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Cover Photographs. Front: Guzmania species, a cool-growing plant grown from seed labelled "*Guzmania squarrosa*". Photograph by Andrew Flower. Back: *Cryptanthus* 'Strawberry Flambe' grown by Lyla Shepard

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In This Issue

Eric Gouda, one of our International Directors, starts this issue with a description of two **little-known quesnelia species from Brazil** *Q. seideliana* and *Q. lateralis*. Our other new International Director Renate Ehlers contributes two **new tillandsia species from Mexico**, *T. huamenulaensis* on page 56 and *T. nicolasensis* on page 70 plus a review on page 60 of *T. cucaensis* that was previously considered synonymous with *T. makoyana*.

We have two **book reviews**: Jason Grant reviews *The Tillandsia tectorum Complex* by Liselotte Nromadnik on page 55 and Derek Butcher reviews *Bromeliaceae of the Yucatan*, senior author Ivon M. Ramirez Morillao, on page 87.

Commercial experiences with bromeliad cultivation are not made public very often, and we are very fortunate to have been given the article by Corn Bak researcher Eline W. de Voss on page 73 detailing their work on the nutritional requirements of their cultivar Guzmania 'Ostara'. Their photographs of damage caused by over and under supply of various mineral elements will be an excellent guide for growers.

Yuriba Vivas gives us an **overview of the genus guzmania in Venezuela**, page 88, with information on habitats and future research plans. More information is available on a new web page at the Selby Botanical Gardens website that has more photographs of the plants and scans of the herbarium type specimens. Go to www.selby.org then the research sectioon and look at the "What's New" listing and click on "Guzmania of Venezuela." If you have photographs of any of the missing species, please send them to bholst@selby.org and he will add your photo to the web site and give you credit.

Donations to our Society are of critical importance to our ongoing operational costs, and on page 81 we thank the many members who have donated over recent months. Maintaining mutually rewarding relations with our affiliated bromeliad societies is equally important, and on page 83 we have an article that hopefully will be of interest to bromeliad societies. Originally published in the Australian Orchid Review in 2000, just think "bromeliad" when you read "orchid" - the principles of **looking after your members** are the same. Continuing the services theme, on page 82 BSI President Joyce Brehm discusses the operations if the BSI **Affiliates Chair** (currently Martha Goode) and the **Media Chair** (currently Keith Smith).

Cultivar Registrar Derek Butcher unravels the many names of ***Tillandsia capitata* 'Rio Hondo'** on page 64, and the Editor reports on a **3-year potting mix trial** comparing sphagnum moss peat to coconut husk fibre on page 93.

We have a **report and pictures from two shows**: the Bromeliad Society of New Zealand "Fiesta 2006" on page 68 and the Bromeliad Guild of Tampa Bay Show on the back cover. The **events calendar** is on page 94.

Some notes on two lesser known blue Quesnelia species from Brazil

Eric J. Gouda[1]
Curator University Utrecht Botanic Gardens

Figure 1. *Quesnelia seideliana* inflorescence and flowers.

The *Quesnelia seideliana* L.B.Sm. & Reitz we are growing in the Botanic Gardens of Utrecht was collected in Brazil, but unfortunately without any collecting data. It seems to be larger in all parts than the type collection used by Lyman B. Smith (1979) for his description, and several differences are found comparing it with his description. This could be expected when a description is based on one specimen only, not giving the variation within a species.

A short description giving the differences and some additions is given below:

Leaves in culture, two plants 50 -93 cm long, 4-6 cm wide, cinerous lepidote with transverse bands abaxial, less lepidote adaxial. *Inflorescence* the fertile part 5 cm long (excl. petals 4.5 cm) with several narrowly-ovate peduncle-bracts clustered below the inflorescence forming an involucrum; *peduncle-bracts* remote except at base and apex, the central ones elongate and over 10 cm long, densely cinerously lepidote; ***floral-bracts*** 1.5 x 2.5 cm, ovate, with triangular acuminate apex, all distinctly exceeding the sepals, ochraceous and slightly tinged reddish at apex; ***epigynous tube*** about as long as the ovary; ***sepal***s 10 x 5 mm, sub-oblong, obtuse, slightly asymmetrical, fleshy and connate for 2 mm at the base, lepidote; ***petals*** ligulate, 3 x 0.7 cm, bright (pale) blue in upper half, bearing 2 fimbriate ligulae at the base and 2 lateral folds reaching 2/3 of the petal; ***anthers*** dorsi-fixed near the centre; ***pollen*** cream.

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Figure 2. Detail of the inflorescence of *Quesnelia lateralis* showing the two-petal flowers.

Figure 3. Habitat and inflorescence of *Quesnelia lateralis.*

It is an easy species to grow and flowers from all shoots at the same time (even from small shoots). Although the blue petals seem to be different (less intense) to that of *Quesnelia lateralis* Wawra, this is not the case. When you hold the petals of the two species together it is exactly the same color. It is the contrast of the blue petals of *Q .lateralis* with the bright red bracts that makes the difference.

The *Quesnelia lateralis* that we are growing is from Rio de Janeiro. I have not seen lateral inflorescences yet, only an apical one, but never the less it has a spectacular coloration. Looking at the b&w picture Abb.322) in the book by Rauh (1981) I expect that a lateral inflorescence develops from a very premature shoot, not really lateral like in *Disteganthus lateralis* and *Tillandsia complanata* that are producing several lateral inflorescences at the same time. Interestingly all the lower flowers in our specimen have only two sepals, two petals and four stamens, but they look normal. They just

open slightly less than *Q. seideliana*, keeping a tubular look. Lyman B. Smith cites one specimen from Espirito Santo and several from Rio de Janeiro, but in this case our specimen has some characters different to the description.

A short description giving the differences and some additions is given below:

Inflorescence: the fertile part about 9 cm long; floral-bracts 3.5 x 1.3 cm, apiculate, the lower much exceeding the sepals, the upper only slightly exceeding them, sparsely lepidote, bright red; ***sepals*** fleshy at the base, short connate, strongly asymmetric, the lateral wing exceeding the apex; ***petals*** ligulate, bright (pale) blue toward apex, white at base, broadly rounded or faintly sub-apiculate, bearing 2 fimbriate ligulae at the very base and 2 lateral folds reaching 2/3 of the length of the petal; ***anthers*** dorsi-fixed near the middle; pollen cream.

As far as I know at least the last species has been introduced into at least some collections in the U.S.A. but I think that both are. And they are worth it, just because they are easily growing and flowering. The more well known *Quesnelia liboniana* (De Jonghe) Mez, that has about the same needs and often makes several shoots, can be found in many collections.

Literature cited

Rauh, W. (1981). Bromelien. Stuttgart, Ulmer Verlag.

Smith, L. B. and R. J. Downs (1979). Flora Neotropica Monograph No. 14, Part 3 Bromelioideae (Bromeliaceae). New York, The New York Botanical Garden.

Acknowledgments

I want to thank the Botanic Garden of Vienna by the person of Walter Till for sharing this living material with us.

Members' Seed Fund

The BSI seed fund is available to all members and is an excellent way to help conserve whilst enjoying the challenge of raising from seed. Donations of seed are earnestly requested, wherever possible including the location the seed parent was growing in, please.

Details of the seed fund are on www.bsi.org, or you can send a stamped, self-addressed envelope to:

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637 South Inwood Road

Shreveport, LA 71119-7260,

United States of America

Book Review

Jason Grant

Der Verwandtschaftskreis um *Tillandsia tectorum* mit einem Reisebericht aus Nordperu, Lieselotte Hromadnik, 2005. [The Tillandsia tectorum Complex with a North Peru Diary, translation by Derek and Margaret Butcher]. Die Bromelie Sonderheft 5, Deutsche Bromelien-Gesellschaft e.V., Frankurt am Main. 23 cm, 120 pages, softcover, ISSN 0724/0155, German and English.

This is a taxonomic revision of the *Tillandsia tectorum* complex, a morphologically diverse group of lithophytes that range from southern Ecuador to central Peru. The historical background behind the taxonomy and discovery of species in this group is detailed in the context of the collection new specimens made by the author and her colleagues. The new material gathered and observed over a period of many years in Ecuador and Peru and subsequently in cultivation in her private collection in Austria has led her to describe numerous novelties. The complex comprises 15 taxa, 10 of which are described as new: *T. balsaensis* Rauh, *T. chusgoensis* L. Hrom., *T. heteromorpha* Mez, *T. heteromorpha* var. *rauhii* L. Hrom., *T. lithophila* L. Hrom., *T. malyi* L. Hrom., *T. obliviata* L. Hrom., *T. reducta* L.B. Sm., *T. rupicola* Baker, *T. stellifera* L. Hrom., *T. tectorum* E. Morren, *T. tectorum* var. *globosa* L. Hrom., *T. tectorum* var. *viridula* L. Hrom., *T. tectorum* forma *gigantea* L. Hrom., and *T. tomekii* L. Hrom. For each taxon a list of specimens examined, a morphological description, information on habitat and range, and discussion are provided, in addition to an overall key to the taxa of the complex and distribution map of all species.

This revision is published bilingually in German and English; the English language translation is skillfully presented by Derek and Margaret Butcher. On each page the left hand column is in German, and the right hand in English, leading for easy comparison of text (if need be) and an easy flow throughout the book. It is copiously illustrated with photos from the field, from desert highland landscapes to habits of the plants and details of the flowers. In addition to the scientific aspect of the book, is the personal account in diary form of a month-long plant collecting expedition to Peru that details the thrills and complications faced in such a journey. Overall this is an excellent and recommended guide to a fascinating group of tillandsias that will be useful to taxonomists, horticulturists, and ecologists alike.

Tillandsia huamenulaensis: a new species from the State of Oaxaca, Mexico.

Renate Ehlers[1]

Figure 4. *Tillandsia huamenulaensis,* habitat.

I travelled in February 2003 with my friends Jürgen and Uli Lautner and Manfred Kretz along the coast from Pochutla to Huamelula. We wanted to stay over night in the small hotel in Huamelula but in the afternoon we went to the Rio Huamelula to take photos of *Tillandsia ionantha* var. *maxima*. Near the road in the dry bushes and trees along the road we saw a big tillandsia looking similar to the plant we collected near Rio San Nicolas in Jalisco. We saw a plant coming into spike and Manfred tried to get it for me down from the tree without hurting it. I was waiting near the road for him and the plant when a car stopped and a Mexican told me: what are you doing here so alone, that is not very safe for you, can I take you along? I told him that I am not alone and my friend is coming soon. And really, Manfred got the very big plant and I saw it looked different to the plants from Rio San Nicolas and as well different to the plants we collected in Chiapas near Comitan. It was 150 cm tall and when I put it in the car the top broke off and I was very sad. In the garden of the small hotel I tried to pack the plant, but it was still very big for my suitcase and I was afraid to break the inflorescence again. So I collected some small wooden branches and fixed it along the scape and the rhachis. And at home I was very happy that the lower part of the inflorescence looked good and after some weeks it flowered. After checking intensively all the related plants I think it is a new species. I had collected one more plant which flowered in October 2004 in my collection, so I could compare again.

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Tillandsia huamenulaensis R. Ehlers, sp. nov.

A *Tillandsia limbata* Schltdl. rosula infundibuliformia multo majora, foliis perrigidis coriaceisque, nervatis, laminis multo longioribus apicibus filiformibus, inflorescentia altiora, rachide minus geniculata, rosea nec rubra, floribus multo majoribus, internodiis fere duplo majoribus, bracteis florigeris 10 mm longioribus, sepalis longioribus, fere duplo latioribus, petalis longioribus, erectis absque sinuum, apicibus non divergentibus et stigmate laminis convolutes differt; a *T. comitanensis* Ehlers rosula multo majora infundibuliformia, foliis minus nervatis, vaginis foliorum paulo conspicuis, laminis foliorum vaginis sexies usque ad octies longioribus apicibus filiformibus, rhachide minus geniculata, rosea nec rubra, internodiis 2-3 cm longis (versus 1-1,2 cm), bracteis florigeris majoribus, ovatis nec suborbicularibus, sepalis longioribus et magis connatis et petalis longioribus apice latiori (10 versus 8 mm) recedit. Typus: Mexico, Estado Oaxaca, inter urbes Huatulco et Salina Cruz prope pagum Huamenula, 100-200 m s. m., 5. 2. 2003, leg. R. Ehlers EM 030406, M. Kretz, et J. & U. Lautner, epiphytica in vegetatio littorale arida in fruticibus et arboribus parvis una cum Tillandsia roland-gosselini Mez (MEXU, holo , WU, iso).

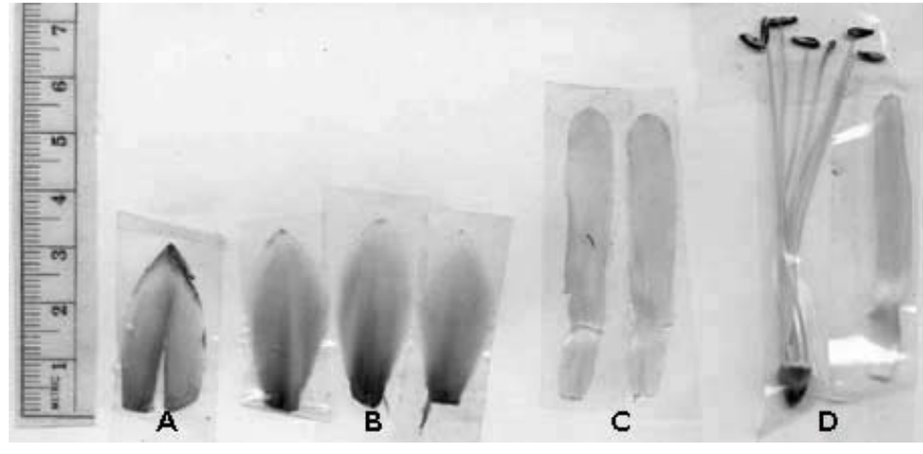

Figure 5. A floral bract, B sepals, C petals, D pistil.

Plant growing epiphytic on coastal bush-trees, stemless, 60-70 cm high, flowering 90-150 cm high, a funnel-form rosette composed of few (15–20) leaves. ***Leaves*** 60–90 cm long, green, rigid, densely and finely adpressed cinereous lepidote throughout, especially underneath, appearing green; ***sheaths*** elliptic-ovate, 8-12 cm long, 6-8 cm wide, sub-conspicuous, adaxially green with light brown, abaxially concolorous with the blade, erect-funnelform; ***blades*** narrowly triangular with long filiform tips, to 80 cm long, 3-5 cm wide above the sheath, adpressed lepidote on both sides, abaxially nerved and more lepidote, appearing grey. ***Scape*** 30–50 cm long, erect, stout, from slightly shorter than to exceeding the leaves, pink; ***scape-bracts*** erect, the lower ones lanceolate, caudate, the sheaths 3-4 cm long, imbricate, adpressed to the scape, internodes 3-5 cm, leaving the pink, glabrous scape visible, the upper ones ovate and only acute. ***Inflorescence*** central, erect, conical, laxely bipinnate or tripinnate, 40-50 cm long; 30-40 cm wide,

much surpassing the rosette, internodes between the branches 3-4 cm, composed of many branches; ***primary bracts*** like the upper scape-bracts, 3-4 cm long, enfolding the lower part of the sterile base of the axillary branch; ***branches*** 18-40 cm long, spreading 25–45°, composed of 1-3 spikes, the sterile base to 10 cm long, the spikes composed of 7–15 laxly distichious, sessile flowers, rhachis visible, geniculate, about 3 mm in diameter, flattened next the flowers, pink, glabrous, internodes 2–3 cm, about ¾ as long as the sepals; ***flowers*** erect with slight sinus and closely appressed to the rhachis, 1/2 -2/3 contiguous with it; ***floral bracts*** 7-9 mm shorter than the sepals, 2.5-3 cm long, 1.5–1.7 cm wide, ovate, sub-obtuse, enfolding the base of the sepals and 2/3 of the rhachis, green, glabrous, coriaceous with thin margins, adaxially strongly nerved, ecarinate; ***sepals*** 30-33 mm long, 15 mm wide, spatulate, obtuse, the anterior 3 mm, the posterior 4-5 mm connate with the ovary, coriaceous, green, glabrous adaxially nerved; ***petals*** tubular-erect, ligulate, 5 cm long, 10 mm wide, 6 mm at the base, throat slightly open, the obtuse tips not spreading, greenish white; ***stamens and pistil*** exerted, filaments to 5.8-6 cm long in two sets of unequal length, thin, oval-round in cross section and equal in diameter for the entire length, whitish-green, concolorous with the petals; ***anthers*** 4-5 mm long, 1 mm wide, versatile fixed 1/3 from the base; style 5– 5.5 cm long, white; ***stigma*** 2 x 2 mm, lobes erect, little spreading, green; ***ovary*** 5 mm high, 4 mm at base. The plant is monocarpic.

Figure 6. Spike.

The plant seems to be related to *Tillandsia limbata* Schlechtendal 1845, but differs in the following characters:

From *Tillandsia limbata* Schlechtendal the plant differs: plant growing in hot arid area not in moist forest, a funnelform, less spreading rosette, much bigger, leaves very rigid and coriaceous, nerved, the blades many times longer and with filiform tips. Inflorescence taller rhachis less geniculate, pink not red, flowers much bigger, internodes nearly twice as big, floral bracts nearly 1 cm longer, Sepals much longer, nearly twice as wide, petals much longer, erect with no sinus, the tips not at all spreading.

From *Tillandsia dasyliriifolia* Baker, based on description by Ivòn Ramirez (2004), the plant differs: leaves much longer, blades to 80 cm long not only to 30 cm, branches of inflorescence much longer, to 40 cm not only 20 cm. Flowers sessile, no peduncle, floral bracts longer and wider, (to 3.0, not only to 2.3 mm), sepals much longer, (to 33 mm not 15–22 mm), twice as wide (15 not 7–8 mm), higher connate, petals much longer, (to 50 mm not to 37 mm), filaments longer (to 60 mm not 36 mm), stigma with lobes small and erect not expanded.

Geographical distribution: Mexico, Estdo Oaxaca, in dry and hot area on costal bush-trees. So far only known from the type-collection between Huatulco and Salina Cruz near Huamenula, and in the area around of Pochutla, (Photo Ing. Zima CR.)

Figure 7. *Tillandsia cucaensis*

Literature Cited

Ramirez-Morillo, I. M., G. C. Fernández-Concha, et al. (2004). "Portraits of Bromeliaceae from the Mexican Yucatan Peninsular-IV: Tillandsia dasylirifolia Baker: Taxonomy and Reproductive Biology." Journal of the Bromeliad Society 54(3): 112-121.

Tillandsia cucaensis Wittmack: a review based on recently collected material.

Renate Ehlers

On 11th March 1992, during a trip to Guatemala, Klaus and I came to the Lago Isabel. We drove in a motor-boat along the Rio Dulce and its canals and saw very large green plants growing near the river on trees with *Tillandsia schiedeana*, *T. festucoides*, *T. streptophylla*, vrieseas and aechmeas. We collected only one big plant, assuming it was *T. limbata*. Though the plant got one of the best and warmest places in our glasshouse it died after 5 years without flowering. We also collected a flowering plant and I took a photo of a spike with the greenish flowers and I put the details of floral characters in my book and glued the bracts, sepals, petals and stamens and took just one branch of a huge inflorescence for my herbarium. I still had my doubts as to its true identity. During my investigations of all the plants belonging to the *T. makoyana*/*T. dasyliriifolia* group, Derek Butcher sent me his translation from the Latin of the description of *T. cucaensis* Wittmack, 1891. When I compared this description with the plant from Rio Dulce it seems that I collected this plant! My friend Jürgen Lautner sent me a photo which he took at the Rio Dulce showing Eberhard Bludau with a very big plant which seems to be the same plant. The plant I collected in Rio Dulce I have named *Tillandsia* aff *cucaensis* Guatemala, Rio Dulce, and I will argue that this plant validates *T. cucaensis* Wittmack as a true species.

Tillandsia cucaensis is treated as a synonym of *T. makoyana* Baker in Smith & Downs (1977). However, the Type of *T. cucaensis* comes from Guatemala, Ocos to Costa Cuca, Quezaltenango, Bernoulli & Cario 694 (GOET, US photo). So it is possible that the same species occurs at Rio Dulce: both places are near sea-level. I have observed T. *makoyana* in many states and locations in Mexico and I have many in my herbarium. The plant growing in Oaxaca in the desert of Tehuacan on nolina and cacti is, according to Werner Rauh, *T. makoyana* Baker and when I presented photos and details of inflorescence of this plant to Harry Luther and the other experts they agreed.

The description of *T. makoyana i*n Smith & Downs (1977) seems to be a combination of the attributes of *T. makoyana* and *T. cucaensis* plus details from some of the other collections listed under *T. makoyana*.

If we are to treat these taxa as separate species we will need to refer to the protologues for comparison purposes.

Tillandsia makoyana Baker (1889). Leaves densely rosulate, lanceolate-acuminate, 1½ ft. long, 2 in. broad low down, tapering gradually to a long point, channelled down the face. Peduncle a foot long; Bract-leaves many, small, adpressed. Inflorescence a lax simple spike 5-6 in. long with the flowers adpressed to the flexuose rachis; flower-bracts ovate, green, an inch long; calyx 1 in. longer than the bract; sepals obtuse; corolla violet,

1/3 in. longer than the calyx, shorter than the stamens. Habitat Mexico. Described from a drawing of Professor Morren's made from a plant flowered by M. Jacob-Makoy & Co., at Liege, in 1879.

Mez (1935) described it as follows:

T. makoyana Bak. Bromel. (1889) 189. – Semimetralis. Folia usque ad 0,55 m longa et fere 50 mm lata, apicem versus perlonge acute, dense lepidibus obtecta glaucocanescentia. Scapus erectus, vaginis quam intemodia paullo brevioribus, ex ovato triangulatim acutis. Inflorescentia (speciminis debilis) simplex, dense pinnatim spicata, ad 0,15 m longa et 13 mm lata, tota laete viridis; bracteis stricte erectis, apice ut videtur rotundatis alutaceo-marginatis, quam sepala manifesto brevioribus. Flores stricte erecti, rhachidis geniculis appressi, ad 50 mm longi; sepalis summo apice violaceo-brunnescentibus; petalis sepala viz duplo superantibus, tubulose conniventibus, violaceis, quam stamina optime brevioribus; stylo antheras superante.

Heimat unbekannt, wahrscheinlich Mexico. Es existiert nur eine sehr rohe Abbildung der Art in der Kew-Bibliothek. Zweifelhaft, ob von n. 13 verschieden.

Translation by Derek Butcher: Plant to 50cm high. Leaves up to 55cm long and almost 50mm wide, very long acute towards the tip, covered with dense glaucous-grey lepidote. Scape erect; scape bracts a little shorter than the internodes, from ovate acute triangular. Inflorescence (specimen weak) simple; spike dense pinnate, to 15cm long and 13mm wide, totally light green; bracts strictly erect, tip appears to be rounded with pale brown edges, clearly shorter than the sepals; flowers strictly erect, appressed to a geniculate rhachis, to 50mm long; sepals uppermost tip violet brown; petals barely twice as long as the sepals, converging into a tube, violet, much shorter than the stamens; style exceeds the anthers. Habitat unknown, probably Mexico. Described from a drawing held in Kew. Doubtfully different to *T. pulvinata*

What is interesting here is that although the same drawing was used the descriptions are not the same! One wonders how Morren would have described it! Despite these efforts the descriptions are not very complete. Therefore I have added the characters I observed on the *Tillandsia makoyana*, collected in Mexico, Estado Puebla near Tehuacan EM 012802 to the description of *T. makoyana* Baker. This gives a better view of this taxon if we are going to compare it with *T. cucaensis*.

Tillandsia makoyana Baker, based on a specimen collected in Mexico, Estado Puebla near Tehuacan EM 012802 leg. R. Ehlers 12. 12. 2001: Plant stemless, 50–100 cm high. Leaves many, densely rosulate in a funnelform narrow rosette, to 65 cm long, densely and finely appressed glaucous-cinereous lepidote throughout; strongly nerved on both sides; sheaths elliptic-ovate, 12-16 cm long, 7–11 cm wide, castaneous; blades linear-triangular, very long acute towards the tip, to 40 cm long, 3-5 cm wide. Scape erect, stout, from slightly shorter than to exceeding the leaves; scape-bracts erect, a little shorter than the internodes, the lower ones ovate to triangular, linear-laminate, imbricate, the upper ones ovate-lanceolate, acute, sometimes remote. Inflorescence

central, erect, simple to conical pyramidal, laxely bipinnate, to 4 dm long; primary bracts like the upper scape-bracts, scarcely larger than the floral bracts, enfolding the lower half of the sterile base of the axillary branch; these to 24 cm long, laxly flowered, the internodes about equaling the floral bracts; rhachis strongly undulate, very stout, flattened next the flowers, glabrous, flowers about 15 mm apart, to 50 mm long; calyx 2,5 cm longer than the floral bracts, erect and closely adpressed to the flexuous rhachis; pedicels 1 – 2 mm; floral bracts erect, 18–20 mm long, 11–13 mm wide, broadly ovate, obtuse, clearly shorter than the sepals, coriaceous with a hyaline margin, nerved, ecarinate, (bright red in Mexico) or greenish with red margins; sepals narrowly elliptic or obovate, obtuse, 20–22 mm long, 10-11 mm wide, very short-connate, coriaceous, even except near the margin, green with uppermost tip violet brown or red, glabrous outside, brown-punctulate-lepidote inside; petals tubular-erect, 3.3–3.5 cm long, (barely twice as long as the sepals,) 7-8 mm wide, spatulate erect, nearly not narrowing towards base, obtuse apex not recurved, converging into a tube with closed corolla throat, violet (to mauve) getting white towards base; stamens and pistil excerted, filaments in two sets unequal in length 4.7–5 cm long 1 mm wide, oval not much narrowing towards base, yellow–green, anthers 2.5 mm long 1 mm wide, versatile fixed 1/3 from base; style surpassing the stamens 2–3 mm, 4.2–4.5 mm long, yellow-green; stigma small, 1.5 mm high, 2 mm wide, erect not twisted, the lobes slightly spreading; ovary 8–10 mm high 3.5 mm wide, green; capsule slenderly cylindric, acute, 4.5 cm long (6-8 cm long?); seeds 3.3 cm long.

Tillandsia cucaensis Wittmack (1891) description from Mez (1935): Type. Guatemala, Ocos to Costa Cuca, Quezaltenango, Bernoulli & Cario 694 (GOET, US photo). Plant 1 meter high or more. Leaves up to 50cm long, above the sheath to 6 cm wide, then narrowing gradually to a thick subulate tip, both sides dense appressed lepidote glaucous especially underneath. Scape thick, clothed by sheaths where the upper ones exceed the internodes. Inflorescence many flowered, a lax bipinnate panicle, sub-pyramidal, to 40cm long and 30cm in diam at base; primary bracts broad ovate, becoming obtuse, much shorter than the side branches. Lower branches ascending, to 20 cm or a little longer, about 9 flowered, the base with sterile bracts; spikes to 15cm long, pinnate, largely undulating, lax; floral bracts to 18mm apart or more, very upright erect, not imbricate nor enclosing the axis, leathery except for membranaceous margins, glabrous on the back and strong prominent nerved, to 33 mm long, much shorter than the sepals, broad rounded; flowers certainly over 40mm long, erect, appressed to the rhachis; sepals leathery, about equally free, the back glabrous and a little nerved, broad oval, rounded, to 27mm long; petals longer than the sepals by to 10 mm, green, tubular erect, shorter than the stamens. Habitat Guattemala: near Ocos on the Costa Cuca (Bernoulli and Cario n.694). Costa Rica: near Nicoya (Tonduz in herb. inst. phys.-geogr. Costaric. n. 13674)

Tillandsia* aff *cucaensis based on a plant collected in Guatemala, Rio Dulce, Lago de Isabel, nearly sea - level, EG 922001 leg. Klaus and Renate Ehlers 11. 3. 92 . This plant fits the description of Tillandsia cucaensis Wittm in nearly all details and

does not correspond to *T. makoyana*. Plant up to 150 cm high, a spreading much bigger green rosette with thinner and greener leaves, these spreading, not a funnelform narrow rosette like T. makoyana. Spikes to 23 cm long, largely undulating, the internodes much bigger, flowers about 18 mm apart, not like T. makoyana 15 mm, the rhachis less geniculate. Flowers over 40 mm not about 30 cm; floral bracts to 32 mm long, to 16 mm wide, not only 18–22 mm long, 11-13 mm wide; sepals to 30 mm long 10 mm wide not 22 mm long; petals 40–45 mm long whitish green, not 33-35 mm and violet; stamens longer; stigma lobes slender, longer and more spreading.

So if we compare the characters to this plant they fit Tillandsia cucaensis Wittm.

Conclusion: Now that Ramirez et al.(2004) have shown what we can now expect to see as T. dasyliriifolia we should be unravelling the unsubstantiated synonymising of the past and resurrect Tillandsia cucaensis Wittm. This will then open the way for a wider investigation of this group. It is possible that T. cucaensis has greater ties with T. limbata but certainly not T. makoyana. Only more detailed investigation will tell.

Acknowledgments

My best thanks to Dr. Walter Till, University of Vienna, for his cooperation and advice and for the Latin diagnosis. And to Harry Luther for his advice, my friends Virginia and Robert Guess, and Derek Butcher.

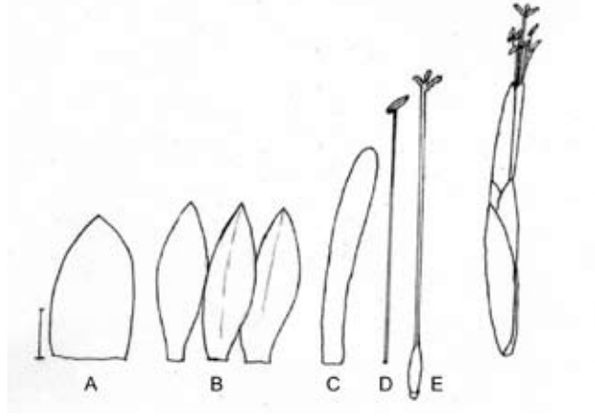

Figure 8. A floral bract, B sepals, C petal, D anther, E filament

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Tillandsia 'Rio Hondo'

Derek Butcher, Bromeliad Cultivar Registrar

The recent naming of a *Tillandsia maya* in Novon:209-11. 2003 had me worried because we already have *Tillandsia* 'Maya' in the Cultivar Register and to further confuse it is likely that *T. maya* will be treated as T. xmaya! Plants named under the ICBN rules always have precedence over those named under ICNCP rules irrespective of date.

This and other query from Ken Woods here in Australia prompted me to action. Dennis Cathcart named 'Maya' in Cargo Report #7-3 for a supposed natural hybrid of xerographica x capitata occurring in Guatemala. Some followed this naming and others not, so we see its photo in 'New Tillandsia Handbook' by Shimizu & Takizawa, (1998) on page 113 as a formula. Just for interest sake, on the same page you will see a Dimmitt hybrid namely *T. xerographica* x *brachycaulos*. This was named 'Betty' by Paul Isley. We know that *T. brachycaulos* and *T. capitata* are very similar, in fact some collected plants seem to fall between the parameters of both species. It depends whether you are a lumper or a splitter! To my mind a hybrid with these as parents should show some sort of similarity but in this case they don't. Here the man-made hybrid gives a hint of what the natural hybrid should look like. In this case it adds weight to my belief that the parentage xerographica x capitata was the wrong one to use!

Apparently this all started in 1989 when Uwe Feldhoff collected a plant at Zacapa, Rio Hondatal, Guatemala and sent a specimen to Renate Ehlers in Germany. Investigations showed that it was different to what is generally considered to be the range of the very variable *T. capitata*. Although *T. rhodocephala* , another variant within *T. capitata* in the broad sense, was published by Ehlers & Koide (1994), no action has yet been taken with this particular taxon.

Meanwhile, Guatemalan exporters had also been selling this plant around the world to the general nursery trade as *Tillandsia sphaerocephala* Guatemala. The true *T. sphaerocephala* from Bolivia was, at that time, not common in collections and it had in any event been confused with *T. schreiteri* in Smith & Downs, Flora Neotropica. (1977) It had never been found in Guatemala and in any event the stamens are included so it was an odd identification. The plant was also distributed by the name of *T. harrisii* to which it does have some vague similarity when young and not in flower!

When I knew that Renate Ehlers was not immediately going to describe this taxon I decided to call it by the name of *Tillandsia* 'Rio Hondo' and it is recorded as such in the Bromeliad Cultivar Register with notes referring to 'Uncle Derek says'.

In July 2001 Anwyl Bromeliads in New Zealand imported a shipment from Tropimeyer (Guatemala) that included *Tillandsia* "*sphaerocephala*". 40 or 50 plants flowered whilst in the quarantine house, and all were the same and were given the provisional

Figure 9. Tillandsia 'Yellow-rose." Photograph Andrew Flower

Figure 10. Tillandsia 'Rio Hondo' Photograph Derek Butcher

name of 'Yellow-rose' because the coloration of the primary bracts was quite different from any other *Tillandsia capitata* photos in the records. Now several hundred of these plants are being grown in New Zealand collections with the label *Tillandsia capitata* 'Yellow-rose'. This colour was unique and may have been the result of the transportation, or perhaps the sharply lower temperatures in New Zealand because subsequently the remaining plants from this shipment flowered in cultivation with that orange coloured primary bract typical of 'Rio Hondo'. Indeed, offsets from those initial flowering plants that were called 'Yellow-rose' also flowered with orange primary bracts. (Andrew Flower, pers. comm.)

To summarise, we have a plant variously called, *T. xerographica* x *capitata*, *T.*'Maya', *T. sphaerocephala* Guatemala, *T. harrisii*, *Tillandsia capitata* 'Yellow-rose' in New Zealand, and *T.* 'Rio Hondo'. Because of the duplication problem with *T.* 'Maya' would you please change all labels to read *T.* 'Rio Hondo' or *T. capitata* 'Rio Hondo'and I will note the Cultivar Register accordingly.

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Fiesta 2006

David Anderson[1]

photographs by Birgit Rhode

Figure 11. "Broms, baby and me"

For the second successive year the Bromeliad Society of New Zealand held their annual competition, show and display at the Alexandra Park Trotting Stables. Fiesta is a pertinent name for this colourful event on the society's calendar. The public attendance was very good being quite comparable with previous years with many keen buyers. Because the Fiesta was held much earlier in the year than usual the neoregelias were near their peak of colour.

Of great interest to our society members who attended were the plants entered into the various competition classes. In particular a new class established this year was for NZ hybrids proved very popular. Dominating this scene over recent years have been the vriesea hybrids that have been bred by Andrew Maloy. He has used *Vriesea gigantea*, *Vr. platynema* var. *variegata* and *Vr. fosteriana* amongst others in his breeding programme and has produced some absolutely stunning plants, many of them having been displayed in the NZ journal. Unfortunately the single plants of these hybrids have not been bred on in large numbers making it difficult to obtain a particular hybrid. There were other notable NZ cultivars including neoregelia hybrids bred by Avon Ryan and Andrew Steens and a range of other lovely plants bred by our Plant Registrar Gerry Stansfield.

There was a high standard of entry of plants in the competition with the show champion being awarded to a superbly grown *Tillandsia streptophylla* exhibited by Brian Chudleigh of Katikati.

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Figure 12. *Neoregelia* 'Grace Darling' exhibited at Fiesta 2006.

Figure13. Show Champion, *Tillandsia streptophylla* grown by Cushla and Brian Chudleigh.

Tillandsia nicolasensis: a new species from coastal Jalisco, Mexico.

Renate Ehlers.[1]

In 1998 Lydia Köhres from Erzhausen, Germany told me about a plant she found in Jalisco near Chamela near the Club Polynesia that looks like *Tillandsia makoyana* but has red flowers with open throat. Lydia gave me a herbarium specimen, and even dried I saw the big difference of the details of flowers compared to *T. makoyana.*

In December 2002 I was on a trip through Mexico with Lydia and Gerhard Köhres and I was very keen to go the place in Jalisco where Lydia found the red-flowered tillandsia. But we did not need to go to the Club Polynesia. We took a little road along the river San Nicolas and found the plant very soon. A very nice and big plant where I could already see it was coming into spike went with me to Stuttgart and I could study all the details of the inflorescence when it was flowering. The plant at the location has a more spreading rosette than the plants I recollected at the same location when I came back in February 2004 with Jürgen and Uli Lautner and Manfred Kretz. I collected some plants that flowered in my collection in autumn 2004. We found on this trip the new species also near the main road near Tomatlan. So it seems it is widely spread in this area. Interestingly there is also *T. makoyana* growing nearby.

Tillandsia nicolasensis R. Ehlers, sp. nov.

A *Tillandsia makoyana* Baker rhachidi magis flexuosa robustioreque, internodiis majoribus, floribus sessilibus, bracteis florigeris multo majoribus vinosis rhachim minus celantibus, sepalibus majoribus latioribusque, vinosis, nervatis, adaxialiter non brunneopunctulatis, petalis spathulatis nec lingulatis et sinuosis, carnosis, vinosis nec violaceis et fauce corollae peraperta apicibus rectis differt; a *Tillandsia limbata* Schtldl. rosulis infundibuliformibus, minus foliis perrigidis disctincte nervatis griseis compositis, ramis inflorescentiae magis flexuosis internodiis majoribus, floribus in totis partibus majoribus, bracteis florigeris majoribus latioribusque, vinosis, distincte nervatis solum sepalas celantibus, sepalis fere duplo latioribus, fauce corollae magis aperta et petalis majoribus latioribusque spathulatis nec sinuosis vinosis recedit. **Typus:** Mexico, Estado Jalisco, inter urbes Puerto Vallarta et Cihuatlan, Río San Nicolas, 50 m s. m., leg. *R. Ehlers EM002305,* 10. 12. 2000, WU (Paratypus); loco citato, leg. *R. Ehlers EM041401,* 1. 2. 2004, MEXU (Holotypus), WU (Isotypus); Estado Jalisco, prope viam principalem, km 106, prope urbem Tomatlan, leg. *R. Ehlers EM041402,* 1. 2. 2004, WU (Paratypus); Estado Jalisco, Club Polynesia prope urbem Chamela, leg. *L.* & *G. Köhres s. n.,* 1998, WU (paratypus).

Plant growing epiphytic on coastal trees and bushes, solitary or in small groups, stemless, many leaves forming a funnelform to slightly spreading rosette, plant to 60 cm high, flowering to 150 cm high, 40–70 cm in cross section. ***Leaves*** 25-60 cm long, very rigid and thick, strongly nerved, green on both sides densely fine grey lepidote therefore looking green-grey; ***leaf sheaths*** 7-14 cm long, 4-8 cm wide, elliptic, erect and adpressed to each other, light brown finely adpressed lepidote on both sides, gradually merging into the triangular blades. These 20–45 cm long, 1.7-3.5 cm wide above the sheath, narrowly triangular acuminate, the margins slightly involute, adaxial looking green, finely nerved, abaxial strongly nerved and as to the dense and fine adpressed grey-white trichomes looking whitish grey. ***Scape*** erect, 25–55 cm long, much surpassing the rosette, very stout, at the base 1-2 cm in cross-section, glabrous, wine-red; ***scape bracts*** densely imbricate hiding with their sheaths most of the scape, the lower ones subfoliat with blades to 15 cm long, the upper ones only acute without blade, the sheaths 4–5 cm long, rose grey lepidote, internodes ca. as long as the sheaths. ***Inflorescence*** central, erect, to 60 cm long, 15-55 cm wide, laxly bipinnate, usually ample, subconical but sometimes reduced to a few branches, composed 7–15 branches, these spreading in an angle of 50–90°; ***primary bracts*** very short, slightly shorter than the floral bracts and similar to these, red, strongly lepidote, only 1/3 as long as the sterile base of the branch and enfolding it; ***branches*** 10-30 cm long, to 3 cm wide, linear, with to 12 cm long 5 mm wide only slightly flexuous base enfolded of 3–4 sterile bracts, then laxly composed of to 13 fertile flowers; ***rhachis*** strongly geniculate, flattened next to the flowers, red, glabrous, visible because not enfolded by the floral bracts, the sepals adpressed to the rhachis, internodes about as long as the floral bracts; ***floral bracts*** 2–2.5 cm long, 8-10 mm shorter than the sepals, 1.7–1.8 cm wide, broadly oval to deltoid, obtuse to subacute, densely enfolding the sepals but not the rhachis, ecarinate, coriaceous with thin margins, abaxial slightly nerved (prominently nerved when dry,) wine-red or green-red, glabrous, lustrous, adaxial strongly nerved, very tiny punctulate lepidote; ***sepals*** 2.5– 2.6 cm long 1.3–1.4 cm wide, obovate obtuse, coriaceous with thin margins, glabrous, the anterior 3 mm, the posterior ones 5 mm connate with the ovarium and towards the base very slightly carinate, abaxial lustrous wine-red, glabrous, adaxial green-red, strongly nerved; ***petals*** 4-4.5 cm long, 8–11 mm wide, broadly spatulate (nearly not narrower against the base), coriaceous, nerved, wine-red, yellow-green towards base, building a tube with widely open corolla the obtuse apices erect, not recurved; ***stamens*** widely exerted, filaments in two sets of unequal length, 5.5–5.7 cm long, oval-linear (nor much narrower towards base,) yellow green, anthers 3.5–4 mm long, 1 mm wide, elliptic, versatile fixed 1/3 from base, brown-black, pollen egg-yellow; ***style*** to 5 cm long, 1 mm in cross-section, narrower towards base, yellow-green; ***stigma*** 2–2.5 mm long, 1–1.5 mm wide, lobes narrow, erect to little spreading, nearly not twisted, light green, strongly papillose, Typ I Brown & Gilmartin; ***ovary*** 8 mm high, 3.5 mm wide, narrowly elliptic, green; ***capsule*** 6 cm long.

According to Sue Gardner's classification (1982) the plant belongs to group II of Tillandsia with the corolla throat open. In this group she includes *Tillandsia limbata* Schlechtendal. But if we look at the plant it looks closer to *Tillandsia makoyana* Baker**.**

1 address

Figure 14. *Tillandsia nicolaensis* spike

From *Tillandsia makoyana* Baker the plant differs: rhachis of branches more flexuous, stout not slender, internodes of flowers bigger, flowers no pedicels, floral bracts much bigger in size, less enfolding the rhachis, wine-red not carmine-red or green, sepals bigger, and much wider, nerved, inside not brown-punctulate-lepidote, wine-red not red or green, petals spatulate not ligulate with some sinus, very fleshy, corolla throat widely open with tips not spreading, wine-red not violet. Belonging to Gardner's group II of Tillandsia with filaments not broadened near apex and corolla-throat open not to Group I.

From *Tillandsia limbata* Schlechtendal the plant differs*:* plant growing in hot arid area not in moist forest, a funnelform plant with fewer leaves, the leaves very rigid and prominently nerved looking grey not a green more open rosette, branches of inflorescence more flexuous with bigger internodes and flowers much bigger in all parts, floral bracts bigger and wider, wine-red, stronger nerved, enfolding only the sepals not also part of the rhachis, sepals nearly twice as wide, petals with corolla-throat more open, bigger and wider, spatulate with no sinus, dark wine-red not white.

Geographical distribution: So far the plant is only known from Jalisco in areas of costal trees and bushes, growing with *T. paucifolia* Baker, *T. eistetteri* Ehlers, *T. diguettii* Mez & Roland Gosselin ex Mez.

Figure15. *Tillandsia nicolaensis*, floral parts

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Nutritional needs of *Guzmania* 'Ostara', a cultivated Bromeliad

Ir. Eline W. de Vos[1] **Photographs by Corn. Bak® BV**

Introduction

All plants are dependent on certain chemical elements for their growth and flowering, of which the macronutrients nitrogen (N), phosphorus (P) and potassium (K) are the most important. Calcium (Ca) and magnesium (Mg) follow closely. The plant's requirements are completed with minute amounts of trace elements, such as iron (Fe), boron (B), zinc (Zn), manganese (Mn), copper (Cu) and molybdenum (Mo).

Each plant species has its own preference in amount and combination of these nutrients, but there are some basic rules concerning nutritional needs that apply to all plants. Bromeliads, however, are a quite exceptional group of plants, since they tend to live in rather infertile environments. Especially the (facultative) epiphytes among the Bromeliaceae family have adapted to living on the scarcity of nutrients that accumulate in the tank. As a result their growth rate is typically very slow.

Cultivated Bromeliads can exhibit accelerated growth, when given the right environmental and nutritional conditions. Commercial growers tend to fertilize up to the plant's limits, in order to achieve a short cultivation time. This can easily lead to problems with plant quality because of accumulation of one or more elements. Another underestimated problem can be caused by suboptimal *ratios* of macro elements. An optimal NPK ratio will give the grower the opportunity to apply larger quantities of fertilizer before problems arise. With Bromeliads, decreased plant quality because of a nutrient *deficiency* is much less common.

Figure 16. *Guzmania* 'Ostara'

To easily recognize nutritional problems in Bromeliads, at Corn. Bak® BV, the Netherlands, experiments are conducted to determine the damage characteristics for element excess and -deficiency for commercially important cultivars. The symptoms of damage are recorded on photo. Since we are a supplier of young

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plant material, this knowledge can be quite valuable for our customers. Therefore, all test results are available on request.

In 2003, nutritional experiments were done on *Guzmania* 'Ostara', which is a large hybrid with orange bracts (Fig. 1). Worldwide, approx. 2½ million plants of this cultivar are sold annually.

Method

Guzmania 'Ostara' plants were tested from the moment of potting, up until flowering. Different groups (36) were created, each containing 20 plants of a similar starting height. They were grown in a greenhouse at 19-20º C (66-68º F) and 70% RH (relative humidity). The potting soil had a pH of about 5,5 and was minimally fertilized with PG mix 12-14-24 (trace elements included). EC (Electrical Conductivity, a measure for the salinity) of the soil was 0.3 mS. The soil was therefore not entirely free of nutrients. During 59 weeks each group manually received a specific fertilizer mixture, which always differed from the control group in only one element.

The water used in a Dutch greenhouse is traditionally rain water that is being collected in large basins. This has a very low EC (0.1 mS) because of a minimal saline content. The different fertilizer mixtures were applied from above, wetting the leaves; filling the tanks and also reaching the potting soil. Because of the salinity of the fertilizer

Table 1. Control group fertilizer composition.

		in 1 liter fertilizer:
N	122 ppm	8,7 mmol
P	17 ppm	0,6 mmol
K	263 ppm	6,7 mmol
Mg	8 ppm	0,3 mmol
Fe	0,2 ppm	3,6 µmol
B	0,04 ppm	3,7 µmol
Cu	0,1 ppm	1,5 µmol
Mn	0,1 ppm	1,9 µmol
Zn	0,1 ppm	1,5 µmol
Mo	0,001 ppm	0,01 µmol

(EC ~ 1.0 mS), the leaves were always given a short spraying of clean rain water after applying fertilizer to avoid leaf burn. Fertilizer mixtures were applied once every week (summer) or once every two weeks (winter). In between fertilizer applications clean rain water was supplied from above, wetting leaves and soil alike. This was done as often as the plants required it, but with a minimum of two times a week, always making sure that there was enough water between the leaves and in the tank.

The composition of the control group fertilizer mix (as tested in two groups) is shown in Table 1.

For all the micronutrients and Mg one group was grown on a fertilizer mix with an entire lack of the tested element. They were also tested in two excess groups: for the elements Fe, B, Cu, Mn and Zn there was one group that received 20 times, and another that received 60 times the amount of the control group. For Mo that was respectively 120 times and 480 times. For Mg 11 times and 22 times.

The control group did not receive any aluminum (Al), chlorine (Cl) or calcium and therefore functioned as a "deficiency" group for these elements. These elements were all tested at different excess concentrations. Also, Ca was tested in two different formulations: the liquid calcium nitrate which all growers use, and a Ca fertilizer from a biological source. See Table 2 for an overview of excess test group compositions.

Table 2. Composition in ppm of single elements in fertilizer solution of excess test groups. *Compare with table 1.*

	excess 1	excess 2
Fe	4	12
B	0,8	2,4
Cu	2	6
Mn	2	6
Zn	2	6
Mo	0,16	0,48
Mg	88	176
Ca	70	210
Al	5,6	-
Cl	35	70

For the macronutrients N, P and K, growers usually work with the ratios listed on the fertilizer bags, for example 20-5-30. These numbers describe the *weight percentage* of N_{total}, P_2O_5 and K_2O in the bag. In this example that would mean that 1 kilogram (2,2 lbs) of (undissolved) fertilizer contains 5% = 50 grams (1,76 oz) of P_2O_5. *Note: do not confuse this molecule with its element P. 50 Grams of P_2O_5 contains 21,8 grams (0,77 oz) P. However, the aforementioned ratio is commonly – in short – referred to as the NPK ratio.*

When using the same notation, our control group has an NPK ratio of 15-5-40. For all three elements, one group was tested on a deficiency, and another on an excess. The ratios tested are shown in Table 3.

Table 3. NPK ratios tested. *(Sometimes an element that is* not *being tested in a group, is also slightly different from the control group. In those cases it was technically impossible to create the exact desired ratio with the available fertilizers. It is unlikely, though, that this caused any problems for the test plants.)*

	NPK ratio
control group	15-5-40
N deficiency	4-6-39
N excess	33-5-39
P deficiency	15-1-36
P excess	15-24-40
K deficiency	15-2-14
K excess	15-5-90

At a certain plant size, the groups were induced for flowering with acetylene gas. Some weeks before and after induction no fertilizer was applied, in order to facilitate the switch from vegetative to generative stage.

At two points in time soil samples were analyzed: directly before flower induction and at the end of the experiment, when the plants were ready for sale. This was done by the lab analysis method of 1 volume soil : 1,5 volumes water. From some groups also leaf samples were analyzed.

Figure 17. Brown leaf tips because of Boron excess 60X

Figure 18. White residue leaves because of Calcium.

Figure 19. Yellow-red discoloration of the older leaves due to excess Copper.

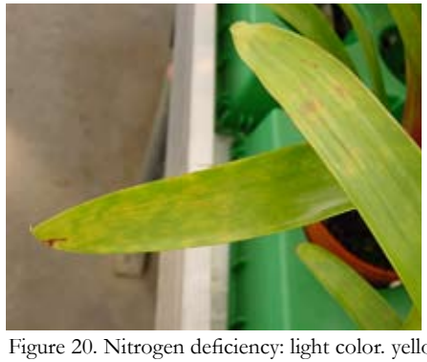

Figure 20. Nitrogen deficiency: light color. yellow and brown leaf patches.

Results and discussion

General observations

Surprisingly, only a few groups showed clear symptoms of damage (see Table 4). Apparently the tested nutrient concentrations were not extreme enough. The omission of one single micronutrient or Mg from the fertilizer mix never led to any visible problems. It can be argued that the plants never faced a *total* lack of any micronutrient, since the soil was slightly fertilized from the start. It seems that this initial supply is sufficient for the entire growing period. From previous experiments we know that a total lack of *all* micronutrients at the same time invariably leads to slower growing plants with a lighter coloring.

Figure 21. Nitrogen excess: dark green leaves, "green" inflorescence.

Figure 22. Potassium deficiency

Figure 23. Phosphorus excess

Not one of the tested excess levels for Fe, Zn, Mn, Mo, Mg, Al and Cl elicited a visible response in the plants. In most cases, the excess of these nutrients was fully absorbed by the roots. The soil analyses showed no higher levels than the control group. Exceptions were Fe and Mg; these accumulated in the pot and reached levels of up to five times that of the soil of the control plants. *G.* 'Ostara' is either quite tolerant to the elements mentioned, or the test levels were not high enough to evoke damage.

The soil analyses also presented us with some classic examples of antagonistic

interactions. Because of a Ca excess, Mg, Mn and Zn levels in the soil were also raised, due to competitive absorption-inhibition.

Boron

Quite early on in the experiment, damage started to show in both excess groups. At first this manifested itself as a yellow discoloration, later on turning into desiccated brown foliage. The longer (or: more of) a boron excess was applied, the longer these necrotic leaf tips became. In our 60x test group we found brown leaf tips up to 9 cm (3,5") long. From the soil analyses we can deduce that an amount of 8 µmol/lt (0,09 ppm) B in the soil is enough to cause the characteristic leaf tip damage (see Fig. 2).

The leaves of the boron test groups contained a significantly higher amount of B than those of the control groups; over 5000 µmol per kg dry matter (vs 80 in the old leaves of the control). 5000 µMol per kg dry matter (54 ppm) seems to be the absolute limit the leaves can hold, since this was the same for both old and young leaves in the

Table 4. Results. + : clear damage,
- : no visible effect. *See text for details.*

	deficien-	excess 1	excess 2
N	+	+	
P	-	+	
K	+	+	
Mg	-	-	-
Ca	-	-/+	-/+
Fe	-	-	-
B	-	+	+
Cu	-	+	+
Mn	-	-	-
Zn	-	-	-
Mo	-	-	-
Al	-	-	
Cl	-	-	-

excess groups. Anything above this will be accumulated in the soil, as the plant no longer absorbs it. It is however notable to see that, in the control groups, the younger leaves contain 15 times more B than the older leaves. According to literature, boron is not a very mobile element in the plant. But in *G.* 'Ostara' apparently some sort of relocation is taking place in favor of the younger leaves. Therefore the younger leaves will probably be more susceptible to boron damage.

Copper

Shortly after inducing the plants for flowering, it became clear that an excess of copper (20x and 60x) causes the older leaves to change color. The green fades away, the leaves turn a yellowy red and they start to curl up lengthwise. In an even later stage (or at a higher excess dose) the leaves desiccate from the tip down and turn brown. This affects only the few oldest leaves on the plant. See Fig. 3.

Copper is not a very mobile element in the plant. This can also be seen in the tissue analysis; the amount of copper in the older leaves is clearly higher than in the younger leaves. The soil analysis did not show a much raised Cu level, whereas the tissue samples

contained a concentration of Cu that was 10 times that of the control group.

Calcium

In *G.* 'Ostara' no leaf damage was observed because of a calcium excess. But when using calcium nitrate in the fertilizer solution, a crystalline white residue can often be found on the tank and leaf margins (Fig. 4). Under certain circumstances this can lead to leaf burning. The basis of the leaves (at tank height) will then turn crenate with brown edges.

We have seen this specific type of damage in other Bomeliad cultivars, that is why we are very reluctant in using calcium in the fertilizer mix. In our own nursery Bromeliads grow on a fertilizer with no calcium at all, with very good results. Our customers get the same recommendation, but rarely follow this advice. This is because of the widespread belief that calcium is one of those chemical elements that have a key function in plant physiology. Of course this is true for most plants, but here we see an important difference with Bromeliads and other plants. Bromeliads have a very slow growth rate because of their adaptation to scarcity, and maybe their need for calcium is very limited because of the same reason. It is our experience that the small amount of calcium that is mixed into the potting soil (to get the right pH) is enough.

When comparing the formulation of the calcium fertilizers, we find that the biological calcium does *not* leave the characteristic white residue on the leaves. Therefore the risk of leaf burning is less. That is why we would recommend that a grower uses biological calcium instead of calcium nitrate, if he wants to use calcium at all.

Nitrogen

A nitrogen deficiency causes lightly colored plants that stay behind in growth. The plant shape becomes short and stocky with pale yellowish, broad leaves, that can even develop yellow or brown necrotic patches (Fig. 5). The inflorescence is also very short and light, but brightly colored.

When presented with a nitrogen excess, the plant turns a darker shade of green and grows long narrow leaves, that sometimes have small brown leaf tips. Very characteristically, flower induction can be (partially) inhibited, causing the occurrence of green inflorescences or plants with no inflorescence at all (Fig. 6). The physiological background of this phenomenon is that the switch from vegetative to generative stage can not be made on a high nitrogen level. Because of the nitrogen, the plant stays in "growing mode".

Phosphorus

G. 'Ostara' experienced little discomfort from a deficiency of phosphorus. In the excess group, small yellow or brown leaf tips appeared (Fig. 7). In the soil samples of the excess group, the phosporus level was hardly raised. Consequently, the plants must have absorbed most of it. Only one excess level was tested, but from experience and other experiments we know that phosphorus is an element that can easily cause large brown necrotic leaf tips when applied in overdose. The damage looks quite similar to that of boron excess, and is irreversible.

Potassium

Both deficiency and excess showed characteristic symptoms; these could visually be seen on the plants as well as in the soil samples. The deficiency caused dark green plants, whereas the excess group consisted of lighter colored plants. Both groups showed yellow leaf tips, and especially the excess group had lots of yellow leaf patches. The deficiency group showed a lot of brown necrotic leaf spots (Fig. 22).

Conclusions and recommendations

✓ Deficiency of a single micronutrient will seldom lead to damage in *G.* 'Ostara'. An excess of Fe, Zn, Mn, Mo, Mg or Al must be quite high in concentration before damage occurs.

✓ Never add extra boron to the fertilizer mix; if the soil is prefertilized with PG-mix, boron will be sufficient for the entire growing period. Any boron excess will invariably lead to brown necrotic leaf tips. Aim to never exceed a soil boron level of 6 µmol/lt (0,06 ppm).

✓ When in excess, copper can cause damage to the oldest leaves. This starts as a yellow-red discoloration of the entire leaf, and leads to desiccation of the leaf from the tip down. The damage does not show until the later plant stages, and can better be predicted from tissue analysis than from soil analysis. We found considerable damage at 0,5 µmol/lt (0,03 ppm) Cu in the soil. This corresponded with 500 µmol/kg dry weight (33 ppm) in the plant.

✓ Calcium nitrate leaves a white crystalline residue on tank and leaf margins. This can lead to burning of the margins. Calcium of a biological source does not display this problem. At Corn. Bak® BV, we advise against the use of calcium, but if you must use it we favor biological calcium.

✓ When lowering the nitrogen concentration in the fertilizing solution, you get a stockier plant with short, broad leaves. Its color then changes to a lighter green, towards yellow. The inflorescence will turn very bright. When applying *more* nitrogen, you get luxuriant plants that are dark green with long narrow leaves. With a nitrogen application that is too high, the inflorescence stays green or the plant remains entirely in a vegetative stage, giving no inflorescence at all. Therefore always make sure not to fertilize the plants for a short period around flower induction time.

✓ A true phosphorus deficiency is not often found in *G.* 'Ostara'. An excess of the element can easily lead to (large) brown leaf tips.

✓ Potassium plays an important role in Bromeliads. Both deficiency and excess can give cause to a lot of leaf damage in the form of discolored leaf tips or spots. It is often difficult to visually distinguish deficiency from excess. Soil or tissue analyses may then be decisive.

Donations to the Bromeliad Society International

July 1, 2005 to December 31, 2005

The BSI extends a sincere "thank you" to all the following for their contributions.

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If you wish to make a contribution to our society's operating costs, or support the Bromeliad Identification Centre, please mail your check to the BSI Treasurer, Ed Doherty, 3533 Milton Ave., Dallas TX 75205-1221, United States of America.

Did You Know?

Joyce Brehm, BSI President

The Affiliate Chair, Currently Martha Goode helps us keep track of the Affiliated Societies. Affiliated Societies get special attention from the Bromeliad Identification Center and Harry Luther, Director of the BIC. They get reprints free from publications that Harry writes for their information and library. We encourage you to send us articles to publish on the BSI website and/or the Journal of the Bromeliad Society.

This is a good way to inform the "Bromeliad World" of happenings in your society. It is really important that we hear of our loving friends that have passed away, show results, future planning and other things that you may think are of interest only to you, but are really interesting to all of us. People from other societies may visit your event if they know the date of your upcoming show or sale.

We need to keep the Affiliate information updated so that we can be sure to keep you updated and contact you as necessary.

Please have your affiliate contact send their news letter or information electronically to Martha Goode, stevegoode1@ameritech.net, or send her a letter at 826 Buckingham Court. Crystal Lake, Il 60014-7601. She will be in touch with you to confirm your information.

This issue I also want to focus on the Media Chair position. We have a volunteer who collects programs from affiliates, puts together and maintains media programs for our Affiliate Members. These programs can be used for your local meeting programs of for your own information.

There are two ways to obtain these programs; by renting or by purchasing them, what ever works best for your situation. Slide programs are no longer available, but we now have I-photo (Mac), Windows and PowerPoint CD's that will play on a computer or digital projector projector. Many clubs now have these devices on which to play and show their programs. Currently we have the following programs available for your use and more are in the works:

Bromeliads from A to Z
Bromeliads of Hawaii

Please help increase our programs by sending a CD of programs you have developed for your society to the address below. For more information contact:

Keith Smith, BSI Media Chair, at merr@foothill.net, or 1330 Millertown Road, Auburn, CA 95603.

Structuring Local Orchid Societies around Members Needs

by John Snedden[1]

I have often wondered if there is a relationship between growing orchids and living a long life. At times I believe that there is, because orchid growers have to be around for a long time - live a long life, to see the results of their growing and caring for orchids. Or to put it another way, because orchids take time to cultivate and flower well, they give the grower focus and motivation to be around long enough to see the final results of their work. How often I have stood in front of a small young plant knowing that I will be watering and caring for this plant for maybe four to five years before seeing a flower - knowing also that the plant will need a few more extra years before developing into a really nice specimen plant. Well, I'm sure that many would agree that there is some kind of relationship between growing orchids and longevity. But I am more assured that most orchid growers would agree that there is a definite relationship between growing orchids and joining an Orchid Society so as to grow orchids better.

These are some thoughts about how to structure Orchid Societies so as to meet its member's needs.

Orchid Societies should be places of learning. Someone once told me that it is easy to grow orchids, particularly cymbidiums. They said that you just have to observe the 'five basic rules' shade, air circulation, potting, watering and fertilising. Presuming this to be true I read some books about these 'basic rules', so now I know how to grow cymbidiums in California, in Sydney and in London. Not much help for us living in Northern Tasmania. Later I discovered that the best ways to learn how to apply the 'basic rules' that I had read about, was to join a local Orchid Society. I did this and at the club meetings I started to listen to how local growers interpret and apply these illusive 'five basic rules' in the context of where we lived. I found out that orchid growing has something in common with the Aboriginal Nations of Australia - knowledge is passed on orally - by word of mouth, from generation to generation, and wise and successful is the person who listens to it and practices it.

Orchid Societies should be places of learning. Over that past years our club (the Launceston Orchid Society) has invited many guest speakers to share their knowledge with us, many coming from the mainland of Australia. This has useful and practical implications, particularly if the speaker grows his/her orchids in an area with similar climatic conditions as ours. At times too we ask our own members to share their orchid growing experiences with the club and this is always very helpful. I believe that there is little or no place for secrets in an Orchid Society. It is always helpful to others if members accept that knowledge they have gained in growing orchids is knowledge to be shared around with others. An open house (Orchid House) policy certainly ben-

1 John Snedden,1 Diprose Street, Kings Meadows, Launceston, Tasmania. 7250, Australia.

efits others. With this in mind could I offer a few suggestions? Firstly why not suggest that your club offers a one-to-one mentoring program for new members. Link up new growers with more experienced growers, have the experienced grower visit the new grower at home to check out the Orchid House or place where the orchids are grown. Encourage the new grower to ask questions about orchid cultivation potting, fertilising, watering and all those other things we talk about amongst ourselves. Encourage the development of the student and mentor relationship. There is nothing worse than a new grower walking in the dark, growing orchids by trial and error, guessing what to do next or what went wrong, what to do or not to do Mentoring means investing time in other people, and this must produce results in the long term - it will produces 'educated' and 'learned' Orchid Society members who are not re-inventing the wheel, but who are growing in their knowledge of orchid cultivation from the shared experience from others.

Could I further suggest secondly that Orchid Societies plan education programs for their clubs? By this I mean more than just using speakers at monthly meetings to polish the existing skills of members. Let's develop new skills and move into new areas of orchid cultivation. I suggest that each Orchid Society put together a list of Orchid genera that can be grown in their area, and don't be afraid to include some of the exotic genera Be positive, optimistic, enthusiastic and courageous - suggest to your members that all the genera noted on the list can be grown by everyone if there is an interest to do so and skills made available to do so. Here's a suggestion; every second month or every third month, plan to introduce a new genus to your members. Have a speaker talk on how to grow this orchid well and successfully. And what is most important have plants for sale for the members, so that everyone can go home and practice what they have learned. You may need to ask for plant orders well before the scheduled talk. Prepare some notes for members with clear and simple guidelines for cultivation. If other members are already growing the genus you will be introducing don't worry, let them listen anyway, and have them buy the 'plant of the day' too. On the anniversary of the talk and the genus, have the members bring their plant along to the meeting, compare and discuss the results of the past years cultivation. Do this each year if circumstances permit.

Orchid Societies should also be places of competition. Since joining an Orchid Society I have also learned that knowledge about how to grow orchids well, is not secret or private information to kept to yourself, so as to give you advantage over other growers at show or competition times. And even though competition is an important aspect of joining an Orchid Society, as I see it this competition is not really competition between growers, but competition between the plants they grow. We put our plants on the show bench for judging, not ourselves, and the awards that are given go to the plants not the growers. Maybe the winning plants allow their growers to display the awards in their houses, as an acknowledgment of the part grower's play in cultivating a winning plant. Yet competition is a component of the ethos of the Orchid Society. So let's encourage healthy competition. Our Orchid Society in Launceston encourages

members to bring along to each meeting a few plants. These are displayed on 'the bench' and our members conduct a 'popular vote' where each member records on a specially prepared slip of paper, what they consider to be the best plant in each category. Our judges also select what they consider to be the best plant of the night. We note the winners of each section in our next newsletter, but we do not award points to the winners that are tallied at the end of the year and award prizes to those with the highest point tallies. It was felt in the past that to do so is to reward the members with finances available to buy and cultivate a large orchid collection, while penalising members who have only a small collection.

To further encourage competition amongst members, we have committed ourselves to purchase a 'club competition plant' every one or two years. This venture is really worthwhile pursing, and I would suggest that other clubs seriously embark on a similar program. It means that each year the club buys in then sells to members, a small mericlone plant of the same genus, and one for each member. Later set aside one meeting night each year as the 'competition plant night'. Have the members bring their club competition plants along to the meeting, compare the growth and flowers when they come, discuss the members varying methods of cultivation. When all competition plants from a specific year are flowering, then have a final competition and award the best plant and flower.

It is also worth considering buying in and selling to member's seedlings from one cymbidium cross one or two for each member or participating member. Do this each year, and compare the results when the plants flower. Give a prize for the best result. This element of club competition is important because in a hands-on way it teaches members what to expect when growing seedlings the disappointments and the elation's.

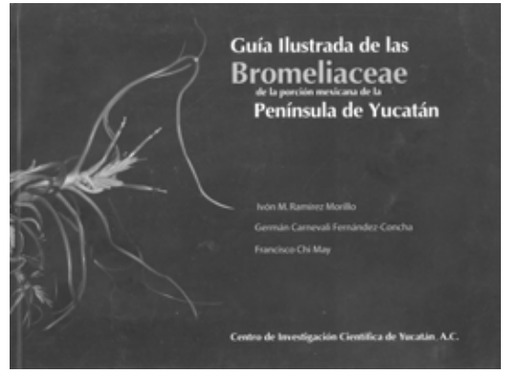
Orchid Societies should be places where we enjoy good company. I believe that the learning and competition aspects of our Orchid Societies are important aspects of society life, but so is the aspect of sharing the company of orchid growers. It is good to 'hang around' with people who have interests simular to ours. Some people call this 'group dynamics'. This means that if people 'hang around' with others in common-interest groups like Orchid Societies, the atmosphere is 'dynamic' because people learn from each other and people develop skills in relating better with others, people learn to become better people. It is important for Orchid Society members to partake in club activities seeing themselves as 'givers' as well as 'receivers', contributors not only to the orchid growing skills of others but also into the lives of others. Since being a member of an Orchid Society, I have learned a few lessons in the area of group dynamics. Firstly, I have learned that people have very differing likes and dislikes in regards to orchids, and I must learn to acknowledge and respect this - I cannot be critical of a person who has different tastes to me. Every time I go to an orchid show or exhibition or even to a monthly club meeting, I decide what plants I like and what plants I don't like so much. Often others will share their assessments of the plants on

show with me, or with a group of people standing observing the plants. Some people can be raving about a plant that I don't so much care about. And again others do not share my enthusiasm about a plant that I think is really great. Isn't this just amazing, we have such differing likes and dislikes. Some people love greens, love pinks, hate reds, not that interested in pure colours, rave about whites, die for oranges, wouldn't buy a yellow, why is it like this? I don't know. To some extent, when it comes to personal likes and dislikes, we just have to accept that great minds don't always think alike. As members of an Orchid Society we learn to agree to disagree. But this is the Orchid Society dynamic. Just imaging how dull and boring an annual Orchid Show would be if we all liked and grew the same colour cymbidiums, and we all benched our favourite plants (they'd all be the same colour), surely this would be the professional orchid hybridisers worst nightmare and path to bankruptcy. We join Orchid societies because we like 'hanging around' with people with similar interests as ours. And being different from each other and liking different things expands us. The therapy we get from being part of an Orchid Society is just as important as the therapy we get from busying ourselves for some time each day in our Orchid Houses. Orchid societies are multi faceted clubs so lets all pitch in and make them ever more relevant to our members.

Book review

Derek Butcher, Cultivar Registrar

Guia Illustrada de las Bromeliaceae de la porcion mexicana de la Peninsula de Yucatan, Ivon M Ramirez Morillo, German Carnevali Fernandez-Concha and Francisco Chi May, 2004, 27cm, 124 pages, soft cover, Spanish, Centro de Investigacion Cientifica de Yucatan, A.C. (CICY), Publisher: contact Jimenez Editores e Impresores S. A. de C. V. situated at 2º. Callejon de Lago Mayor 53 Col. Anahuac, Mexico 11320 D. F. con tel. (55) 55 27 73 40 Fax 53 99 47 11 Email jimenez_edit@att.net.mx



We generally think of the Mayan Indians when the name Yucatan is mentioned and yet there are 31 species of Bromeliaceae in this area, some endemic. While some readers may find the Spanish difficult to understand I found that the organisation of the chapters helped greatly. In any event, the excellent coloured photographs – some 105 – well illustrate the range of bromeliads found in the area as well as variations at species level. There is a key to assist in identification as well as maps to show where particular plants may be found, and a glossary for uninitiated. The section on cultivation is written for resident Mexicans. Because of the large proportion of tillandsias represented, this book is recommended for tillandsia buffs. However, it would also be a valuable tool to identify Bromeliads for the plant-conscious visitors to the area.

The genus *Guzmania* in Venezuela

Yuribia Vivas[1] (Fundación Instituto Botánico de Venezuela, Caracas, Venezuela)

The genus *Guzmania* was described by Hipólito Ruiz and José Pavón (1802) in the "Flora Peruviana et Chilensis." The type species is *Guzmania tricolor* Ruiz & Pav., an epiphyte found and collected on Mount Pillao near Chacahuassi, Peru. The name honors Spanish naturalist Anastasio Guzmán, a student of South American plants and animals, Grant & Zijlstra (1998).

Guzmania is placed in the subfamily Tillandsioideae, and is distinguished from other members of the subfamily (*Vriesea*, *Tillandsia*, *Catopsis*, *Racinaea*, *Alcantarea*, *Mezobromelia*, and *Werauhia* by having polystichous flowers (that is, arranged in many planes on the inflorescence axis), white, whitish, yellow, or greenish petals that lack nectar scales, and having generally reddish brown-colored seeds. In general appearance, *Guzmania* is very difficult to distinguish from *Mezobromelia* since both are polystichously-flowered and may have similar color schemes, but the presence of nectar scales in *Mezobromelia* and absence in *Guzmania* is the main difference. Smith & Downs (1977), Smith(1998), Gouda (1987).

Figure 24. Polystichously flowered inflorescence of *Guzmania coriostachya*. Photograph by Yuribia Vivas.

Approximately 200 species and 17 varieties of *Guzmania* are known, making it the third largest genus in the subfamily, after *Tillandsia* and *Vriesea*. Utley (1994), Smith (1998), Luther (2004).

Species of *Guzmania* are distributed from the southern U.S.A (Florida) and Mexico to Brazil and Peru, including the Antilles. They are most frequently found in cloud forests at middle elevations. The majority of *Guzmania* species have the capacity to store water among their leaves, which provides a unique and important niche for many forest canopy inhabitants that includes small vertebrates and invertebrates. Laessle (1961), Paz (1977; 1980). Epiphytes such as *Guzmania* play an important role in the cycle of water and nutrients, and can be used as a tool in the evaluation of the level of humidity, degree of succession, and degree of disturbance (FIGURE 3). Smith & Downs (1977), Heywood (1993).

1 Fundación Instituto Botánico de Venezuela, Caracas, Venezuela

Figure 25. Natural habitat of *Guzmania mucronata* in Pico Periquito, Henri Pittier National Park, Aragua State, Venezuela. Photograph by Yuriba Vivas.

Guzmania in Venezuela

Venezuela is a tropical country located along the northern coast of South America. It has some of the greatest biological diversity on earth, being influenced by the confluence of the Guyanese, Andean, and Caribbean phytogeographic regions. The bromeliad family is one of the most important of the angiosperms in the country in terms of species richness and ecological importance Huber et al. (1998).

Twenty-eight species of *Guzmania* are currently known from Venezuela, mainly in the Andean, Coastal Cordilleran, and Guayanan states; few are found in the predominantly lowland states of Guárico, Cojedes, Barinas, and the Federal Dependences. Holst (1994). Species range in elevation from near sea level to approximately 3500 m in the case of the subparamo species, such as *G. lychnis, G. mitis, G. pennellii* and *G. confinis*.

Ten of the 28 species are considered endemic to Venezuela. These are, by major region, *Guzmania mucronata*, *G. nubigena, G. ventricosa, G. virescens, G. acorifolia, and G. hedychioides* from the Coastal Cordillera; from the Amazon Region: *G. steyermarkii, G. nubicola, and G. terrestris*; and from the Eastern Mountain Range, *G. membranacea* is endemic to the state of Sucre. It is interesting to note that *G. sanguinea*, a widespread

Figure 26. Andean coastal Cordilleron of Venezuela

species in tropical South America, is known in Venezuela only by a single herbarium specimen and a few sightings of the living plant; these from Avila National Park. *Guzmania hedychioides* (, with large ginger-like flowers, is known only from the type collection, from Henri Pittier National Park in Aragua state.

G*uzmania* includes many species of ornamental value, especially those with brightly colored bracts or leaves, which may also be negatively impacted by collectors. *Guzmania lingulata* (L.) Mez, *G. monostachia* (L.) Rusby ex Mez, *G. lychnis* L.B. Sm., and *G. virescens* (Hook.) Mez, are reported as "vulnerable" in the "red Book of the Venezuelan flora", which follows the categories and criteria of the International Union for Conservation of Nature and Natural Resources IUCN. Llamozas et al. (2003).

I am currently working on a project to fully evaluate all of the species of *Guzmania* in Venezuela and work out as many taxonomic problems as possible, update the known geographic ranges, and prepare a guide to *Guzmania* in the country. Included in the guide will be identification keys, descriptions, synonymy.

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Acknowledgments

I thank Bruce Holst for the suggesting corrections to the manuscript, to Selby gardens and Francisco Oliva-Esteva for use of some pictures, and Joanne Miller for help in translating the manuscript.

Figure 27. *Guzmania confinis*, frequently found as a terrestrial. Photograph by Francisco Oliva-Esteva.

Figure 28. Holotype of *Guzmania hedychioides*, from the US National Herbarium.

Testing Coconut Husk Fibre in a Potting Mix

Andrew Flower, BSI Editor

This material has been available for some time, usually under the trade names "Coir" or "Cocoa Peat," but does not appear to have been accepted very widely as a candidate for bromeliad composts. Many years ago I tried some little pellets of Cocoa Peat from the local Garden Centre, but without success. More recently there have been larger bales of the material being supplied locally by commercial distributors to the horticultural industry, and in 2003 I again tried it as a replacement for New Zealand sphagnum moss peat in my potting mix. This time I had much better results.

I made up two potting mixes; our regular 50-50 mix of moss peat and 2cm bark chips and a trial 50-50 mix of coconut husk fibre and the same bark chips. Both mixes included slow-release fertilizer and coated insecticide. I potted a dozen seedlings in each mix, and left them in those pots for three years – checking them last month. After 3 years, there is a marked difference in the root growth, with those plants in the coconut fibre markedly healthier and more prolific than those in the moss peat-based mix. Why has the product improved? The product often sold in retail outlets is untreated fibre, pH about 6.57. I used the treated fibre normally used by commercial growers: it is pre-washed with a calcium and magnesium solution that reduces the pH. Our local laboratory analyzed the product and found: pH 5.8; EC (electrical conductivity) 1.1; nitrate-N. 29ppm; P, 29ppm; S, 43ppm, K, 147ppm; Ca 28ppm; Mg 24 ppm; Na, 47 ppm. The product we use is manufactured by Tropicoir Lanka in Sri Lanka under the brand "Profit Coir," and is manufactured to the Dutch RHP standards. (RHP is a Dutch company that develops quality standards for peat products, potting mixes, soil improvement materials etc.)

The other result to stand out was the longevity of the coconut fibre. After three years it remained fresh and buoyant whereas the peat moss had subsided into a powdery mass that disintegrated when the plants were removed from the pots. There was not, however, a significant size difference between the plants.

Fig 29. *Mezobromelia capituligera* seedling, after 3 years in coconut fibre/bark mix.

Fig 30. *Mezobromelia capituligera* seedling, after 3 years in sphagnum moss peat/bark mix.

EVENTS CALENDAR

Australia

April 29-30, 2006. Bromeliad Society of New South Wales Autumn Show. Wellbank Street, Concord.

October 28-29, 2006. Bromeliad Society of New South Wales Spring Show. Wellbank Street, Concord.

United States

March 25-26, 2006. Harry P. Leu Gardens Annual Spring Sale. Harry P. Leu Gardens, 1920 N. Forest Ave., Orlando, FL 32803.

April 1-2, 2006. Bromeliad Society of Houston Spring Bromeliad Sale. Houston Arboretum & Nature Center, 4501 Woodway, Houston, TX USA. Apr 1, 9-5, Apr 2, 11-4. For more information, contact bromeliadsocietyhouston.com or 713-858-3047.

April 22-23, 2006. Bromeliad Society of South Florida Annual Show. Fairchild Tropical Botanic Gardens, 10901 Old Cutler Road, Coral Gables, FL 33156. For more information, contact Robert Meyer, at 305-668-3344.

May 26-28, 2006. Bromeliad Society of Houston Standard Bromeliad Show & Sale. Houston Arboretum & Nature Center, 4501 Woodway, Houston, TX USA. Sale: May 26, 12-5, May 27, 9-5, May 28, 11-4; Show: May 27, 2-5, May 28, 11-4. For more information, contact bromeliadsocietyhouston.com or 713-858-3047.

June 6, 2006. (this is a date change) World Bromeliad Conference Judge's School 3. Bromeliad Society International. Town and Country Resort Hotel, Mission Valley, San Diego, California, USA. The all-day school will be held in San Diego. Pre-registration, including a small fee is required. For more information, contact Betty Ann Prevatt, JCC Chairman, at 239-334-0242 or email bprevattpcc@aol.com.

June 6-11, 2006. World Bromeliad Conference, large show and sale, judged competition, lectures, social events, and more. Sponsored by the Bromeliad Society International and the San Diego Bromeliad Society. Town and Country Resort Hotel, Mission Valley, San Diego, California, USA. Hotel rates are $124 per night. The rate is good for any three days during the Conference. For more information, contact BSI Membership Secretary, 1608 Cardenas Dr. NE, Albuquerque, NM 87110, USA. E-mail: membership@bsi.org; www.bsi.org.

September 8-10, 2006. Southwest Bromeliad Guild Show. Corpus Christi, Texas, USA.

September 16-17, 2006. Bromeliad Society of Houston Fall Bromeliad Sale. Houston Arboretum & Nature Center, 4501 Woodway, Houston, TX USA. Sep 16, 9-5, Sep 17, 11-4. For more information, contact bromeliadsocietyhouston.com or 713-858-3047.

September 30, 2006. Florida Council of Bromeliad Societies' Extravaganza, Sale, banquet, and rare plant auction. Miccousukee Resort and Gaming Convention Center, Miami, FL USA. For more information, contact www.fcbs.org.

BSI Benefits

The BSI Benefits article published in the November-December 2005 Journal has been amended. The new version is available on the BSI website, or it may be ordered free-of-charge from the Editor.

The Bromeliad Society International

The purpose of this nonprofit corporation is to promote and maintain public and scientific interest in the research, development, preservation, and distribution of bromeliads, both natural and hybrid, throughout the world. You are invited to join.

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Cryptanthus 'Strawberry Flambe' grown by Lyla Shepard.

The Bromeliad Guild of Tampa Bay Show was held March 5-6, 2006. 33 exhibitors entered 242 horticultural and 56 artistic entries. Lyla Shepard took the Mulford B. Foster Award with *Cryptanthus* 'Strawberry Flambe' (above) and also won the Morris Henry Hobbes Award with *Cryptanthus* 'Silver Lyla.'