# Bromeliaceae

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# The Bromeliad Society of Queensland Inc.

**P. O. Box 565, Fortitude Valley**
**Queensland, Australia 4006,**
**Home Page www.bromsqueensland.com**





Front Cover: *Guz.* 'Augusta' (unreg) Photo by Ross Stenhouse

Rear Cover : *Quesnelia quesneliana* Photo by Ross Stenhouse

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# Plant Competition Results

**Popular Vote - June Meeting**

**Intermediate**

| | | |
|---|---|---|
| First | L. Grubb | *Vriesea* 'Squiggles' x 'Red Chestnut' |
| Second | G Vauhkanen | *Neoregelia* 'Shelldance' |

**Minishow - July Meeting**

**Advanced**

| | | |
|---|---|---|
| Class 1 Second | Danny & Lindsey | *Billbergia* sanderiana |

**Intermediate**

| | | |
|---|---|---|
| Class 1 First | G & N Aizlewood | *Bill.* Dr Oesers x 'Catherine Wilson' |
| | G & N Aizlewood | *Bill.* Hallelujah |
| Class 2 Second | L. Grubb | *Calopsis Morreniana* |
| Class 3 Second | L. Grubb | *Neoregelia* 'Whim' |
| Class 4 First | G & N Aizlewood | *Bill.* 'Cimmeron Rose' |
| Second | L. Grubb | *Till. complimata* |

**Novice**

| | | |
|---|---|---|
| Class 1 First | B. Batchelor | *Bill.* 'Pink Patches' |
| Second | B. Batchelor | *Bill.* 'Spotted Wren' |
| Class 4 First | G. Stay | *Guzmania* |

## THE IMPORTANCE OF THE PH METER

(by Robert Willmott)

***Editorial comment (Bob Reilly):*** *Reprinted, with permission of the Bundaberg Orchid Society, from the Bundaberg Orchid Society Newsletter, June 2006, v. 4 (6), p.4. In the March-April 2006 edition of Bromeliaceae by C. A. Wiley highlighted the importance of having the correct pH for the water and, by extension the potting media, used for bromeliads. This article gives some practical suggestions for adjusting pH, and ways of measuring it. The suggestions may be particularly useful for those growers who use media similar to those used for orchids, for their bromeliads.*

PH is the measure of hydrogen ion concentration of a particular media. It is expressed as the negative logarithm of hydrogen ion concentration with 7 being neutral, below 7 is acid, and above 7 is alkaline. Each unit of measurement change decreases or increases the pH by a factor of 10. For example, a pH of 5 is 10 times more acid than pH 6 and 100 times more acid than a pH of 7. When wanting to change the pH, more lime, for example, is required to change the pH from 5 to 6, than 6 to 7.

The pH of a media determines the solubility of the nutrients essential for plant growth. Although plants survive in a pH range as low as 3.5 to above 7.5, extremes should be avoided for best growth. Most orchid plants should be grown in media having a pH range of 5.5 to 6.5.

Low pH (acid) can be increased by adding liming materials such as dolomite, calcium carbonate (garden lime), or calcium hydroxide. High pH (alkaline) can be reduced by the addition of finely powdered sulphur. The amount of liming material or sulphur to change pH depends on the ability of the media to hold nutrients and the initial pH of that material. Only small amounts of material are necessary to change the pH of bark, whereas larger amounts are necessary to change the pH of peat. Constant use of an acidic or basic fertilizer will also change the pH.

Most of our orchid potting mixes are bark-based, and as the mix ages the pH will decrease. It would be wise to periodically check the pH with one of the inexpensive kits available at nurseries, and add lime etc to correct it.

PH can be measured in two ways. A simple pH kit is available which is most useful for solid materials such as potting mix. A liquid is applied to the sample then, a powder that will change colour, which when compared with a colour chart in the kit, will give a reading of the pH.

When measuring the pH of liquids, hand-held meters are available. These vary in expense from around $20 (I have never found these types particularly accurate), to quite expensive. For around $120, a local hydroponics supplier will have one that is ideal for our use. They will have a facility to allow compensation for temperature, and will come with solutions that will enable you to calibrate the instrument and thereby give very accurate readings. They are battery operated and will display the pH reading with a small margin of error. It is important to maintain the meter in accordance with the instructions that come with it. One of these meters might be a useful addition to your club's library.

## Did You Know

Previous editions of this Journal are available for downloading from the Society's Web Site. It's a good way of getting back editions starting 2005

**http://www.bromsqueensland.com**

## Charcoal, The Forgotten Ingredient

(by Rex Hardy)

*Editorial comment (Bob Reilly): Reprinted with permission of the Bromeliad Society International, from the Journal of the Bromeliad Society, September-October 2002, v.52 (5), p.226. Charcoal is used in certain bromeliad potting mixes e.g. those based on cymbidium orchid mixes. However, it could be used more widely. It can be bought at some orchid nurseries.*

When I was a young man, one of my memories of helping my late father with his cacti in his large glasshouse, was the way he always included charcoal in his potting mixes. Up until recently, I always thought the idea of this was to help drainage of the potting mix, but a small article in one of my father's cactus books told me otherwise.

In the days of wood fires, charcoal was plentiful, and the benefit to potting mixes was well recognized. It appears that as our wood fires have disappeared from the scene, so has the use of charcoal, yet its benefits are still there.

It should be noted that charcoal has no food value in itself. However, it does have several important uses for plants and potting mixes. One of the most important is that it acts like a magnet and a sponge collecting and conserving ammonia. This remarkable function is one of the marvels of science yet no one has been able to explain why. If pieces of charcoal are in the soil, roots will cling to them to absorb the collected ammonia.

When organic fertilizer decomposes, one of the first products given off by the bacteria is ammonia gas. This gas is extremely volatile and easily escapes, but if a grain of charcoal lies next to a grain of fertilizer, it will absorb 80 times its own bulk in ammonia and will hold it, a trait that plant roots utilize. It is the ammonia-forming capacity of bone meal, fish meal, natural manure, compost and other such organic fertilizers that we pay for, and the gas should not be allowed to escape.

Charcoal has other equally valuable properties. It is the world's most perfect purifier. It acts as a continuous factory for the destruction of injurious acids. Whenever evil organic gases are given off, charcoal will absorb the odor. A sprinkling of charcoal over the compost heap will not only prevent odor but will conserve ammonia. After purchasing the charcoal, break it into half-inch pieces by placing it on a large piece of plastic and breaking it with a hammer. Further benefits that plants receive by incorporating charcoal in your potting mixes include: I) It checks damping off of seedlings; 2) When cuttings are started in water it encourages root growth and keeps the water fresh; 3) Charcoal in potting mixes also sweetens the soil and saves fertilizer; 4) Last, but not least, it helps to open up the potting mix as well as helping in the drainage.

If you are now using Perlite in your potting mix why not substitute some of it with some small pieces of charcoal?

## WATERING AND WETTING AGENTS FOR BROMELIADS

(by Geoff Lawn)

Editorial comment (Bob Reilly): Reprinted, with permission of the Bromeliad Society International, from the Journal of the Bromeliad Society, January-February 2003, v.53 (1), pp 9-13.

Although water is essential to all living organisms, most gardeners take for granted their watering routine in sustaining a bromeliad collection. It is often assumed that when simply applying moisture to open beds

or potted specimens under cover, it will automatically find its way through the soil to the roots to sustain the plants.

There are natural principles at work when moisture soaks into soil or potting mixes. The water absorption rate is affected by:

• Potting mix composition and existing surface moisture level. Decomposed humus can absorb and retain at least 3 to 4 times the amount of moisture compared to soil particles or inert fillers such as perlite.

• Water temperature, droplet size and volume.

• Air temperature

• Relative humidity

Water infiltration is more effective if cool water is sprinkler-sprayed onto an open, chunky, slightly damp, humus-filled mix on a hot, humid day. When cold water is applied by hand-held hose to a compacted, fine, dry soil in freezing, almost humidity-free weather, seepage into the mix is not as fast or uniform. Furthermore, compaction or settling of mix ingredients occurs over time as the humus portion decays and its nutrients are used up by the plant roots. If not fertilized, repotted or if other ingredients are not added, the mix finally becomes an anaerobic, nutrient-deficient mass incapable of sustaining live roots.

Since growth of many bromeliads is semi-dormant in winter, watering is less frequent, and this potentially sets up future problem. The potting mix can develop dry pockets as the surface, especially if uneven, becomes bone dry and the water trickles to the side, down the inside of the pot, past the root ball. This problem is easily detected by upending the pot to inspect for a uniformly moist mix (or otherwise) immediately after watering. With their fibrous, vascular leaf tissue, parched bromeliads generally fail to wilt like other plants, but the leaf margins of broad-leaved tank forms roll inward, and those of succulent silvery species shrivel and curl. Leaf tip die-back or dying lower leaves are also telltale stress signs of insufficient moisture and nutrient deficiencies.

Soil or potting mix fertility relies on four factors:

1. **Physical aeration**: The spaces between mix particles, which assist the roots to "breathe".—vitally important for epiphytes and lithophytes. Most terrestrial bromeliads also prefer fast drainage of excess water once the saturation point is reached—few bromeliads inhabit bogs or swamps in the wild. In open ground, earthworm movements aerate the soil, but their constant processing of the same humus within containers is detrimental, eventually turning the contents into sludge.

2. **Chemical nutrition:** Natural leaf or wood lifter, soil minerals and trace elements, manures and/or man-made fertilizers improve soil quality.

3. **Water**: Preferably natural rain (pH-7 {neutral), which carries fewer dissolved salts and pollutants than surface or underground water.

4. **Micro-organisms and biochemical activity**: Bacteria and fungi assist the breakdown of humus, releasing its nutrients to the plant's roots.

Three factors affect the movement of water into the soil or potting mix, simplified here of complex sciences:

l. **Gravity**: The universal constant force, which pulls the water downward, taking the route of least resistance under normal conditions.

2. **Cohesion**: Water molecules, being polar, are attracted to each other. This force holds a water droplet together, creating surface tension and causing the droplet to behave as if a thin flexible film covered its surface. Water molecules therefore tend to stay

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# FERTILIZERS

by Rob Smythe MSc

This is not going to be your usual fertilizer story. I am not going to say why plants need this or that also I am not going to source my comments. My interest in this subject goes back decades. As an Inorganic Chemist by profession you could say I am giving you my learned opinion. Just a few home truths that I have discovered and archived away in my brain over these years.

1) Dilute and often is always better than concentrated and infrequent. I fertilize dilute and infrequent as my plants grow in soil.

2) Fertilize during growth periods rather than non growth periods.

3) With expensive fertilizers, you are often paying for the brand and the packaging. Check the analysis on the back. How much N.P.K are you getting for your dollar? Once I thought I was on to a good thing (large packet low price) but found out the fertilizer was full of sand (a spreader). In Australia I think only one convention for measurement is in use. Others are used overseas. An N =6 means you get 6g of Nitrogen for every 100g of fertilizer.

4) Bromeliads grown for their coloured flowers, fertilize as you might fertilize other hot house plants.

5) Neoregelias and other bromeliads grown for coloured leaves—read on and think carefully before formulating your fertilization regime.

6) Plants without roots eg *Till. albida* or offshoots or bare root epiphytes try to avoid ammonium/ammonia based fertilizers. Choose nitrate or urea based. Be warned, old urea can become toxic also.

7) Foliar fertilizing. You have to know your plants. Neoregelias can not absorb from the upper surface of the leaf blades but if you wash the fertilizer down into the tanks it becomes available to the plant. Tills can absorb very well from the foliage.

8) Fertilizing potted plants is less hazardous than fertilizing plants in the ground. You can wash it out of the pots.

9) Trace element deficiency—you can virtually ignore unless you are growing seedlings. Over abundance (toxicity) is a different story. Normal N/P/K fertilizing may protect plants from taking up toxic excesses of some trace elements like copper and molybdenum. Always mix trace elements with stock fertilizer before usage.

10) Fertilizing mature tank broms must be done via the tank . Root fertilizing these is a waste of time and fertilizer. Use of expensive growing media for mature plants adds nothing as roots are non functional as far as fertilizer absorption is concerned. The roots of mature plants are just finding something to attach to. I actually grow my advanced plants in empty pots with plants just held in place with foam.

11) The most important agent in fertilization is the one in shortest supply.

12) Use a complete fertilizer otherwise you might run into problems with trace element antagonisms. These antagonisms are calcium verses boron, iron verses manganese and iron versus phosphate. An example would be adding superphosphate to a mixture with enough iron present. To the plant phosphate would mask the iron and the plant could become iron deficient.

13) Be aware of the fertilizer characteristics of your potting medium. Examples are

Peat—does absorb the nitrogen (not necessarily a bad thing—slow release).

Bark—deficient in either magnesium or

sulphate. I have forgotten which.

Lime Treated Bark—residual calcium could mask boron availability.

Scoria—deficient in major elements.

Seek chemical advice. An example is soaking bark in a solution of Epsom Salts. That is why I am confused—I remembered the treatment, which supplies both magnesium and sulphate, and not the cause.

14) pH— This is always important with plant nutrition. Growers use so many different potting mixtures. I would suggest you buy some pH papers and check the pH of the fertilizer mix, not necessarily as you apply it as a better indicator is the last drop draining out of the pot. More details below.

**Types of Fertilizers**.

1. Synthetic dry chemical based. (My favoured choice)
2. Synthetic single mix liquid.
3. Synthetic two mixed liquid.
4. The above with chelating agent (EDTA).
5. Natural Product solid.
6. Natural Product liquid.
7. Slow release non coated
8. Slow release coated.

I guess we need a breather. Now I will answer some of the questions troubling you.

**Q. Why do I choose synthetic over natural product?**

A. The reason is the same as why I choose pharmacy medications over natural products. Pharmacy medications have been tested and you know what is in them. When you buy a drug at the pharmacy, it has been through trials costing millions of dollars. A natural product may have one ingredient that say, lowers you blood pressure but what do the other 999+ plant ingredients (chemicals) do that have never been clinically tested? Do all strains, genotypes and phenotypes of a plant have the same chemical composition? We only have to see how the botanists keep splitting and lumping species to know the answer to the last question. We all know there are two chemically different types of hemp. Smoke one type and you go loopy while the other is used for making rope.

**Q. Why only ground fertilize young plants? Don't mature plants take up fertilizer through their roots?**

A. Thanks to a very senior nurseryman who I thought had gone troppo, I can answer this. After purchasing plants at the Mt. Cootha show I could not fit them into my case. This was necessary to allow me to get them back to Townsville. He told me to chop off the roots. I thought he was mad. They are actually dead on old plants and are only operating as fasteners, I was later to find out. I confirmed this by getting two of the same adult plant and with one plant I chopped off the base of the plant just below the bottom leaf. Eventually new roots appeared and I re-potted it. Then a little time further on I fertilized both doctored and non-doctored plants. Bet your life the doctored one went all green and only the weeds in the other pot showed response to fertilizer. I should have realized this, dead root syndrome, earlier as I was always being asked , how I establish my plants on my trees. My advise has always been— to wait till they start to pup and then attach them with the pup touching the tree. Yes that is were the attaching roots come from, the pup, not from the older plant.

Reminder: As I said above know your plants. What is the saying?- one shoe does not fit all. The large vrieseas sprout roots all the time and feed off the detritus in their own axillary wells. If you pull the lower leaves off you will see these root bundles. This type of plant, being loved for its flower as well as its foliage might be fed as per a normal flowering plant.

**Q. Why don't Neos feed through their leaf blades?**

**Continued on page 9**

# The Editors Desk

**by Ross Stenhouse**

In this edition, I have endeavoured to present a number of articles focusing on cultivation so that the newer growers (and the not so new) can benefit from other people's knowledge and experience. Derek Butcher has raised the thorny issue of 'Truth in Labelling' for commercially sold plants. This is an important issue for some, others are not so concerned and regard the variation as an interesting aspect of their hobby.

Rob Smythe has produced another well thought out article, this one on fertilizers. Rob being an academic, uses the scientific method in his approach to growing and writing about bromeliads. This article combines practical experience with a theoretical approach.

Bob Reilly as normal has produced a number of excellent articles, all of which I am sure you will enjoy. Bob and I work closely, I am fortunate in being able to indicate, in advance the theme of a forthcoming issue and Bob delivers articles following that theme. In selecting articles for Bromeliaceae I am working on the principle that if I find them enjoyable to read, then its likely that a lot of others will do so likewise. I remind the reader that I am a newcomer to the world of horticulture, my work life has been spent mainly in the world of engineering and IT.


## Bromeliaceae Production Crew

**Editor:** Ross Stenhouse
**Proofreader:** Roy Pugh
**Regular Contributors**: Derek Butcher, Rob Smythe, Peter Paroz, Rob Reilly, Beryl Batchelor


## Photographer's Code

RS - Ross Stenhouse

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A. Have you ever had a bad scale infestation on a Neo? If you had such an event and killed the scale then foliar fertilized it you would have the healthiest green looking neo in your garden. The scale produce little holes through the wax coating that lets fertilizer in. Neos have no stomata (breathing holes) on the upper surface. Tills do, as they grow in nutrient deficient zones and have no water/fertilizer entrapment as a rule. They need every opportunity to absorb fertilizer and moisture (Warning it also increases their potential of absorbing toxic quantities in our artificial environment).

**Q. Why didn't you choose the fertilizer with a chelating agent?**

A. This agent is only used to stop trace elements especially iron from precipitating out of solution. Without it iron reacts with water and oxygen and comes out of solution as a deposit of rust which can not be taken up by the plant. If I was root feeding broms and had alkaline soil or if I was fertilizing via the tank and using bore water, sometimes high in bicarbonates in my area, I would use the fertilizer containing a chelate. A similar problem, re precipitation of chemicals, is avoided by using a freshly prepared two mix solution. With the two mix, chemicals which might react together and could precipitate out (e.g. Calcium ions with phosphate/sulphate) are kept in separate bottles. Similarly with dry chemical based fertilizers it is imperative that

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## PLANT LABELING

by Derek Butcher

Some of you will have heard of the Garden Clubs of Australia where individual societies sort of affiliate to get better insurance rates etc. I did not even stir this up but this is what has been issued in the latest GCA bulletin. They have over 45000 members and yet the 'Authorities' were unaware of their existence. As such they would have more political clout than we Bromeliophiles.

"PLANT LABELING

The plant labeling issue which we have been pursuing over the last year has started to make real progress now. We have had discussions with representatives from the nursery industry and consultant for the weed committee. We have also written to the National Weed Committee, government departments and government ministers, and a discussion with a Federal Member who has written to the relevant member/s on our behalf.

What started out to be just a request for "truth in plant labeling" has become a mine field. One of the major issues which have been raised is that all plant labels should have information relating to the weeding and seeding potential of the plant and its ability to "jump the garden fence" and create problems in the environment. Most claim that 70% of all invasive plants in Australia were originally garden escapes, however this is in dispute.

We will continue to pursue labeling issues through these channels on your behalf as gardeners and would really appreciate any information you can give us on inadequate or incorrect labeling. "

While I may argue with the Weed Committee that puyas are not weeds my main interest is the correct identity of plants which leads to the following comment

There is a hybrid *Aechmea* circulating Australia through supermarkets and others by the number 491. In fact it is the plant illustrated on the front cover of the March/April 2004 issue of 'Bromeliaceae'. There is a strong feeling that this plant is 'Stefanie'(yet another spineless *Aechmea* hybrid) and a quick check of its photo in the Bromeliad Cultivar Register should give you food for thought. The problem is that Deroose in Europe would have quality control to ensure similar looking plants being offered for sale. This is something not practised in Australia so some will not look like 'Stefanie' even though they have the number 491. It would be great if the supplier did mend his ways but at least you have been warned.

## In the Doghouse Again

Andrew Flower, BSI Editor

*Editorial commment (Bob Reilly): Reprinted, with permission of the Bromeliad Society International, from the Journal of the Bromeliad Society, January-February 2006, v. 56 (1), pp21-22. In the March-April 2006 edition of Bromeliaceae, an article by C. A. Wiley titled: Water and Good Growing was reprinted. Andrew Flower's article complements that one, and Andrew's results reinforces Mr. Wiley's point about being careful of the amount of salt in the water you use on your bromeliads.*

Ten years ago we moved to a new house. The wife, the dog, the cats, bromeliads and me. Lissa was enticed by the large garden , the house and its location. The rest of us saw the potential in the large commercial dog kennels that were quickly converted into a potting shed with surrounding greenhouses and shade-houses built to house the collection (mainly tillandsia). There is still a dog house in the potting shed, of course. I rather like it in there, and visit frequently. But the big news for the bromeliads was their new water – nice, fresh rain water collected from

the greenhouse roofs. Or so I thought.

Why did I take the opportunity to collect rainwater, when previously they had been grown successfully for many years, albeit slowly, using municipal domestic water supplemented with liquid fertilizer once a month during the growing season? Because I could improve on that: my primary interest is in raising bromeliads from seed, and seedlings make up 97% of my collection. Growth had always been slow, with a typical 10-15 years to flower tillandsias from seed. My readings of David Benzing (1980) and Charles Wiley (1976) convinced me that attention to water quality would help improve growth. The two key factors that stood out were pH and salt content. pH is a term for the degree of acidity (sour) or alkalinity (sweet) of the water; given that a reading of 7.0 is neutral, higher numbers are alkaline and lower numbers acid. The numbers are a logarithmic scale, with the acidity or alkalinity increasing tenfold for each number the reading increases above or below 7.0. Wiley said that the main reason for acidifying the water is to make the mineral nutrients available and on his figures the pH would need to be between 6.0 and 6.5. Benzing recommended a range between 4.5 and 6.5 for fertilizer solutions, although this needs to be reconciled with Wiley's observation that potassium is not adequately available to plants below pH 5.5 And so I installed a 1,000 gallon holding tank, plus pumps and water lines to spray the plants.

Disaster soon ensued. Please turn to page 12 and look at figure 1. Do you know what caused this damage to the guzmania? Actually I have shown this photo to a group of specialist growers in Australia, and a national conference attended by experienced growers from the USA, Australia and New Zealand. The suggested causes included wet feet, cold, arsenic from treated timber framing. Interesting, not because they all "got it wrong," but rather because such symptoms are actually near to impossible to read out of context. Charles Wiley set out some "maximum limits for most bromeliads," and although he did not say how these figures were arrived at they were the only guide I had. His figures were: total salts maximum 350 ppm, sodium 30 ppm, boron 0.5 ppm, chlorides 5.5 ppm, sulfates 5.6 ppm. When the damage began showing up on my guzmanias, I sent a sample of the collected rainwater to a testing laboratory. Results included: total salts estimate 230 ppm, sodium 41.2 ppm (Wiley's maximum 30 ppm), chlorides 83.2 ppm (Wiley's maximum 5.5 ppm). And this was our rainwater?

With the genius of hindsight I figured that because we live a couple of miles from the sea, and the prevailing wind comes straight over the sea, the salt spray was blowing over the water-collecting roofs. Rain would subsequently wash the deposited salt into the collection tank. Checking further I learned that salt spray can carry up to 500 km (300 miles) inland with decent winds. The moral is: if you are going to use a new water source, always check it before you start using it, and again after a few months of use. I now check the primary water supply at least once a year. As a general rule, water supply by municipal authorities for domestic drinking water is unlikely to be seriously harmful to bromeliads, but I would still check it for hardness (calcium) and the pH can be quite alkaline. Our town supply water has been up to pH 8.7 which, while not causing obvious damage to the bromeliads, was way above the recommended levels of pH 6.0 to 6.5. I used to use citric acid to bring the pH down – it is quite cheap and available from supermarkets or drugstores. The downside with citric acid is its short lifespan in solution, and for commercial use we prefer phosphoric acid. Your local supplier should be able to provide you


figure 1


*Ae. nudicaulis v. aureorosea*


*Aechmea* ‘Stefanie’ as 491


*Aechmea* 'Bryan Ellis' (unreg)

with a free analysis of the water they are supplying you, and there are private testing laboratories who usually charge no more than the cost of one or two choice bromeliad plants.

Twentyfive years ago David Benzing (1980 p.60) wrote "Little is known about the symptoms of mineral deficiency in Bromeliaceae…." and we have not accumulated much information on deficiency or toxicity since then. There is scope here for more informed reports of symptoms and their causes, and that should be of assistance to those of us who do not have the time or the resources to have plant and water analyses done on their plants when they experience difficulties in cultivation. Ideally, of course, we should be pro-active and get regular check-ups for our plants like we do with our motor vehicles (and ourselves as time moves on). But that is probably asking too much of non-commercial growers. Those of you who do collect information on symptoms of mineral deficiencies, overdoses or diseases please share them if the information is not commercially sensitive to you.

Literature cited

Benzing, D. H. (1980). *The Biology of the Bromeliads*. Eureka, California, Mad River Press.

Wiley, C. A. (1976). "Water and Good Growing." *Journal of the Bromeliad Society* 26(2): 59-65.

## Cryptanthus Update

by GEOFF LAWN.
International Director,
Cryptanthus Society.

The interesting reprinted history on Cryptanthus 'It' in Bromeliaceae May/June 2006, pp.5, 15 needs a more accurate update re identification. A quick check of Beadle's hard copy Bromeliad Cultivar Registry 1998 or the current online Registry and the linked photo on fcbs.org/ notes Cryptanthus 'It' is now regarded as a cultivar of Cryptanthus arelii, not an "unknown species" Harry Luther acknowledged some undescribed Cryptanthus taxa have been in cultivation for many years.

In the Cryptanthus Society Journal Vol.14:2:54-55 (1999) he described C. arelii from a 1982- collected plant (SEL 1987-242), linking it to Foster's #2466 which Harry said appears to be conspecific with C. arelii. Because C. 'It' sported off C. #2466 and later in Ed Hummel's collection the reverse form C.'Ti' sported off C.'It', both these variegates are now recognised as forms of C. arelii.

## APOLOGY

It appears that the gremlins got into the printing of Mike Symmons letter to the Editor May/June 06

In item 2] Mike wrote "Neither grex names or double quotation marks are allowed under ICNCP rules" We omitted the word Double which could make Mike look rather foolish.

In item 3] Mike wrote " the number of species in a Bromeliad collection is, to a large extent, indicative of the value of that collection and they should be easily identified" We omitted the last 5 words.

In the last paragraph Mike wrote "I readily admit that there probably many plants incorrectly labelled in my collection" We omitted the word probably. This could suggest that Mike knows they are incorrect rather than suspects he has been sold plants with incorrect labelling.

Bromeliaceae unreservedly apologises for these omissions and any concern they may have caused

*Neo.* 'Fairy Dust' - not fertilized

*Neo.* 'Fairy Dust' over fertilized but undamaged

*Neo.* 'Happy Thoughts' before over fertilization

Fertilizer burn - Two weeks after application

***Edmundoa lindenii* (variegated)**

## A BEGINNER'S GUIDE TO PRODUCING BROMELIAD SEED

(by Bob Reilly)

Producing bromeliad seed can be very interesting and a lot of fun. It can also be the surest way of obtaining the seed that you want, as seedbanks often only have a limited range of seed.

Before I describe how you can produce seed, I will outline a few botanical terms. Please bear with me while I do this, as it makes the rest of the article a lot easier to follow.

Most bromeliad flowers have male and female parts in the one flower.

The male parts, which are illustrated on page 15, comprise the anther (that contains the pollen), and the filament (that supports the anther). Collectively, they are known as the stamen. The pollen is usually white or yellow. It is ripe when the pollen "grains" come away as a "film" when you touch the anther.

The female parts, which are also illustrated on page 16, comprise the stigma (that "accepts" the pollen), the style (that supports the stigma), and the ovary (which is where the seed is produced). Collectively, these parts are known as the pistil. The stigma is, typically, ready to accept pollen when a small drop of nectar forms on it. The drop is readily visible through a magnifying glass for those of us whose eyesight isn't what it used to be.

Basically, seed is produced when pollen that is acceptable to a particular bromeliad is placed (whether by humans, insects or other mechanisms) on a receptive stigma. Fertilisation then follows, and seed is produced. (There are lots of variations on this basic theme, but this explanation is adequate for our purposes here.)

Seed can be produced without any human intervention. For example, a lot of bromeliads are fertilised by insects such as ants and bees. However, many bromeliads have evolved over the centuries so as to only use particular pollinators, for example, long-billed honeyeaters. As these pollinators are in the Americas, (from whence bromeliads came), and are not in Australia, then pollination of such bromeliads is unlikely to occur without human intervention.

If you want to start with some easy bromeliads for producing seed, the following points may assist you:

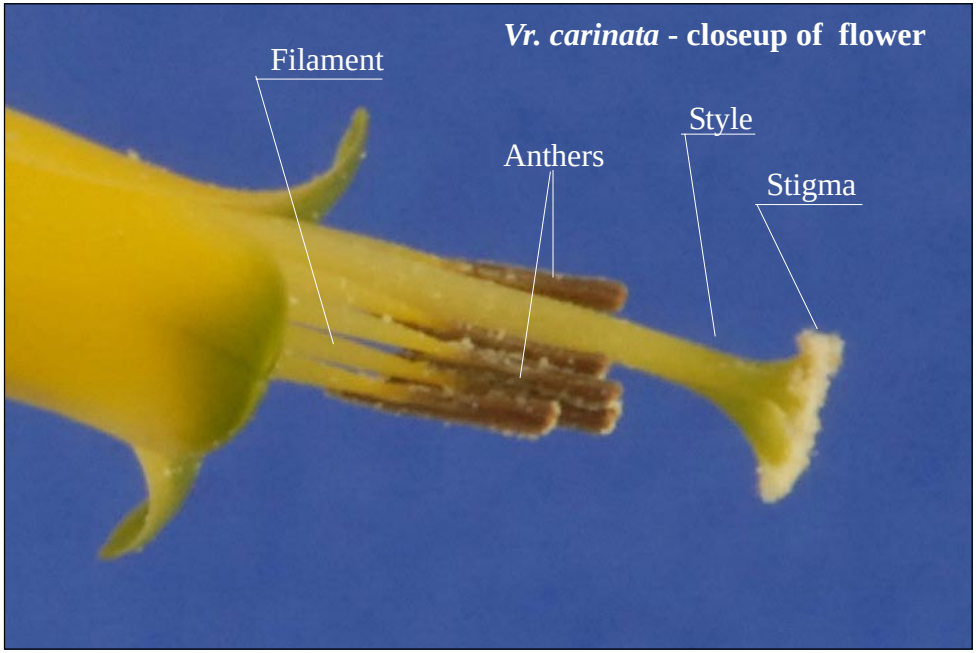
• Select bromeliads where the stigma is higher then the anthers, that, in turn, projects beyond the petal's tips. (See the illustration on right of page 16). Many aechmeas, alcantareas, billbergias, tillandsias and vrieseas fall into this category. A slightly more difficult group are those whose stigma is below the petals' tips (and still above the anthers), but are readily accessible for pollination as the petals' tips project outwards, giving ready access to the stigma. Most neoregelias fall into this category.

• Select day-flowering bromeliads so as to avoid the midnight to 3 am trips to the plant to pollinate it. Thankfully, the vast majority of bromeliads you will encounter are day-flowering.

• Select plants from within the same genus to pollinate, as crosses between plants of different genera are, generally speaking, much less likely to succeed.

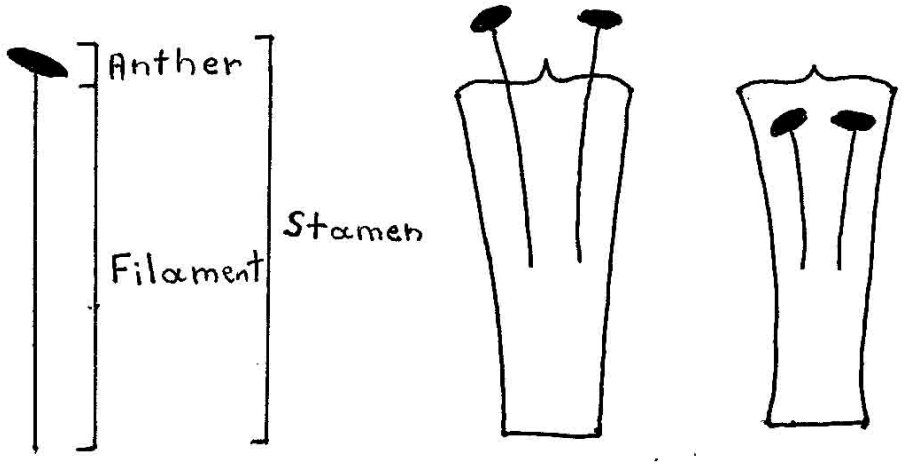
• You have the best chance of obtaining seed of a bromeliad species, if you use two different "clones" or plants of a slightly different genetic make-up. However, as it is often difficult to determine if two plants are different clones, then have a go at pollinating them even if you are not sure as to their origins. After all, you have little to lose, other than some of your time.

• While most bromeliads will produce


Vr. carinata - closeup of flower
Filament
Anthers
Style
Stigma


Anthers loaded with Pollen
Vr. sucrei - closeup of flower


Pistil and Stamen hidden within flower
Guzmania 'Gwendolyn' flowers




The left-hand illustration shows the elements of the male component of a bromeliad's flower. The anther, (which holds the pollen), is supported by a long thin stalk known as the filiment. Collectively they form the stamen.
The other two illustrations show two situations. In the central one, the stamens project beyond the petal's tips, and the pollen on the anthers is easy to harvest. The one on the right shows stamens where the anthers do not project beyond the petal's tips. The pollen is difficult to obtain.

fertile seed, initially, you may wish to concentrate on those that can produce, from seed, a flowering-sized plant within three to five years. Most aechmeas, billbergias and neoregelias meet this requirement.

• Species' bromeliads are often more likely than hybrids to produce viable seed. (Hybrid neoregelias are a frequent exception to this generalisation).

To pollinate bromeliads, you need the following equipment:

•Two bromeliads. Normally, one is used to supply the pollen, while the other is pollinated. However, if you wish, use each one to supply pollen for the other.

•A small artist's brush, sharpened pencil or similar object.

•A pair of manicurist's scissors.

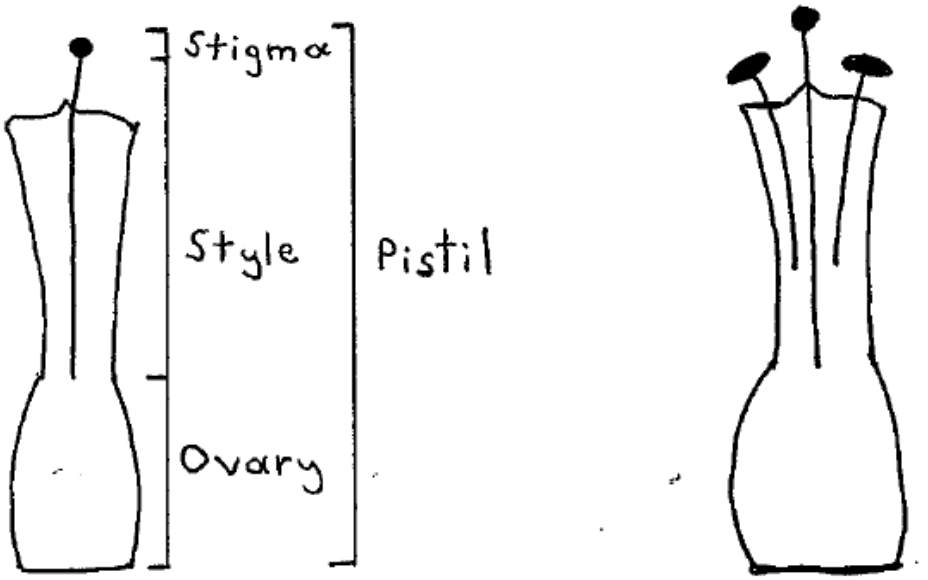
The pollination process is as follows:

•Wait until an hour after sunrise on a fine day and gently wipe the anther with the artist's brush or pencil tip. If the pollen is viable, it will form a white or yellow "film" on the object's tip.

•When a drop of nectar forms on the stigma, gently brush the pollen onto the stigma's top. Liberally "coat" the stigma with pollen.

•Repeat the process, if you have the time, at 15 minutes' intervals for the next 90 minutes. (Personally, I find that it does not make a lot of difference how many times I apply the pollen, as long as there is plenty of it on the stigma following the first application. Still, other people have achieved better success using repeated applications of pollen).

•If you wish to minimise the chances of the "seed" plant pollinating itself, use the scissors to cut off the anthers of the plant be-




The left-hand illustration shows the elements of the female component of a bromeliad flower. The stigma is supported by the style that is connected to the ovary. Collectively, these elements are known as the pistil. The right-hand illustration shows a bromeliad petal with stamens and, in the petal's centre, the stigma and style. In this case the stigma proijects beyond the petal's tips and is easy to pollinate. If the stigma does not project beyond the petal's tips, then it is more difficult to pollinate.

ing pollinated, before the pollen they contain is viable. (If you do this as soon as it is light enough to see what you are doing, then you should be right).

• Repeat this process on as many flowers as you can, over several days or weeks, to maximise the chances of obtaining some seed.

If a flower has been fertilised, the ovary will gradually swell over time. Some bromeliads, for example many aechmeas, produce berries that change colour (typically from a light to dark shade) when they are ripe. In other cases, for example neoregelias, the seeds are ripe when the fruit comes away from the plant with a slight tug.

Many aechmeas, billbergias and neoregelias take 2 to 12 months for their seed to ripen from the time of fertilisation.

Many people separate the seed from the pulp of berry-type fruit by squeezing the berry's contents into a small jar of water into which one or two drops of detergent have been added. They then seal the jar and shake it vigorously for 5 minutes, repeating this step 2 or 3 times over the next 24 hours.

They then pour the mixture through a

tea-strainer and onto a paper towel. The seed will go through the strainer and the pulp will be left behind. After the seed has dried, it can be scraped up and stored in a paper envelope until you are ready to sow it. Label the envelope with the harvest date, and the parents' names.

(Personally, I just squeeze the berry's contents directly onto a paper towel. After a day, the seed is dry and can be scraped off the paper. If the seeds stick together, gently rub them between your fingertips to separate them).

Seed from other types of fruit produced by bromeliads such as aechmeas, billbergias and neoregelias can be scraped from the fruit directly onto a paper towel. Then store them in a paper envelope. (Note that bromeliads such as tillandsias, guzmanias and vrieseas produce seed with "thistle-like" hairs attached to them. They do not form berries or have fleshy fruit. They are not covered in this article because they are not the best ones for beginners to start on).

Normally, you will find that you produce more seed than you require for your own use. Please donate any surplus species seed to the Society's seedbank c/- Doug Parkinson, 51-53 Analie St., Ningi Queensland 4507). You will need to keep hybrid seed to find out which is the best and which you can eventually name.

### Society Constitution Under Review

The constitution provides the basic rules on how the society is run. No action may be taken by the society which is contrary to those rules. It has been a number of years since the constitution has been reviewed and the management committee has appointed Ross Stenhouse and Glen Bermoth the job of co-ordinating the review.



### New Members

Please welcome the following new members: Pamela Foley, Janice Gersbach, Karen Maxwell, Vickey Dennien, Doreen Noble, Vicki Atherton, Alex Mead, Val Mitchell.

*Gus. sanguinea* 'Tricolor'

*Guz. sanguinea var. comosa*

## GUZMANIA SANGUINEA

by Bob Reilly

This plant is one of the most beautiful guzmanias when it is flowering. For the rest of the time, its green leaves "blend into the background" in many collections. Its cultural requirements were covered in the article on growing guzmanias in the May-June 2006 edition of *Bromeliaceae*.

In brief, their main requirements are: grow them under 70% shadecloth, or the equivalent amount of shade from trees. Pot them in a well-draining mixture, using a 150 mm (or larger) pot Water them once a week in winter and twice a week in summer. Foliar feed them on a weekly or fortnightly basis.

Typically, about 15, 5 cm wide, leaves form a flat rosette approximately 60 cm across. At flowering, the leaves become completely red, yellow-orange, a combination of these colours, or a red/yellow/green combination. This leaf colouration is retained for several months. Flowering can occur in spring or autumn. There is also a very attractive variegated form known as *G. sanguinea* 'tricolor'

The photographs on the page opposite, show a plant exhibiting the "typical" red-yellow-green combination, and a plant of *G. sanguinea* "tricolor'

*G. sanguinea* var. *brevipedicellata* is a much smaller plant, having 2 cm wide leaves, and a width of 30 to 40 cm..

A much rarer plant is *G. sanguinea* var. *comosa*—see the photograph on page opposite, that was supplied by Nina Rehak. Its distinctive feature is the "feather-duster"-like structure sticking up out of the centre of the inflorescence. The function of this structure is unknown, but it makes recognition of this plant very easy!

Harry Luther takes up the story of this interesting plant in an edited extract from his 1989 article on it:

"…The first record of this taxon in cultivation appeared as a short article in the equally short-lived publication *Bromeliad Papers* published by Alex D. Hawkes in the late 1950s and early 1960s….Apparently, the plant did not persist in cultivation.

The next appearance of this odd plant in print, and beautifully photographed, was on p.260, vol.XXXI, (1981) of the *Journal of the Bromeliad Society*. This article by Jeffrey Kent stated that the plant has been collected above Tumaco in southwest Colombia….

Shortly before Mr. Kent's expedition, Franz Gruber of the nursery Orchideas S. A. in Colombia introduced a limited number of plants of this taxon into Florida…They were (incorrectly) identified as *G. sanguinea* var. *erecta*. They have remained in horticulture but have never been widely distributed because of their limited potential for asexual propagation. Evidently, no one has attempted to grow them from seed.

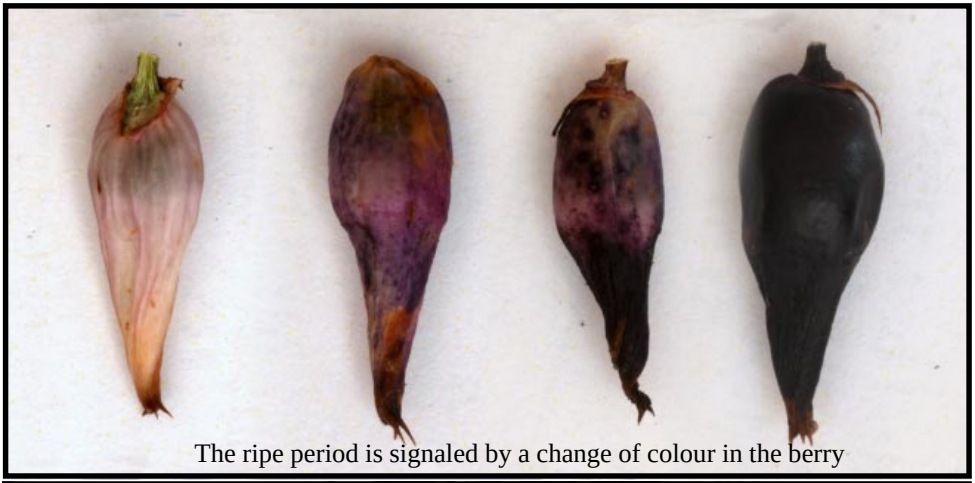
Finally, after more than 44 years since its discovery (and nearly 30 years since it was introduced into horticulture), this confusing plant has a name, *G. sanguinea* var.*comosa*…"

Alas, Nina Rehak's plant is no more, and I do not know of any others in Australia. Some still persist in the United States.

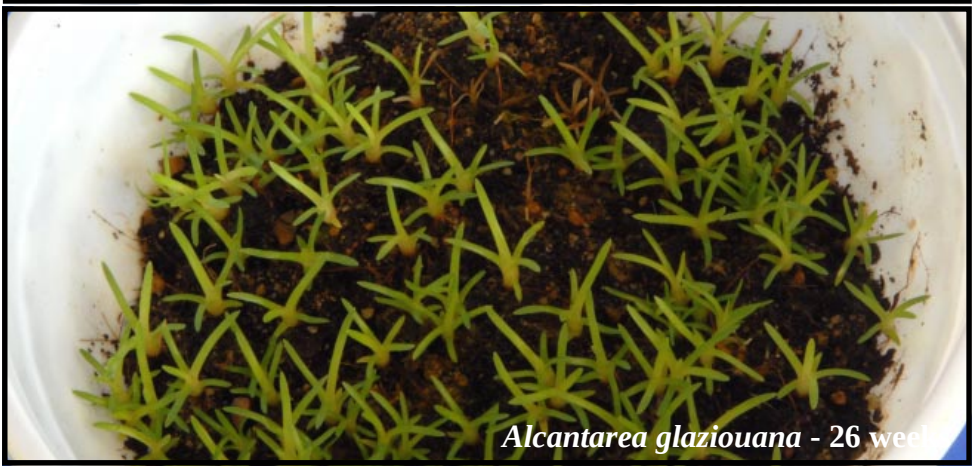
**Acknowledgements**: I thank Nina Rehak for supplying the photograph of *G. sanguinea* var. *comosa*, and Doug Upton and Ross Stenhouse for the other photographs.

References

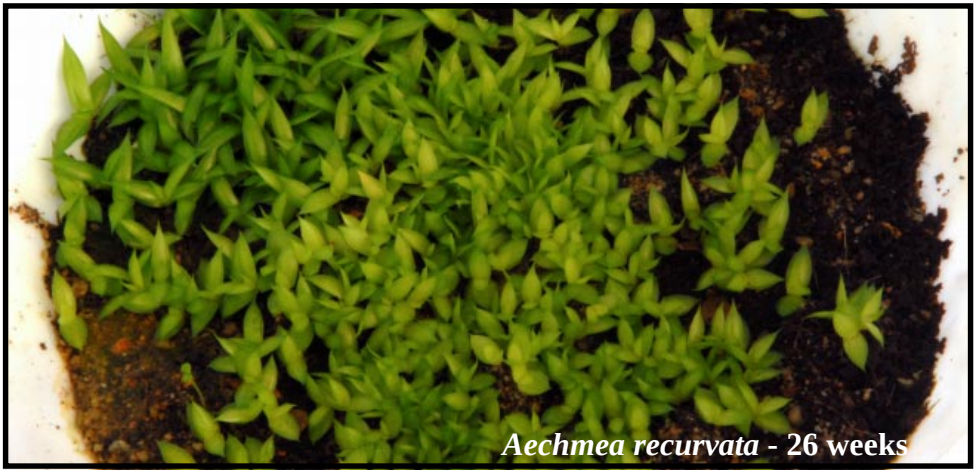
Luther, H. E. (1989) *Guzmania sanguinea* var. *comosa*, Journal of the Bromeliad Society, September-October 1989, v. 39 (5) pp 197-204.



The ripe period is signaled by a change of colour in the berry



***Alcantarea glaziouana* - 26 weeks**



***Aechmea recurvata* - 26 weeks**

## AECHMEAS FROM SEED TO SEED

(by Arla Rutledge and Harvey Kendall)

**E*ditorial comment (Bob Reilly)****: Reprinted, with permission of the Bromeliad Society International, from the Journal of the Bromeliad Society, March-April 1989, v. 39 (3), pp 77-81. The authors were American bromeliad growers who had extensive experience in growing bromeliads from seed. While many bromeliads can be grown from seed, aechmeas are some of the easiest ones to pollinate, and then grow on from seed. In a future edition of Bromeliaceae an article by these authors on growing neoregelias from "seed to seed" will be reprinted.*

The complete life cycle of a plant is truly a marvelous process. Having a hand in the process adds to the thrill. If you have acquired some experience in raising and blooming bromeliads, you may wish to extend your skills to include hand pollination, harvesting seed, sowing the seed, and caring for the young seedlings.

The species aechmeas that develop berry fruit provide good material for the novice. Included in this category are: *Aechmea fulgens, A. ramose, A. ludemanniana, A. mexicana, A. castelnavii, A. nallyi, A. racinae, A. miniata, A. victoriana, A. angustifolia, A. bracteata, A. coelestis. A. mertensii, A. penduliflora, A. tillandsioides,*

The flowers are usually accessible, the flower parts easily identifiable, the berries visible and the seed evident. Since the anthers and the pistil in the aechmeas are approximately the same height, some may self-pollinate, the close proximity bringing the pollen from an anther onto the pistil at a propitious moment and thus causing fertilization. Also you may have insects in your area that are attracted to the pollen or the nectar secreted at the tip of the pistil. In that case, the insect will spread the pollen within one flower, from one flower to another, or from the flower of one plant to the flower of another.

Some plants require the pollen from the flower of the same species but from another clone before fertilization will occur.

**Hand Pollinating**

I f you are intent on getting seed on your plant, it is best not to rely entirely on nature. You will increase your chances of obtaining seed if you will enter into the pollination process yourself. (Note: Not all aechmeas will open their petals for you. These types are naturally pollinated by insects with a long proboscis, but you can accomplish the same effect by spreading the petals and pollinating as described below.)

In most instances, the pollen in bromeliads remains viable for a period longer than the pistil will receive it. In aechmeas, you can expect the pistil to receive pollen over a period from as little as 15 minutes to more than an hour, depending on the species concerned.

The pollen will ripen shortly before this period begins and will remain viable considerably longer. The reception period can be determined by observing the pistil with a magnifying glass. When a bead of nectar is present on the tip of the pistil, it is receptive to the pollen. The aechmeas are usually fertile during the early daylight hours.

Using a small artist's brush or the tip of a pencil, dab into the flower and look to see if you have picked up any pollen. It will show as a bright yellow powder or a coarser "meal" on your brush or pencil. Proceed from flower to flower, if you have more than one open, and dab several times at each to ensure that the pollen reaches the pistil. If you are not sure that the pistil is receptive, it is recommended that you repeat the process at half-hour intervals throughout the morning.

Do not be surprised if you do not find ripe pollen. Since most bromeliads have alternate means of propagation, they do not always have perfect seed production mechanisms. Frequently a plant will simply not produce pollen. Such cases may respond to pollen from another specimen of the same species, and it is even believed that seed production can be stimulated by the presence of pollen from a different species even if actual hybridization does not occur.

Cross-pollination or hybridisation is a little more complicated. Most hybrids occur between two species of the same genus. Rarely can we succeed in crossing two plants from different genera. To cross-pollinate, we take the pollen from one species and apply it to the pistil of another species. In the aechmeas, the parts of the flower are so close together that the pistil may accidentally pick up pollen from its own anthers and the cross is thus thwarted.

To assure a cross, professionals will use a small manicurist's scissors to trim off the anthers before the unwanted pollen is ripe. When attempting a cross with a plant that does not respond to its own pollen, the cross might seem to be a foregone conclusion; however, as mentioned above, the seed may not carry any traits of the pollen parent, because the seed plant developed seed merely by being stimulated with another plant's pollen without actually transmitting the pollen's life force to the ovary. For these reasons, only the resulting seedling plant can tell us whether or not the cross occurred. *(Editorial comment-Bob Reilly: For this reason, if you are attempting to produce a hybrid, then it is best to always remove the anthers from the seed parent).*

**Harvesting**

After pollination, we must continue to care for the plant appropriately until a berry forms and seed ripens. This waiting period can be from 2 to 10 months, depending upon the species. In almost all instances the ripe period is signaled by a change of colour in the berry (See photograph on p.22) This colour change may be from orange to brown, from red to brown, light purple to purple, or from white to blue or purple. The colour change usually occurs quickly—within the period of a day.

When the berry-type fruits have reached the harvesting stage, the fruit will be soft to the touch and a gentle tug will easily remove the berry. You should harvest each berry as it ripens and not wait for the later ones. Delay could cause fatal spoilage. *(Editorial comment-Bob Reilly: At least under southern Queensland conditions, a delay of a week or so in harvesting berries does not appear to have a significant impact on germination rates)* On the other hand, harvesting the berries before the ripening stage is reached could give immature seed and no germination.

It will be noted that not all the fruits on a spike are ripe at the same time. Ripening occurs over a period of several days, one or two berries a day. Do not remove the spike from the plant until all fruits have ripened. To do so will stop development in the yet unripe berries.

In the nonberry-type aechmeas blooms such as *A. fasciata, A, orlandian*a, or the "cob-type" such as *A. bromeliifolia, A. triangularis*, or *A. pineliana*, the difference in the flower-head arrangements and the absence of a distinct colour change in the fruits makes harvesting a little more difficult. Since in a number of aechmeas the fruit is concealed in the bracts or buried in the base of the cob-type bloom, a close check will reveal the fattening of the fruit and only a slight, if any, colour change when ripe. However, a gentle tug on the fruit and its easy removal will indicate the fruit is ready to harvest.

To harvest the seed, pick the berry and squeeze its contents into a small jar. You will immediately recognize the seed. It may be long and thin or shaped like a tiny egg. (On rare occasions, as in A. chantinii, which is one of the aechmeas that require hand-pollination in the absence of insects, the seed may actually have germinated in the berry. In that case, you will see scraps of green. These tiny plantlets are usually hardy and may be plucked at this point and grown as any other seedlings.)

When you have harvested the ripe berries and have them in a jar, fill the jar half full with water, tighten the lid, and shake the jar. Repeat the shaking frequently for the next 24 hours. *(Editorial comment-Bob Reilly: Many people find that if you shake the jar vigorously for five minutes, and again after another day, this will enable you to obtain most of the seed).* It may also be advantageous to include a drop of liquid detergent in the jar.

This agitation and soaking will remove much of the sticky pulp from the seeds. After one day in the jar, the seeds may be dried. Pouring the seeds and liquid into a small mesh sieve, such as a tea strainer, is a simple method of removing the seed from the jar. Spread them on a sturdy paper towel. After one to two days, depending upon the humidity, the seed should be scraped off and stored. It is important that the seeds be allowed a certain amount of air exchange so that they will not develop mould or germinate prematurely. Therefore, keep them in a paper envelope—not plastic. A dry glass is acceptable only if the seeds are completely dry and if the jar is large enough to ensure adequate ventilation for the seeds.

The seeds are ready for sowing as soon as they are harvested. **Unless you really need thousands of plants all alike, be kind and helpful and send some to the Seed Fund, (C/- Doug Parkinson, 51-53 Analie St, Ningi, 4511).**

**Sowing**

The seed of many bromeliads will remain viable for as much as 12 months, although the percentage of viability decreases with age.

The preparation of seed beds for this type of bromeliad is relatively simple. You will need a plastic container with a transparent lid such as a plastic shoebox, refrigerator dish etc. For a small planting you can use an inexpensive plastic beverage glass such as those used on airlines; the cover can then be a plastic sandwich bag. The bottom of the container must be perforated. A hot nail held by pliers will work. Handier is an electric soldering gun.

The planting medium should be a fine-textured commercial house-plant mix. It might be helpful to sterilize the mix by heating in a pressure cooker, oven, or a microwave oven, but our modern spectral fungicides such as Benlate, Benomyl, or Physan will obviate any damping-off problems.

Prepare some pure water—rainwater or bottled drinking water is recommended, and absolutely necessary if your water is as heavy in minerals as ours in southern California. Never use water from a water softener. Add the fungicide as recommended by the manufacturer. Use this water to saturate the soil.

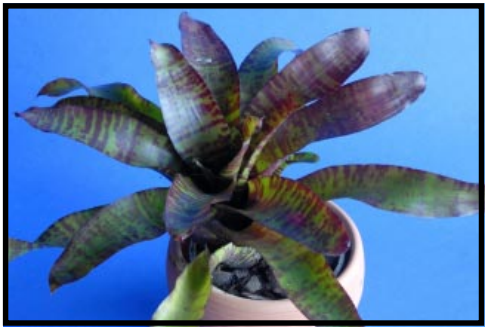
**Editorial comment (Bob Reilly)**: An alternative approach is as follows:

• *Obtain a Chinese food container and thoroughly clean it,*

· *Sterilise the seed-mix by pouring boiling water over it*

• *Then proceed as indicated below, but noting that once you place the lid back on the container, the seeds are unlikely to need further waterings for several weeks or months.*

Fill the container to a depth of about







*Neo* ‘Blushing Tiger’ is shown at left.

The set of seven photographs show the wide variation you get by putting the pollen from ‘Blushing Tiger’ to the stigma of ‘Blushing Tiger’ in other words ‘selfing’,

2.5 cm with the moistened mix. Compact it with your fingers to obtain a smooth, firm surface. Spread the seeds on the surface so they are not touching each other. You may want to note the number of seeds so you can later compare it with the number of seedlings. Such information is important for further investigation and experimentation in the field of seed viability.

Do not cover the seeds with the mix. A soil covering means certain failure of the seeds to germinate. Place a lid on the container, mark it with the name and date, and set it in a light, warm spot away from the direct rays of the sun. The top of a refrigerator is frequently used for seed germination, since it is warmed by the even heat given off by the refrigerant coils.

**Germination and care of seedlings**

How long will you wait before you see green sprouts? Germination usually occurs in about 14 days. However, if the seed is old, the period may extend to as much as 30 days. Keep a close watch on the seed beds. If they become dry, set them in a pan of pure water until the mix is damp again. Watering from above may shock the tiny organisms and cause the germination to stop. Even after the seedlings are well on the way, overhead watering may be fatal, because the tiny root system of the seedling may be dislodged from the medium

When the seed shows its first germination, it is usually a single leaf. However, soon another leaf will begin to appear. In a short period of time you will notice the second set of leaves beginning. At this point, the lid or covering on the container may be removed. This action should be done over a period of several days by moving the lid a small amount each day. Gradually removing the lid averts damping-off by allowing the seedling to become adjusted gradually to the different atmosphere. To provide humidity in the area of the seedlings, if they are being cared for in the house, small containers of wet sand or gravel may be placed in the area of the seedlings.

**Potting up**

When the seedlings have reached 1 cm or more in height and the third set of leaves is in evidence, move them into a larger, community container. (In some instances, you will find certain aechmea seeds will germinate on an apparent stem with leaves developing at the top of the stem. In this case, the transplanting should be delayed until a tiny root appears at the base of the leaves. Then they may be moved to the community pot with the seedling being placed so that the base of the leaves rests on the medium.)

Prepare the community pot with the same medium used in the germinating pot. The new container could be a “pony pack” a propagation flat, or a similar shallow pan with good drainage. Pick individual plantlets from the seed bed with a knife tip, tweezers, or some similar instrument and plant them in the new pot so that their leaf tips barely touch. Such close proximity helps maintain a high humidity around the plants.

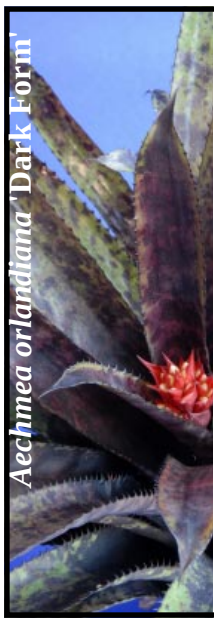
The root systems may be very small and unable to hold the plants erect. A good aid at this point is plastic toothpicks used to support the wobbly seedlings. Bottom watering is recommended until the plants are quite stable, and misting daily with a spray bottle will keep the medium surface moist and also create humidity. Include a fungicide in the spray if there is evidence of fungus. Continue using a weak fertilizer solution every two weeks.

When the plants are again crowded, after 6 months or more, they may be transferred into individual pots. If the plants are showing sturdy growth and have a healthy, mature root system along with hair-like seedling roots, they may be placed in the medium used for mature plants and off-shoots. A pot

*Billbergia vittata*

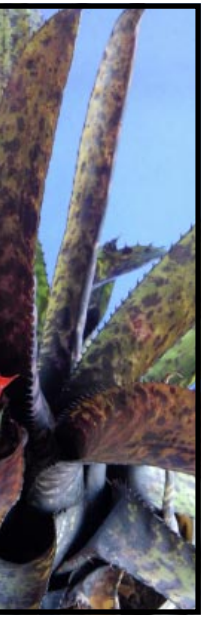
*Aechmea phanerophlebia*

*Guzmania lingulata* 'Clarity'



*Aechmea orlandiana* 'Dark Form'

*Guzmania* 'Lyndall' (unreg)



*Hohenbergia correia-araujoi*

*Guzmania* 'Olive'

of at least 75 mm is recommended, because the medium in the very small pots will dry quickly and may cause some losses. If clay pots are used, it will be necessary to water more often, as the porous texture draws the moisture from the medium causing it to dry quickly. Plastic pots retain moisture much longer.

Each time the plants are transferred to a new pot, you may expect some losses. Even with good care, the losses amount to about 10%. Give these casualties a decent burial and devote your attention then to the living.

**Maturation**

The smaller aechmeas such as *A. mertensii* or *A.. tillandsioides* should reward you with a bloom spike in three years. The larger plants will take a little longer to reach their mature size. When the first inflorescence appears, you will enjoy pride and satisfaction at bringing a bromeliad through its complete cycle—from seed to seed.

## HYBRID VARIATION

(by Bob Reilly)

When you read articles on hybridising, they often make the point that the seedlings produced by crossing a hybrid with a hybrid will be very variable. The photographs on pp. 26 and 31 illustrate this point.

On page 26 you will see the results of 'selfing' (in other words, putting the pollen from the plant back onto its own stigma so as to produce seed) a plant of Neoregelia 'Blushing Tiger' . N. 'Blushing Tiger' is a Lisa Vinzant hybrid from Hawaii that, as the name implies, blushes red in the centre at flowering. The plants produced from self pollination show great variation, with some having hardly any barring at all on the leaves and none with the red centre. None of this progeny can be called 'Blushing Tiger' To try to identify them as 'Blushing Tiger' selfed is only asking for trouble because the 'selfed' part is almost always forgotten when any new labels are written. If the progeny are good enough they should have their own name

The "best" clone obtained from this cross is a matter of personal choice. (Personally, I like the one in the bottom left-hand corner on p. 26, but I am sure opinions would differ on this point). The main point though, is that there is a big difference in appearance between them and just describing the cross as N. 'Blushing Tiger' (selfed) is not going to help very much.

On the page opposite, the results of crossing two hybrids that have *Vriesea fosteriana* and *V. platynmea* var. *variegata* in their parentage are shown. The variation is tremendous, with some plants being very pale, while others have dark brown markings and banding.

All of these hybrids are worthy of their own name. However, this does create a dilemma for the hybridist. First of all, it will take a long time to produce enough plants to make a commercial, or even semi-commercial, release of them if you only have one plant to start with, as is the case here. Second, if you have 30 or so of these hybrids, then, collectively, they will take up a lot of shadehouse space as they are being multiplied to produce commercial quantities. Even large nurseries run out of space, let alone the average hobbyist.

So, the outcome is often that a lot of unnamed (that is, beyond the "formula name" of the cross), but beautiful, plants finish up on the market. While it is easy to be critical of the hybridist for doing this, in fairness, they face a very real dilemma in such a situation

A couple of additional points are worth making about these plants:

•Because of their variation, you need to see the plant, (or at least a photograph of it), that you are buying to ensure that you are buying the one that you really want.

**The interesting results obtained from crossing a V. fosteriana hybrid with a V. platynema var. variegata hybrid**

•While some beautiful hybrids have been produced from these "complex" hybrids (as they are sometimes described), there are also a lot of very "average" plants as well. So, the chances of producing an outstanding hybrid by using this approach can often be less than using two species that people have not used extensively as parents for hybrids.

**Continued from page 6**

apart from other substances.

3. **Adhesion**: The attraction of water molecules to other hydrophylic (water-loving) substances, such as soil particles, wood or humus. In a growing medium, moisture stays spread in suspension because the adhesive force is greater than both gravity and the cohesive force.

If moisture is not absorbed by the plant, an allied fourth force is of course evaporation. Depending on the retentive properties and volume of the growing medium, the higher the air temperature and drier the atmosphere, the quicker the rate at which water will evaporate. Also, unsealed clay or terracotta pots extract water from the mix, and therefore the contents dry out faster than if in plastic containers.

Other important variables influencing many of the above factors are the strength, duration and frequency of sunlight and wind (or ventilation).All these elements in cultivating bromeliads may seem obviously basic but sometimes we overlook some or think they don't matter, perhaps hoping our plants will adapt.

Hydrophobic soils (which repel water) occur where there is a build-up of a wax-like coating on dry soil particles, usually at the mix surface. In studies of localized dry spots in turf grass for example, the soil particles were found to be coated with a complex organic, acidic material, which appeared to be the mycelium (growth structure) of a fungus. Water beads up when applied to such a surface. This is a larger problem in finely textured clay or loam soils compared to sandy soil particles, which tend to be larger and therefore more aerated. Repotting or replacing soil with a more porous mix can often solve this water repellency problem, at least temporarily. Water repellency occurs more in terrestrial mixes where the top 3 cms. are mainly soil and are allowed to dry out.

Wetting agents are useful for bromeliads, and two main types come in granular, liquid and crystal forms.

**Surfactants** (surface spreaders) are biodegradable detergents which reduce the surface tension of water, allowing the water molecules to spread out and more easily penetrate the soil surface. The granular polymer (compound) types are effective immediately and if they are multi-coated in different surfactants, they tend to operate longer—up to 6 months or more. Horticultural use brand names include Multicrop's Deep Watering Granules, Debco's Saturaid, Yates Slippery Water and Richgro Ezi-Wet. These granules are seldom necessary for pot-grown or garden bed epiphytes or lithophytes if the open mix is largely coarse bark, scoria or humus-based. In addition, rosettes of epiphytic bromeliads are invariably cup or tank-shaped for water and nutrient catchment, with the overlapping leaf axil reservoirs chanelling any overflow down the sheathed stem to the root zone. Hence the value of overhead watering. This vertical trickle-down effect works the same way as micro-drip irrigation. There is also some capiliary wetting sideways (like a sponge), especially if the mix has a high humus content. Automatic sprinkling from above relies on this principle because, with crowded plants and foliage overlapping pots, not all surface areas of the growing medium are wetted as compared to thorough hand-watering. In epiphytes in the wild, the pri-

mary role of roots is host attachment, not sustenance. In cultivation, however, they act more as feeding roots, supplementing the nutrient intake of the rosettes. Surfactants assist fertilizers to reach this target.

Few bromeliads which are exclusively terrestrial have water-storing rosettes—their relatively narrow, arching, recurved leaves act like an umbrella, shedding water to the outer root zone. In my experience, dyckias, despite being xerophytic, flourish more with regular watering and the use of surfactants. Cryptanthus and orthophytums benefit also, appearing less stressed if constant moisture is available. Pitcairnias, ananas, hechtias, deuterocohnias, puyas, and other ground-dwellers experiencing seasonal habitat dryness show more active growth in cultivation if drying soil is not a constant problem.

Liquid surfactants have similar results to granular polymers but generally the active ingredients are used up or leached out quicker. Brand names in liquid form include Garden King's Wettasoil, Multicrop's Eco Wet, Brunning's Easy Wetta, and Wetter Soak. These are high concentrates needing dilution (follow the manufacturer's instructions), and as with the granular types, it is better to not apply to the plant's foliage, as tissue damage may occur and they can possibly clog the water-absorbing trichomes. Both granular and diluted liquid polymers are suitable for adding within the growing mix.

**Humectants** ('super absorbents") are industrial silica crystals which attract and store water in potting mixes. Brand names available include Hortex Australia's Rainsavers, Yates' Waterwise, Hydrobead's hydrogels, Terra-Sorb and Agrosoke, although the latter two I have not seen locally. A little goes a long way with these compounds, for when immersed in water the solid crystals expand enormously into soft gel form, absorbing moisture up to 200 times their own weight within one hour. Again, follow the manufacturer's directions on proportions when adding this slurry to your growing medium. A second method is adding the crystals dry into the mix, pot up the plant, water thoroughly and the crystals will expand. Another watering two hours later ensures the crystals are fully charged. To apply to established plants without undue disturbance, a few crystals can be inserted in individual holes made by a stick probe to the root area, covered over then water added. These gels last at least several years, rehydrating at each watering. Eventually the crystals disintegrate, depending on the fertilizers and the pH of the mix and the water. They can be invaluable for cryptanthus and orthophytums in particular, and especially for specimens in small pots and hanging baskets which dry out so fast otherwise in hot, windy weather. Crystals are probably better suited to controlled watering under cover, as their use in garden beds may leave bromeliads' roots too damp in cold, wet winters.

Apart from rain, there is no substitute for regular watering which creates extra humidity for those bromeliads which need it to really thrive. Wetting agents are a handy supplement to keep water in the rooting medium, but they alone cannot counteract an unsuitable mix as a quick fix. Although claimed to be "environmentally-friendly," there is some evidence that long-term use of these synthetic compounds destroys soil microbes.However if repotting is done annually, wetting agents should not adversely affect the health of a plant. Some new lines (in the U.S.A. at least) have microbes and organic fertilizer added to the wetting agents, but the fertilizer is probably not specifically suited to bromeliads.

As outlined, growing media for terrestrial bromeliads have many problems in water infiltration and retention, unless epiphytes are grown in earthy dirt only. Rainforest epiphytes in the wild often experience daily rapid

saturation and drying out of roots steadfastly clinging to tree branch bark covered in mosses and lichens during the wet season—perhaps conditions we should try to replicate with "difficult" species. Though perhaps only in a fully controlled glasshouse can a cloud forest canopy for mist-wet epiphytes be recreated. Dry woodland epiphytes in their normal habitat are often dehydrated; not a condition to be duplicated to attain showbench quality specimens. Dry seeds need to imbibe moisture to germinate and misting seedlings is usually a must in the early stages of seedraising.

Other watering methods with limited use include self-watering pots with built-in wells, capillary matting, and wick-watering—ideal for select specimens to "mind themselves" while the gardner is away. In addition, applying mulch to garden bromeliads both conserves moisture and feeds the roots.

Plant tissues are 80-90% water; thus the importance of watering. There are moisture meter probes on the market but they're probably impractical for large collections—observation and experience are still the best indicators of all.

**References**

Benzing, David. 1980.The Biology of the Bromeliacls; pp. 59-76, 106-111, 257. Mad River Press.

Galceran, Sherry. 1990. Potting with polymers. Cryptanthus Society journal 5(4): 22-23.

Miller, Chris. 2001 .Timing soil surfactant applications. Turfgrass Trends 10 (1).

Tracy, Dick. 1989. Polymers rescue thirsty plants. Journal Bromeliad Soc. 39W: 35-36.

Tarrant County (Texas) Bromeliad Society Newsletter, reprinted BSI Journal 38(4): 177-178. 1988.

**Websites**

http://ces.soil.ncsu/soilscience/publications/Soilfacts/AG-439-25/body.htm

Source: H.D.Sunderman (1983), Soil wetting Agents, North Central Regional Extension Publication 190, Colby, Kansas State University

Website: www.aquatrols.com

Website: www.vitagrow.co.uk/amenity.html

Website: www.agsa.com.au/atm/articles/vol21/wetagnt.htm

## BULBOUS TILLANDSIAS

(by Lester Ching)

*Editorial comment (Bob Reilly): This is an edited version of an article which first appeared in Bromeliad, October 2003, v. 43(10), pp10-11. While this article was written with New Zealand growing conditions in mind, most of the suggestions and comments are also relevant to Queensland. Nearly all of the "pseudo-bulb" species recommended in the article are easy to grow in Queensland, while the recommended "true bulb" species can be grown successfully, with a bit more care.*

There are two main groups of bulbous tillandsias:

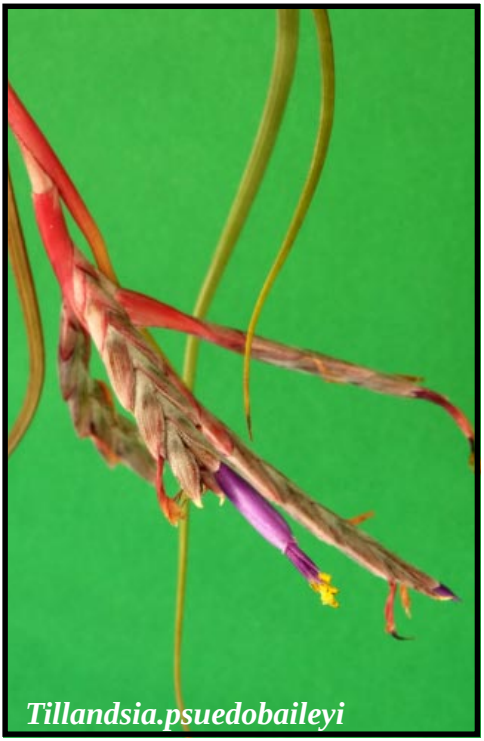
- "Pseudo-bulb": which is an "open" bulb e.g. *Tillandsia disticha, ehlersiana,* and *streptophylla*.
- "True bulb": which is a "tight" bulb e.g *plumosa, filifolia,* and *fuschii.*

Pseudo-bulbs may have thin leaves, are often covered with large trichomes so the plants appear snow white or grey, and most have ants inhabiting them.True bulbs have tight fitting leaves and thick, water-holding tissue in the centre e.g. *T. plumosa.*

Bulbous tillandsias live exclusively epiphytically (in and on branches, cacti etc), and saxicolous (growing on rocks) in dry areas as well as rainy regions. Almost all bulbous forms are ageotropic i.e. their shoots are not affected by gravity, and grow in the direction where the bud is pointed when it first appears.

The plants, whether they are positioned on the upper or lower side of their host branch, are directed sometimes horizontally, and sometimes downward. This phenomenon is especially spectacular in *T. ionantha, bulbosa, caput-medusae, seleriana* and others. Water is held between their leaves, which serve to

*Tillandsia bulbosa*



*Tillandsia.psuedobaileyi*

*Tillandsia caput-medusea*

store the water while it is being absorbed by capillary action. Even if the plant is upside down, it can still hold water, as the leaves remain tightly closed.

The outer leaves do not hold water, but are inhabited by ants. The ants sometimes find their way into the inner leaves holding the water, but they cannot get out, and so provide nutrients for the plant.

Some observations about how to best grow these plants are as follows:

• Plants with stiff grey to grey-white leaves require more light and less water.

• Air movement is most important so as to enable plants to gather nutrients. (This point is often overlooked, but it can affect the plant's growth).

• Water—light watering during winter (once a month in New Zealand), and regular watering during summer (two to three times a week). Plants should be dry within four hours of watering.

• Light—high light to give warmth, and encourage strong growth. These plants can stand little light for long periods.

• Temperature—recommend 10-35 degrees C; if under 5 degrees C, keep the plants dry to minimise damage.

• Fertiliser—use of a fertiliser recommended for bromeliads once a month during September to March is great for blooming and plant reproduction. Some suggestions: Phostrogen, Yates Thrive, Nitrosol, and Watkins Bounty.

The following are some bulbous tillandsias you might like to look out for, as well as some cultural suggestions. The first group are pseudo-bulbs.

• ***baileyi***: single inflorescence, good light, sunny.

• ***balbisiana***: long slender plant, long flower spike, bright light, mist often.

• ***bulbosa***: different shaped plant with curled leaves, semi-shade, mist often.

• ***butzii****:* interesting shape and leaves, semi-shade, mist often.

• ***caput-medusae***: inflorescence pale to dark red colour, bright light, not too moist.

• ***circinnatoides*****:** sword-like flower spike

• ***disticha***: branched spike with slight fragrance, light, warm, mist often.

• ***intermedia***: pups from base and inflorescence.

• ***pauciflora***: infloresence grows outwards.

• ***pruinosa***: small, bottle-shaped bulb, mist often.

• ***pseudobaileyi***: small species, onion-shaped bulb, good light.

•***seleriana***: large, bottle-shaped bulb, mist often.

• ***streptophylla***: comes in different sizes and shapes, undemanding

• ***weberi***: similar to *T. bulbosa*

**True bulbs**

• ***atroviridipetala***: grown sideways or upside down is best, bright light.

• ***filifolia***: fine leaves, grow in clusters, semi-shade.

• ***fuchii***: small, ball shape.

• ***splumosa***: delicate, small plant.

## 2006 TILLANDSIA WORKSHOP

The Bromeliad Society of Queensland's 2006 Tillandsia Workshop will be held from 10 am to 3 pm on Saturday 16 September at 112 Verney Rd, Graceville.

Each participant will give a 5 to 15 minutes' presentation on a tillandsia-related topic of their choice. Topics range from introductory (for example, how do I stop my *T. stricta* from dying) to advance (for example, the various forms of *T. capitata*). During, and after, each presentation, there will be observations, questions, comments, etc. from the workshop's other participants.

Participant' need to register with the workshop organiser, John Olsen on (07) 3379 3433. by 31 August 2006. John will be able to give you further details.

*Tillandsia bulbosa x streptophylla*

*Tillandsia pruinosa*

***Tillandsia fuchsii* forma *gracillis***

## GROWING AECHMEAS

by Bob Reilly

Aechmeas grow well in coastal Queensland. The plants featured in this article are easy to grow, have attractive foliage or inflorescences, and, in some cases, both. (This article is an expanded version of one titled: *Some Hybrid Aechmeas* that appeared in the November-December 2004 edition of *Bromeliaceae)*.

All of the plants described in this article grow best in pots or small buckets. Squat pots are better than conventional ones as they help to keep the plant stable and upright. Because the plants are tall relative to their width, (and so are inclined to fall over when they are watered), in some cases it helps to grow them in a large pot, but only fill the container with potting mixture to half its depth. Another technique is to grow them in a small pot, but wedge it into a larger pot or small bucket using stones or similar objects.

Potting mixtures used successfully include:

• A mixture of one part charcoal to seven parts of chemically – treated pine bark chunks. (A special type of soluble fertiliser, available from the Bromeliad Society of Queensland, is used to treat the pine bark chunks);

• Well composted pine bark;

• One made of 2 parts Cocopeat or peatmoss to 1 part coarse sand

The composted pine bark mixture is probably the one most commonly used. A continuous release fertiliser such as Nutricote or Osmocote should be added to the composted pine bark, and sand-based potting mixtures, when the plant is potted.

Aechmeas should be given a heavy watering (between 7am and 10am) once a week in winter and twice a week in summer. During summer, they can be watered either early in the morning (between 6am and 8am) or late in the afternoon (after 4pm). (A heavy watering results in the plant's "vase" or "tank", formed by its leaves, being completely "flushed out" with water, and water flowing from the pot's drainage holes).

Foliar feeding with liquid fertiliser is not essential. However, some people prefer to use a liquid fertiliser such as Phostrogen, at half the strength recommended by the manufacturer for indoor plants, every fortnight.

These plants are subject to attacks from brown and flyspeck scale. These can be treated using a systemic insecticide such as Folimat or Confidor. Because it is sometimes difficult to see whether a plant has scale, when the infestation is in its early stages, it is best to spray all your plants once a year in early summer. (However, avoid days where the maximum temperature is likely to exceed 30 degrees Celsius as some aechmeas will "burn" when treated with insecticides under these conditions).

Further, spray any new plants you obtain, before they are placed with the rest of your collection. These measures will usually keep scale under control.

These plants reproduce through offsets known as pups. The pups usually emerge through the leaves near the base of the plant. In some cases, they form at the end of stolons up to 30 cm long which emerge from the plant's base. Pups should be removed when they are one third to one half the parent plant's size. Where pups are growing at the end of stolons, retain a 2 cm piece of stolon with the pup when you remove it. Place the pups straight into the potting mixtures described previously. Ensure they are held firmly by the mixture.

After the first batch of two to three pups have been removed, a second batch can some-

times be induced by fertilising the plant with a continuous release fertiliser such as Nutricote or Osmocote. The best times of the year to remove pups are mid September to end of November and late February to early April. Pups removed at these times will usually commence growing quite quickly.

Nearly all of these aechmeas have small spines on each leaf's edges. If you are working in or around them for any length of time, avoid scratches by wearing gardening gloves and some form of covering over your arms.

During winter, these plants can be grown under 50% shadecloth. At other times grow them under 70 to 75% (medium density) shadecloth. Alternatively, they can be grown quite successfully under trees or shrubs, provided they receive the same amount of shade as would have been experienced under the shadecloth.

The plants described in this article can, in most cases, be obtained fairly readily from some of the nurseries that advertise in *Bromeliaceae*. They can also be found in the plant sales' areas at the Society's monthly meetings, field days, and shows.

Photographs of many of the aechmeas described in this article appear in the May-June 2006 edition of Bromeliaceae, as well as this one.

**'Bert' (variegated form)** About 20, 5 cm wide, leaves form an erect rosette approximately 40 cm tall. The green leaves have purple spots and markings, as well as central, cream stripes of varying widths. The inflorescence consists of small clusters of yellow-petalled flowers. The plant grows well in a 175 mm bucket.

**'Bitter Sweet'** About 20, 4 cm wide, leaves form an erect rosette approximately 50 cm tall and wide. In good light, the leaves turn a pale, pink-purple, with pronounced dark purple spots. The inflorescence is relatively insignificant. The plant grows well in a 200 mm bucket.

***blanchetiana*** About 15, 10 to 15 cm wide, leaves form an erect rosette 150 cm high and wide. Depending upon the clone, the leaves can be yellow-green, yellow-orange or orange-red. The multi-branched inflorescence rises well above the plant's leaves. It consists of hundreds of "wheat-like" flowers.

This plant grows well in the ground and is a good landscaping subject. It can also be grown in a 250 mm bucket.

**'Blue Tango'** About 20, 7 cm wide light green leaves form an erect rosette around 70 cm wide and high. The multi-branched infloresence rises well above the plant's leaves. There are over 30 "branches", with each being about 7 cm long and 1 cm wide. They are an iridescent dark blue/purple in colour. The inflorescence retains its colouration for several months.

This plant can be grown in a 200 mm bucket.

**'Burning Bush'** About 15 leaves, 7 cm wide, form an open rosette, with a central "vase". The rosette is about 50 cm across, and 50 cm high. The leaves' upper surfaces are a shiny greyish-green, while the lower surfaces are dark brown-maroon in colour.

The multi-branched inflorescence rises well above the plant's leaves. Each "branch" is 20 to 40 cm long and consists of a large number of yellow-coloured berries arranged in a cone-shape. The berries retain their colour for several months.

This plant can be grown in a 200 mm bucket.

***caudata* var. *variegata*** About 20, 7 cm wide, leaves form an open, erect rosette approximately 60 cm wide and tall. The green leaves have cream edging, and central stripes, of varying widths. The branched, pyramidal, yellow inflorecsence rises to the top of the plant's leaves.

***coelestis* var. *albo-marginata*** About

15, 4 cm wide, leaves form an erect rosette approximately 40 cm across and tall. The green leaves have white margins, and are lightly covered with silver scurfing. The pink, cylindrical inflorescence is about 10 cm long and 5 cm wide. The flowers have blue petals. The plant can be grown in a 140 mm pot.

**'Echidna'** About 20 leaves, 2 cm wide at their base, form a relatively "tight" rosette, about 20 cm high, and 50 cm wide.

The upper surface of each leaf is green in colour and appears covered with a silvery "scurf" when young. The leaves' lower surfaces are brown-green in colour, with narrow silvery horizontal bands.

The inflorescence is similar to *Ae.recurvata* (one of this plant's parents). It resembles a dark red cone, about 10 cm wide and high, which rises above the plant's leaves.

This plant can be grown as a hanging plant in a 125 mm pot. It likes higher light levels compared with the other plants described in this article.

**'Eileen'** About 15 spineless leaves, 5 cm wide, form an erect, vase-type rosette about 50 cm high and wide. The leaves are coloured apple green on both surfaces and have a light covering of fine, silvery-grey scurf on their upper surface. The scurf is more pronounced on the lower surface.

The pink inflorescence rises just above the plant's leaves and is cone-shaped. It is about 10 cm wide at its base and 10 cm high. This plant can be grown in a 200 mm bucket.

***fasciata*** About 10, 10 to 15 cm wide, leaves form an erect rosette approximately 40 cm high and 30 cm wide. The leaves are usually green and, typically, thickly covered with silver scurf on both surfaces. Its striking pink, pyramidal infloresence is often 10 to 15 cm high and wide. The inflorescence retains its colour for many months.

This plant was introduced into cultivation in 1826. There are many forms of this lovely bromeliad.

**'Fireman Sam'** About 10, 5 cm wide, leaves form a vase-like rosette approximately 50 cm tall. The green leaves have faint silver banding on their lower surfaces. The inflorescence is similar to that of *Ae. fasciata*, but significantly smaller. The plant grows well in a 175 mm bucket.

**'Fosters Favorite Favorite'** This plant is a variegated form of 'Fosters Favorite', a hybrid produced by Mulford B. Foster, one of the American bromeliad "pioneers". The "original" 'Fosters Favorite Favorite', that is, the one imported from the United States of America, has white edging to the wine-red coloured leaves. The leaves, of which there are about 10, form an open rosette about 40 cm wide and 30 cm high.

The Australian form of 'Fosters Favorite Favorite' originated over 30 years ago in a nursery on the northern coast of New South Wales. Instead of being white, the leaves' edges are a creamy orange. It is a more vigorous plant than the United States form. I have had the Australian form for over 25 years and it has been a consistent performer for the entire period.

Both the American and Australian forms have a relatively insignificant inflorescence, consisting of about 10 red berries spread along a 50 cm pendent inflorescence. However, they look quite attractive for several months. I have grown this plant in a hanging basket. In that situation, the sunlight shining through its leaves creates an attractive effect. This plant can be grown in a 125 mm pot.

**'Frederike'** About 20 spineless leaves, 10 to 15 cm wide, form an upright "vase" about 30 cm in width, and 40 cm high. Each leaf has a light green upper surface, with the lower surface having a similar colour, and being covered with a silvery-grey "scurf". In the variegated form of this plant, the centre


*Ae.'* Echidna'


*Ae.* 'Lucky Stripes'


*Ae. disticantha*


*Ae.* 'Mend'

of each leaf has numerous thin creamy-white longitudinal stripes. Some of these are very close together, giving the appearance of wider, white striping. The variegation is apparent on both upper and lower surfaces.

The inflorescence consists of a pink-red "basket" about 15 cm across and 7 cm high that rises just above the plant's leaves. The inflorescence retains its colour for several months. This plant can be grown in a 200 mm bucket.

**' Gold Nugget'** About 10, 7 cm wide, leaves form a 60 cm tall, tubular-shaped plant. The green-brown leaves have silver "scurfing" and bands on their upper and lower surfaces.

The 25 cm long inflorescence is comprised of about 12 grey-green, 5 cm long, "clusters". This plant can be grown in a 200 mm bucket.

**'J C Superstar'** About 30 leaves, 5 cm wide, form an open "vase-type" rosette about 60 cm wide and 60 cm high. Each leaf 's upper surface is grey-green in colour, has narrow red-brown edging, and is covered with fine, silvery-grey scurf. The leaves' lower surfaces are a light red-brown in colour, with silvery horizontal banding of varying widths.

The semi-erect, 70cm long, multi-branched inflorescence rises above the plant's leaves. Each branch has 2 to 3 "side" branches each of which has about 10 yellow berries. Each group of berries have the shape of a "sword", about 10 cm long, and 2 cm wide.

**'Mardi Gras'** Similar to 'Lucky Stripes', only the variegation is in the centre of the leaves rather than their margins.

**'Mend'** About 20, 5 cm wide, leaves form a semi-erect rosette approximately 40 cm across and tall. The green leaves have cream margins that flush pink in good light. The multi-branched inflorescence has lavender-petalled flowers. The plant grows well in a 200 mm bucket.

***nallyi*** This plant is quite variable in its appearance, with the cultivar described here being 'Julian Nally'. About 15, 8 cm wide, leaves form an open, erect rosette approximately 50 cm tall and wide. The 30 cm long, pyramidal inflorescence of white and yellow berries is 'framed" by large, lolly-pink bracts.

***nudicaulis*** This is a variable species. Typically, it has less than 10 leaves, each with a distinct "thumbnail" depression at its base. The leaves form a vase-like rosette up to 30 cm tall. The leaves can be green, brown-red, have silver barring, and be variegated. The infloresence is often 20 cm long, with pink/red bracts and flowers arranged in a cylinder.

This hardy plant grows well in 140 mm pots, or in the ground, and on stumps and logs.

There are several varieties e.g. *aurearosea*, and named cultivars e.g. 'Mary Hyde', 'Silver Streak', and 'Xavante' of this species. There are also many more named, but unregistered cultivars. Over 30 different forms are available in Australia.

***orlandiana*** About 20, 5 cm wide, leaves form an erect rosette approximately 25 cm high and wide. Typically, the leaves are pale green with black, horizontal banding and markings. In good light, the plant flushes pink. There are many different forms of this species, including variegated ones such as 'Ensign' and 'Snowflake'.

The inflorescence is a compact "panicle" with scarlet bracts and yellow flowers. This plant will often grow better on a log, rock, or stump, than in a pot.

**'Pacifica'** (This plant is often seen in collections labelled as: *disticantha x chantinii* ) About 20, 5 cm wide, "curved" green leaves form an erect rosette approximately 50 cm tall and across. The leaves' lower surfaces have pronounced silver scurfing. The multi-branched, pink, inflorecsence rises well above the plant's leaves. Each branch is about 5 cm long and 1 cm wide. The plant grows well in

*Ae.* 'Snowflake'

*Aechmea hybrid*

*Ae. orlandiana* (light Form)

a 175 mm bucket.

***phanerophlebia*** About 20, 5 cm wide, leaves form a bottle-shaped rosette, approximately 60 cm tall. The green leaves have silver banding. The pink-red, 15 cm long, cylindrical inflorescence rises just above the plant's leaves. The flowers have blue-tipped petals.

**'Pink Rocket'** About 20 leaves, 10 cm in width, form a relatively open, vase-type rosette, about 70 cm in width and 50 cm high. The upper and lower surfaces of each leaf are "apple green" in colour, and covered in "fine" silvery-grey scurf.

The inflorescence consists of a 20 cm wide and 15 cm high pink-red "ball" which rises just above the plant's leaves. Blue-purple tubular flowers occur on the surface of this ball. The inflorescence retains its colour for several months.

This plant can be grown in a 200 mm pot. As the plant appears to "burn" relatively easily, grow it in shady conditions.

**'Purple Gem'** About 30 leaves, 5 cm wide, form an open, vase-like rosette about 50 cm high and 70 cm wide. The leaves' upper surfaces are dark green in colour, with irregular, dark red markings towards the leaves' base. However, in good light, the entire leaf surface turns brown-purple. The leaves' lower surfaces are dark brown-purple in colour.

The multi-branched, 50 cm long, inflorescence. rises just above the plant's leaves and then arches to one side. Each branch consists of a "cylinder" of about 15 purple berries from which flowers with blue petals emerge. The plant can be grown in a 200 mm bucket.

***recurvata*** About 10, yellow-green leaves form a squat, bottle-shaped rosette, approximately 15 cm high and wide. At flowering, the centre flushes red, while the flowers have red/purple petals.

This is a hardy plant that readily forms a clump. It can be grown in a 125 mm pot, but it also grows well in rockeries and as a "garden border." It has been used as a parent in many hybrids e.g. 'Echidna' and 'Bryan Ellis'

**'Reginald'** About 15, 5 cm wide, leaves form an open, semi-erect rosette approximately 35 cm across. The leaves have faint silver scurfing and are maroon-red on their lower surfaces. The leaves' upper surfaces are green, with central, cream stripes of varying widths. The cone-shaped inflorescence rises well above the plant's leaves and consists of about 30 red "berries". The plant is sensitive to cold conditions. It can be grown in a 125 mm pot.

**'Shelldancer'** About 25 leaves, 7 cm wide, form an open tank-type rosette, about 30 cm high and 50 cm in width. The upper and lower surfaces of each leaf are light green in colour and covered with a fine, silvery-grey scurf.

The multi-branched, 50 cm long inflorescence, initially rises above the plant's leaves, and then arches downwards. Each branch consists of a cylindrically shaped collection of pink-red berries. Each "cylinder" is about 30 cm long, and 7 to 10 cm wide. The inflorescence stays in colour for several months.

This plant can be grown in a 200 mm bucket.

**'Spring Beauty'** About 20, 7 cm wide. Purple-green leaves form an erect rosette approximately 50 cm tall and across. The leaves have silver scurfing on both surfaces. The multi-branched, predominantly pink, infloresence rises well above the plant's leaves. Each branch is about 8 cm long and 1 cm wide. This plant will grow well in a 200 mm bucket.

**'Tonado'** About 20 leaves, 5 cm wide at their base and rapidly tapering to 2 cm in

*Ae.* 'Spring Beauty'

*Ae. fasciata*

*Ae.* 'Pacifica'

*Aechmea phanerophlebia*

width, form an open vase-type rosette, about 40 cm wide and 50 cm high. The leaves' upper and lower surfaces are a dark red-maroon in colour.

The multi-branched, 50 cm long inflorescence, rises above the plant's leaves and then arches to one side. Each "branch" consists of about six red-tipped white berries, from which flowers with blue petals emerge.

This plant can be grown in a 125 mm pot.

**'True Blue'** (unreg) (This is a cultivar of *Ae. fendleri*) Numerous, 5 cm wide, "curved", green leaves form an erect rosette approximately 70 cm tall and wide. At flowering, a cylindrical inflorescence rises well above the plant's leaves. The 'cylinder' is about 30 cm long and 8 cm wide. The flowers have blue petals.

This plant grows well in a 200 mm bucket.

**Acknowledgements**

I thank Olive Trevor for supplying many of the plants described in this article, and Ross Stenhouse, for taking the photographs used to illustrate it.

**Author contact details:**
phone (07) 3870 8029,
email: bob.relly@transport.qld.gov.au

## WATER

(by Lloyd P. Champagne)

*Editorial comment (Bob Reilly): Reprinted, with permission of the Bromeliad Society International, from the Journal of the Bromeliad Society, July-August 1977, v. XXVII (4) pp 150-153. In this article, a Louisiana (United States of America) grower gave his views on watering bromeliads. He made the valuable point that many bromeliads grow well with far less water than some people give them.*

The subject may sound mundane. However, I suggest to you that it is the single most important topic in the culture of bromeliads, as it probably is in the culture of most plants. I further submit that it is also the most frequent cause of dead plants in the entire ornamental plant business.

It is impossible to talk about watering plants without considering many other factors that also affect watering. These other factors include the type of soil, the surrounding humidity, the size of the pot, the number of plants in each pot, the amount of sunlight, surrounding temperature, air flow, to mention the more important ones. Therefore, it is almost useless to ask your fellow-growers how often they water. What works for them may not work for you, due to the listed variables.

The first thing we normally learn about bromeliads is that they do not like wet feet. This is the first thing I learned about them, and I am sad to say that I have not followed the rule sufficiently. It is not at all sufficient that there merely be good drainage in the pot. The fact of the matter is that the roots of bromeliads generally like to be thoroughly (I said thoroughly, I mean it, and I repeat it) dry between waterings. There is only one proper way to determine when to water, and that is to feel the soil. I suggest to you that as long as there is any coolness whatsoever to the soil, it is not time to water.

As the years go on, I find myself mixing an ever-looser and faster drying soil. I believe that it really doesn't matter one whit what mixture you use, as long as it is fast drying. I have experimented and continue to experiment constantly with different potting mixtures. I find that the slowest drying soil of all is any soil with a lot of leaf mold. Leaf mold retains water longer than other medium, and has the further disadvantage of "souring" when it remains damp. Also leaf mold "packs", and prevents aeration of the roots. Other undesirable substances in high concentrations are sphagnum moss, sawdust, wood

shavings, and any other type of organic material that has a tendency to pack. Surprisingly, sharp sand, by itself, is very slow drying.

On the other end of the spectrum, whatever you use, I advise very high concentrations of perlite, shredded tree fern, and/or hadite in order to keep the soil very loose and well aerated and rapidly drying. This becomes especially important when a grower grows bromeliads along with various other plants that require "en masse" watering. As one's collection grows, it becomes increasingly impossible to give individual attention to the plants. Therefore, that all should be watered at the proper time, can only be accomplished by using the proper size of pot and the proper moisture retaining properties of the soil, in order to get the proper amount of drying all at the same time. Even then it becomes difficult.

I keep several plastic gallon jugs around my greenhouse filled with water, so that I may give some individual plants a drink as I make my twice-daily tour, as they may need it, while awaiting the en masse watering. As one's collection grows, it is likely you will find that watering becomes less frequent due to the increasing amounts of water which must be evaporated, the closeness of the pot plants, decreased sunshine and air circulation, and all of the other factors listed above. This is especially true when one moves into a greenhouse. Again, it becomes more likely when one may tend to close up a greenhouse for the winter, with the resulting coolness of winter, decreased fresh air and circulation, as well as decreased sunlight, slower growth, and lesser need for water.

Most of the bromeliads I have seen killed have been killed with tender loving care. Surely, we all have seen some plants neglected to death, but I consider this the exception. I have never killed a bromeliad with lack of water. I tried to do this in the summer just past, and I failed. I took a pot of *Neoregelia* 'Painted Fingernails' to one of the far corners of my yard, out in the midday sun. I never watered it once throughout the entire summer. It survived on water and dew only. I even ran across it inadvertently a couple of times with my tractor's wheel. We went through at least two dry spells during the summer without any rain whatsoever for six weeks. When I brought this plant indoors in October, it was beautifully healthy, hardy, and growing well. Yes, it was also dry.

Almost none of my bromeliad-nut friends have succeeded in raising guzmanias. I am having wonderful luck. I am sure the reason for my good luck is that I use this extremely coarse soil, a small pot, a lot of air, and even a substantial amount of direct sunshine. My dear friend, Art Boe, and I, have had some vigorous but friendly arguments over planting with sphagnum moss and tying the moss to the plant. He even does this with seedlings, even guzmania seedlings. He claims this reduces the shock of transplanting. I agree with his contention that it may help support a plant in the soil, but I also insist that it is a sure fire method of rotting the plant.

I am constantly reading references in the Journal about browning and softening at the bases of the leaves. Without exception, this is always referred to as fungus rot. I stress the fact that I am not a professional botanist, nor a microbiologist. Even so, I insist that any fungus that may occur is a purely incidental phenomenon and is not the cause of this leaf rot. The real reason, is, naturally, water. Any time you have a browning or a softening or rotting of the leaves near the base of the plant it is due to wet rot. If you are having to remove leaves from the base of the plant, cut down on your watering. The problem is that it may take months after the excessive water-

ing before the rot becomes evident. In the extreme cases it is possible to smell the sour water. I have a general rule in life: when in doubt, don't. This is a good rule for watering bromeliads.

As a physician, I have been brought up on the enormous life saving properties of fluids and electrolyte replacement in humans. This alone has saved more infant lives than any other phenomenon in medical practice. I truly suffer as I walk through the greenhouse, noting the dryness of the plants, and I so terribly want to water them, but I don't. It is even a good idea to dump the water out of the cup of certain plants such as *Tillandsia xerographica,* and even more so during winter.

I have already referred to outdoor humidity. Certainly, one has to take these admonitions in view of the fact that the humidity in Louisiana *(where the author lived-Bob Reilly)* is often 100%, and I have seen it as low as 6% in Denver. We have never seen 6% humidity in Louisiana. I have seen my brother thoroughly soak an outdoor garden in Denver, and one hour later, it is bone dry. It naturally follows that over-watering is much less a hazard in areas of extremely low humidity.

I also suggest that most bromeliad diseases result from over-watering. I certainly know that scale is one disease that I have totally eliminated by dryness. About the only "disease" I have are crickets and/or grasshoppers that inhabit the cup of the guzmanias and cut the leaf in order to pull it over for protection.

During the cool, overcast, wet days of winter, my greenhouse is like a terrarium. The moisture condenses on the cool roof and literally rains or drizzles in the greenhouse. It is during this type of weather that I water as little as once every 18 days. I never mist. The humidity is always so high in Louisiana, it seems senseless to mist. How much higher humidity can one get than 100%? When I do water, I find it necessary to soak everything thoroughly in order to be sure that none of the plants become neglected.

As I mentioned, I water everything en masse, without any individual attention. Now, misting may be useful in some of the drier regions. However, I find that so many people who do mist their plants, don't know when to stop. And they so over-mist, that they substantially soak the plant. Even in the hottest, driest days of summer, I never water more than once every five days.

I have also found that a small electric fan is very useful to keep the air moving. The only beneficial effect that this can have is to hasten the drying process. In so doing, it guarantees the drying of the plants that may be somewhat crowded and less well aerated. It also follows that during winter, the cooler that you keep your plants, the less water they need. There are several reasons for this situation. Evaporation is slower, plant growth is slower and requires less water, and there is less danger of excessive drying out (if that is, in fact, possible).

I don't talk to my plants except to warn them to shape up or ship out. I think that the plant talkers, while they are talking to their plants, are also feeling the soil.

**Society Bus Trip - Field Day**
**9th September 2006**

Bruce Dunston's Place 9-11 AM
and a
visit to Mike Synmons, 17 Moore Rd. Burpengary. Bring your own lunch.
Bus leaves Uniting Church Hall, 52 Merthyr Rd., New Farm, 7.30 AM then to pick-up at Woolworth Shopping Centre, Gympie Rd., Chermside - Cost $16.00

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it is freshly mixed and used immediately so there is no time for precipitation.

The organics might have their place in horticulture where you need some instant fertilizer followed up with more slowly released material.

The only place for the slow release type, as I see it, is with the potting up of pups. Plenty of fertilizer is available while the roots are developing and functioning but its availability tapers off when it is no longer needed. Still be light on or you may have large strappy green plants.

To keep colour and shape in my maturing Neos I fertilize them once or twice a year during sunny weather (stops strappy growth), with cool nights (no use fertilizing unless plants are photosynthesising) and when rain is expected (I grow in the garden bed and if it does not rain, I can't wash it out). Twice I have been caught out with no rain arriving. My first lot of affected young plants are still all green three years on. I have now transplanted them. I must say that this is an exceptional case, 6 months is more like the usual green period. I must confess it is not always my fault, I often blame the possums. Very small seedlings get frequent and more dilute treatment with a vitamin B tablet added to the mix. This helps with transplant shock. They should also have their nitrogen available in a very dilute reduced form (not nitrate) as it has been found with some plants (not tested for broms) that nitrate reductase does not operate in newly germinated plants until they are more than a month old. This just means that though nitrogenous fertilizer has been supplied the plant can't utilize it. A bit like us with all the colds and snotty noses babies get due to their immune system not becoming fully functional until about 18 months of age. If you don't understand the chemistry it would be best to not fertilize newly germinated seedlings until they are more than a month old. I think it is reasonable to believe that low levels of fertilizer won't destroy leaf colour but what this level is only experience will tell as we all grow our plants differently. N.P.K only tells us the ratios and nothing about the dilution required.

**Q. Would you use flowering (higher P, lower N) fertilizer to toughen your plants?**

A. No I would not. I am fully aware that in recent years a lot of people have been advocating such usage. I have not found experimental evidence to support this. It is a myth that inflorescences don't need nitrogen. About 20% of total plant Nitrogen, 20% of total Phosphorous are tied up in the inflorescence and seed of some broms so why bump up the ratio of P to N something like 4 fold when in fact the plant wants them in the inflorescence in similar proportions to what they are in the plant. I don't deny that it is a fact that too much nitrogen makes flower spikes and plants very floppy so it is the dilution that is important not the ratios.

An example of a general fertilizer is N.P.K 17.7:7.9:16 on a percentage weight basis while the same brand flowering fertilizer is 6.2:14.6:16.8 .

The most important agent to a plant is the one in short supply. An army can only move as fast as it can cross the bridge. There is no use increasing the size of the army to get more troops into action. Similarly there is no use force feeding a plant with fertilizer if it is not getting enough light, water, carbon dioxide or warmth.

I live in the dry tropics and the most important fertilizer is water. Plants can concentrate the chemicals they need so give it to them dilute and let them do the choosing. Over feed and they can become gluttons and can go floppy or even die in weeks (photo provided).

**Q. With your infinite wisdom could you recommend a fertilizer for broms?**

A. No! Choice depends on your circumstances. Now, some many moons ago I went around all the supermarket shelves copying down the analytical data and cost of fertilizers. I found out two things. For every expensive brand there was a cheap brand just as good. One enterprising firm was very smart. They sold an orchid fertilizer obviously for orchid growing. I looked at their analysis on the back of the packet and the ratios of the components were as close as you could get to the ratios found when analysing the chemical constituent in healthy phalaenopsis (orchid genera) leaves. That is just like us being on a saline drip verses a mouth full of salt so it must be easier on the plants especially if the dilution is suitable. If I had to design a fertilizer for broms based on analysis of leaves it would have an N.P.K of around 6:2:4 for tillandsias and 6:1:16 for guzmanias. I don't have analytical data for neos. This suggests that we should be looking for a low phosphorous fertilizer rather than the reverse. Since doing this calculation I have been reading a fairly recent brom book. It recommended an NPK of 6:2.4:8.4 for broms which is quite close to my calculated figure.

**Q. What pH should your fertilizer be at?**

A. pH is a complex issue with plants and nutrition. I do know this, normal plants take up metal ions and release an equivalent amount of acid (charge balance) at the root/root hair tips. Hence roots can penetrate some rocks. Is it the same for broms with tanks? How do they cope with an acidic tank or do they do things differently? I do not know the answer to the above questions. My guess therefore is that your tank fertilizer could be adjusted a bit towards the alkaline side of the normal fertilizer range.

Generally for plants the optimum pH for trace element availability is pH 6.0 to 6.5. Between 6.5 and 6.0 molybdenum availability starts to drop off and below Ph 5 all trace elements except iron become less available to plants. An interesting bit of trivia for you to quote to impress learned company is that molybdenum should not be a problem in metropolitan areas as it is used in spark plugs and crank shafts of cars. Cars would be spewing it out in enormous quantities in excess of your plant needs. For every 60 million hydrogen atoms a plant needs it needs only one atom of molybdenum. Availability of all trace elements except molybdenum drop off at greater than pH= 6.5 so I would not recommend that you adjust the pH of fertilizers to greater than 7 which is the pH of pure water. Fertilizer with added EDTA could help when operating outside the suggested range (eg when using some bore waters). As I have said pH is a big subject to cover but with watering via the tank the possibility of toxicity due to picking up toxic levels of chemicals is non-existent with the exception of one aspect namely the quality of the water used. Nickel, chromium, lead and aluminium, four known toxic non essential elements should not be present in harmful quantities in the tanks. The one trace element that I could see as possibly becoming toxic, in wells, is found when people use impounding tank water coming off rusting galvanized rooves. The sacrificial zinc could become toxic especially at a pH between 5.0 and 6.5.

**Q. What is the story to the ammonia/ammonium verses nitrate issue?**

A. Plants can suffer from ammonia/ammonium toxicity. If the plants are not growing in media (when root fertilizing) or have no detritus in the tanks (when tank fertilizing) there will not be any bacteria to oxidise the ammonia /ammonium to nitrate. Plants normally take up the nitrate and on a needs

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# LETTERS TO THE EDITOR

Dear Editor

**Cultivars**

The letter from Mike Symmons is a timely reminder that we should all be vigilant in seeking to have 'Bromeliaceae' accepted in the Bromeliad community as a high class production.

1. First I must point out that spelling and punctuation errors that occur were called printer's errors in the past, but these days of computers are more likely to be treated as Editor errors.

Variegation is very prevalent in cultivated Bromeliads, in fact more so than any other plant family and there is therefore nobody to follow. I pointed this out in J. Brom. Soc. 55(4); 187-9. 2005 when dealing with name changes in Pineapple especially variegated Ananas. Because variegation keeps mutating the only real solution is to add the type of variegation as an adjective even to using 'Novar' when the variegation seems to vanish.

2. I too shudder at the use of grex names which only confuse the issue. *Neoregelia* 'Aussie Dream' is just one example. A quick check in the Cultivar Register will reveal the following.

"A grex name for 'Meyendorffii' (variegated) X *olens* 'Marie'. No individual clones have been given this name by the hybridist. However, plants of all shapes and sizes, grown from stock from this source may have been called 'Aussie Dream' and are incorrect because there is no photographic record to authenticate an 'Aussie Dream'. Authentic cultivar names given include

'Big Pinkie', 'Cherry Chip', 'Classic', 'Downunder Gem', 'Dream Girl', Dreamtime', 'Glorious', 'Grand Albo', 'Great Expectation', 'Gympie', 'Larnach's Pride', 'Little Lady', 'Little Ol', 'Lovely Lady', 'Lucky Seven', 'Midnight Express', 'Oh', 'Pink Delight', 'Queensland', 'Red Glow', 'Red Pride', 'Rosie', 'Shining Example', 'Something Special', 'Superba', 'Tartan Princess' & 'Touch of Class'. "

3. A quick look at the Bromeliad Cultivar Register 1998 will show that Don Beadle has the same view as myself as to the use of species names followed by the Cultivar name. So there are at least two people who prefer this approach. The thing is, the use is optional as shown in examples under Article 17 of the ICNCP rules 1995. From a Register point of view it seems better to list under cultivar name not species. It is interesting that when taxonomists transfer species to synonymy under the ICBN rules, linked cultivar names are never mentioned.

As Mike Symmons says, we should be seeking to lift our game.

regards

Derek Butcher

## BROMELIADS DOWNUNDER 18th World Bromeliad conference

The 18th World Bromeliad conference will be held in Cairns in mid/late June 2008. This will be the first time that this event will be held outside the United States of America. (It was to be held in New Orleans, but Hurricane Katrina put a stop to that).

The WBC will be jointly hosted by Cairns Bromeliad Society Inc. and the Bromeliad Society International (BSI). Lynn Hudson, Australia's BSI director, was successful in her bid for the conference to be held in Cairns. As more details become available, they will be published in Bromeliaceae.

# CALENDER OF EVENTS

## BSQ Field days for 2006

**Sept 9** - Bus Trip/Field Day Bruce Dunstan "Stockade Nursery" 70 Wades Road, Bellmere - 9am-1pm Plant Sales - *See ad page 48 for full details*

**November 25** - Len & Olive Trevor "Olive Branch" 232 Canvey Road Upper Kedron Phone: 3351 1203 9am-3pm plant sales 9.30am, morning tea & lunch, talks and tours of bush houses Members please bring a plate

## Bromeliad Show and Plant Sales

**11-12 November 2006** - BROMELIAD BONANZA . Show and sale of bromeliads to be held at the Mt Coot-tha Botanic Gardens. Over 500 varieties/hybrids of bromeliads will be on sale. It will also be the first public release of Starting with Bromeliads. This guide to growing bromeliads in the sub-tropics has over 200 colour photographs and 200 plant descriptions. Other bromeliad books will also be on sale. Opening times: Saturday (11th) 8 am to 4pm, Sunday (12th) 9am to 3pm. Admission: Adults $3, children under 14 free.

## Bus Trips for 2006

**October 28** Depart Uniting Church, Methyr Rd New Farm at 7am, Pick up at Woolworths, Gympie Rd Chermside approximately 7.20am. Arrive back Brisbane approximately 5.30pm

- Visit to Margie & Alex Tymson, large tropical garden. No Plant sales
- Visit Linda & Graham Percival, 1 Purcell Rd, Bells Bridge, Gympie Lunch & plant sales

Contact: Nancy Kickbusch Ph. 3300 1704

## Workshop

**September16** - Tillandsia Workshop will be held from 10 am to 3 pm , Graceville, Brisbane see page 36 for full detail

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basis convert it to the useful reduced form. If bacterium are not present (no soil or detritus) the plant could takes up toxic levels of ammonia/ ammonium (reduced form). Use ammonia/ammonium fertilizers only in a diluted form and take special care with those plants not grown in decomposing medium. Foliar fertilizers usually are urea based to avoid this problem. They also have detergents to make them cover more of the leaf.

The above means that you should not be too conscientious about cleaning out the tanks. At least leave the side ones dirty. Take special care with plants without roots or ones growing in non decomposing media like scoria. Another bit of trivia is that the blue green algae often found in the tanks is usually capable of trapping nitrogen from another

source—the air. That is, it has a similar function to the nitrogen fixing bacteria found on roots of legumes. The latter is used widely in farming to naturally fertilize farm land. A pea plant is used in our local sugar cane industry for this purpose. In China the algal nitrogen fixation process is widely used to fertilize rice paddy fields.

I have deliberately over fertilized some of my plants to see what damage is done. Other than the greening results mentioned above I fertilized N. Happy Thoughts by sprinkling solid fertilizer over it. Within two weeks the plant had darkened. Spots were more intensely green. After a month the plant was falling apart at the crown. At this stage I washed it out to see if I can save it (photo supplied).

I must stop somewhere. Every time I read it over I find more that may interest the reader. I can be forgiven here as I did my honours degree studying trace elements in animals and my masters studying trace elements in plants. I thought after 40 years I had forgotten it all but snippets keep coming back.

My ultimate piece of wisdom (knowledge comes but wisdom stays) is if it is working for you don't fix it. Treat the above as food for thought.

**Quesnelia quesneliana**