BULLETIN

HELICONIA SOCIETY INTERNATIONAL

A Journal of the Heliconiaceae and the related Cannaceae, Costaceae, Lowiaceae, Marantaceae, Musaceae, Strelitziaceae, and Zingiberaceae

SEPTEMBER 2011 VOL. 17 NO. 3

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

HSI Editors
Dr. Ken W. Leonhardt and Dr. Richard A. Criley
Department of Tropical Plant and Soil Sciences
University of Hawaii
Honolulu, Hawaii 96822 USA

Response of *Etlingera corneri* and *Zingiber spectabile* to photoperiod.

Richard A. Criley
University of Hawaii
criley@hawaii.edu

In Hawaii, *Etlingera corneri* flowers in late March into early May, bearing 0.5 m stems that arise directly from the rhizomes. In contrast, the Beehive Ginger (*Zingiber spectabile*) has a longer flowering season with the stems that bear the inflorescence elongating from below ground in late June – early July, and maturing into harvestable flower heads in July and August. If left on the plant, flower heads age into reds, oranges, and yellows in August and September. The strong seasonality of flowering suggested that photoperiod might play a role. Harvest records provided by growers support this hypothesis (Criley and Maciel, 2002).

Rhizomes of both *Etlingera corneri* and *Zingiber spectabile* were collected from the Harold L. Lyon Arboretum in fall 2007 and rooted in shallow trays of peat + coarse aggregate. In January 2008, single rooted shoots were planted into 20 inch wide wood fiber pots (8 inches deep) filled with a peat-perlite-redwood compost -cinder (1:1:1:1) medium amended with 7 lb Osmocote 18-6-12 fertilizer and 3 oz MicroMax minor elements per cubic yard of medium. Growth was followed by determining new leaf production on the pseudostems and the number of new pseudostems produced.

In the first 6 months following planting, average new shoot production per original propagule was 20.4 for the *Etlingera* and 9 for the *Zingiber*. The leaf counts per pseudostem were about 13-14 and 20-24 respectively, and these counts were maintained on subsequent growths. After 6 months, we stopped recording shoot and leaf number, and the plants were subjected to photoperiod or natural day treatments.

Hawaii's natural day length ranges from 10.8 hours in winter's shortest days to 13.8 hours in summer's longest days. Beginning in April 2008, short day treatments of 9 hours were applied using a black plastic covering drawn over plants in a glasshouse or to plants on wheeled carts that were moved in 27°C darkened chambers. In another glasshouse, 400 watt high pressure sodium lamps provided day length extensions to create 16 hour long days. Fifteen plants of each ginger were grown under the long day conditions from potting up, while 15 were grown under natural day conditions until the short day set-up was constructed. Five plant units were exchanged between natural day, long day, and short day conditions after about 8 weeks, creating rather complicated photoperiod regimes.

Zingiber spectabile under high pressure sodium lamps

None of the *E. corneri* plants produced inflorescences in the first year under any of the photoperiod treatments. This may have been because growth was not mature enough to sense short day lengths or because an insufficient number of short days were provided. Unfortunately, it was not possible to

Etlingera corneri plants in 20 inch wood-fiber tubs in the University of Hawaii greenhouse. Inflorescences appeared from late March to early May under natural day conditions.

determine the number of short days needed to initiate and develop inflorescences because of greenhouse renovations that necessitated termination of short and long day treatments in fall 2008. Thus, the natural day lengths began in October when ~12 hour day lengths prevailed. In spring 2009, plants that had been given natural short days through the winter flowered heavily at about the same time as plants at the Lyon Arboretum and produced an average of 12.5 flowers per plant, but plants lighted from October through the winter with a 4-hour light interruption from 10 pm to 2 am did not flower. From this, we conclude that *E. corneri* is an obligate short day plant.

A few *Z. spectabile* plants did flower in their first (2008) summer. Of particular interest was a set of five plants that began their existence under natural days, were then subjected to 9 weeks of 9-hour short days in late April to late June, and flowered out in September-October 2008. The nine weeks of SD were sufficient as well for a plant previously given 16 hr long days to produce inflorescences in late summer 2008. Plants given interrupted nights through winter 2008-2009 did not flower while floral stalks were produced on plants given natural days during winter.

The results suggest that *Z. spectabile* may require a short day period of at least 9 weeks followed by long days in order to initiate and develop flowers. In Hawaii, natural flowering begins to occur about 13 weeks after the 12 hour photoperiod transition in late March.

Short day conditions were imposed upon gingers using a black plastic film tent.

The Purpose of HIS

The purpose of HSI is to increase the enjoyment and understanding of *Heliconia* (Heliconiaceae) and related plants (members of the Cannaceae, Costaceae, Lowiaceae, Marantaceae, Musaceae, Strelitziaceae, and Zingiberaceae) of the order Zingerberales through education, research and communication. Interest in Zingiberales and information on the cultivation and botany of these plants is rapidly increasing. HSI will centralize this information and distribute it to members.

The **HELICONIA SOCIETY INTERNATIONAL**, a nonprofit corporation, was formed in 1985 because of rapidly developing interest around the world in these exotic plants and their close relatives. We are composed of dues-paying members. Our officers and all participants are volunteers. Everyone is welcome to join and participate. HSI conducts a Biennial Meeting and International Conference.

Membership dues are (in $US): Individual, $40; Family, $45; Student, $10; Contributing, $50; Corporate (Company or Institution) $100; Sustaining, $500; Contributing Lifetime Member, $1000, Libraries, $35 and PDF, $25. Membership fees constitute annual dues from 1 July through 30 June. All members receive the BULLETIN (usually published quarterly), the Membership Directory, and special announcements. Please send all inquiries regarding membership or Bulletin purchases to: Dr. David Lorence, NTBG, 3530 Papalina Rd., Kalaheo, HI, USA 96741. Back issues of the Bulletin are $5.00 per issue.

HSI Officers for 2010-2011

President, W. John Kress; Vice-presidents for Membership, Carla Black and Jan Hintze; Secretary, Victor Lee; Treasurer, David H. Lorence; Cultivar Registrar, Bryan Brunner; Archivist: Sandra Barnes. Board of Directors: Bruce Dunstan, Vinita Gowda, Anders J. Lindstrom, David Skinner and Chelsea Specht.

The HSI BULLETIN is the quarterly publication of the HELICONIA SOCIETY INTERNATIONAL. Inquiries: Victor Lee <admin@heliconia.org>

The impact of the study suggests that *Etlingera corneri* and *Zingiber spectabile* may be amenable to manipulation of flowering time using day length control. Unfortunately, the large size of *E. corneri* foliage pseudostems (reaching 10 ft) makes it difficult to create artificial short day lengths, but the somewhat shorter *Z. spectabile* (to about 6 ft) may be manipulated for out-of-season flowering. *Etlingera venusta*, which also has a narrow flowering window, may also be responsive to short photoperiods and should be examined as another attractive cut flower ginger.

Cart used to wheel plants into darkened chamber to create short day lengths.

This research was supported by a grant from the Joseph H. Hill Memorial Foundation, administered by the International Cut Flower Growers Association in Hazlett, Michigan. This support is gratefully acknowledged.

Developing floral stems of *Z. spectabile.*

Literature Cited

Criley, R. A. and N. Maciel**.** 2002. Seasonal flower production among Zingiberales --Some examples from a commercial cut flower grower in Hawaii. Bull. Heliconia Society Intern. 10(4):10-13.

Achievement Award to Dr. Helen Kennedy

Long time HSI member, Dr. Helen Kennedy of the University of British Columbia, received an Outstanding Achievement Award from the Society of Woman Geographers at their triennial meeting in May, 2011, in Boulder, Colorado. An Honorary Research Associate in the Dept. of Botany and Honorary Curator of Vascular Plants in the UBC Herbarium, Dr. Kennedy has traveled all over the world to track down, describe and classify Marantaceae.

In presenting the award SWG President Martha Talbot said, "It gives me great pleasure to congratulate you on receiving an Outstanding Achievement Award from the Society of Woman Geographers. Your many years of studying prayer plants in the fast disappearing rain forests all over the world is an inspiration to us all. And hopefully your work and possibly introducing them for cultivation will keep these unique plants from going extinct."

The Society of Woman Geographers was established in 1925 at a time when women were excluded from membership in many professional organizations, particularly the Explorers Club, which did not admit women until 1981. Dr. Kennedy was only the 34th to receive their Outstanding Achievement Award.

Dr. Helen Kennedy (right) receives award from Society of Woman Geographer's President, Martha Talbot. (Linda Liscom photo).

Visit the Heliconia Society International web site at

www.heliconia.org

for full tour itineraries and all details on the

2012 HSI Conference in Panama and Colombia

Heliconia robusta

Bruce Dunstan
Queensland, Australia
brucedunstan@hotkey.net.au

Heliconia robusta is a species that has been known since the early 1900's being collected in Bolivia in 1907. It has not been commonly cultivated; in my travels to Conservation Centres, Botanical Gardens and growers collections over the past 20 years it had been one species of many that I had never seen.

Before the Iquitos HSI conference in 2008 I travelled with Carla Black, Angel Rodriguez and Jan Hintze to southern Peru, heading off from Cusco high in the Andes we travelled even higher getting to 4200m before we started heading down into the Amazon basin and travelled to the edges of the world famous Manu National Park, Peru's largest. It was here that we saw *Heliconia robusta* growing.

I had travelled to Manu prior to the Miami conference in 1996 and had found that although it was certainly a wet tropical Amazonian climate this area also has cold blasts of weather coming up from Argentina and Bolivia that could plunge winter temperatures down to 7° C. We endured a very cold motorised canoe ride out of the National Park on this earlier trip and the 13°C felt very much colder with the wind chill of the moving canoe. My interest in cold hardy Heliconias is why I was keen to travel to this southern part of Peru, as well as the hope of seeing *Heliconia gloriosa* in habitat, which we didn't do, unfortunately.

H. robusta, below, and at right

Heliconia robusta belongs in the Subgenus Griggsia, Section Obscurae. Other species I have seen in this group include *H. obscura*, *H. obscuroides*, and *H. fragilis* in Ecuador and *H. laxa* and H. *mutisiana* in cultivation.

Heliconia robusta grows 2-3m tall in disturbed areas and was reasonably common along roadsides in and around the town of Pillcopata in Cusco Province of southern Peru. As with other species in this group *Heliconia robusta* tends to have necrotic bract margins very early in its development and loses colour quickly. It will never be a cut flower variety or perhaps even a landscaping candidate due to its rapidly degenerating inflorescences. Another interesting trait was that all cut pseudostems exuded copious amounts of clear mucilage, similar to that from *Heliconia standleyii* inflorescences.

Other species of *Heliconia* growing in this area included *H. subulata*, *H. aemygdiana*, *H. penduloides*, *H. lingulata*, *H. apparicioi*, *H. hirsuta*, *H. stricta*, *H. lasiorachis*, *H. rostrata* and *H. carlei* making this area very rich in Heliconia species.

Market Potential of Torch Ginger and Beehive Ginger

Vivian Loges[1], Andreza Santos da Costa[2], Walma Nogueira Ramos Guimarães[2], Maria do Carmo Ferraz Teixeira[3]

[1]UFRPE, Av. D. Manoel de Medeiros, s/n, 52171-900 Recife-PE; vloges@yahoo.com, [2]UFRPE, Doutorandas daUFRPE; andreza.costa@gmail.com; wallamo@gmail.com, [3]Fazenda Mumbecas Flores Tropicais Ltda., mariadocarmo@florestropicais.com.br

Abstract

*The increasing production of tropical flowers is of great importance for Brasil's national floriculture. Species such as **Etlingera** spp. and **Zingiber spectabile** are examples of exotic tropical flowers that show interesting characteristics to be commercialized as cut flowers. The market potential for these species in Brasil leads to the analysis of positive and negative aspects of its production, postharvest and commercialization, the main objectives of this article.*

Introduction

The term "tropical flowers" is used for products of Floriculture originating from tropical areas (Pizano, 2005). The production of tropical flowers in Brasil has potential of internal market of more than 150 million of customers and an international market with a potential of about US$ 9 million per year. Unique beauty, form and colors and high durability of products are some of the reasons for the acceptance of these flowers in the national and international market (Agronegocios, 2007).

The introduction of new products or the increment of production of tropical exotic species adapted to the conditions in Brasil is of great importance to the national Floriculture. Species of genera *Etlingera* and *Zingiber*, from family Zingiberaceae, are examples of exotic tropical flowers that present interesting characteristics that have stimulated many national growers to produce them as cut flowers and landscape plants. Climatic conditions in the "Zona da Mata" and on the Coast of Northern Brasil, in the States of Bahia, Sergipe, Alagoas, , Paraiba, Rio Grande do Norte, Ceara, and in the North Region are favorable for production, and allow these products to be exported or commercialized internally, especially to the South and Southern Regions.

The objectives of this research were to determine the market potential of the genus *Etlingera* and the species *Zingiber spectabile* and the analysis of positive and negative aspects related to the production, post-harvest and commerce of their culture.

Genus *Etlingera*

Many species of *Etlingera* were collected from Sabah, west Malaysia. Because of difficult access, the heavy rains and the native groups that, historically, were cannibals, few collections were made in this area until 1930. These species are used for landscaping, trade as cut flower and in cuisine (Bannochie, 1987).

The clumps have vegetative shoots with large and vivid leaves, and flower shoots with terminal inflorescences, emitted separated. Flowers in red, yellow, white, pink, and other numerous combinations of colors emerge from inside the bracts, making this genus one of the most beautiful in the family (Mood, 1996).

The propagation of species from *Etlingera* can be done from seeds (sexual propagation) protected by rounded or elongated capsules in the inflorescences, which open when ripe and ready for dispersion (Criley, 1996a). Despite the ease of propagation by seeds, most *Etlingera* species are propagated in commercial cultivation by division of clumps. The rhizomes should present at least one new shoot (Chapman, 1995), and the price ranges from R$ 5.00 to R$ 10.00, depending on cultivar (US$ 3 to 6; 1 dollar = R$1.65 as of February 2009).

Plants from mother rhizomes with at least 3 years of cultivation reach commercial production between 11 and 15 months of age (Lamas, 2004) or after 24 months (Chapman, 1995). When starting the production from rhizomes, treatment is recommended to reduce the risk of introduction or dissemination of phytosanitary problems in the areas of cultivation.

The use of plantlets originated from tissue culture is recommended, because of the sanitation and safety of uniform plants. However, the availability of tissue culture plants is still limited. Experiments of micropropagation have been developed, for example the experiment of Melo et al. (2005).

The main species described in the genus *Etlingera* are cited below:

- *E. elatior:* Until the 80's, only two varieties were cultivated commercially. Known as torch ginger (emperor-stick is the literal translation from the Portuguese "bastao-do-imperador"), *E. elatior* is suitable as cut flower and for landscaping. The inflorescences are conic, borne on shoots emerging directly from the soil and reaching up to 6.5 feet high. The vegetative shoots present foliage ranging from green to reddish brown, 3 to 6 meters tall, making production in protected environments impossible in temperate climates (Chapman, 1995; Keppler, 1996). In the northern Brasil *E. elatior* are cultivated in the colors: light pink, named Porcelain; dark pink, named Pink (Pink Torch) and red, named Red (Red Torch).
- *E. venusta* presents characteristics favorable as cut flower. It was collected in Malaysia and Thailand, below

200m altitude, in flooded areas. Plants are 3 to 4 meters high. The inflorescences, color bright red with long shoots that remain attractive even after the formation of fruits, because the bracts don't darken quickly (Mood and Ibrahim, 2001). Pernambuco does not have this species yet.

- *E. corneri* was introduced recently for cultivation, is similar to *E. elatior*, but the plants are smaller, allowing the cultivation in pots. It has inflorescences with colors varying from pink to dark red (Mood and Ibrahim, 2001).
- *E. junnanense*: presents small inflorescences, yellow or red, but the shoots are very short, limiting their use as cut flower (Mood and Ibrahim, 2001).

E. pyramidosphaera – known as tulip-stick, is similar to *E. elatior*, but smaller plants. Presents pink, red, and very dark, almost black inflorecences (Chapman, 1995). There are cases of production of *Etlingera* in Pernambuco, named "tulip" and "little tulip", however, the species must be confirmed.

The introduction of exotic *Etlingera* species in Brasil is subject to regulations and procedures of the Ministério da Agricultura, Pecuária e Abastecimento (MAPA), which requires the careful inspections of plant material to minimize the risks of introduction of pests and diseases (Giacometti, 1995).

In relation to production, the choice of a place for cultivation should follow these criteria. After the field planting, development of clumps begins, and after production is stabilized, transplanting should be avoided. The following factors should be observed: easy access; flat or lightly inclined terrain; good drainage; possibility to construct the planting beds in the north-south direction to ensure uniform sunlight; water availability; location distant from sources of dust, rust and other residues.

The torch ginger is well adapted to a wide range of temperature; however, for commercial plantations, temperatures from 22 to 35C are indicated and elevated moisture, between 70 and 80% (Ribeiro, 2001; Lamas, 2001). Yields are good in conditions of the Zona da Mata of Pernambuco, which presents hot weather, average annual temperature 24.1C, humidity that varies from 70 to 95% and annual precipitation between 1600 and 1800 millimeters (ITEP, 2006).

In tropical and subtropical areas, the plantings are made in open areas, with direct sunlight or in partially shaded places. In Para, cultivation is associated with the native arboreal vegetation. The irrigation system could be through overhead sprays, micro sprinklers or furrow

Clumps of Red Tulip (Tulipa Vermelha)

irrigation. Planting beds are elevated 10 to 20 cm with plants in simple lines spaced 1.25m between plants and 2.5m between lines (Lamas, 2004). Larger distances between lines can be used to allow mechanized cleaning.

The plants can fall down easily, because they are herbaceous plants reaching over 5 meters high, requiring the protection of wind-breaks. To avoid falling down and damage to the vegetative shoots, and to aid access and maintenance, support trellises with bamboo or irrigation tubes are constructed on the sides of the plant beds.

The plants form large clumps, and new vegetative shoots and inflorescences develop around and in the center of the clump. Thinning of invasive shoots between lines is recommended. After a certain time, the yield and quality of inflorescences may be reduced, because of the density of the clumps and the competition between plants for light and nutrients. This is a sign of the need to renovate the plants. In Costa Rica, it is recommended to thin all shoots when production is reduced (information provided during presentation of the Agronomist Engineer Jose Guilhermo Murillo Segura. Recife, 7th of July 2006).

The production of inflorescences varies, based on species and cultivars of genus *Etlingera*, and many are seasonal. In Brasil, Lamas (2004) affirmed that production under adequate conditions can yield 60 to 90 inflorescences per clump/year. Caetano and Paiva (2006) evaluated five cultivars of torch ginger cultivated in Ceara Coast and observed higher yields with the cultivar Rosa, followed by cultivars Porcelana and Vermelha, occurring specially in the months of November to February.

Guimarães et al. (2006) evaluated the production of *Etlingera* cultivars for 12 months in Zona da Mata (Forest zone) and observed that: Tulipinha produced 173.33 shoots, with production concentrated from September to November of 2005, without producing inflorescences from March to June of 2006; Red Tulip produced 118.7 shoots; Red Torch ginger produced 109.7 shoots; Porcelain produced 68.0 shoots (Table 1). The seasonal behavior shown by some cultivars could be interesting if it coincides with periods of higher demand in other areas of Brasil or internationally.

In Australia, in breeding work with *Etlingera*, Hoult and Marcsik (2000) observed that four cultivars of *E. elatior* produced 50 to 200 inflorescences; *E. venusta* produced less than 10 inflorescences; *E. pyramidosphaera* produced 80 to 120 inflorescences per clump.
In the "Forest area", it was observed that cultivars of pink and porcelain torch ginger achieved the time for cutting between 36 and 42 days after the beginning of formation of inflorescence (Table 2). Floral shoots without adequate length and diameter for commerce up to 21 days after emergence of the inflorescence can be removed, because they will not present the necessary quality for commerce (Loges et al., 2003).

Caetano and Paiva (2006), evaluated five cultivars of Torch ginger and observed that floral shoots that varied in length from 39.4 to 51.4 cm, with external and internal inflorescence diameters of 9.8 to 10.6 cm and 3.1 to 3.5 cm, respectively. The phytosanitary problems can be factors of risk for the culture of *Etlingera*, if some factors are not taken in consideration. The conditions of production of the tropical flowers, related to the temperature, precipitation and relative humidity of air, are favorable to the appearance of various diseases (Warumby, et al., 2004). Propagation by rhizomes also contributes to these problems, because they can be a source of pathogens if the propagation is done without adequate treatment. Problems can arise as a result of production of *Etlingera* cultivars together with other species of tropical flowers that host the same pests and diseases or in areas contaminated as a result of production of banana or sugar-cane.

Several disease problems observed in torch-ginger (Lins & Rabbit, 2004; Warumby, et al. 2004) are anthracnose (*Colletotrichum gloeosporioides*), which occurs in any part of the plant, reducing the productivity and devaluating inflorescences for commercialization; rotted rhizomes (*Rhizoctonia solani*), which causes rotting of the roots and rhizomes, compromising the water absorption and nutrients, and causing withering and nutritional deficiency, mainly in plants of cultivar Porcelain; and gall nematodes in roots – *Meloidogyne incognita* has been the most frequent species, causing underdevelopment and withering in the hottest hours of the day, and yellowing and burning of oldest leaves. To reduce the occurrence of these illnesses, the use of healthy and treated plants is recommended before planting, pruning plants, removal and destruction of remaining portions of production, correction of pH of the ground and adequate handling of the culture (balanced fertilization, airing of the plants, humidity or not-extreme water stress, draining of the ground) (Warumby et al., 2004).

Clumps of Porcelain (Porcelana)
Fazenda Mumbecas, Paulista, PE, 2006.

Concerning the insects that compromise the quality of the inflorescences in production, the "irapuá" bee (*Trigona spinipes*) is important. It damages the bracts, restricting the commercialization of the opened inflorescences. Allowing inflorescences to remain when totally opened is not recommended, because the bees are attracted to the plantation area,

Table 1. Flowering yields/plant of *Etlingera* species at Paulista, PE (2005).

Species	Cultivar	Sept. to Nov. 2005	Dec. 2005 to Feb 2006	Mar. to Jun. 2006	July to Sept. 2006	Total Yield Per plant
Etlingera sp.	'Tulpinha' Little Tulip	112.3	6.3	0	54.7	173.3
Etlingera sp.	'Tulipa Vermelha' Red Tulip	90	15	0	13.7	118.7
Etlingera sp.	'Tulipa Rosa' Pink Tulip	30.7	4.7	1.3	5.3	42
E. elatior	'Vermelho' Red	70	17.3	8.3	14	109.7
E. elatior	'Porcelana' Porcelain	28.7	19.7	8.3	11.3	68

Table 2. Development of floral stems of *Etlingera* at Paulista, PE (2005).

Parameter	Days after formation of the inflorescense			
	21	**27**	**36**	**42**
Inflorescence length (cm)				
Porcelana	20.7	16.9	15.7	17.7
Vermelho	16.4	18.3	22.8	20.2
Inflorescence diameter (cm)				
Porcelana	3.1	4.1	9.8	15.5
Vermelho	3.0	3.9	8.8	11.3
Floral stem length (m)				
Porcelana	1.6	1.6	1.6	1.7
Vermelho	1.4	1.5	1.5	1.6
Diameter of stem (cm)				
Porcelana	1.9	1.8	1.8	1.8
Vermelho	1.8	1.7	1.8	1.7

Table 3. Development of floral stems of *Zingiber spectabile* at Paulista, PE (2003).

Days after formation of the inflorescence	Inflorescence length (cm)	Inflorescence diameter (cm)	Stem length (cm)	Stem diameter (cm)
22	4.9	4.9	51.5	1.6
29	9.3	6.4	55.5	4.6
37	12.8	7.1	59.7	1.6
42	13.9	7.1	56.4	1.6

causing damage to inflorescences. Other pests that had been observed on *E. elatior* are: giant-rhizome-driller, or of pseudo-stems, (*Castinia icarus* and *C. licus*); mites, that occur, generally, in groups, causing the loss of brightness of leaves, becoming bronzed (Warumby et al, 2004).

The regular control of weeds is necessary in order to prevent competition with the plants, particularly in the initial phase. Later, shading during development of the plants inhibits the development of weeds. Other recommendations for production can be found in Lamas (2001 and 2004) and Ribeiro (2001).

Etlingera corneri (R. Criley photo)

Zingiber spectabile

Known as beehive ginger, the species *Zingiber spectabile* Griff. belongs to the family Zingiberaceae. This species is commercialized as a cut flower, because of the unusual shape of the rounded or elongated inflorescence formed in the top of stems emitted directly from the ground. Inside the bracts of the inflorescences, delicate flowers in dark colors with white marks are produced. The clumps present vegetative stems with large, eye-catching leaves.

It is usually propagated by rhizomes, but another method is propagation by cuttings, which are placed in horizontal position over the soil and covered with 5cm of medium. Some species produce seeds when pollinated manually, but the seeds rarely germinate (Chapman, 1995). The price of a rhizome is, approximately, R$3.00.

The conditions and forms of production are very similar to torch ginger. Recommendations for production can be found in Lamas (2001 and 2004) and Ribeiro (2001).

In Australia, breeding work done with *Z. spectabile* by Hoult & Marcsik (2000) resulted in three cultivars: 'Green', 'Lemon' and 'Apricot'. These cultivars presented yields varying from 50 to 80 inflorescences per plant, with durability of 10 to 14 days. In Costa Rica, five cultivars of *Z. spectabile* were selected with different periods of production, increasing the period of supply of the product (information provided during presentation of the Agronomist Engineer Jose Guilhermo Murillo Segura. Recife, 7th of July 2006).

Etlingera venusta (R. Criley photo)

In production, inflorescences present colors that vary from green and yellow to red. The growers associate these variations to specific times of the year and to weather conditions. When the development of floral stems was studied, it was observed that they achieved the stage for harvest between 29 and 37 days after the formation of inflorescences, and a suitable stage of harvest was maintained even 42 days after formation of inflorescences, allowing the inflorescences to be harvested with larger flowers. The length of floral stems did not exceed 59 cm (Table 3) (Loges et al., 2003). Meleiro (2003) analyzed *Z. spectabile* cultivated in direct sunlight throughout 11 months and observed that the length of floral stems was 66.9 cm

Part II of this article will appear in Heliconia Society Bulletin 17(4). Literature citations for this article can be found on the HSI website: www.heliconia.org.

This article was contributed by Dr. Vivian Loges. It was published as a part of a National Journal updating the cultivation of tropical flowers, held at Pariquera-Açu, Vale do Ribeira-Sao Paulo. November 7 and 8, 2007.

Translation assistance was provided by Alberto Ricordi, PhD candidate in Architecture, University of Hawaii and Marta Lelis, landscape designer in Hawaii. Editing by Richard Criley.

Colombia: The Anchicayá Valley

Bruce Dunstan
Queensland, Australia
brucedunstan@hotkey.net.au

For the past 20 years I have wanted to travel in Colombia but have put it off due to worries over security. In that time I have done trips to surrounding Panama and Ecuador a couple of times, taken two trips to Peru, and have travelled to Costa Rica and Brazil. This year I finally had the chance to get to Colombia and have a play in the forest, one of life's true pleasures. I should add that John Kress was a major reason I finally reached Colombia. John co-authored the book on Colombian species, *Heliconia: Llamaradas de la selva colombiana* and when he signed my copy back in 1999 wrote, "-Bruce now you can really fantasize about what I missed in Colombia." This playful dig has motivated me all these years - and we did find some really amazing things that I'm looking forward to showing John when we get together next year in Panama. We also had with us all of José Abalo and Gustavo Morales's publications of the *Heliconias* they described in Colombia thirty years before us. A great highlight for me was emailing images to José while we were in the bush and getting his thoughts in nearly real time. It certainly makes plant identification a cinch to communicate with someone who has described more than 50 species!

Carla Black from Panama and I went in August 2011 with the view to check out some localities Carla was keen to visit as part of the post tour for the 2012 Heliconia Society International conference which will be held in El Valle, Panama in late July 2012. Our guide was Emilio Constantino and he will guide the post-conference tour as well. Emilio has devoted most of his life to studying South American wildlife and to promoting its conservation; read more about him in the post tour description on the HSI website, and see his galleries on Facebook, at: http://es-la.facebook.com/people/Emilio-Constantino/100000760847983

Emilio's contacts throughout Colombia allowed us to get advice from people on the ground in specific areas regarding how safe a particular road may be. This proved to be immensely helpful in ensuring we saw what we were hoping to find while avoiding any potential danger. Colombia is becoming safer and areas that were a war zone two years ago are just as safe to visit now as any other place in Latin America.

We started our trip in Cali, the country´s third largest city nestled at the base of the western mountain range, the Cordillera Occidental. Our first adventure was to travel up and over the range and onto the Pacific slope. Buenaventura is Colombia´s only Pacific port city and is connected to Cali by a new road and an old road - and as always, the old road is best route for plants.


H. gigantea

However, our first stop was on the new road for *Heliconia gigantea*, a plant we had really hoped to see in habitat. We were very excited to see this plant that has only been seen by a handful of heliconia people. We busily took photos, pulling flowers apart as usual. A flowering clump of *H. venusta* was growing alongside, also on our to-find list of Colombian endemics.

As Carla got to work on her staminode photos, I dropped down into the creek and had a quick look. There were more huge heliconias growing down in the creek. Emilio had told us he knew of only a couple of clumps of *H. gigantea*. As I looked way up at these monstrous plants I realised I was looking at *H. titanum*! Here we were, Day One - Stop One, looking at the two giant species we had come all the way to Colombia to see! We could have gone home happy on Day Two! Fortunately, we had many days ahead of us.


H. titanum

At the higher elevations of the new road to Buenaventura we came across *Heliconia burleana* and vast areas of *H. griggsiana*. This Colombian form has plenty of red on the rachis as well as gold and blue, quite a different colour scheme to the forms we had seen in Ecuador. Oh, the joys of polymorphism. Along this road the mountains tend to affect rainfall with some very dry pockets alongside very wet areas. The change in rainfall has an amazing effect on plants. In one valley the hills are dry with cactus and *Tillandsia* that look right at home in a desert. A few kilometres farther and you are back in the humid rainforest bordering the Chocó, one of the wettest places on earth. Down towards sea level we saw a couple of red pendants; one appeared to be *H. obscuroides* but the other we weren´t able to identify. It looked something

like a large necrotic red *H. regalis* but the flower parts don´t agree with that ID. After a nice lunch at a popular truck stop we found *H. arrecta* with its almost vertical leaves growing precisely where the type description suggested we would see it.

Mega-milipede

The old road to Buenaventura rises up over the range from Cali then branches off to the south towards El Queremal. This was our base for a couple of days as we drove down the Anchicayá Valley. This region is one of the wettest places I have travelled, with average rainfall ranging between 8-10m per year. Luckily for us, it fell mainly at night. In our ten days in one of the wettest parts of the world, we got rained on just one afternoon!

Anchicayá is a local Indian name that means "the mountains that cry," a direct reference to the almost constant rain. At higher elevations we saw *H. titanum* in the creek beds. As we dropped steadily down into the valley we were blown away by the diversity of the plants. I've already written a journal article on the bromeliads we saw on this road. Like the heliconias of Colombia, all the plants we saw haven't seen the light of day for a very long time, or were likely to be new species. Few are widely cultivated.

H. arrecta

The next species we came across was *H. fragilis*, another red pendent. *H. obscuroides* is very common in this region. Next, slightly further down, was *H. rhodantha* with its very broad and asymmetrical leaves. This feature allowed us to identify it easily from other species. The first we came to had obviously been flowering for a long time as the inflorescence had hit the ground and was growing into the rich organic compost. There were still pink flowers emerging but it was well past its glory days. Then we noticed another bud just emerging from the pseudo stem. It was the ugliest bud I'd ever seen! Brown and necrotic at birth. Luckily, while Carla was once again taking detailed photos of the floral parts, I walked down the road and found another clump growing on a rocky hillside. After plenty of sweating and a little swearing I was able to clamber up the steep slope and managed to stand on a clinging clump of *H. obscuroides* to get to the *H. rhodantha* inflorescences. I carefully cut a couple then turned around and realised I was a little too high up to just jump. With one hand holding my precious flowers I wrapped my other arm around the *H. obscuroides* pseudostems and leaves and abseiled on my backside down the steep wet rock slope. Thankfully the *H. obscuroides* roots were firmly attached and I survived to tell the tale.

H. rhodantha

Further down the road *H. latispatha* made its appearance and dominated the roadside for many kilometers. Finally we saw something different: *H. spiralis* var. *anchicaya*. This plant is a slender pendent that grows 2-3m tall. We saw solid yellow as well as red and yellow forms. It was growing very happily on the steep slopes alongside the road. While I was collecting seed I dropped one and went after it in the organic mulch beneath the plant. I didn't find that particular seed but unearthed a millipede that was easily 200mm long. That warranted a photo with my collecting knife just to provide some scale for the unbelievers.

As we travelled further along this road we were amazed at the number of waterfalls that flowed down the steep slopes. I guess 8-10m of rain has to get to the bottom of the range somehow. The rich diversity we saw in bromeliads was amazing; I photographed 13 species of *Pitcairnia* as we descended.

Getting towards the lower elevations we saw *H. nigripraefixa* and another red pendent with a red and yellow striped rachis that we couldn´t identify, another that looked to be a *H. spir-*


H. spiralis var. *anchicaya*

alis hybrid with one of the larger species as it was huge but had the thin *H. spirals*-style inflorescence.

When we saw the *H. aff. regalis* again, we knew we were down in the humid lowlands. The sun was certainly hotter and the humidity was oppressive. I was standing in the back of the truck with the wind blowing over me but still felt very hot. After we crossed the river along the flat we drove through an amazing *Anthurium* forest. The upright growing plants had a superficial resemblance to the florists' *Anthurium*, *A. andreanum*, but these plants had white spathes and leaves 1m wide. The plants themselves were 4-6m tall surrounding the road, creating an impenetrable border.

The next *Heliconia* species spotted was *H. spiralis* var. *spiralis*, a tall 3-4m plant with clear bright yellow inflorescences. Again, overcome with excitement I went charging over the edge of the road, and plunged into a garbage dump. The plants were obviously happy growing in all the waste plastic. We found more clumps deeper in the forest but they were smaller than the one growing by the side of the road in more light. It wasn't until later that evening when we had all the relevant literature out that we deciphered the identity of the plant.


H. nigripraefixa

Next on our list of species we were hoping to see was *H. stellamaris*, so as we drove along heading towards Buenaventura we had our eyes peeled for it, but after reading the description Carla felt sure we would need to be in the cool shade of the forest, not baking on the side of the road.


Anchicaya Valley View

We decided we would take a trip to San Cipriano, a small tourist town that backs onto the forest reserve protecting Buenaventura's water supply. The only problem with getting to San Cipriano is there is no road. But there is an old rail line. The locals have constructed *brujitas*, carts powered by motorcycles that run on bearings on the otherwise abandoned rails. We parked our car and took off for an overnight in San Cipriano. The *brujitas* get some speed up and the wheels whining on the tracks sound like a dentist´s drill. As two from separate directions meet, the one with the smaller load is removed from the track and the other continues on its way. We stayed in San Cipriano on a weeknight, which was great. On weekends the town fills up with people from Cali and Buenaventura looking to get away for the weekend, cool off in the river, and party.

The next morning we began a quick walk back into the El Escalerete reserve and within half an hour we had spotted *H. stellamaris* growing in the forest. This interesting species has bright orange bracts covered in translucent hairs. We found one old white flower. The bulk of the bracts looked to be sterile and seemed to be closed up as if they were never going to have fertile flowers emerging from them.


H. spiralis var. *spiralis*

H. stella-maris

The heavy rainfall in this region meant there were epiphytes growing on everything and we walked through a rich forest with amazing plants around every bend of the trail. We saw the Chocó Toucan as well as aracari feeding on palm fruits. By the end of the day we were back at our comfortable hostel in Cali, shooting off emails and photos to our envious friends back home.

Waterfall in the Anchicayá Valley

The Anchicayá Valley was undoubtedly one of the best locations I´ve visited in all of my travels. I´m excited that more heliconia enthusiasts will get to follow our route in 2012.

Ensete lasiocarpum- The end of the monotypic banana genus *Musella*

Jana Leong-Škornicková
Herbarium, Singapore Botanic Garden
JANA_SKORNICKOVA@nparks.gov.sg
Photos by Jana Leong-Škornicková

The golden lotus banana or Chinese yellow banana is native to the watersheds of the upper Yangtze River and its branches between northern Yunnan and southern Sichuan, where wild populations appear. It was originally described by Adrien Rene Franchet in 1889 as *Musa lasiocarpa*. Even though some characters point to its relationship with members of the genus Musa, this species resembles some *Ensete* species. This lead Ernest Entwistle Cheesman to suggest in 1947 that it should be called *Ensete lasiocarpum*. At that time, *Musa* with over 40 Asian species and *Ensete* with two species in Asia and three in Africa, were the only two recognised genera within the banana family (Musaceae). So, to which genus does the golden lotus banana belong? Well, maybe neither, or so thought Hsi Wen Li, who in 1978 proposed a third distinct genus *Musella* to accomodate this gorgeous plant, and thus its name baecame *Musella lasiocarpa*. Such a scenario provides fertile ground for taxonomists to quarrel and leaves horticulturists pulling out their hair with every name change.

E. lasiocarpum flower bud, day 1.

When morphology leaves us in the lurch, it is time to call on DNA. This was finally what a group of botanists from Xishuangbanna Tropical Botanical Garden in Yunnan did recently. They gathered and analysed nearly 40 species of bananas covering all three genera in order to find out more about the

evolutionary relationships within the banana family. The results of their study were published early this year (2010) in the botanical journal ***Taxon*** and seems to end the decades long dispute. The golden lotus banana clearly clustered with members of the genus *Ensete*. So it is time to let go of *Musella*, and the name *Ensete lasiocarpum* should now be used.

An interesting bit of information that came out of this study was that this Yunnan native is more closely related to African *Ensete* species than Asian *Ensete*! Citing fossil evidence, the authors of this paper explained that the genus *Ensete* had in the past a much wider distribution, which had been disrupted by changes of climate in the Tertiary or early Quarternary periods.

E. lasiocarpum flower, day 15.

The golden lotus banana is widely cultivated by farmers on the edges of terraced uplands, marginal lands, plantations and even in local gardens. The stems are rich in starch and can be eaten boiled as a vegetable. More often though, whole plants are used fresh or boiled as fodder for pigs. Other reported uses include soil and erosion control, as a weaving material, medicine, wine brewing and as a source of honey during the winter season. And of course, being such a beauty, this species has great ornamental potential.

Ensete lasiocarpum does not usually exceed 1.5 metres in height and its false trunk made of overlapping leaf sheaths ends in an upright bright yellow compact rosette inflorescence resembling a lotus. It thrives in well drained soil in direct sunshine. This banana will continue to flower for several months, starting with numerous rounds of female flowers positioned at the base of the inflorescence and followed by male flowers later. If pollination by insects occurs, the ovaries of the female flowers will turn into grey-greenish, short and rather fat angled fruits. Their rather thick skin is covered in white, bristly hair. The stone-hard, black seeds are covered in a cream-white pulp, which turns into a deep violet mush when fully ripe.

E. lasiocarpum flower, day 22.

Nurseries in Singapore sometimes carry full-grown flowering plants in pots, where they can be successfully grown. Unlike other *Ensete* species, *E. lasiocarpum* produces suckers freely and so is easy to propagate. Seeds are also available but need a period of cold before they germinate, so it is wise to ask before purchase if the seeds have been so treated. The good news for gardeners outside the tropics is that this banana is cold tolerant and in milder parts of the temperate zone can survive winter without being brought into the home.

E. lasiocarpum male flowers

This article was originally published in Gardenwise 35:32-33, July, 2010. The basis for this summary is the following paper: Liu, Ai-Zhong; Kress, W. John; Li, De-Zhu. 2010. Phylogenetic analyses of the banana family (Musaceae) based on nuclear ribosomal (ITS) and chloroplast (*trnL-F*) evidence. Taxon 59(1):20-28.

Additional *Ensete* images are on page 16.

Heliconia Society International
XVII International Conference 2012
27-31 July 2012
Hotel Los Mandarinos, El Valle de Anton, Panama
Official Conference Organizer: Arians's Tours
www.arianstourspty.com
www.heliconia.org

CALL FOR PAPERS

Persons wishing to present papers or posters at the 17th Heliconia Society International Conference in Panama 27-31 July should submit their topic to the Organizing Committee at admin@heliconia.org as soon as possible.

Your submission should include an abstract of at least 100 words and be delivered by 31 March 2012

Topics should relate to any of the eight families of the order Zingiberales and can include systematics, floriculture, propagation, plant pathology, travel and exploration, art, ethnobotany, ecology or any other pertinent area of research.

Presentations are to be in English and should be 30 minutes long.

A PowerPoint projector and computer will be available during the conference.

Printed handouts will be the responsibility of the speaker.

Following the conference, a manuscript suitable for publication in the HSI Bulletin will be greatly appreciated.

Three great opportunities exist for conference attendees: Pre-conference tour in Panama and Costa Rica; the Conference itself in El Valle, Panama; and a Post-conference tour in Colombia. The fee schedule (including taxes) is summarized as follows:

	Pre Booking Before March 31, 2012 Single Rate	Double Rate		**Booking** April 1, 2012 or later Single Rate	Double Rate
Pre-conference 23-27 July	US $ 810	US $ 690		US $ 895	US $ 735
Conference 27-31 July	US $ 755	US $ 670		US $ 899	US $ 810
Extra night in Panama City	US $ 99	US $ 185		US $ 99	US $ 185
Post-conference 31 July-7 Aug	US $ 2208	US $ 2008		US $ 2475	US $ 2275

All fees will be handled by either Credit Card or Bank Transfer. Please see the Conference Registration form for details, including cancellation penalties.

One-year old Heidi Leong shows us the scale of the golden lotus banana in the garden.

Ensete lasiocarpum plants in flower

In this issue:

The specific epithet *lasiocarpum* is derived from Greek, meaning wooly, rough, hairy fruit. Indeed a name well chosen!

This is your last reminder to renew your HSI membership.
See membership categories on page 2.

HELICONIA SOCIETY INTERNATIONAL

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