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Establishing tissue culture bananas in NSW

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Introduction

Over recent years much of the Australian banana industry has moved to the use of disease free tissue culture plants for new banana plantings to exclude potentially devastating diseases such as banana bunchy top virus (BBTV) and panama disease (*fusarium oxysporum f. sp. cubense*). The use of tissue culture plants also eliminates the risk of introducing pests such as banana weevil borer and nematodes with the planting material.

However, only a small proportion of NSW growers are using tissue culture plants when replanting. Growers say this is due to a number of factors, including a perception that tissue culture plants cannot be used if irrigation is not available, as well as the lateness of delivery times for tissue cultured plants produced in NSW, which often limits growers to planting after Christmas.

Irrigation is not critical

A trial by Johns and Akehurst in 1997 planted tissue culture bananas at Alstonville on ten dates over ten weeks and showed that tissue culture plants will establish successfully without irrigation provided they are watered in well at planting, even if no follow up watering occurs. They also found that follow up watering improves the growth rate if the establishment period stays dry. This trial conclusively demonstrated that tissue cultured banana plants will establish in NSW banana growing districts without irrigation.

Timing is important

A further trial conducted by this author in 2009 found that a better result is achieved by the end of the growing season if the plants are planted before Christmas, and preferably in early December.

This trial investigated the effect of planting time on subsets of plants grown from the same batch of tissue cultured plantlets, which were deflasked on 22 August 2009. The trial showed that of the three plantings of these tissue culture plants, the first planting of the smallest plants were, by the end of the growing season in late April, larger than the two later plantings. This outcome suggests that banana plants take better advantage of the peak of the growing season if they are in the field than do plants which remain in the nursery for more of the growing season.

Smaller plants are cheaper and easier to handle

The costs of banana plants in pots increases as the pots get larger due to the added potting mix and the extra space and time required in the nursery. However the major cost difference between the different sized plants used in this trial will be the

Plant in 2‘‘ tube ready for planting on

Banana plant from a 2'' tube, watered in after planting.

transport cost, with the 90 mm square tubes needing about eight times the space of the 2‘‘ tubes, with about seven times the weight.

Spring temperatures determine deflasking time

The timing of deflasking of tissue cultured banana plants in NSW is limited by the climate. The deflasking process cannot begin until temperatures are warm enough to enable vigorous root growth from the tiny plants as they become established in the pots. This usually means plants are not deflasked before mid August and that even though the banana planting season begins in NSW around October, planting of tissue cultured plants cannot usually happen until December, and often January, if growers wait for the plants to grow ‘big enough’.

The industry standard size is plants larger than the ten leaf stage, which was a requirement of the early QBAN scheme. This trial aimed to discover if smaller plants planted in the field in November would result in better establishment and growth than larger plants planted in December and January.

A field trial at Alstonville, NSW, (latitude 28°51' S) compared three groups of tissue cultured banana plants with a conventional planting of bits and suckers to determine which group produced the largest plants by the autumn.

The plantings were made at four different times in the summer of 2008/09, each three weeks apart. The first planting was of bits and suckers planted in early November 2008. All plantings had about 30 g of super mixed in the bottom of the hole before planting.

The following three plantings were of tissue cultured plants produced by Yarrahappini Nursery at Stuarts Point on the NSW Mid North Coast. Each of the tissue culture plantings were from a group of plants deflasked and potted up on 22 August 2009. The plants planted in late November from 2‘‘ tubes were therefore much smaller than is usual in NSW. The plants in the December planting three weeks later were in ‘olive pots’ and a little larger, but still considered small compared to the size of plants usually planted in the field in NSW. The planting in January was of plants that were about normal size for NSW with the top of the funnel leaf about 35 cm above the 90 mm square pots. Each of the tissue culture plantings were watered in with about four litres of water soon after planting.

Size comparison between 2'' tube and olive pots.

Comparison of pot size used in the trial. NB: Plant in the 2'' tube is six weeks old and losing condition.

Early planting by autumn is important

Plant size was compared by measuring the length of the largest leaf for all treatments on 27 April 2009. Statistically important impacts of treatment on leaf length were detected via the analysis of variance (p=.001) as seen in the table below.

Treatment	Length average
S	147.1
TC1	119.3
TC2	118.1
TC3	93.9

Standard error of the means = 4.8

'Least significant difference' = 15.8 (thus statistically S > TC1/TC2 > TC3)

S = Bits and suckers planted in early November

TC1 = 2'' tube plants planted in late November

TC2 = medium sized plants in olive pots planted in mid December

TC3 = large tissue culture plants in 90 mm square pots planted in early January.

Early planting gives better results

These results have shown that the suckers planted in early November grew the largest plants. The data also shows that of the three tissue culture plantings, the November planted plants were larger by the end of summer when compared to the plants kept longer in the nursery and planted in December and January. In other words, the banana plants with a shorter time in the nursery but a correspondingly longer time in the field grew to be larger than the plants with a longer time in the nursery but less time in the field. The smaller plants are cheaper to grow and significantly cheaper to transport.

It is therefore recommended that growers in NSW using tissue cultured plants should aim to have plants in the ground before the middle of December, or earlier if possible.

The advantage continues through to bunching

Bunching time was recorded for each of the trial lots and it comes as no surprise that the plants that were larger at the end of the first growing season were the first to throw bunches the following summer.

Plants that were ahead in this photo – taken in late January – stayed ahead of other plantings right through to bunching.

This shows that in the NSW climate plants grown from bits and suckers will establish better and yield earlier than tissue culture plants in NSW because they can be planted by early November.

The results also demonstrate that when using tissue culture plants, early planting of smaller nursery plants gives these plants longer in the ground during the summer growth season and leads to a size advantage at the end of the first growing season, whereas later planted, larger nursery plants have less time in the field, are smaller by the end of the season and ultimately throw later bunches.

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