Heliconias: A potential intercrop in coconut ecosystem

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Coconut gardens offer greater scope for intercropping due to the wider spacing of 7.5m, unbranched stem and compact terminal crown of leaves. Coconut palms utilize only 25% of total land area available. The unutilized soil resources and under storey sunlight in plantations can be utilized effectively by growing compatible inter crops which do not affect the growth and yield of palms. With changing life styles and increased urban affluence, floriculture has assumed a definite commercial status in recent times, particularly during the past 2-3 decades. Appreciation of the potential of commercial floriculture has resulted in the blossoming of this field into a viable agribusiness option.

In general flower crops come up well in full sunlight. Lack of open spaces is a limiting factor in humid tropics for commercial floriculture. Cut flowers such as orchids, anthuriums, selected commercial varieties of Heliconias etc perform better under shaded condition. Growing flower crops of higher market demand is a promising venture in coconut plantations. It has immense potential for attracting women and youth in agriculture and many can view it as a second income or post retirement occupation. Intercropping heliconias help in tripling the income of coconut farmers. The domestic demand for flowers is growing annually by 15-20 per cent in major cities. World trade on floriculture produces like cut flowers, ornamental plants, flowering plants, flower seeds and plantlets are gaining tremendous momentum.

Heliconias

Heliconias are newly identified cut flowers in our country and are gaining popularity year-by-year. Among the tropical flowers, Heliconia is outstanding for its diversity in form, colour, size and particularly, its vase life. Heliconia flowers are actually highly modified leaves called bracts, which may be erect, pendulous or spiraling in the shapes of bird's beaks, lobster claws or fan shaped and with colors of reds, pinks, gold, oranges and splashes of a mixture of colours. The genus is made up of about 100 species along with a large number of hybrids and cultivars. The requirement of light for growth and flowering varies from species to species. Heliconia needs to be replanted after 3-4 years.

Commerical Heliconia varieties suitable for coocnut gardens

Heliconia stricta 'Iris', *H. bihai* x *H.caribaea* 'Kawauchi', *Heliconia stricta* 'Sunrise' and *H. orthotricha* 'She', were suitable as intercrop in coconut

H. 'She'

H. 'Sunrise'

H. 'Kawauchi'

tions. A combination of varieties 'She' (Fig.1) and 'Sunrise' (Fig.2) can be planted in 1:1 ratio for year round production of inflorescences.

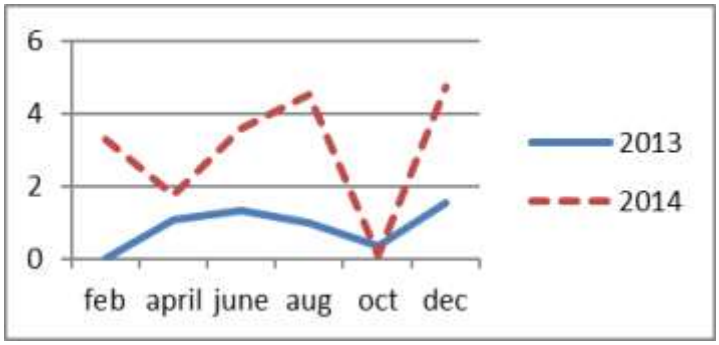

Fig. 1. Yield of *H.* 'She', inflorescences per month

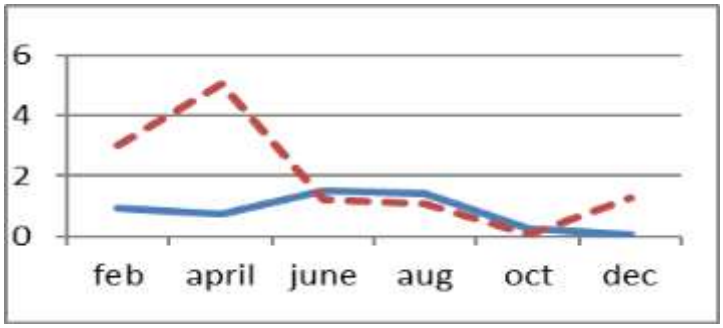

Fig. 2. Yield of *H.* 'Sunrise', inflorescences per month

In general, plantations of palms aged 8-25 years are not suitable for intercropping due to overshading. *Heliconia stircta* cv 'Iris' performs best in more than fifty percent shade. The growth and performance of *Heliconia stricta* 'Iris' was found to be positively related to shade intensity. The plants grown under 65-70 % shade produced higher number of inflorescences (100 no. $yr^{-1}clump^{-1}$) with best quality from second year of planting. The inflorescences produced have more than one meter length, 6-8 number of bracts and 9cm stem girth with higher carotenoid ($0.13mg.g^{-1}$) and xanthophyll ($0.99\ mg.g^{-1}$) contents. A single inflorescence of *Heliconia stricta* 'Iris' can fetch Rs. 20 to Rs.250 in the national market. Large flowers of more than one meter length can fetch $2 to $18 each in international markets.

Planting material

Seven months old rhizomes with more than nine centimeter collar girth can be used as planting material. After removing the leaves, rhizomes cut back at one meter height from the basal end is used as planting material.

Planting

Heliconia rhizomes are planted in pits of size 30cm x 30cm x 30cm. Planting can be done any time except winter and heavy monsoon seasons. For commercial cultivation, at least 250 plants are to be planted which requires 25 cents of coconut plantation. The rhizomes are planted at 1.5 m spacing leaving an area of 2m around the coconut basins. The pits are refilled with topsoil mixed with dried cow dung (1kg/pit) and bone meal (250g/pit). Mulching with dried leaves or coir pith is done after planting. Rhizomes start sprouting at forty five days after planting. Thinning of slender stems (less than 7cm diameter) should be carried out monthly for promoting more number of quality inflorescence.

Manuring

Heliconia can be grown both purely organic or integrating organic manures and chemical fertilizers. The manures and fertilizers are applied at quarterly intervals beginning from three months after planting. For organically grown Heliconias, 200g vermicompost and 100g neemcake are applied per plant at three months interval. For integrated method of cultivation, half the dose of vermicompost and neemcake (100g and 50 g per plant) along with 13:5:13 NPK (5g/plant) can be given at three months interval .In both the conditions, drenching diluted cow dung slurry in the ratio 1:10 at six monthly interval enhances the production of quality inflorescence.

Harvesting

Harvesting is usually done before 9am in the morning or after 4pm by cutting the rhizome along with the inflorescence at ground level. After cutting, the outer leaves are stripped off and the top most leaf blades are cut leaving the petiole.

The inflorescences have 10-12 days of vase life and are used in stage decorations, bouquet making, long arrangements etc.

Inflorescences of around one meter length and nine centimeter stem girth with 2 or more open bracts are selected for sale. Smaller inflorescences can be used for value addition such as bouquets and table top arrangements. The cut end of the inflorescences stem is dipped in tap water for about an hour in order to remove the field heat. These are then washed in water for removing soil and dust. The excess water is wiped off and inflorescences are graded based on their length. Inflorescence with fewer flowers inside the bracts are ideal for marketing as it will reduce time and cost of cleaning and minimize occurrence of insects, odours from water accumulation and organic matter deterioration.

Direct marketing

By adopting direct marketing farmer will get maximum benefit. It can either be sent directly to star hotels in major cities of India or can be used for value additions such as flower arrangements or bouquets. Bouquet making and flower arrangements are profitable value additions which can be adopted by women self help groups located in major cities.

The initial cost of cultivation is very high due to the cost of planting material which may require financial support from banks etc. The cultivation of Heliconias opens up scope for employment generation and youth empowerment through export, value addition such as bouquet making, flower arrangement, stage decoration etc. Additional labour employment of 1000 man days/ha in the first year, 1800-2000/ha in second year and 2500 man days/ha in third year is expected.

Grading of Heliconia inflorescences

Grades	Length of inflorescence (cm)	Stem girth (cm)	Spike width (cm)
Grade I	>100	>9	>25
Grade II	100-75	9-7	20-25
Grade III	<75	<7	<20

Economics of cultivation

The economics of intercropping Heliconia *stricta* cv. 'Iris' for three years in one hectare of coconut plantations is given below:

Year	Input cost (Rs.)	Returns (Rs.)		Net returns (Rs.)	Benefit cost ratio
		Inflorescence @ Rs20/-	Rhizomes @Rs.60/-		
I yr	**146750**	**24000**	**-**	**-122750**	
II yr	**255000**	**540000**	**225000**	**510000**	3:1
III yr	**400000**	**675000**	**540000**	**815000**	3:1

HSI Member Profile: Annop Ongsakul

When did you join HSI?
In 1998.

What is your profession?
I am in the tropical cut flower business. I have Sulee Nursery in Phuket, Thailand.

What is your work with Zingiberales?
I grow many kinds of Zingiberales for cut flowers. I hybridize *Curcuma* and *Globba*.

When and what was your initial attraction to Zingiberales?
Since I was young. I saw curcuma growing wild in my area and was impressed with its inflorescence.

What is your favorite in the Order?
All of them!

Have you had a special success?
I have introduced my own hybrids and varieties of Zingiberales to the cultivated plant world: 5 hybrids of *Curcuma*, 5 hybrids of *Costus*, 1 *Etlingera* and 3 *Heliconia*.

What do you hope to accomplish, or what do you see in the future of your field?
I want to continue promoting Zingiberales for cut flowers and to make them more popular in Thailand.

Below, some of Annop's *Curcuma* and *Costus* hybrids

Heliconia cultivars introduced to the commercial trade by Annop Ongsakul

H. x 'Sexy Cat'

H. chartacea 'San Rafael'

H. 'Carla Black'

Report of the HSI Awards Committee 2018

Chelsea Specht, Cornell University

Student award proposals are submitted directly to Dr. Chelsea Specht at cdspecht@cornell.edu. Five submissions were received this year, and about a dozen additional inquiries that did not result in submissions. Three of the submissions involved projects that did not include Zingiberales species or ecological systems and those submissions were not reviewed. They literally had nothing at all to do with *Heliconia* or other Zingiberalean organisms.

The award was increased to 1K as of the 2016 board meeting, and that amount is retained for the upcoming year. The increased award does seem to have attracted more applicants and will also hopefully continue to increase the quality of the completed research. Faculty continue to provide letters attesting to student status, and if a grant is submitted for greater than $1000 the students provide sources of additional funding as part of the budget.

In 2017, we supported:
Preeti – (IISIR Bhopal) a student of Vinita Gowda.
"Quantifying diversity of mating systems in Hedychium spp. from the North East of India"

Mannfred Boehm - University of British Columbia, a student of Quentin Cronk.
"Are Sicklebill hummingbirds pollinators of Heliconia?"

Laura Bizzarri - University of Connecticut, a student of Carlos Garcia-Robledo.
Hummingbird mites, hummingbirds and Zingiberales using next-generation sequencing"

These students will be contacted to determine whether they have results for the HSI Bulletin.

One proposal was funded since Jan 2018:

Santos Miquel Niño, Regional Herbarium, BioCentre / Universidad Nacional Experimental de los Llanos Ezequiel Zamora (UNELLEZ).
"Heliconias of Venezuela"

There are currently three recent submissions in review:
- Enrique Valderrama – revision of Renealmia for Flora de Colombia
- Sara-Xaali O'Reilly Berkeley – Manchester University – *Heliconia*, microbes and invertebrate community ecology
- Dusty Gannon – University of Oregon – Molecular mechanisms of pollinator recognition in *Heliconia*.