

Getting the best from your tissue culture

Recent trial work has found that undertaking an additional early desuckering application in the plant crop of tissue-cultured plants can significantly improve yield and stability in the following ratoon crop.

A different approach to desuckering tissue cultured plants

Desuckering is one of the most important management requirements in a banana plantation. When using Cavendish cv. *Williams* tissue culture, a different approach to sucker management needs to be adopted as opposed to managing suckers from conventional planting material such as bits.

The corm from the mother plant grown from tissue culture is generally 'V-shaped', rather than a 'U-shaped' corm, typical of bits and suckers (Figure 1). A 'V-shaped' corm means that sucker development of tissue culture plants comes from underneath the corm in a spiral sequence upwards (Figure 1).

The connection of these early suckers (referred to as 'first flush' suckers) to the mother plant are small and weak (Figure 2). A small and weak connection from the mother to the follower can restrict flow of nutrients, leading to the follower having reduced growth, poor vigour, and snapping away from the mother plant.

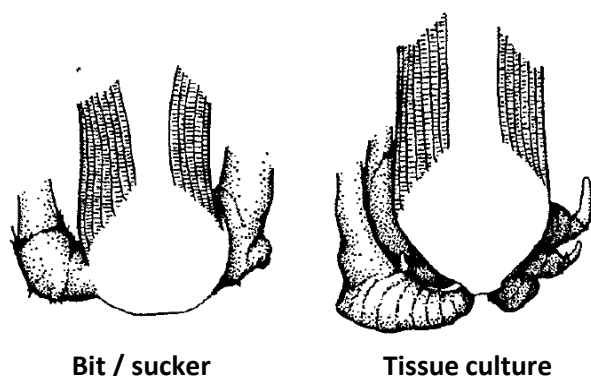


Figure 1 Sucker development from bits or suckers is generally a 'U' shape originating higher up the corm. Suckers derived from tissue culture develop from underneath the mother plant and lower down the corm.

What is a flush of suckers?

The first series of suckers that emerge all at once are known as the first flush. These suckers are early suckers and are set low down on the corm.

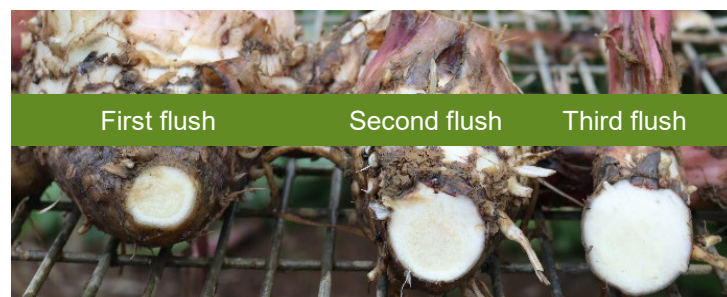


Figure 2 First flush suckers from tissue culture plants have a small and weak connection to the mother plant. Whereas second and third flush suckers have stronger connections.

About the trial

A trial conducted at South Johnstone Research Facility investigated whether plant agronomic characteristics significantly improved by undertaking an additional early desuckering application in the plant crop. The trial also looked at the physical connection between the sucker and mother plant.

Comparing agronomic performance

The trial consisting of 330 Williams Cavendish tissue culture plants had two desuckering treatments applied.

1. Desuckering twice (early & late) - Fifty percent of plants were desuckered twice, once at 3 months after planting, where all of the first flush suckers were removed (via cut and kerosene). The second desuckering treatment was at the commencement of bunch emergence, when sucker selection for the first ratoon crop was conducted.

2. Desuckering once (late only) - The remaining 50% of plants were only desuckered once, at the commencement of bunch emergence. This is when sucker selection for the first ratoon was undertaken.

Comparing sucker connection

A small number of plants not included in the agronomic assessments were used to inspect the physical connection between the suckers and mother plant. Half of the plants received no desuckering (Figure 3) and the other half received an early desuckering where the first flush of suckers were removed at three months after planting (Figure 4).

At the commencement of bunch emergence, plants were dug up to determine if there was a visual difference in the connection to the mother plant and whether sucker development improves with early desuckering.



Figure 3 Left: Plant not desuckered. **Right:** The same plant dug up at commencement of bunch emergence with the soil and roots removed. Visual observations showed first, second and third flush sucker development, with smaller and weaker connections compared to the plant that received the early desuckering treatment below (Figure 4).

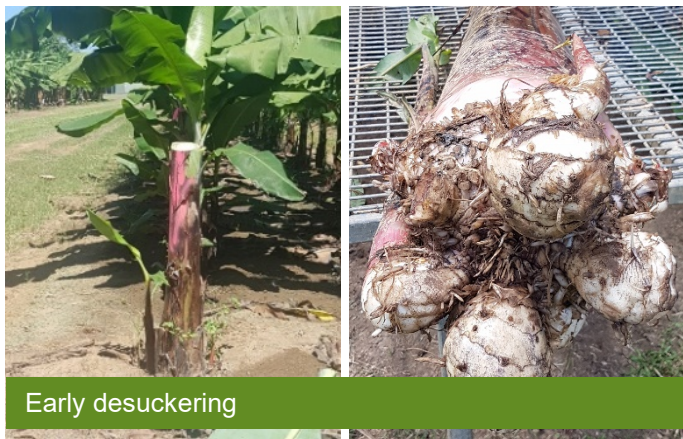


Figure 4 Left: Plant desuckered early (First flush suckers removed 3 months after planting). **Right:** The same plant dug up at the commencement of bunch emergence with the soil and roots removed. Visual observations showed fewer suckers with stronger and larger connections compared to the plant that received no desuckering treatment above (Figure 3).

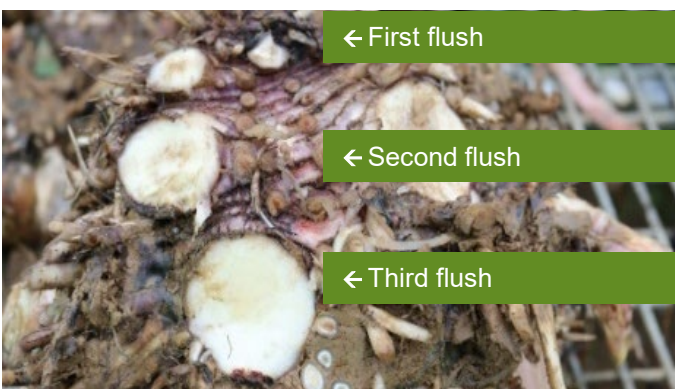


Figure 5 Size of sucker connections to mother plant

Did you know?

Research shows that suckers greater than 30 cm in height are dependent on the mother plant, competing for nutrients, water, and therefore compromising yield of the mother plant. Removing suckers early improves yield.

Results

- Plants desuckered once (late only) produced significantly shorter plants in both the plant and first ratoon crop (Table 1).
- Plants desuckered twice (early & late) produced significantly heavier bunches in the plant and first ratoon crop compared to plants desuckered once (Table 1).

Table 1 Effect of desuckering treatments on plant agronomics in the plant and first ratoon crop

Treatment	Height Plant	Height Ratoon	Yield Plant	Yield Ratoon
Desuckering twice (early & late)	2.6 m	2.9 m	21.2 kg	25.0 kg
Desuckering once (late only)	2.5 m	2.7 m	20.2 kg	19.7 kg

Average plant height and bunch weight for plant and ratoon crop cycles

- The largest difference in bunch weight was in the first ratoon crop. Bunches were 26.9% heavier in plants that were desuckered twice than plants desuckered once. The heavier bunch weight was a result of a higher number of hands per bunch, finger length and average fingers per bunch.
- First flush suckers have smaller and weaker connections, approximately the size of a 10 cent piece. Second and third flush suckers have larger and stronger connections (Figure 5), making ratoon plants less vulnerable to uprooting and snapping.
- Undertaking the first desuckering at or close to the commencement of bunching can result in:
 - Poor sucker selection, due to difficulty in determining first, second or third flush suckers.
 - Increased risk of uprooting, due to removal of unwanted suckers all at once, destabilising the plant.

Take home messages

- Removing suckers early improves yield and plant stability of ratoon crops.
- Tissue culture produced under the Quality Banana Approved Nursery Scheme (QBAN) is recommended best practice when establishing a new farm or replanting old blocks. QBAN tissue culture ensures that pests and diseases are not introduced and/or spread within and between farms.