More About Foliar Feeding

Pineapples (*Ananas comosu*) are distantly related to *Tillandsia* air plants, so a pineapple plant is something of an air plant on steroids. Note the purple flowers peeking out at the bottom of the inflorescence, whose colour is quite intense. This is the same plant that was pictured in the Useful Concepts chapter, in bloom 18 months after the pineapple top was planted. (July 2020)

The following piece is part of a collection of writings published on the Practical Small Cacti Malaysia site.

Introduction

Foliar feeding is an excellent cultivation strategy for plants that are good at absorbing nutrients through leaves or stems, such as pineapple plants. Foliar feeding is also beneficial for cactus plants. In the following, we will look at some outcomes of foliar feeding experiments.

Nicknames for Scientific Names

PMag = *Parodia magnifica*	GBald = *Gymnocalycium baldianum*
PClav = *Parodia claviceps*	MGeo = *Myrtillocactus geometrizans*
GStella = *Gymnocalycium stellatum*	GSteno = *Gymnocalycium stenopleurum*

This naming scheme is purely for convenience. Just think of them as webchat nicknames.

A Pineapple Plant

A wider view of the pot-grown pineapple plant. (July 2020)

Since many bromeliads are also epiphytes, pineapples can absorb a lot of nutrients via its leaves. Leaves also act as funnels, directing water and debris to the base of the leaves. Pineapples are CAM photosynthesis plants like cacti, with reduced water loss in order to better survive drought.

The above pineapple plant was grown in a pot. It was fed mainly by applying manure fertilizer powder (a product that is a 50% aged manure mix) to the base of the leaves. The plant was also fertigated with dilute fertilizer sprays. While the pot isn't very large, the root system is helped by nutrient absorbtion via the leaves. The plant is healthy and strong and is better-looking than practically all other pineapple plants in the neighborhood.

The pineapple plant with its fruit, about a week before harvest in mid-October 2020.

Foliar feeding works for pineapples. The fruit was harvested in late October 2020 – it weighed 1.9 kg. Pineapples are easy-to-grow CAM plants. So if you live in a tropical urban area and you don't want to grow your pineapple plants in the ground, you can grow them in pots[1]. Provide them with adequate nutrition and you will still get to enjoy fairly large fruits.

This can be translated to the cultivation of cacti. First, select the species of cacti that have the potential of becoming very productive. Then provide them with adequate nutrition. Foliar feeding is a good way of providing nutrition to cactus plants. I believe this strategy works in a tropical climate. After all, I have enjoyed hundreds of cactus flowers – it can't be 100% dumb luck.

1 When removed from its pot in November, the plant had a lot of roots in the pot – it was somewhat pot bound. But no matter, a fruit of nearly 2 kg is no slouch.

An Echeveria

An *Echeveria* in bloom in January 2021. Note the healthy colour of its succulent leaves. The other two pots contain rain lilies, *Zephyranthes*.

Regular fortified sprays improved some *Echeveria* specimens too (picture above), resulting in better leaf colour and a flower stalk appeared in January 2021. Normally these plants are not watered, and there is no soil in the two pots containing the succulents, only small stones and rubble. The roots survive on organic debris that get trapped among the stones and rubble.

While it's nice getting an *Echeveria* to flower in the tropics, I have since *reduced* the frequency of fortified water spraying for these succulents – because they tend to become lanky after blooming, and would bend over and look like a mess. This behaviour is similar to bolting[2] in regular plants. I prefer to keep the rosettes more compact, hence a reduction in nutrition is warranted. Still, it's good to know that *Echeveria*s are willing to flower in the tropics given adequate nutrition.

2 Bolting is the diversion of resources into a flowering stem in order to produce seeds. High temperatures are often the cause of bolting in leafy vegetables. Vegetables that have bolted results in a poor quality harvest.

Attempt to Push the GSteno Specimen

Left: The large GSteno in mid-April 2020, wet after spraying.
Right: The same specimen in late August 2020.

From the beginning of June 2020, I have switched to daily fortified water sprays, except on rainy days. On weekends, small amounts of additional fertilizer salts were added to provide NPK to plants. My suspicion is that larger plants are not getting enough nutrients and daily sprays of fortified water may help with stem growth and flower production.

For my solitary GSteno specimen (above pictures), this resulted in positive changes. The stem is slightly fatter. In particular, look at how the lower stem below the offsets have filled out and there is more green than brown. Newer growth at the top is also better-looking, with more dark green colour.

I also made sure to get the two offsets wet, so that they also get nutrients through foliar feeding. Such offsets often grow slowly – it's possible they don't have a strong connection to the main stem and are unable to draw nutrients efficiently. The offsets have grown significantly, a very positive outcome. I think foliar spraying is absolutely necessary if you want to make such offsets grow larger. Larger offsets will be stronger and easier to root, ensuring successful outcomes.

The top of the GSteno specimen with many failed flower buds, August 2020.

As for flower production, many flower buds were produced, but so far all were aborted. Foliar feeding leads to stronger growth, and new areoles on mature *Gymnocalycium* like this species often appear elongated and probably has the capability to produce flower buds.

While better feeding gave a positive push to the plant to produce buds, other issues caused flower production to fail prematurely. There are many factors that could have caused flower buds to be aborted. This specimen may have a poor root system, damaged due to past cultivation methods. Or the species may need a resting season. But this plant did flower twice, in April 2017 and July 2019, seemingly without any special prompting or pampering.

Some growers in online forums have reported that their GSteno specimens are prolific at producing flowers. So it may turn out that continuously growing a big green stem is bad for flower production in the case of GStenos. The challenge is to discover the conditions for reliable GSteno flower production in the hot and humid tropics – such knowledge may also be useful elsewhere.

In September 2020, I abandoned this experiment, electing to harvest the two offsets instead. The progress of the two offsets is covered in the Hooray for Healthy Roots chapter.

Response of PMags to Daily Spraying

The big PMag in early June 2020. The two rear stems are marked with arrows.

One of the main objectives of daily spraying of fortified water is to improve the performance of the big PMag. While the specimen flowers almost continuously, its two rear stems (see picture above) rarely flower. The stems appear to be growing well, and each has a somewhat dense apex. However, they have not been producing flowers for a long time.

The rationale is that if the stems are in competition for limited resources, then the two rear stems may be losing out and thus they are reluctant to flower. So this is a simple cause-and-effect experiment.

After about 1½ months (see pictures on the next page), both stems have more wool near the apex and each of the stems has at least one flower bud. All it took was some extra feeding. Foliar feeding worked. It's probably not luck, because in September 2020 after the initial flowers, both stems continued with new flower buds. The three stems at the front were still producing flowers as usual, so with adequate nutrition, all five stems are now productive. This specimen produced 38 flowers in 2019 and I hope to maintain that level of productivity[3].

3 If productivity stalls, it's probably pot bound and the specimen will need to be repotted.

The left rear stem in July 2020 with a flower bud.

The right rear stem in July 2020 with a flower bud.

By the end of July 2020, the flower buds on the rear stems are clearly visible.

After about 3 weeks, the left rear stem has a flower open. (August 2020)

After another 3 weeks, the right rear stem has a flower open. (September 2020)

The two rear stems in late September 2020. Both stems still have buds, so all five stems[4] of the specimens are steadily producing flowers.

That's not all. Another two PMag specimens also started to produce flower buds (see next page.) Since the two specimens are likely pot-bound, they will probably be reluctant to produce more flowers. But foliar feeding did push them to produce flower buds.

4 Actually, four are very large offsets and there is only one main stem. For PMags, offsets can grow very large, so it is easier to think of them as stems.

The arrows point to two specimens that ‘woke up’ and produced a flower bud each. Before this, the one on the left has never previously flowered, while the one on the right has flowered once or twice. Since they have been in their pots for a long time, there are plenty of roots in there and they are likely pot-bound. Both were originally stems (or offsets) of the big PMag specimen. (August 2020)

The two PMag specimens with flower buds in late August 2020.

Left: The smaller PMag with its first flower ever in early September 2020. The stem of the specimen is about 6 inch long. When the upper part of the stem grows to a mature size, PMags never seem to stay upright.

Right: The larger PMag with a single flower at the end of September 2020. This is the larger of the two PMag specimens that were used in flower forcing experiments. This particular specimen has flowered about twice before, but has not done so for a long time because it is probably pot-bound.

Response of PClavs to Daily Spraying

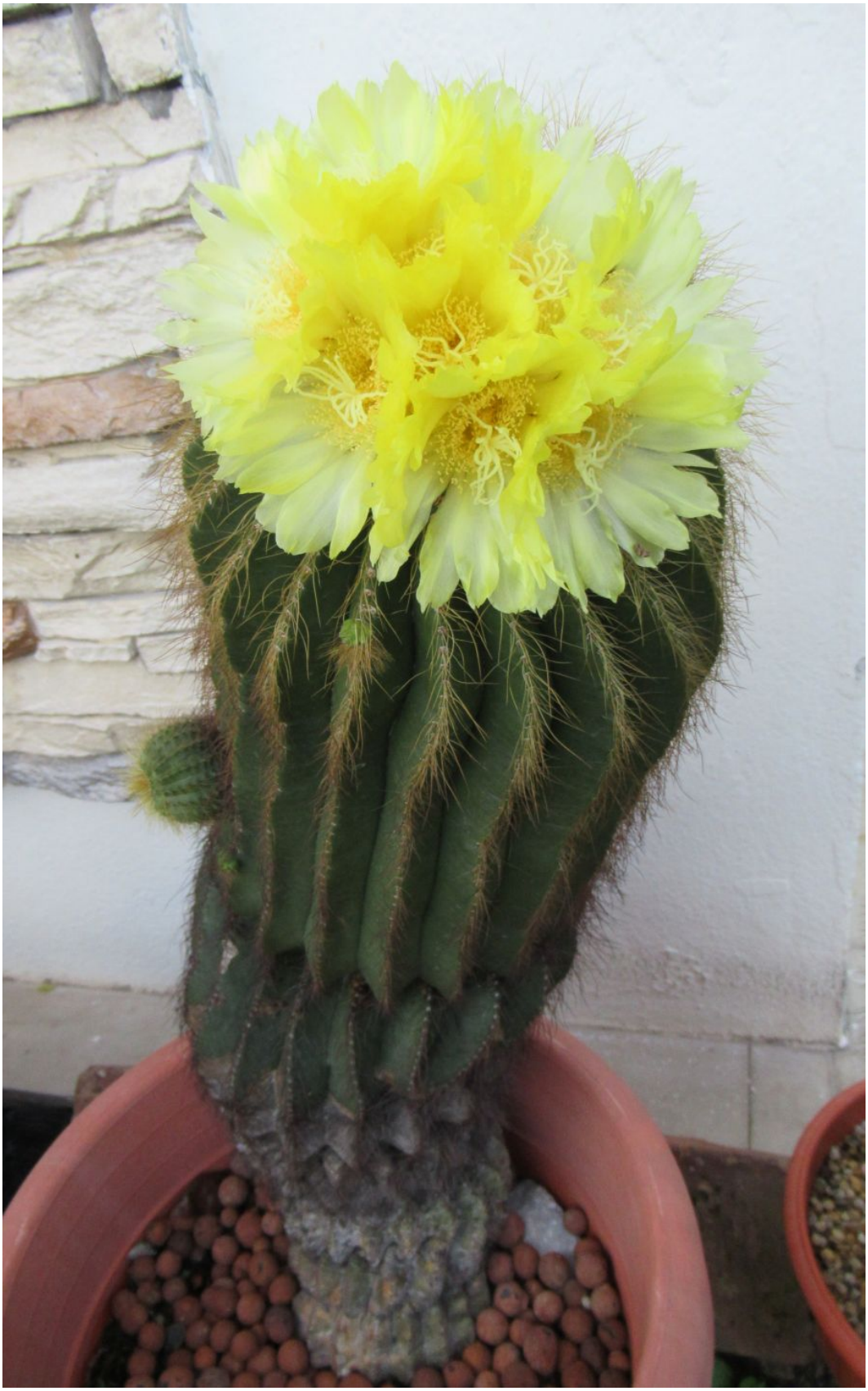
For the large PClav, growth and flower production appear to be sustained and vigorous. It took many months of spraying before something other than “vigorous flower production” could be observed.

Flower buds shown a week apart on the large PClav, late August 2020.

The day after the second picture, with 7 buds opening in the morning. Note that there are 2 more buds at maximum size, ready to open the next day. (August 2020)

With 7 flowers open later in the day. (August 2020)

Flower production was sustained throughout the year. Stronger growth – a probable direct result of better nutrition – led to the specimen producing ever-larger bursts of multiple flowers. The number of flowers produced by this specimen is reported in the Data and Charts chapter.



With 9 flowers open the next day. (August 2020)

In late December 2020, strong growth on the largest offset (arrow) was finally seen.
Those dried flowers were the aftermath of a show of 11 simultaneous flowers.

A different positive result of foliar feeding on the large PClav was finally seen in the renewed growth of its one large offset towards the end of 2020 (picture above). This offset has not been growing for a long time. Direct spraying of fortified water on the offset restarted its growth.

Towards the end of 2020 and into 2021, the large PClav appear to be sustaining more than 7 flowers for each burst of flower buds, but with more simultaneous flowers, they become slightly smaller. The higher number of buds also led to longer periods of time between each burst of flowers. By mid-2021, the time between each large burst of flowers is nearly two months. Other than the change in bursty flowering behaviour, the rate of flower production may be slowly increasing as the specimen grows taller. Another year or two of data gathering will prove or disprove this.

For PMags and PClavs, I think one has to watch for signs of growth stopping due to roots becoming pot-bound. PMags have the strongest root systems and are quickest to run into this problem. Other than becoming pot-bound, large and strong PMags and PClavs are quite trouble-free and are very productive with adequate feeding. ♦

Version Information

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Colophon

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