BULLETIN

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Promising new *Curcuma* cut flower hybrids for Australia

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Introduction

Curcumas are a member of the ginger family Zingiberaceae and are highly valued for their medicinal properties and as ornamentals. Over the last 10 years, Curcumas have become a very popular ornamental with many new cut flower and potted flower varieties being developed. Many of these new varieties have been derived from intensive breeding work done in Thailand, primarily on the native species *C. alismatifollia*, commonly known as 'Siam tulip' or 'Thailand tulip'.

In Australia, the range of Curcuma cultivars sold as a cut flower and potted colour has mostly been selections from overseas. A number of these cultivars have been used both as a cut flower and potted colour. However, only a select few have been good cut flower types and these have been predominantly *C. alismatifolia* cultivars.

As a continuation from the ginger breeding work already underway as part of the 'New and Improved Ornamental Crops' program at the Northern Territory Department of Primary Industry and Fisheries (NTDPIF), located in Darwin, Australia. A Curcuma breeding program was initiated to provide the local ornamental industry with new and improved cut flower and potted flower varieties. At the beginning of the program, the focus of the Curcuma breeding work was on cut flower varieties, however, as the breeding work progressed the focus has expanded towards identifying promising potted colour types.

In 2008, sixteen promising new Curcuma cut flower hybrids were selected from the initial hybrid field trial after evaluating them against a number of flowering characteristics. The outcomes from the flowering evaluation of these sixteen hybrids are discussed in this report.

Method

The hybrids in the field trial were assessed over two flowering seasons during 2005/06 and 2006/07 against the following flowering characteristics (see Table 1). For the postharvest studies flowers stems were cut just above the soil level and when approximately 50% of the dayflowers were open on the inflorescence. Data was recorded on vase life, stem length and inflorescence head length for each flower stem. In addition, inflorescence colour and form of the hybrids was also recorded during the field assessment.

In the field, hybrid vigour and performance was observed and recorded in relation to flowering period, productivity, adaptability to the full sun condition and the incidence of spotting on the inflorescence. The incidence of spotting was only assessed on those hybrids crossed with the species *C. alismatifolia* and *C. thorelli*. Both of these species are very susceptible to this spotting disorder which is caused by a fungal disease that causes the appearance of small dark pin-hole spots on the inflorescence bracts, stem and leaves (Figure 1). During rainy, overcast and high humidity conditions the severity of spotting increases.

Figure 1. Incidence of spotting on inflorescence

Table 1. Evaluation of flowering characteristics for cut flower

Characteristics	Minimum standard	Priority
Vase life	10 days from pick to first sign of ageing	Essential
Yield	>10 stems/plant	Essential
Stem length	30cm	Important
No. of colourful floral bracts per spike	Numerous	Important
Spotting - Response or tolerance to Phomas fungus	Good	Important

Results and discussion

A total of 56 hybrids were selected as a result of the field and postharvest assessments, and from this a selection of sixteen 'best-bet' cut flower types were identified based on improved commercial traits which were yield, vase life, stem length, hybrid vigour and low incidence of spotting. A successful "Curcuma naming" competition was conducted with the staff at NTDPIF that resulted in these sixteen hybrids being named. The names and pictures of these sixteen hybrids are presented in Figure 2.

In general, for most of the sixteen hybrids the stem length ranged from 20 to 30cm long. 'Waterlily' had the shortest stem length of less than 20cm and 'Pink Ruffle' the longest at 50cm long (see Table 2). In Table 1, the flowering characteristic for stem length was rated as important with the minimum standard for cut flower being 30cm long. However, stem length of less than 30cm was still considered acceptable for some of the smaller head length hybrids such as 'Waterlily', 'Sophia' and 'Tip Top' which could be used in small floral table arrangements (Table 2).

All sixteen exhibited good hybrid vigour in regards to their performance in the full sun conditions. In regards to productivity, the most productive hybrids were 'Pink Ruffle', 'Triumph', 'Bella Vista' and 'Vabesi' producing 10 to 20 flowers per plant. In general, most hybrids had moderate yields of up to 10 flowers per plant (Table 2). It is expected as the plant matures that the productivity of these hybrids will increase as the rhizome grows and increases in size.

All sixteen hybrids met the minimum vase life standard of 10 days from pick to first sign of ageing. In the postharvest studies, inflorescences were rendered undesirable when up to 30% of the coloured bracts showed visible signs of drying and discolouration around the edge of the bract (Figure 3). Varieties 'Pink Ruffle', 'Valentine's Blush', 'Festive' and 'Vabesi' had excellent vase life of 10 to 14 days. Along with 'Territory Splendour', 'Top End Peak' and 'Fairy Wings' with reasonable vase life of 7 to 10 days (Table 2).

The Purpose of HSI

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Figure 2. New *Curcuma* cut flower hybrids

The degree of spotting was found to be general low for most hybrids. At the start of the flowering season in October there was none to very little spotting observed, primarily due to the infrequent rainy days at this time of the year. However, the incidence of spotting became more prevalent later on in the flowering season as the frequency of rainy days increased along with high humidity. Hybrids that experienced moderate spotting under these conditions were 'Whitecap', 'Festive' and 'Fairy Wings'. Only two hybrids, 'Vabesi' and 'Venita' developed no symptoms of spotting on the inflorescence throughout the flowering season (Table 2). 'Vabesi' is a hybrid derived from parent species other than *C.alismatifolia* or *C. thorelli*. However, the hybrid 'Venita' is a cross between *C. alismatifolia* and an unknown *Curcuma* species.

The inflorescence form of most of the *C. alismatifolia* hybrids were fairly similar and the colour of the coma bracts ranged from light pink in 'Fairy Wings' to dark pink/purple in 'Desire', and white with tinges of pink and green on the tips in 'Top End Peak'. In the *C. thorelli* hybrids, some had a strong pink tinge colour present on the tip and margins of the white coloured bracts such as 'Valentine's Blush' and 'Territory Splendour'. In addition, the foliage of some of these hybrids such as 'Bella Vista' and 'Territory Splendour' had an attractive dark purple colour stripe down the midrib of the leaf (Figure 2). Only two hybrids had very different inflorescence forms these being 'Vabesi' and 'Venita', which had a larger inflorescence heads and a lot more colouring on the basal bracts.

Figure 3. Visible signs of ageing with drying and discoloration of inflorescence

Table 2. Production and postharvest performance of sixteen new *Curcuma* cut flower hybrids.

Code	Variety Name	Stem length (cm)	Head length (cm)	Yield[1] (stems)	Vaselife[2] (days)	Spotting[3]
01	Waterlily	15 - 20	12	5 – 10	Reasonable	Low
02	Pink Ruffle	40 - 50	14	10 – 20	Excellent	Low
03	Territory Cerise	30 - 40	15	5 – 10	Excellent	Low
04	Desire	30 - 40	12	4 – 8	Excellent	Low
05	Triumph	30 - 40	15	10 – 20	Excellent	Low
06	Valentine's Blush	20 - 30	16	4 – 8	Excellent	Low
07	Bella Vista	20 - 30	18	10 – 20	Excellent	Low
08	Territory Splendour	20 - 30	16	5 – 10	Reasonable	Low
09	Whitecap	20 - 30	16	4 – 8	Excellent	Low/Mod
10	Top End Peak	30 - 40	15	5 – 10	Reasonable	Low
11	Festive	30 - 40	17	5 – 10	Excellent	Low/Mod
12	Fairy Wings	30 - 40	18	4 – 8	Reasonable	Moderate
13	Sophia	30 - 40	14	5 – 10	Reasonable	Low
14	Tip Top	30 - 40	12	5 – 10	Reasonable	Low
15	Vabesi	30 - 40	19	10 – 20	Excellent	None
16	Venita	30 - 40	17	4 – 8	Excellent	None

1. Yield = number of stems/plant after two flowering seasons
2. Vaselife = Reasonable: 7 – 10 days; Excellent: 10 – 14 days

Conclusion

Sixteen promising 'best-bet' Curcuma cut flower hybrids were selected based on the improved commercial traits of yield, vase life, stem length, hybrid vigour and low incidence of spotting. The hybrids 'Pink Ruffle', 'Bella Vista' and 'Desire' were found to have highly desirable flowering characteristics such as long stem length ≥30cm, excellent vaselife >10 days, and a low incidence of spotting on the inflorescence. Tolerance to spotting was one of the important criteria in this evaluation as it significantly reduces the flower quality.

This breeding work demonstrates that through rigorous selection and crossing of *C. alismatifolia* and *C. thorelli* cultivars that show some tolerance to spotting, hybrids that are significantly less susceptible to spotting can result. Furthermore, when a susceptible species is crossed with a non-susceptible species, this can produce a hybrid which is resistant to spotting, as found in the variety 'Venita'. In addition to the improved commercial traits, these sixteen hybrids have also provided an expanded range of Curcuma cut flower colours and forms for the local cut flower industry.

Northern Territory Government

Fact Sheet CF12

Curcuma

Name: *Curcuma sp.* (Zingiberaceace)

Common Name: Curcuma, Hidden or Surprise Ginger

Origin: Indo-Malayan region

Distribution: *Curcumas* are herbaceous perennials and are widely distributed in the tropics of Asia from India to South China, Southeast Asia, Papua New Guinea and Northern Australia.

Australian Distribution: *Curcumas* are commercially grown for cut flower in the Darwin region of the Northern Territory and in Northern Queensland. In addition, they are sold as potted flowering plants in nurseries and garden centres. *Curcumas* can be grown as far south as Sydney.

Preferred Climate and Soil Types: *Curcumas* like a moist well-drained soil with protection from the wind. Most *Curcumas* prefer part sun, but there are some that will take full sun. In winter or during the cooler drier months in Northern Australia, the plants die down and go dormant. During this dormant period plants left in the ground or pot need to be kept relatively dry and not wet as they may rot. Plants in the ground are best lifted from the soil after the foliage has died back and stored in a warm, dry place. Rhizomes can then be replanted in the garden or pot and watered normally in September/October when the temperature starts to increase. New shoots will re-emerge and the plant will start to produce flowers around November/December.

Description: *Curcuma* belongs to the ginger family Zingiberaceace that consists of a number of important economical members, as well as, important ornamental species. The most known economical member of this genus is *Curcuma longa,* used to make the spice tumeric.

Curcumas are herbaceous perennials with well developed rhizomes and often tuberous roots. Plants range in height from 30cm to 1.5 metre tall. A terminal inflorescence is produced ranging from 12cm up to 50cm long. The inflorescence is a conelike spike with spirally arranged bracts where the uppermost bracts called the coma are often brightly coloured and range from white, pink, burgundy red, orange or purple. From inside these bracts the 'true' flower emerges. These flowers are brightly coloured such as white to pink, yellow and shades of violet.

Varieties: There are a number of varieties derived from overseas breeding programs, particularly in Thailand, that are now available in Australia. A few of these varieties belong to the species *C. alsimatifolia* such as 'Thai Magic', 'Siam Tulip' and 'Siam White'. Other Thai varieties available in Australia include 'Jewel of Burma', 'Jewel of Thailand' and 'Siam Jewel' or 'Laddawan'. An attractive variety is 'Voodoo Magic' with striking dark purple mid vein coloured leaves and a purple inflorescence. There is also the local species from Northern Australia *C. australasica* or 'Cape York Lily' which range in colour from light pink to a dark pink/purple coloured inflorescence.

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Culture: *Curcumas* are vegetatively propagated by division of the rhizomes after the plant has died down and gone dormant. Care must be taken when dividing rhizomes to not break-off or damage any of the tuberous roots or storage roots attached to the primary rhizomes. These tuberous or storage roots are what stores the nutrients that provides the energy for the plant to regrow. Some species do set seeds and the seedlings can be variable. Seeds are best sown fresh and may take 3 to 4 weeks to germinate.

Pests and Diseases: A major pest of *Curcuma* is caterpillars that can cause severe damage to the plant and inflorescence if not controlled. Other minor pests are grasshoppers that chew the leaves and ants which chew the edges of the inflorescence bracts. Rhizomes are prone to bacterial rots if grown in poor free draining soil conditions, and if the rhizome is regularly watered while dormant. The *C. alismatifolia* varieties are susceptible to a fungus disease that causes tiny brown spots usually on the inflorescence bracts and stem, and in some cases spotting on the leaves. Some varieties are highly susceptible to this fungal spotting and can cause serious damage to flower quality. This spotting usually becomes a problem when increased wet and humid conditions are experienced.

Harvesting: The stem of the inflorescence and surrounding leaves are usually cut at ground level to thin out the clumps and allow more light into the beds.

Post-Harvest: To prolong the vase life, flowers should be picked early in the morning and placed in water as soon as possible. Most inflorescences will keep for up to 7 days with some lasting up to 2 weeks.

Websites:
Palmwood Tropicals www.palmwoodtropicals.com.au
GingersRusTM www.gingersrus.com
Gingerwood Nursery www.gingerwoodnursery.com

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The green giant: *Heliconia solomonensis*

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Heliconia is a genus of approximately 220 species with the majority restricted to the Neotropics, from the Tropic of Cancer in Central Mexico and the Caribbean islands through Central America to the Tropic of Capricorn in South America. However, there is an outlying group of six unusual Old World species restricted to the Pacific islands of Samoa, Fiji, New Caledonia, the Indonesian Moluccas, New Guinea, Vanuatu, and the Solomon Islands. Whereas most Neotropical species have brightly colored inflorescences and are pollinated by hummingbirds, all six Pacific species are characterized by having primarily green inflorescences, either erect or pendent, and green, white, or yellow flowers. In his comprehensive study of the Old World heliconias, Kress (1990) places them in their own subgenus, subgen. *Heliconiopsis*. Kress observed that one of the species with pendent inflorescences, *Heliconia solomonensis*, is pollinated by nocturnally foraging, nectar-feeding macroglossine bats that hang from the recurved bract margins while lapping up nectar and transferring pollen from stamens to stigma, thus pollinating the flowers which remain open for only a few hours at night. Kress suggested that three other species with primarily green and white flowers (*H. lanata, H. papuana*, and *H. indica*) are also bat pollinated. However, two other Pacific species, *H. laufao* from Samoa and *H. paka* from Fiji, both with erect inflorescences and yellow-green to bright yellow diurnal flowers, were observed by Pedersen and Kress (1999) to be pollinated by diurnally foraging Wattled Honeyeater birds.

Figure 1 shows an isolated clump of *Heliconia solomonensis* cultivated at the McBryde Garden of the National Tropical Botanical Garden on Kauai growing on a moist but well-drained slope. It is an impressive plant reaching 5 -7 meters tall with densely clumping, brown-mottled pseudostems, large glabrous green leaves, and striking green pendent inflorescences reaching 75 cm long. Although nectar-feeding bats do not occur in Hawaii (nor do hummingbirds), inflorescences of our plant occasionally produce a few bright red-orange fruits with 1-3 viable seeds, although the majority of flowers never set seed and the aborted ovaries remain yellow (Figures 2, 3). Perhaps self-pollination rarely takes place, or nocturnal insects may occasionally visit and pollinate the flowers although they are not adapted to pollinate them. Introduced birds such as the Japanese White-eye can be ruled out since they are diurnal. In any case, seed are only rarely produced in Hawaii. *Heliconia solomonensis* is truly an impressive species—a green giant among heliconias.

References cited:
Kress, W. J. 1990. The Taxonomy of Old World *Heliconia* (Heliconiaceae). Allertonia 6(1): 1-58.

Pedersen, L. B and W. J. Kress. 1999. Honeyeater (Meliphagidae) pollination and the floral biology of Polynesian *Heliconia* (Heliconiaceae). Plant Systematics and Evolution 16(1-2): 1-21.

Figure 1. Clump of *Heliconia solomonensis* at NTBG with Madelaine E. Bartlett for scale.

Figure 2. Top right. Mature inflorescence, with one red developing fruit under upper RH bract.

Figure 3. Below right. Old inflorescence with all ovaries yellow and aborted.

News from HSI member Rindala Taleb in Côté d'Ivoire:

"Professor Ake Assi passed away on January 14th, 2014. He was Professor at the University of Abidjan and travelled all over the Country. He identified most of the plants found; he worked on taxonomy and ethymology."

Heliconia nutrition

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The fertilization practices of heliconia cut flower producers in Hawaii are varied, both as to frequency and amounts provided to the plants. Because their resemblance to bananas, some growers used high potassium fertilizers such as 10-20-20, 10-5-40, and 12-5-30 two to four times a year. Based on a pounds of nitrogen per acre, the application rate was 520 lb N/A (about 580 kg/ha), with the last application around the beginning of November in Hawaii. Method of application was not specified. Two other growers applied 10-20-20 + minors at three or four month (February, summer, September) intervals, broadcast by hand on *H. psittacorum*. In contrast, another grower fed plants only when starting them out with a heavy dose of nitrogen from urea (rate not specified) and occasional feedings with 10-30-10 or 16-16-16. Rates of application varied considerably, with a 1 lb (of fertilizer) per sq yard for a high (N) analysis fertilizer and a 2 lb per sq. yard for a low analysis (N) fertilizer (these would be about 0.5 and 1 kg/m^2, respectively) for *H. psittacorum*, which is a vigorous grower.

Soil samples collected from these growers were analyzed by the University of Hawaii's Agricultural Diagnostic Service Center. Phosphorus content ranged from 48 to 954 ppm with an average of 315 ppm (@ 620 kg/ha). Potassium content ranged from 246 to 1584 ppm with an average of 539 ppm (@ 1050 kg/ha). Calcium ranged from 790 to 5900 ppm (average 2584 ppm or @ 5000 kg/ha) and magnesium from 200 to 1360 ppm (average 669 ppm or @ 1250 kg/ha). There was little correlation between soil content of the principal nutrients and the foliage content. Unfortunately, pH values for these samples were not recorded as pH is known to influence minor element uptake.

Tissue analyses of *Heliconia*

Leaf samples were collected from 7 growers of heliconia on Oahu (Hawaii, USA). The leaves sampled were the 3rd or 4th leaf blade up the stalk, usually mature and fully expanded. Only the blade tissue was used for analysis, the midrib being removed prior to washing. The leaves were washed in soapy water, sponged clean of debris, and rinsed in deionized water. After drying at 75°C, the leaves were ground in a Wiley Mill to pass a 40 mesh screen, and submitted to the University of Hawaii Agricultural Diagnostic Service Center for analysis.

Foliage tissue content of the various elements were summarized by species or cultivar (Table 1).

Nitrogen: All leaves contained 2.50% or greater, but in some selected samples (chlorotic), the N value was lower than the average for that species. Except for *H. caribaea* in which no values reached 3%, a satisfactory level would seem to be at least 3% N.

Phosphorus: Low values of 0.11% to high values of 0.33% were found, but the averages ranged from 0.14 to 0.23% Values of 0.15 to 0.20% would seem satisfactory.

Potassium: The potassium values seemed somewhat low except for the *H. wagneriana* samples. In one leaf divided into upper, middle and basal thirds, the K gradient decreased from tip to base. The middle portions of the leaf reflected the values of a comparable whole leaf. Leaves should contain at least 1.5% with a level of 2 to 2.5% to be considered satisfactory.

Calcium: The calcium levels of the foliage ranged from less than 0.20% to 0.90% they were surprisingly low for *H. angusta* samples. 'Claw #2', a form of *H. bihai* had much lower calcium than the other *H. bihai* forms sampled. A level of 0.35% would seem to be a satisfactory level.

Magnesium: Values for magnesium were clustered fairly tightly. A satisfactory range would appear to be 0.25 to 0.30%. In 'Parakeet,' *H. bihai*, and *H. caribaea* magnesium values were about one-half the calcium values, while in *H. angusta*, *H. stricta*, *H. wagneriana*, and 'Claw #2' magnesium was about 2/3 to 3/4 the value of calcium.

Manganese: Manganese was found in relatively high amounts in all but the *H. wagneriana* samples. In one chlorotic 'Parakeet' sample, the manganese level was only 57 ppm and in another with light green foliage it was 42. Foliar manganese levels were often 8 to 10 times greater than the iron levels. Only *H. wagneriana* seemed to be consistently lower. For most species, then, levels of manganese above 300 ppm to about 1100 ppm would be satisfactory. Manganese concentration is lower at the tip of the leaf.

Iron: Iron levels seemed low, but this element is often balanced off by manganese. Iron levels decrease from the tip to the base of the leaf. Although iron values of only one-tenth those of manganese were found in healthy leaves, it would seem better to aim for a ratio of at least 1:4 iron:manganese.

Other: Zinc, copper, and boron were all at low levels, usually in excess of 7 ppm. A few samples, mostly from one grower showed high aluminum levels, but there seemed to be no obvious damage.

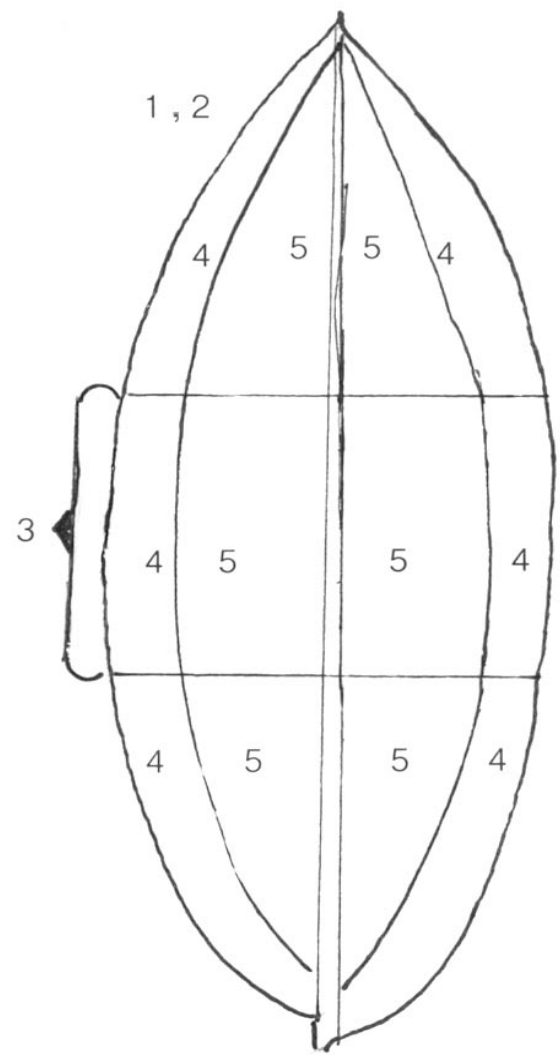
Table 1. Mean foliar analyses of selected *Heliconia* species/cultivars collected from 7 Oahu (Hawaii, USA) growers.

Species	No	%N	%P	%K	%Ca	%Mg	%Na	ppm	Mn	Fe	Cu	Zn	B	Al
H. angusta	5	3.15	0.14	1.39	0.26	0.26	0.43		603	65	10	12	13	189
H. bihai	5	2.82	0.2	1.54	0.72	0.37	0.27		1087	78	9	17	21	21
H. caribaea	6	2.5	0.18	1.68	0.47	0.25	0.26		695	53	10	12	25	109
H. Claw #2	3	3.17	0.2	2.22	0.34	0.22	0.31		382	79	9	14	20	20
H. Parakeet	8	3.11	0.14	1.54	0.5	0.25	0.41		654	71	10	15	14	7
H. stricta	8	3.05	0.2	2.22	0.37	0.39	0.05		574	112	11	20	17	21
H. wagneriana	5	2.86	0.23	3.19	0.43	0.29	0.15		204	70	16	20	20	21

Another set of tissue analyses examined which part of the large heliconia leaf might give the most reliable results, as it is known that there are tip to base gradients as well as marginal to midrib variations. Analyses were run on leaves of 'Golden Torch' that were normal or generally chlorotic. On chlorotic leaves, marginal tissues (about one -half to three-quarter inch) were separated from the internal portion of the blade (midrib removed) (Figure 1). Unfortunately, the healthy green leaf was not similarly analyzed. Preparation of the leaf tissue for analysis was as described above.

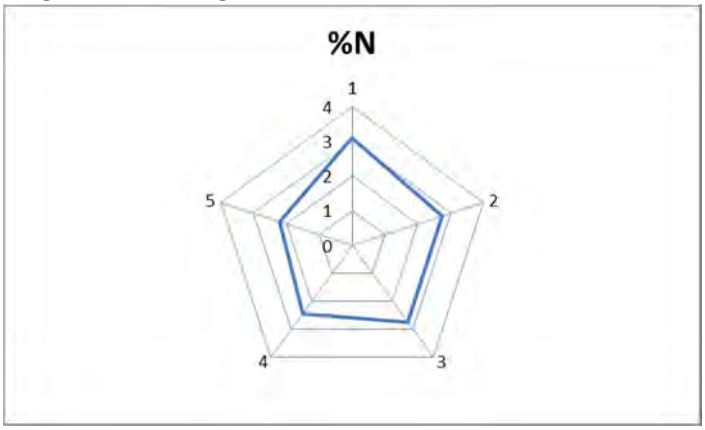
Figures 2 through 8 show the percent content for nitrogen, phosphorus, potassium, calcium, and magnesium and parts per million (ppm) for manganese and iron in leaf blades (no midrib tissue) of 'Golden Torch' heliconia. Axis 1 represents a normal green leaf, Axis 2 represents a whole chlorotic leaf, Axis 3 the middle one-third of a chlorotic blade, Axis 4 the internal tissues of a chlorotic leaf, and Axis 5 the marginal chlorotic tissues. Marginal tissues are clearly most deficient in all elements except magnesium as shown by the shorter Axis 5. One calcium value entering into the average shown in Figure 5 was exceptionally high for the internal tissue of a chlorotic leaf and caused an anomalous point in the graph, but even without this point, the calcium values were higher than in a normal healthy leaf; an interpretation is not known. The really curious result is much higher magnesium levels in the margins and internal leaf tissues of chlorotic leaves than in a whole green leaf (Figure 6); magnesium is an essential part of the chlorophyll molecule, and one would expect low magnesium levels in chlorotic leaves. Manganese and iron were considerably higher in the internal chlorotic tissues than in whole green leaves (Figures 7 and 8), but were quite low in the chlorotic marginal tissue. These results contrast markedly with those for samples collected from commercial growers (Table 1), however these are results for one variety only at one site.

Figure 1. Sampling areas of heliconia leaf



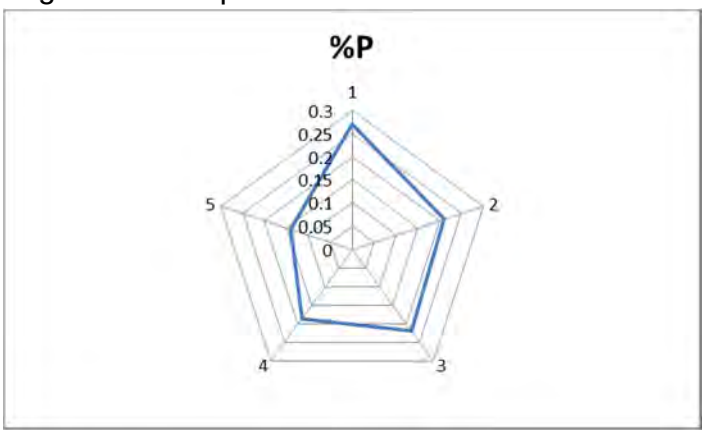
1. Whole green leaf without midrib
2. Whole cholorotic leaf without midrib
3. Middle 1/3 of leaf without midrib
4. Margins of chlorotic leaf
5. Internal portion of chlorotic leaf

Figure 2. Nitrogen content



H. angusta 'Red Christmas', at left, and *H. bihai*

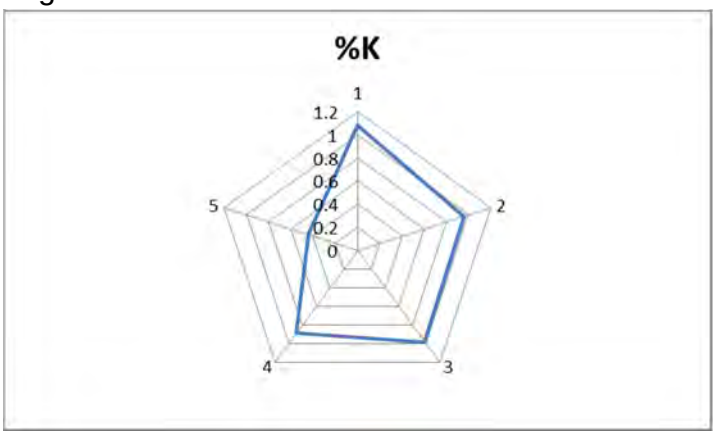
Figure 3. Phosphorus content



H. caribaea 'Purpurea' at left, and *H*. 'Claw #2'

H. psittacorum 'Parakeet', at left, and *H. stricta*

Figure 4. Potassium content



H. wagneriana at left, and *H*. 'Golden Torch'

Figure 5. Calcium content

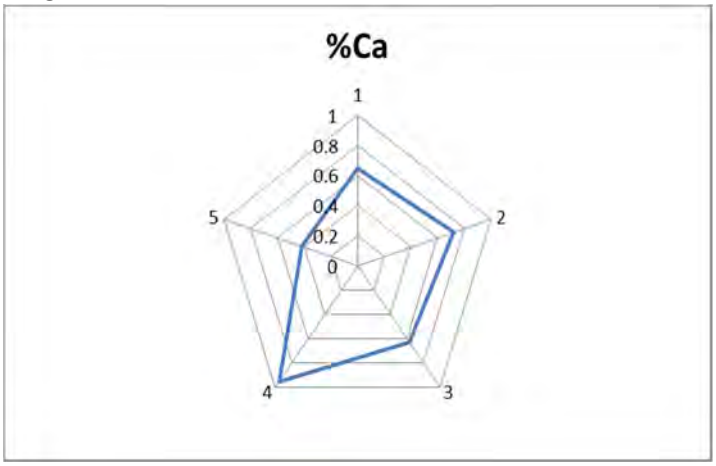
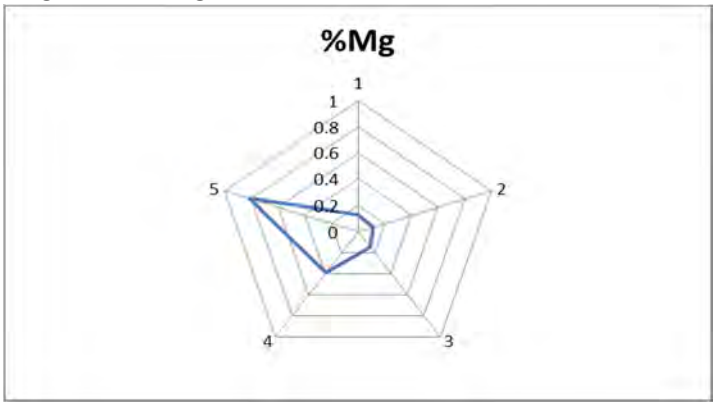


Figure 6. Magnesium content



Heliconia showing nutrient deficiency symptom

Figure 7. Manganese content

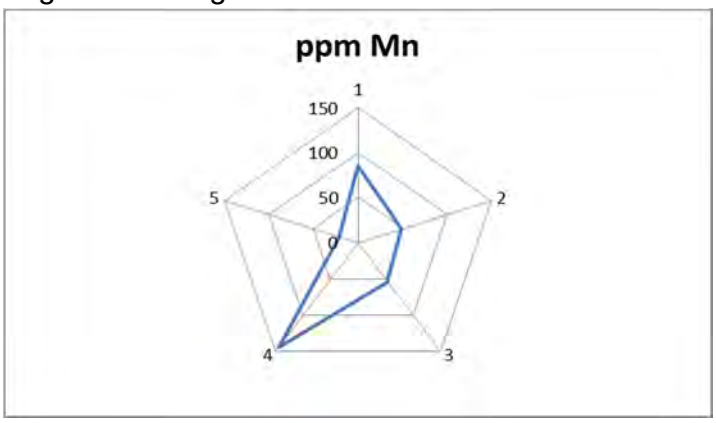
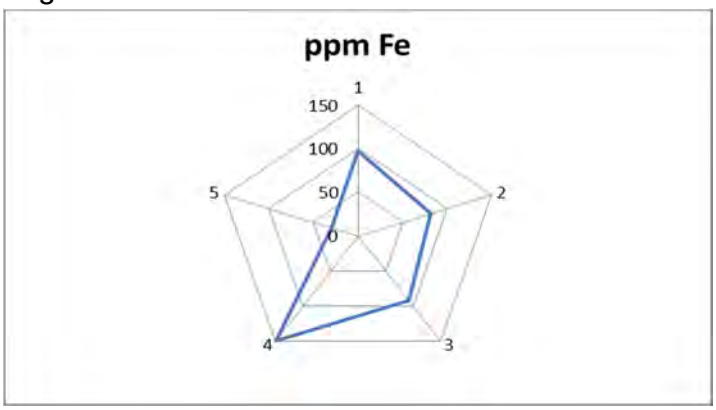
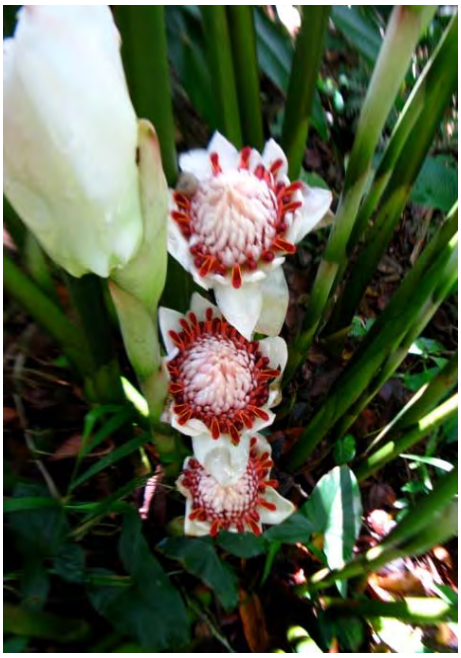


Figure 8. Iron content



New *Etlingera* cultivar registrations

Jan Hintze
Darwin, Australia hintz@ozemail.com.au



'Olympic Torch'
PARENTAGE: *Etlingera hemispherica*
ORIGIN:Seedling of *Etlingera hemispherica* tulip torch ginger. Collection source Country. Santa Rosa farm, Jayuya, Puerto Rico.
DESCRIPTION: White pointed bracts, pale pink inner cone, tulip-like shape. Ring of red and yellow flowers between bracts and cone. Inner cone is loosely packed and pale pink in color. Base and stalk are green. Foliage green with reddish hue underneath leaves.
REFERENCE: Sergio Tejedor-Leon

'Alba-Red Tulip Ginger'
PARENTAGE: *Etlingera hemispherica*
ORIGIN: Unknown. Field collected in Puerto Rico.
DESCRIPTION: Light, brilliant red, tulip like, with fine white stripes along petals. Petal is pointed with white tips. Multiple round of petals, deep loose cone, base is white with green stalk. Foliage is green with reddish hue underneath leaves.
REFERENCE: Sergio Tejedor-Leon

The Costaceae cultivar registry

Continued from the Bulletin 19(4)

Dave Skinner
Tallahassee, Florida USA skinnerd@nettally.com

'Red Lollipop'
PARENTAGE: *Costus erythrothyrsus*
ORIGIN: Per Glenn Stokes, obtained from Mark Collins
DESCRIPTION: Described in Stokes Catalog as follows: A fantastic new costus that is compact (24"-30") that has numerous shiny-red 3" pikes on separate 1' basal stems. Sometimes cones are produced terminally on spiral stems. Plant blooms profusely at any time of year. Spikes retain color long after small orange flowers are gone.
REFERENCE Stokes Tropicals catalog.
PHOTO: no photo available

'Red Rose'
PARENTAGE: *Costus osae*
ORIGIN: Unknown.
DESCRIPTION: Described in Stokes Catalog as follows: A beautiful native of Costa Rica is popular because of its attractive red inflorescences. The round fuzzy leaves help make this plant attractive as a foliage plant. A delight to touch. The plant will grow to 3' (1.8m) in shade. Cultivar name is established but description does not distinguish this from other specimens of species *Costus osae*.
REFERENCE: Stokes Tropicals Catalog 1999
PHOTO: no photo available

'Silver Leaf'
PARENTAGE: *Costus erythrophyllus*
ORIGIN: In general cultivation in the US for many years, origin unknown, name from plant tag as received by Dave Skinner.
DESCRIPTION: This form of *C. erythrophyllus* is apparently named for the silvery sheen when the deeply plicate leaves are seen under certain lighting conditions. The leaf color is a medium green. This cultivar is similar to 'Grey Ghost' except for the leaf color, the more deeply plicate leaves, the stems which are green except at the base, and the deeply lobed ligules which are slightly longer at 25-30 mm. The plant grows to about 1 1/2 meters tall and is glabrous. The bracts have long, leafy appendages and the flowers are white with red stripes.
REFERENCE: www.gingersrus.com/DataSheet.php?PID=7351. PHOTO: www.heliconia.org/Registry/Costus_SilverLeaf.jpg

'Southern Cross'
PARENTAGE: *Costus* 'Tropicais' x *comosus* var. *bakeri*
ORIGIN: Dave Skinner hybrid.
DESCRIPTION: This is a hybrid of 'Tropicais' with the common *C. comosus* var. *bakeri*, which is often sold under the incorrect name of *C. barbatus*. It is a vigorous grower and easy to flower. The plant often flowers at 1 to 1 1/2 meters but can grow much taller. It is mostly glabrous except for the pubescence on the undersides of the leaves. Leaves have cordate leaf base and ligules are truncate, 3-5 mm long. The bracts are bright red but not appendaged and the flowers are bright yellow and tubular.
REFERENCE: www.gingersrus.com/DataSheet.php?PID=745. PHOTO: www.heliconia.org/Registry/Costus_SouthernCross.jpg

'Sweet Charlotte'
PARENTAGE: *Costus guanaiensis*
ORIGIN: Origin unknown, plant found in greenhouse at the University of North Carolina in Charlotte, they said it was received many years ago from an orchid collector in Orlando, Florida. Named and introduced by Dave Skinner.
DESCRIPTION: A compact form of the diverse species *C. guanaiensis*. Grows to about 1 meter tall and wide, free flowering both from basal shoots and terminal on leafy stems. Stems, ligules, petiole, leaves, bracts, bracteoles andcalyx are all thickly covered with short hairs. Inflorescence is typical *C. guanaiensis* with green bract appendages and creamy white flowers with spreading type labellum, red striped and yellow throat. Flowers have a long deeply incised anther crest 25-28 mm from the thecae to the apex.
REFERENCE: www.gingersrus.com/DataSheet.php?PID=7531. PHOTO: www.heliconia.org/Registry/Costus_SweetCharlotte.jpg

'Tico Sunrise'

PARENTAGE: *Costus spicatus*
ORIGIN: Origin unknown, received incorrectly tagged as *C. guanaiensis*. Named and introduced by Dave Skinner.
DESCRIPTION: Plant keys out closest to *C. spicatus*, with a longer bracteole and calyx than the similar looking *C. scaber* or *C. spiralis* with which it is often confused. Plant grows up to 3 meters but can flower at 1 meter. Vegetative parts are covered with short stiff hairs, ligule is 7 mm long, leaves are large to 42 cm long by 14 cm wide, bracts are red toward the base changing to green toward the apex, bracteole 28 mm long, calyx 13 mm long, corolla is pale orange to yellow at base, labellum is yellow with red striped lateral lobes, 4. 5 cm long, stamen is yellow tinged with orange, 4.8 cm long, apex is rounded to slightly delate.
REFERENCE: www.gingersrus.com/DataSheet.php?PID=7302. PHOTO: www.heliconia.org/Registry/Costus_TicoSunrise. jpg.

'Tico Tower'

PARENTAGE: Costus aff. lima x ?
ORIGIN: Collected, named and introduced by Dave Skinner, found in southern Costa Rica.
DESCRIPTION: This plant was found on the floodplains of the Rio Rincon on the Osa Peninsula of Costa Rica. It appears to have characters of C. lima except with green bract appendages and longer yellow tubular flowers. The plant grows quite tall, up to 4 meters, with thick hairs on all the vegetative parts. The ligule is short and truncate with a reddish margin. Bracts are red with green, triangular foliaceous appendages that are pendent on the inflorescence. Bracteole is 22 mm long, calyx is 15 mm, corolla and labellum are bright yellow, stamen is red at the apex.
REFERENCE: www.gingersrus.com/DataSheet.php?PID=7458. PHOTO: www.heliconia.org/Registry/Costus_TicoTower.jpg

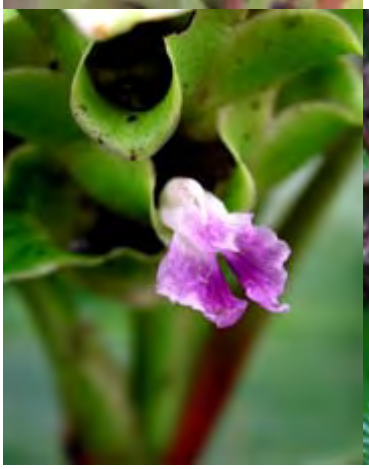
'Tropicais'

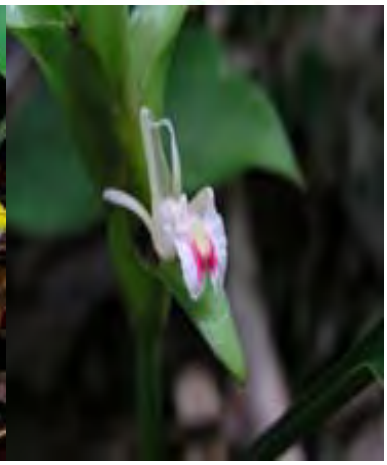
PARENTAGE: *Costus* aff. *spiralis* x *arabicus*
ORIGIN: Plant received by Jackie Petrov from her aunt in Brazil. Named and introduced by Dave Skinner.
DESCRIPTION: This plant has characters of *C. spiralis* and *C. arabicus*. It grows to about 2 meters but can flower on stems 1 meter tall. Vegetative parts are glabrous, ligule is truncate, 10 mm, leaf base slightly cordate. Bracts are red, non-appendaged, bracteole 25 mm, calyx 20 mm. Flower is pale pink and extends vertically from bract, labellum intermediate between tubular and spreading, white to pale pink with yellow throat. Stamen pink to white at apex, apex is rounded, entire.
REFERENCE: www.gingersrus.com/DataSheet.php?PID=7389. PHOTO: www.heliconia.org/Registry/Costus_Tropicais.jpg.

'Twister'

PARENTAGE: *Costus* aff. *scaber*
ORIGIN: Collected, named and introduced by Dave Skinner, found at 1100 meters in the Alto Mayo Reserve, Peru.
DESCRIPTION: This plant is closest to *C. scaber* but may be a new, undescribed species. The vegetative parts have thick hairs. Leaves are broad ovate, ligules short and truncate. The bracts tend to spiral or twist around the inflorescence - thus the name 'Twister'. Bracts are bright red, 35 mm long. Bracteole red, 18-20 mm, calyx 10 mm with shallow lobes, corolla lobes red-orange 40 mm, labellum red-orange 25 mm, stamen 30 mm yellow at base turning red toward apex, slightly exceeding labellum like *C. scaber*.
REFERENCE: www.gingersrus.com/DataSheet.php?PID=7535. PHOTO: www.heliconia.org/Registry/Costus_Twister.jpg (To be continued in the Bulletin 20(2)).

7th International Symposium on the Family Zingiberaceae
"Gingers for Life"
Contact: GingerSymposium@gmail.com





7th Symposium on Zingiberaceae

Date: 17th-21st August 2015

Venue Location: The International Convention and Exhibition Centre, Commemorating His Majesty's 7th Cycle Birthday Anniversary, Chiang Mai Thailand.

Organized by:
The Botanical Garden Organization Biodiversity-Based Economy Development Office (Public Organization) Botanical Society under the Royal Patronage of HM the Queen of the Kingdom of Thailand Rajamangala University of Technology Lanna

Programme:
The international symposium includes oral and poster presentations covering such diverse fields as taxonomy and systematics, molecular studies and phylogeny, phytochemistry and pharmocognosy, diversity and conservation, horticulture and hybridization and all aspects of the biology of gingers. The proceeding of the symposium, include oral presentation and lectures will also be publishes.

Gingers are an important part of the tropical flora and are appreciated and used worldwide as ornamental plants, spices and in medicinal preparations. Besides being important in the kitchen herb, gingers also have many medicinal properties which are well known in ethnomedicine. Gingers have been a part of Asian cultures for as long as these cultures have been documented. This has helped to highlight gingers as symbols of the immense biodiversity of the rain forests. Active scientific studies are still being ducted, and like other special aspects of rain forest ecology, gingers surely demand urgent conservation attention.

Gingers are one of the most important ground cover components in the tropical forests of South East Asia. Thailand has one of the richest ginger floras in the world. About 50 genera of Zingiberaceae are presently known to science, 26 of them are found as native plants within the borders of the Kingdom of Thailand. Of the approximately 1400 species of gingers worldwide, about 300 have so far been found in Thailand.

International Symposium is held about every three years and is the only international event worldwide to focus on these plant family. This 7th symposium will highlight recent developments and research the family Zingiberaceae and other families in the order Zingiberales. It also will provide a venue for researchers to meet and discuss their work.

The Botanical Garden Organization is a comprehensive botanical research institution of plant resources, focusing on conservation biology and plant resource development. Over 200 ginger species from Thailand and surrounding countries have been collected and planted in the Ginger Garden at Queen Sirikit Botanic Garden, Chiang Mai, Thailand. This symposium will emphasize multiple approaches to exploring the Zingiberaceae family and the great potential that Gingers have for improving the quality of life of all mankind in celebration of Her Majesty the Queen's Birthday as well as on the auspicious occasion of the 60th anniversary of HRM Maha Chakri Sinrindhorn.

HSI Bali Conference

Heliconia Society International
XVIII International Conference 2014
24-27 August 2014
Graha Cakra Bali Hotel, Bali, Indonesia
Conference Organizer, David Dowd
Bali Orchid Garden
heliconia@baliorchidgarden.com

We look forward to welcoming you all to Indonesia, and to Bali in particular for the HSI XVIII International Conference, August 2014.

During the two week conference time there will be an emphasis on traditional Indonesian culture, food and plants whilst avoiding touristy activities and seeing many real aspects of Indonesian life.

The Java pre-tour will have a full plant day in Bogor followed by cultural and historical activities in Jogjakarta before moving to Bali. In Bali you will have three nights of feasting in different venues with very traditional non-tourist Balinese cultural entertainment. One day will be in rural areas. The Graha Cakra Hotel is well away from tourist areas and we will have the hotel to ourselves.

The Sulawesi post-tour will take you through rural areas and small towns, seeing life, sampling food, doing things you won't have done before, as well as finding plants wherever possible. Because of the small size of some of the hotels this tour is limited in numbers, so please book early. The hotels are simple but I have been in all and they are quite adequate - and they have Western toilets! A highlight will be a Palace Night with dancing, music and feast in Watampone, followed by another night of dinner and entertainment at Jeneponto. The final night in Makassar is at a very fine hotel.

A good friend of mine, Mr. Bruno Thoeng, has agreed to be Conference Patron and he will be our host one night in Bali and in Jeneponto, as well as helping wherever he can. The government Horticulture Department is also offering assistance in different ways.

If you would like more private days before or after the Conference we will do our best to arrange that for you at the same conference rate at The Graha Cakra Hotel.

This will be a great conference in a beautiful location with many amazing plants and traditional cultural experiences of the 'real' Indonesia. A once in a lifetime opportunity!
Please email your interest to the above email and we will send you the registration forms and details.

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Dr. David H. Lorence
National Tropical Botanical Garden
3530 Papalina Road
Kalaheo, Hawaii 96741 USA

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Heliconia Society International

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