

Rubus Propagation Research

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Rubus propagation research

In recent years, Rubus propagation has moved out of the ground and into the greenhouse driven by more intensive production systems and the need to quickly ramp up new varieties. William Smith, fourth year Honours student from the Tasmanian Institute of Agriculture (TIA) at the University of Tasmania, is investigating how to improve both the efficiency and timing of raspberry propagation from tips for commercial production.

Ramping up a new variety

The Australian Rubus industry has grown rapidly over the last 10 years, largely based on varieties originating from overseas breeding programs. Horticultural consultant Dr Lee Peterson said every plant was precious when importing new varieties.

“Bringing a new variety into Australia is hugely expensive and takes time. We start with six tissue culture plants that are deflasked in quarantine then the best two plants are selected to be grown on and screened for pests and diseases,” he said.



All going well, they go the distance and after 2 years we end up with 2 healthy plants to begin the propagation process. Then it is another four years until we have enough plants for a viable commercial production unit. You place a lot of faith in your breeding program that the variety is going to be a winner.

The move from soil to soilless propagation

Growers began the move away from soil-based root division as a method of propagation several years ago when phytophthora disease issues started to emerge. Tissue culture was an alternative but relatively expensive option for multiplication. It can be viable for long-term crops that will be productive for many years but is generally too expensive for rapid turnover substrate production. It also needs careful management to prevent genetic drift and off types.

Tip plant production is a more economical method of rapid, controlled, soilless plant propagation. The root mass of a ‘mother plant’ is stimulated to produce multiple new shoots or ‘tips’ under greenhouse conditions. These new shoots are carefully cut from the mother root mass and ‘plugged’ into individual cells of media to grow roots. Once they have enough root volume, they are ready to send to the grower for transplanting into their commercial pots or grow bags.

The pros and cons of tip production

Dr Peterson outlines some of the key advantages of tip plant production as a starting point for substrate culture Rubus. “The most obvious advantage of tip plants is they never come into contact with soil and so we avoid phytophthora and other potential soil borne diseases. The second is purely a numbers game. We can bulk up plants faster using tip propagation. One of the pivotal reasons tip plants outperform root pieces is their uniformity and the precision cane number you achieve. Most substrate raspberry systems grow two plants per pot or bag. They need to be very similar so that one doesn’t out compete the other. The uniformity at planting affects the efficiency of every operation that follows, from trellising to pruning through to fruit harvest,” Dr Peterson said. Propagation from tips also offers growers potential for mechanisation with pot handling and planting.



Tasmanian Institute of Agriculture student, William Smith. Photo credit: Michele Buntain, TIA



Left: Dr Lee Peterson (Horticultural consultant) inspecting roots of raspberry mother plants with Tasmanian Institute of Agriculture student, William Smith at BerryWorld's Orielson nurser. Photo credit: Michele Buntain, TIA
Right: Planting out tip cuttings at Hills Transplants, Tasmania. Photo credit: Lee Peterson

Improving the efficiency of tip production

TIA Honours student William Smith is working with Dr Peterson supported by BerryWorld Australia to maximise tip production and manipulate the timing of when tips are produced.

BerryWorld tip plants are sent to three Australian regions for commercial production - Tasmania, and Stanthorpe and Wamuran in southern Queensland. Earliness is key for Stanthorpe production to fit the spring production window whilst Wamuran relies on long-cane plants to fit this environmental niche. The information from this research trial will assist in planning the best propagation strategy for each region.

Mr Smith's research will use BerryWorld's primocane variety 'Diamond Jubilee' that makes up a large proportion of their commercial production. 'Diamond Jubilee' makes the perfect candidate for the study as it tends to be a little more reluctant to produce tips which is quite common for primocane varieties.

"My aim is to see which treatments produce the most tips, when they produce them and over what time frame," said Mr Smith.

"In December I set up a trial of mother plants using combinations of two planting dates and pot sizes. The idea for the earlier planting date is to produce a more mature root mass by the end of the season," he said.

Additional treatments include the use of artificial chilling and dormancy breakers. Dr Peterson explains the rationale.

"Our first plants don't come out of high health until October which puts the program slightly behind the eight ball from the onset. Each year we are cribbing a little time back to get earlier production of tips, which then go on to produce a stronger plant for commercial production. With our first attempts at early production the tips emerged over an extended time, which is not ideal," he said.

"It's far more cost-efficient to produce tips that all emerge together as having uniform age plants gives efficiencies right through the production lifecycle. The idea behind both chilling and dormancy breakers is to stimulate earlier and more even emergence of tips."

During the trial, Mr Smith will measure a range of factors such as root mass, root to shoot ratios,

carbohydrate distribution and root lignification to get an understanding of what influences tip emergence. Then it will be a matter of waiting patiently for the emergence of tips to reveal the final result.

The TIA honours program allows final year agricultural science students like Will to gain practical, industry relevant experience under the mentorship of experienced TIA researchers whilst contributing new science knowledge for industry. William Smith is supervised at TIA by Professor Dugald Close, Dr Sally Bound and Michele Buntain.

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The Tasmanian Institute of Agriculture (TIA) is a research institute at the University of Tasmania specialising in research, development, extension and education to support prosperous, innovative and sustainable agriculture and food sectors in Tasmania.

TIA began in 1997 as a joint venture between the University of Tasmania and the Tasmanian Government, bringing together the human and physical resources of the Tasmanian Government with the scientific research and teaching capacity of the University of Tasmania.

The Institute has a dynamic team of 130+ scientists and technical experts supported by a highly capable team of professional staff. TIA has access to world-class equipment and facilities around Tasmania, and its location in this remarkable and pristine environment enables researchers to explore key questions about sustainable resource management and productive landscapes.