Far North Coast Bromeliad Study Group N.S.W.

Study Group meets the third Thursday of each month

Next meeting December 21st 2017 at 11 a.m.

Venue: PineGrove Bromeliad Nursery

114 Pine Street Wardell 2477

Phone (02) 6683 4188

Discussion: November 2017

General Discussion

Editorial Team:
Kay Daniels
Trish Kelly
Ross Little
Helen Clewett

pinegrovebromeliads@bigpond.com

Meeting 19th October 2017

The meeting was opened at approximately 11.00 am
The 20 members were present and welcomed.
A total of two apologies were received.

General Business

Ross welcomed the Group. There was an excellent attendance with two of our former members returning, welcome back Sue and Steve.

Our best wishes to Tom and Gloria Dunbar and birthday wishes to Helen, who is celebrating her 70th birthday was given a cake of Bromeliad leaves and flowers for the candles. (photo p.10) The cake with strawberries and cream was yummy.

Our mail for the month is the Newslink of the Illawarra Bromeliad Society .

Upon reading a recent issue, Peter an away member has requested seed from Dave's *Vriesea michaelii* (photo p.9 June 2017). Neither Ross' nor Dave's have seed, hopefully another reader may be able to help. Thank you for your best wishes Peter, and may we return ours to you and your Bromeliad friends.

Ross has reminded us just how close Christmas and our celebrations are, third Thursday in December. Please keep in mind for the next meeting what food you are bringing, such as, a salad, (green or potato or other), nibbles or savouries, dessert, (a trifle is already on order with Marie) or any other food item you feel appropriate to the occasion. The Group funds will provide hot chickens, bread rolls and soft drink and the necessary plates, cutlery and serviettes.

♣ A reminder we do not have alcohol at our celebrations ♣

Ross thanked Trish for covering the new library book with many keen members ready to borrow this latest book on Tillandsias.

Show, Tell and Ask !

Ted told his story of the new shade house built on his property at Ashby, unfortunately, constructed in treated pine timber. After excitedly filling the shade house with his bromeliads and keenly watering them for several weeks Ted noticed the plants beginning to brown. After frantic enquiries, Ted, discovered to his dismay, that the chemicals used in treating the timber in his shade house were leaching out and killing his plants. It has been recommended that Ted paint his shade house to prevent further leaching.

Ross displayed an enormous *Aechmea* 'Patricia', a plant grown with plenty of light which enhanced the contrast between the dark foliage and the deep orange of the flower spike just opening. (photo p.9)

John introduced us to the Fernlands website after finding an interesting article on the difference between slow release and controlled release fertilisers. (p.11)

John also had a question about his "spider" group of Neoregelias, *Neo. pendula*, *eleutheropetala* and *wurdackii*, asking do the pups always look totally different to the mature flowering form of mother. One of his pups is long and flat, the other pup is an upright pointed vase rather than the fat bulbous shape with rolled leaves like their mother. Next meeting those of us that have a plant with pups and flowers should bring them along to the meeting to clarify the situation.

John showed two *Tillandsia seleriana*, one quite reddish was growing on a small terracotta plant saucer, having been there and thriving for many years. Plant two was growing in a net pot and less red but growing very nicely. (photo p.11)

Marie had two mini Neoregelias named *Neo*. 'Mambo' and *Neo*. 'Wild in Oz' that she had purchased at Big W which she thought both looked the same. Ross gathered similar plants from his shade house and determined Marie's were the same as plants he has as *Neo*. 'Hot Flash'. (Maries plants photo p.11)

Dave had an extremely tall *Neoregelia* 'Passion' he wanted to know if it could be cut off and set down in a pot and would it root again. The answer is yes, after cutting it off above the pup which is low down, plant it deeply into a pot, setting it at a normal level where it will root and grow on.

Keryn had *Nidularium innocentii* striated, she wanted verification on its name, it was once Latinised as striatum, following the recent BCR ruling is it now striated. Refer to: The New Bromeliad Taxon List it is *Nidularium innocentii* var*. striatum.*

Keryn also had a Neoregelia with a grey smudge over the foliage and was wondering what could be done to remove it as it does not wipe off. It has been suggested to Keryn it could be sap or exude coming from another plant, if it is not affecting the plant's growth, leave it, alternatively move it to another position, trying another environment and see if you get a better response from the plant.

Helen had *Cryptanthus* 'Lisa Vinzant' given to her as a struggling plant. It is now thriving having given one pup, now has two new ones coming.

Les has made a request for our Tillandsia growers to write an article on their experiences growing their plants and any advice they could share with the Group. This is to supplement an article he is writing on Growing Tillandsias.

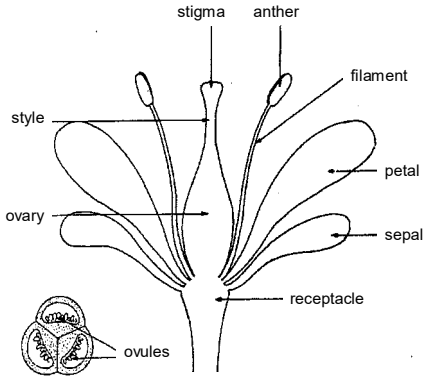
Several months ago the question had been raised about pollination, seed raising and how do you get the variegated hybrids from seed. Ross showed a couple of variegated seedlings he has achieved from a deliberate crossing. Ross' reply to the question was: "Do we need to keep hybridising or should we grow and maintain **species** from seed is the real question that should be asked" ? (notes p.4)

Breeding / Hybridising for Variegation

compiled by Ross Little

A recently asked question: “How do you get seed and make variegated hybrids”.

The cross pollination of two plants is quite a simple process, basically one takes the pollen from the anthers of one plant and places it on the stigma of another and waits for seed to mature which can take from several months to a year or so for some species and hybrids.

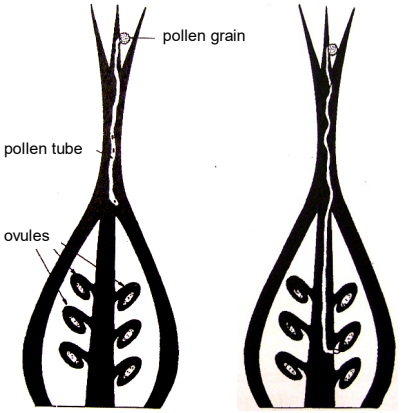


Threeparted ovary is shown in cross section

For some people hybridising is a matter of being opportunistic, whatever is in flower at the time will suffice rather than pollinating for a specific purpose. This can be said for many seed growers who I consider are “opportunistic seed growers”, those who randomly collect seed and grow it, these people are not the hybridiser only a seed grower. Often it’s these cases that have “parent unknown” on the label too, but not always as hybridisers can be a secretive bunch.

A discerning hybridiser is one who sets out to create something different, to improve on a plants appearance, colour, shape, size or they breed for cold or heat tolerance, in other words a hybridiser has an end goal in mind, not just hit and hope. A good hybridiser is one that is selective as to what plant/s are cross pollinated with each other, crossing and back crossing until they achieve that end goal. Parental assurance is important too so pollinating is done in a controlled environment rather than randomly in a shade house risking contamination.

To be sure who the pollen parent is (dad) the anthers of the seed parent to-be (mum) should be emasculated (cut off) prior to the opening of the anthers (pollen bearing part of the flower). This is done just in case the flower is self compatible (will accept its own pollen). Label each flower as it is pollinated, don’t leave it to memory especially if using several fathers onto the same plant.



Once a grain of pollen has been placed on the stigma, if receptive (appears sticky), a pollen tube will begin to develop and grow down the style to the ovary and contact the ovules delivering the sperm, eventually developing into a seed.

We have now begun to understand the process of pollination, but, to achieve a variegated hybrid, first one must use a mother plant (seed parent) known to be a transmitter of the variegated genes. Often these are a variegated *Neoregelia carolinae* type. Here in Australia the most consistent transmitters used are variegated forms of *Neo*. ‘Meyendorffii’ and *Neo*. ‘Mother’ and progeny of it.

One must now be thoughtful in their fathering process and what desired traits are wishing to be passed on before randomly splashing pollen on everything.

If it’s cross banding you are after, add pollen of *Neo. zonata,* ‘Skotaks Tiger’ or ’Hannibal Lector’ to your variegated mother (seed) plant **NOT** the reverse.

Using the larger Neoregelias as father like *Neo*. ‘Great White’, *Neo. pascoaliana* or *Neo. silvomontana* onto a variegated mother will often give large variegated progeny.

If it is stolons you’re after use *Neo. pauciflora*, *Neo. ampullacea*, *Neo. lilliputiana* or *Neo*. ‘Fireball’ pollen onto your variegated mother plant, these will produce mini to medium sized progeny.

Another consideration once you have achieved variegation, try using a spineless plant as a pollen parent (dad) like *Neo*. ’Medusa’ onto your known transmitter or even onto one of your own creations. Hopefully some of the resultant seedlings will be spineless and variegated. Pushing your boundaries further try using a spineless *Aechmea fasciata* to experiment with and enjoy the results.

Don’t forget culling is important as not everything you produce is perfect, keep only the best, most distinctive progeny and toss the rest.

Good record keeping on your label as well as in a book is important also, it will help in analysing your results later and assist in further breeding programs one may wish to undertake. Records are also a big help with your BCR registration. An answer to the question: “Is your hybridising really necessary? Think Twice!"

The two plants pictured here from the same grex are the result of crossing:
Neo. ‘Ladd’s Gem’
with
Neo. ‘Great White’
by Ross Little.
The only two variegates retained from the grex.

Acknowledgements: David Benzing, The Biology of the Bromeliads for information and line drawings, Derek Butcher for photo etc.

Variegation in Bromeliads

Comments by Dr. David Benzing, reprinted from a Facebook posting on:
Planet Tillandsia ionantha, 28th. August, 2017

Initial comment and photos were posted by: Lloyd Godman
Incredibly beautiful, I got this variegated *Tillandsia ionantha* the other day. I asked David Benzing for his ideas on variegation and here is his response:

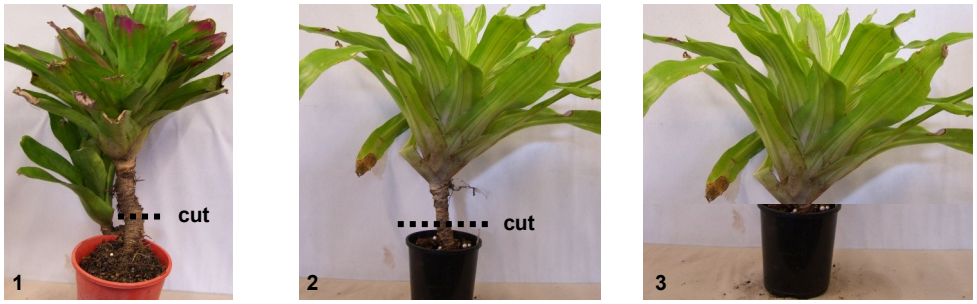
"What you've dug up on the internet is a good example of how bad it's content can be. What's claimed that's true is poorly presented, only half true or flat out incorrect. Here's what I can add that might help. First, I've got to admit that I'm not an authority when it comes to plant pathology or leaf variegation. It's true that the genetic changes that underlie leaf variegations can be spontaneous or induced by a variety of external agents, including ionizing radiation, viruses, mutagenic chemicals, and heat shock. Viruses are ubiquitous of course-even bacteria have them ! Their replication always involves disruptive change in the host's genome.

Bromeliads, being monocots possess two kinds of meristems, whose constituent embryonic stem cells are vulnerable to alteration by all of the agents just identified. In addition to the apical meristem that all plants possess (woody plants also have a cambium that causes stems and roots to become thick and woody) monocots have intercalary meristems located at the base of each leaf and this meristem produces the leaf blade in linear fashion, nothing more, whereas the apical meristem located at the apex of every shoot and root is responsible for the growth of those entire organ systems (shoots and roots respectively). Being non-woody, most monocots lack meristem number three, the cambium.

Leaf variegations occur when patches of stems cells within an intercalary meristem possess mutations that block chlorophyll synthesis (or development of the chloroplasts themselves) within those cells rendering them and the cells derived from them non-green. I don't think it's accurate to describe Bromeliads as unusually prone to such mutations. It is true that leaf variegations within certain Bromeliads are quite unstable, their patterns even shifting from leaf to leaf in a single plant. Such instability can have several causes, viruses for example or simply because the genes that regulate chlorophyll synthesis are unstable in certain genotypes. But such conditions are to my knowledge no more common in Bromeliaceae than in many other families. It certainly is possible by the way that the progeny from a single mother plant (its seeds) may include the rare variegated individual. The condition of this individual may result because it has a different father, the mother receiving pollen from more than one plant or that seed may have experienced a spontaneous mutation that affected the biosynthetic pathway that mediates chlorophyll synthesis, or simply because it is the possessor of the rare homozygous condition that pops up should the defective chlorophyll synthesis gene be recessive and rare in the subject population's gene pool.

By the way variegations that involve chlorophyll versus anthocyanins (the violet to red pigments) are totally independent genetically, the synthesis of these two classes of pigments being entirely separate. This is why green-white variegations usually exhibit the usual suffusions of pink displayed by non-variegated close relatives. Finally, variegated plants are more common in horticulture than nature in part at least because being less photosynthetically competent than their non-variegated relatives the former are less fit in nature and more vulnerable to elimination by natural selection."

How to Deal with a 'Leggy' Bromeliad



Plant #1 cut just above the pup, re-set the top into a new pot as per photo 3, remove some root base and re-pot the pup as normal. Plant #2 cut as marked and treat as normal for a pup as per photo 3.

Neoregelia ‘Cocktail Hour’
1st Open John Crawford

Neoregelia ‘Gee Whiz’
1st Novice Michelle Hartwell

‘Wake Up, it’s Spring’
1st Decorative Helen Clewett

Neoregelia ‘Royale’
Judges Choice Jennifer Laurie

Neoregelia ‘Van Dourme’
grown by Dave Boudier

Neoregelia ‘Gee Whiz’ hybrid ?
grown by Kerry Simpson

Billbergia ’Hallelujah’
grown by Trish Kelly

Neoregelia ’Perfection’
grown by Laurie Mountford

Aechmea ‘Patricia’
grown by Ross Little

‘Not BIG Pineapple, it’s Pigmy P’
grown by John Crawford

Photos supplied by: Ross Little

'Wait for me Mum'
grown by Laurie Mountford

'A Cake for Helen's Birthday'
created by Keryn Simpson

◄▲ *Tillandsia seleriana* grown by John Crawford

Two Neoregelias bought at Big W, on the left as: *Neo*. 'Wild in Oz' on the right as *Neo*. 'Mambo'. Or are they *Neoregelia* 'Hot Flash' ??

◄ 'Rabbits are in Queensland'
grown by Dave Boudier

Controlled Release or Slow Release, What is the Difference ?

Although these terms are sometimes used interchangeably, the terms 'slow-release fertiliser' (SRF) and 'controlled-release fertiliser' (CRF) strictly do *not* mean the same thing – even though both do release plant nutrients at a slower rate than when highly-soluble conventional or 'straight' fertilisers are used. For those who are unclear of these differences, we hope that the following simplified explanation of these distinctions will be both interesting and informative and explain the different manner in which each of these two classes of fertiliser releases plant nutrients.

Slow-release fertilisers (SRFs), unlike controlled-release fertilisers, are not encapsulated in coated prills. The most commonly used slow-release fertilisers are those which supply nitrogen (N) at a slower rate than if a readily-soluble source of nitrogen were applied (e.g. ammonium sulphate, ammonium nitrate or urea). In one of the methods to achieve this, fertiliser manufacturers synthesise what is known as long-chain molecules by chemically combining a nitrogen-source molecule with an aldehyde – for example, urea formaldehyde or methyl urea. The delayed release of nitrogen is achieved by microbial action in the growing medium – slowly breaking down the long-chain molecules and eventually converting the resulting ammonium nitrogen to nitrate (the form of nitrogen which plant roots can take up).

There are other forms of slow-release nitrogen (e.g. IBDU) which differ in composition and modes of action. However, the above example is given to explain the concept of a slow-release fertiliser compared with a controlled-release fertiliser (which we will explain below).

It should be emphasised that the duration of release in a slow-release fertiliser cannot be controlled because the effectiveness of the microbial organisms in molecular breakdown is in turn dependent on other factors – including the nature of the growing medium, its moisture level and temperature. Also, a release time extending beyond two or three months cannot be expected.

(As an interesting aside, animal manures, composts and 'green manures' could be deemed slow-release fertilisers, providing many benefits in soil improvement. However, their nutrient chemistry is complex, and microbial activity is still necessary to slowly convert the organic substances into minerals which plants can use. Plant roots don't absorb manure – as such! After all, nitrate (NO_3^-) derived from manure by microbial action (nitrification) is *exactly* the same as NO_3^- in a mineral fertiliser!)

Controlled-release fertilisers (CRFs) differ fundamentally from (SRFs) in both technology and mode of nutrient release. Soluble essential plant nutrients, either individually or in various homogeneous blends (depending on the application) are encapsulated in an organic resin or polymer coating to form prills. This coating is the secret of delayed release of nutrients in a CRF. The physical processes by which this is achieved is explained in simplified terms below.

It should be emphasised that the term 'controlled' implies a much greater degree of control in the rate, pattern and duration of nutrient release than can be achieved using SRFs.

The principles behind the success of CRFs was first employed several decades ago. Subsequent technological advances and refinements have led to a range of well-known brands of CRFs – for example, Osmocote, Nutricote, Plantacote, Floracote, Multicote, Basacote and Macracote.

Now let's explain simply how a CRF works: The coating on the prills acts as a selectively-permeable or semi-permeable membrane – a barrier to some molecules, but allowing certain different molecules to pass through. When a CRF is applied to an *adequately-moist* growing medium, there is a one-way passage of water through the coating to the inside of the prill. This phenomenon is called 'osmosis'. The absorbed water partially dissolves the mineral nutrients inside the prill to create a highly-concentrated solution. This then increases the hydrostatic pressure within the capsule. When the hydrostatic pressure becomes equal on both sides of the capsule, no more water will enter.

How then does the fertiliser get out into the growing medium? This is attributable to another phenomenon known as 'diffusion' (the movement of molecules from a liquid of higher concentration into a liquid of lower concentration). Again the key lies in the structure of the coating which contains minute micropores. When the plants are watered, the hydrostatic pressures become unequal inside and outside the capsule, and a small amount of dissolved nutrient moves out, by diffusion, through these micropores into the growing medium.

● The *rate* of nutrient release in a CRF is, in most cases, temperature-related. An increase in temperature causes the micropores to expand in width, allowing more nutrient to diffuse out; remember, this is not osmosis but diffusion. (Osmosis is water *in*, diffusion is nutrient *out*.) The nutrients are then dispersed within the growing medium (also by diffusion) – coupled with percolation of dissolved nutrients when the plants are watered. We should regard this correlation between increased nutrient release and increasing temperature as a *key redeeming feature of a CRF*: Cooler weather, in general, means slower plant growth – and lower nutrient demand. This lower demand correlates with the reduced rate of nutrient release. Conversely, as temperatures rise, growth increases – demanding more nutrient. This is exactly what happens in the temperature-related release pattern of CRFs!

● The *duration* of nutrient release is governed in most cases by the thickness of the coating – although there are some other technologies used by a few manufacturers. Products have been developed which offer release times ranging from 2 to 24 months.

● A range of '*patterned*' releases can be achieved in a product by blending a mixture of prills with differing release rates or formulae – designed to synchronise with specific nutritional requirements during a growth cycle.

Benefits of using SRFs and CRFs

The major benefits from using slow- or controlled-release fertilisers over readily-soluble 'straight' fertilisers include:

● Slower release rates mean longer-term feeding and minimal nutrient wastage through leaching.

● A high degree of control over release rates, duration and pattern (CRFs only), means better synchronisation of nutrient release with demand.

● Improved plant growth and health (plants get what they need as they need it).

● Reduced frequency of application, with associated lower labour costs.

● Environmental benefits (minimal nutrient in leachate, reducing freshwater/ marine contamination.

● Minimisation of concentrated nutrient build up – a risk for high salinity-related root and leaf burn.

There is now a developing trend to transfer these benefits, long-proven for container-grown stock, to field crop production by changing to slower-release fertilisers – especially where environmental concerns are an issue.

Acknowledgement: When John Crawford was researching fertilisers recently he came across this blog on Fernlands web site and thought it would be of interest to others, for more information go to **http://fernland.com.au/blog/**

A Brief Study into How Plants Function

by Les Higgins 2017

Part 8: Genetics

Genetic make-up is the foundation of all living things. Every cell in a plant, whether roots, stem, leaves or flowers, contains in its nucleus a set of chromosomes. On each of the chromosomes are genes that control every characteristic of the individual.

Plants that have identical genes for any one character are said to be homozygous (pure) for that character. A plant that contains unlike genes for any character is called heterozygous (mixed). A homozygous plant makes a stable parent.

DNA (Deoxyribo Nucleic Acid) encodes the genetic information of an organism. Nuclear DNA is structured into a double helix chromosome. DNA dictates the manufacture of a messenger to carry its information into the cytoplasm. The messenger is Ribonucleic acid. RNA moves out of the nucleus into the cytoplasm to control the manufacture of a specific enzyme.

The **Gene** is a segment of DNA on a chromosome. It is the fundamental, physical and functional unit of heredity. A **Marker** is a gene of known location on a chromosome. Each gene attributes either singly or as one of a group with specific control of a character. The Gene remains relatively unchanged throughout successive cell divisions.

A **Genome** is the name given for the genetic material contained within the chromosome. A complete copy is found in each normal cell of a plant.

A Gene may occasionally be reduplicated or lost creating a mutation, a form derived by sudden change from a species. A **mutation** is any inheritable change in the DNA sequence usually caused by a miss copying by cell enzymes. Mutants are unreliable parents as part of their genetic code may be missing. When successful germination as pod parent does take place the emerging seedlings may be white or distorted. Mutants are probably more successful as pollen parents.

Mitosis describes one cell dividing into two cells. The chromosomes line up, shorten and thicken splitting in two. Like poles repel and one of each division moves across the cell. The chromosomes are said to have “lined up on the spindle”. A wall grows through the cell centre dividing one cell into two cells each with the correct number of chromosomes.

Chromosomes physically convey hereditary information from one generation to the next. Species dictates the number of chromosomes within the cell. Human chromosomes number 46 as 22 pairs of autosomes and one pair of sex chromosomes (X and Y variants). Tillandsia, dependent upon its species, has about 24 chromosomes.

The famous Mendel Theory of Genetics used a pea which has 14 chromosomes. F1 is a first filial cross-pollination between two parents each transmitting hereditary characteristics according to their genes. F1 hybrids have ‘heterosis vigour’ and are usually better growers than either parent.

According to Mendel the F2 generation segregates into the various types present in the genetics of the family lineage. Genes are of two types, “dominant” and “recessive. Dominant genes induce the appearance whenever they are present. A dominant character is a result of a matched pair of chromosomes where each has a gene that controls the same function. Recessive genes can only manifest themselves in the absence of the dominant gene. [Convention is the initial letter is a capital for a dominant gene and lower case letter for a recessive gene).

A purple (recessive p) flower crossed with a yellow (dominant Y) is used to give a very simple explanation: A true purple X a true Yellow results in a F1 Yellow flower carrying purple recessive. When two F1’s are crossed the F2 combination is (YYYY) once, yellow dominant genes. (YYpp) yellow flowers twice.
(yypp) once, all recessive genes, a mixture of yellow and purple.

If a large leaf recessive purple heterozygous flowering plant is crossed with a small leaf dominant yellow heterozygous flowering plant the parents gene code is LLpp and ssYY. The reproductive chromosomes are Lp and sY. When two F1’s LsYp are crossed the reproductive chromosomes are LY, Lp, sY, sp. A checker board is used to explain the 4^2 (sixteen) variations. Should the desired progeny be a large yellow flower this will appear once as LLYY. The least desirable would be ssppyy this is a small leaf plant with a colour combination flower.

Sixty years ago (when the writer was a student) an attempt was made to explain coloured tips of leaves and petals. It was postulated that flowers have a pair of genes present to control the distribution and density of colour.

It is impossible to predict what a F1+ cross will yield because the exact genetic make-up of the parents is unknown. Large numbers of progeny must be raised

and their types and ratios carefully considered. In a seedling batch the ratio of features such as big or small growth, colour, etc. can indicate the dominant and recessive genes of the parents. Only with large numbers of seedlings can an educated guess be made as a probable result of a specific pollination. That can take several years!

Haplogroup defines a population, usually geographically orientated. Within a haplogroup genetic mistakes do occur. A tetraploid within a diploid haplogroup is a mistake that is extinguished by sexual reproduction by making a sterile triploid. Mistakes that do occur in cultivation can be maintained and are described as:

"Known only in cultivation".

The End of the Series:

A Brief Study into How Plants Function

by Les Higgins 2017

Novice Popular Vote

1st	Michelle Hartwell	*Neoregelia* 'Gee Whiz'
2nd	Dave Boudier	*Neoregelia* 'Van Dourme'
3rd	Keryn Simpson	*Neoregelia* 'Gee Whiz' hybrid

Open Popular Vote

1st	John Crawford	*Neoregelia* 'Cocktail Hour'
2nd	Jeniffer Laurie	*Neoregelia* 'Royale'
3rd	Trish Kelly	*Billbergia* 'Hallelujah'

Judges Choice

1st	Jennifer Laurie	*Neoregelia* 'Royale'

Decorative

1st	Helen Clewett	'Wake Up, It's Spring'

Where do I Find the Dates ?

www.bromeliad.org.au then click "Diary".

Check this site for regular updates of times, dates and addresses of meetings and shows in your area and around the country.