most New Zealand conditions applications of phosphorus and potassium are also recommended.*
- *The amounts of fertilizer required will vary depending on age of the trees, past applications, soil types and analysis of the fertiliser but in general, on most soils, apart from the fertile Gisborne plains, mature trees should receive the individual nutrient requirement at about the following rates per annum*
 - *Nitrogen – 150 to 200 kg per hectare*
 - *Phosphorus – 40 to 60 kg per hectare*

- *Potassium – 50 to 100 kg per hectare*
- *The annual fertilizer requirements can be divided into several dressings but ensuring that most of the nitrogen is applied in the spring to coincide with the flowering and fruit setting periods.*

This advice really did astound me, not because it is essentially correct, but because it becomes much harder to understand where and how the “minimalist” approach (in regards to nutrition) achieved traction in New Zealand through the 1980’s. For me, most interestingly, the amounts recommended in elemental terms are quite a bit more than most New Zealand growers are applying, apart from Far North growers, and about 50% more nitrogen than is commonly recommended on Bay of Plenty soils. Admittedly this was prior to effective root rot control so some additional nitrogen may have been recommended to allow for less effective uptake through *Phytophthora* damaged roots.

Bill also recommended most nitrogen to be applied to co-incide with flowering. This approach has subsequently been supported with the research findings of Dr Carol Lovatt at the University of California (Riverside) showing the yield and fruit size benefits of split applications of soil applied nitrogen and benefits of additional nitrogen over the spring period (to see the paper visit the following URL www.avocadosource.com/journals/ashs_2001_126_5_555-559.pdf).

The most recent nutritional research of Dr Samuel Salazar-Garcia from Mexico, using heavy nutritional inputs to raise yields in a sustainable way, with soil types probably the closest anywhere in the world, to that found in the Bay of Plenty lends scientific support to Bill Fletcher’s recommendations (to view the Salazar-Garcia paper click the link in the **News** section of the industry website).

It’s a real shame that Bill Fletcher died in a car accident shortly after writing this article. I never met Bill but it is clear to me that he left a hole in the New Zealand subtropical scene, was clearly a man before his time, and more importantly he would have made a big impact on our avocado industry through the 80’s and 90’s and even to today.