J. Indian Soc. Coastal agric. Res. 32(2): 37-41 (2014)

Performance of Heliconia-An Exotic Cut Flower Crop as Intercrop in Coconut under Coastal Climatic Conditions of Goa

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Received: 28.08.2014 Accepted: 12.12.2014

A study on the performance of twenty three heliconia types/varieties was under taken under twenty year old coconut plantation as intercrop under coastal humid conditions of Goa for three years during 2010-2013. Suckers of different varieties/types of heliconia were planted at 1.5x1.5m spacing so as to accommodate twenty five plants in four coconut trees. Analysis of variance indicated that all the traits observed differed significantly. The earliest flowering was noticed in heliconia type *Choconiana* (124 days) and *Sexy Pink* took 445 days for first flowering. Number of flowering suckers per clump was highest in Bihai (15) followed by *Lobster Claw Two* (13). Spike length was highest in *Sexy Pink* (108.15 cm) indicating its potential as cut flower followed by *Kenya Red* (67.83 cm) and *St. Vincent Red* (66.41 cm). It is concluded from the study that intercropping heliconia in coconut plantation can give an additional income in the range of Rs. 32,160 in H-4 (*Rostrata type*) to Rs. 1, 37,200 in H-6 (*Hybrid type*). The heliconia types *Golden Torch* (H-2), *Hybrid type* (H-6), *Sexy Pink* (H-8) and *Wagneriana* (H-9) recorded a total income of more than one lakh rupees by sale of flower and suckers from an area of one hectare under coconut plantation and recommended as suitable intercrop in coconut.

(***Key words**: Heliconia, Intercrop, Coconut, Coastal Area)*

Heliconias, which are native to South and Central America, are popular as ornamental plants and cut flowers because of their brilliant colours and exotic appearance. Their enhancing beauty had made them, a best landscape and as a potential cut flower (Janakiram and Pavan Kumar, 2011). The heliconias exhibit a wide array of colours led by red, pink, orange, yellow, green combined with different sizes and shapes (Goel, 2004). Due to its exotic appearance and brilliant colours, it fetches premium price in the market. Leaves of some varieties of heliconia are also sold as cut leaves for flower decoration. The genus *Heliconia* (*Heliconiaceae*) includes a number of species showing potential as commercial cut flower crops. *H. psittacorum* and some of its hybrids (*i.e.* 'Golden Torch') are particularly promising because of their attractive flowers, long straight clean peduncles, prolific year round flower production, excellent post harvest characteristics, and few pest problems. The inflorescences can be used in a manner similar to those of bird of paradise, but they are less massive and are therefore, easily incorporated into smaller floral arrangements.

Coconut is an important plantation crop in Goa next only to Cashew. It is cultivated in an area of 25,730 ha with an average yield of 5014 kg ha^{-1} translating to only 32 nuts per tree per year. In general, coconut is planted at a spacing of 8 x 8m and interspaces in majority of the coconut farms is either unutilized or underutilized. Generally various intercrops are advocated to enhance the profitability of coconut in Goa. Heliconia- an exotic introduced flower crop performs extremely well under partial shade in coastal humid conditions of Goa. Hence, a study was planned to evaluate the performance of 23 varieties/types of heliconia under coconut as an intercrop for vegetative and flower characteristics.

MATERIALS AND METHODS

The present study was undertaken in the 20 year old coconut plantation (Cv. *Benaulim*) in ICAR Research Complex for Goa, Old Goa for three years. Only the heliconia cultivars that have eye appeal, productivity, robust and healthy growth, long vase life and suitable size and shape for packing can be commercialized (Criley and Broschat, 1992). Though institute germplasm bank has got several types and varieties of heliconia, only those suitable for commercialization were selected for this particular study. The flowers of selected types were supplied to market to document the feedback from the market so as to short list the most promising heliconia types with high floral value. The study included 23 varieties (Fig. 1) of heliconias planted as intercrop

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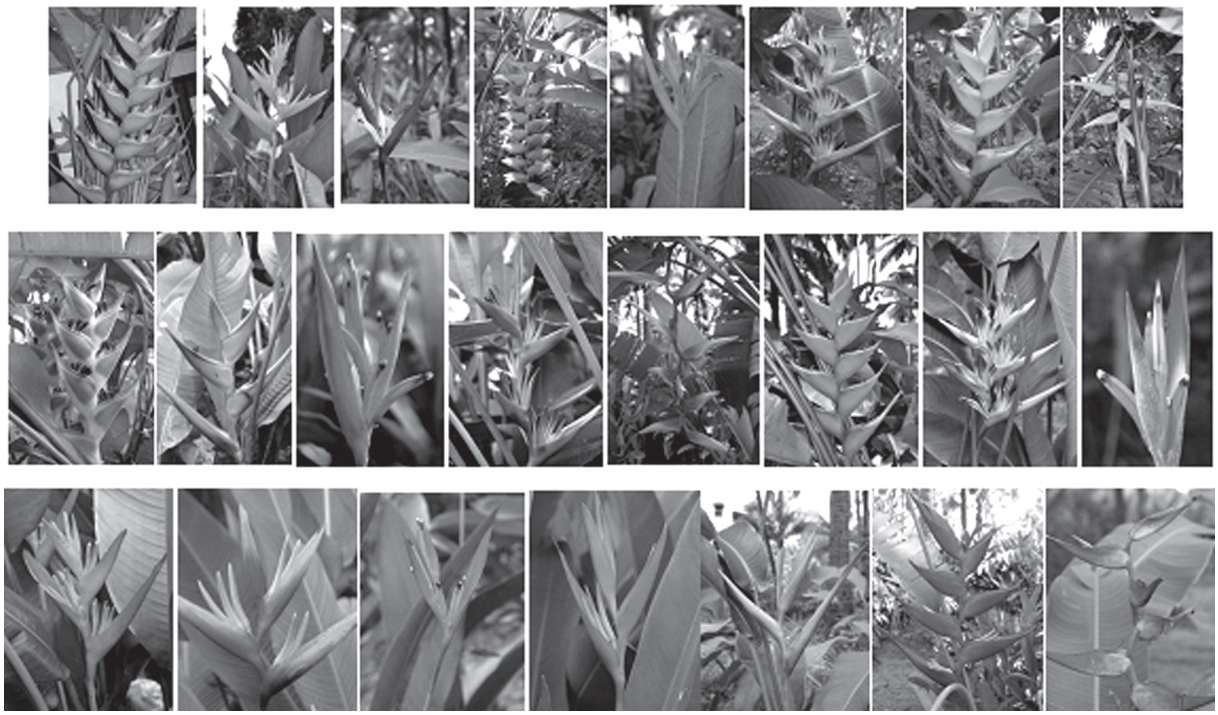

Fig. 1. Glimpse of heliconia types used in the study

in the existing coconut plantations. The study was conducted from 2010-2013 for different purpose like cut flower production, cut leaves production, suckering habit, vase life studies *etc.* The coconut spacing was 8x8m, where in 25 heliconia plants were accommodated in the interspaces of four. Initially, suckers were planted in a pit where in 250g each of NPK was thoroughly mixed in soil. Immediately after planting, the plants are watered thoroughly for better establishment. Generally, it takes about 30-45 days for the sucker to establish. Hence periodic watering is important. Various vegetative traits *viz.,* number of suckers per clump, flowering suckers per clump, leaf traits and several floral characters which are important for cut flower purpose were recorded six months and twelve months after planting and the same is presented in table 1 and 2.

RESULTS AND DISCUSSION

Vegetative characters

The data pertaining to different morphological traits are presented in Table 1. The productivity of any heliconia type depends on important characters like days to flowering, suckering habit and number of flowering suckers per clump in a year. The data indicated that the heliconia type *Choconiana* took only 123.50 days for flower initiation followed by commercial heliconia type *Golden Torch* (136.00 days). The most popular and costly heliconia type *Sexy Pink* took the maximum (444.50) days for flower initiation. Majority of the heliconia types recorded first flowering within 300 days of planting from sucker under coastal condition of Goa as intercrop in coconut. Wider variability was reported for vegetative and floral traits by Pavan Kumar *et al.,* (2011) in different heliconia types.

The suckering habit of any heliconia type decides its commercial viability as cut flower crop. The cost of planting material accounts for 50 per cent of the total cost of production. Therefore profuse suckering habit is a desirable trait in commercial cultivation of heliconia. The data for three years indicated that there was wide variation in sucker production among the heliconia types evaluated. The highest number of suckers per clump (41.09) was recorded in heliconia type *Golden Torch* followed by heliconia type *Lady Di* (37.08). Other popular heliconia types *viz., Tagami, Latispatha* and *Pedro Ortiz* recorded only 6.25, 6.25 and 6.75 suckers per clump respectively. Important cut flower type heliconias *viz., Sexy Pink, Temptress, Wagneriana etc.* also recorded medium to high sucker production per clump. Ramachandrudu and Thangam (2012) also reported high sucker production in heliconia types *viz., Golden Torch, Lady Di* and *Choconiana* under coconut plantation.

Table 1. *Performance of different heliconia types for vegetative characters*

Heliconia Types	Days to 1st flowering	No. of suckers plant^{-1} at 6 months	No. of suckers plant^{-1} at 12 months	No. of flowering suckers plant^{-1}	Leaf length (cm)	Leaf width (cm)	Leaf area (cm ^{2})	No. of leaves sucker^{-1}
Lobster Claw One	264.25	6.75	19.09	2.00	84.03	25.75	1953.57	4.60
Golden Torch	136.00	11.10	41.09	4.90	53.77	12.71	605.86	4.90
Lady Di	152.25	7.09	37.08	4.67	38.28	9.46	460.09	4.40
Rostrata type	248.25	4.00	13.34	1.69	61.53	13.88	738.64	6.05
Choconiana	123.50	10.12	35.92	3.78	89.35	9.38	297.88	4.10
Hybrid type	234.00	11.25	33.75	6.50	74.03	10.90	600.74	5.15
Lobster Claw Two	257.75	10.49	18.50	13.25	85.47	30.46	2189.57	5.42
Sexy Pink	444.50	4.76	9.50	4.00	42.79	28.20	717.13	5.25
H. wagneriana	254.00	4.75	11.75	10.25	77.05	38.42	756.60	5.58
Eden Pink	237.00	4.38	8.50	5.00	61.48	10.08	490.91	4.83
Petra Orange	284.50	11.25	18.00	10.75	50.05	14.35	565.87	4.00
Guyana	382.00	11.63	17.67	12.75	88.73	21.43	1541.07	4.75
Temptress	381.00	7.00	10.50	3.50	65.46	30.40	803.85	4.83
Bihai	411.00	13.50	20.25	14.50	99.65	28.64	2319.45	4.25
Alan Carle	385.00	9.00	17.25	6.50	86.69	22.09	1614.09	5.25
Sassy	376.00	13.75	21.25	5.75	51.88	14.08	584.55	5.50
Tropics	360.50	10.63	19.00	5.00	84.60	24.28	1756.93	5.00
Adrian	293.50	12.75	22.00	5.75	38.95	14.53	488.14	4.75
St.Vincent Red	319.25	7.88	16.25	8.75	52.90	13.13	542.72	4.50
Kenya Red	352.50	13.25	22.75	10.00	49.20	14.70	610.75	4.75
Tagami	372.50	3.13	6.25	3.00	33.20	13.40	396.16	5.25
Pedro Ortiz	309.75	3.75	6.75	3.75	79.60	36.47	1595.70	5.75
Latispatha	284.75	3.63	6.25	4.25	68.77	32.28	851.52	5.00
CD (5%)	16.05	1.91	4.65	1.43	7.92	2.36	227.53	0.74
CV	3.36	15.70	22.00	13.50	8.48	7.29	15.26	10.42

Leaf characters

Leaves of heliconia are used as backdrop material in flower arrangement, bouquet making as well as stage decorations in floriculture enterprise. Sometime, the leaves are used as substitute to *Dracaena* leaves. Hence observation of leaf characters *viz.,* leaf length, leaf width, leaf area and number of leaves produced per sucker is of paramount importance. In the present study, wide variability was noticed for different leaf traits. A leaf of lanceolate shape with medium width is highly preferred for floral decoration. Heliconia types *viz., Lobster claw one* and *two*, *Guyana, Tropics, Pedro Ortiz etc.* produced desirable quality leaves for decoration purpose. The highest number of leaves per suckers was recorded in *Rostrata* type (6.05) followed by *Pedro Ortiz* (5.75). The leaves of highly popular heliconia types *viz., Sexy Pink* and *Temptress* cannot be used since they produce only cut leaves, but their flower compensates the price among the heliconia types evaluated.

Flower characters

The ultimate aim of the present study is to find out the attractive heliconia types along with other desirable traits like productivity, eye appeal, easy packing and more shelf life. The length of spike decides the eye appeal and further usefulness for floral decoration. The data on various floral traits is presented in Table 2. Among the heliconia types evaluated, *Sexy Pink* recorded the longest spike (108.15 cm) followed by *Kenya Red* (67.83 cm). Both the types were highly preferred in the flower market for arrangement and backdrop display. Other commercial types *viz., Lobster Claw One and Two*, *Wagneriana, Temptress, Sassy, St. Vincent Red* and *Adrian* also produced an average spike length of more than 50 cm which is an ideal spike for flower

Table 2. *Performance of different heliconia types for floral characters*

Heliconia Types	Stalk length (cm)	Spike length (cm)	No. of bracts spike^{-1}	Bract length (cm)	No. of flowers bract^{-1}
Lobster Claw One	87.10	51.99	10.53	20.86	8.21
Golden Torch	66.96	18.44	5.95	17.39	22.00
Lady Di	83.28	16.01	5.80	13.21	13.80
Rostrata type	67.79	49.13	16.55	8.62	11.45
Choconiana	86.09	13.25	4.00	12.83	10.38
Hybrid type	74.46	43.01	6.13	15.09	10.25
Lobster Claw Two	85.87	60.46	10.55	12.45	10.07
Sexy Pink	153.18	108.15	14.92	23.56	10.92
H. wagneriana	69.10	44.98	8.25	19.08	15.78
Eden Pink	60.51	37.72	5.51	16.86	7.92
Petra Orange	40.44	29.98	4.13	14.54	8.86
Guyana	77.59	49.51	4.88	14.44	12.25
Temptress	80.95	55.37	11.63	17.29	9.50
Bihai	47.15	37.88	8.38	24.33	13.65
Alan Carle	64.64	48.07	7.75	18.31	18.36
Sassy	83.60	63.53	3.88	14.69	10.24
Tropics	79.54	49.84	5.22	15.62	9.64
Adrian	79.79	56.53	5.10	15.58	10.71
St.Vincent Red	90.78	66.41	4.88	12.65	9.31
Kenya Red	96.90	67.83	6.25	17.80	18.13
Tagami	48.52	34.06	4.50	11.74	9.79
Pedro Ortiz	61.62	32.40	8.00	8.85	11.63
Latispatha	53.46	27.98	7.50	11.55	7.88
CD (5%)	9.82	7.73	0.80	2.52	1.81
CV	9.22	10.62	7.92	11.18	11.14

decoration. Varying spike length for different heliconia types was earlier reported by Sheela *et al.,* (2007).

Economics of heliconia production under coconut plantation

The economics of heliconia production was worked out for ten promising heliconia types for two years. A total of 600-700 heliconia plants can be accommodated in an area of one hectare as inter crop. The economics of flower production was calculated by taking in to account of total number of flowers produced in a year and the cost of flower at farm. Among the heliconia types evaluated for flower sales, *Wagneriana* (H-9), *Sexy Pink* (H-8), *Hybrid type* (H-6) and *Golden Torch* (H-2) produced more number of flowers per hectare and fetched premium price in the market (Fig. 2). The highest income (Rs. 93, 824) per hectare was recorded in H-9 followed by H-8 (Rs. 89, 600). The heliconia type *Rostrata* recorded the lowest income due to less number of flowers and priced low among the types evaluated in the market.

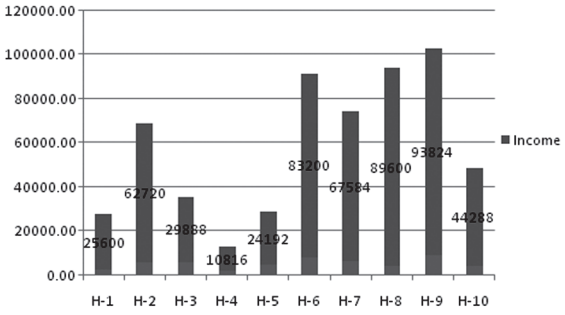

Fig. 2. Income (Rs. ha^{-1}) from heliconia cut flower sales per hectare

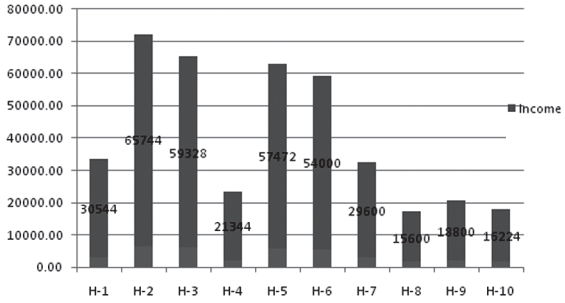

Fig. 3. Income (Rs. ha^{-1}) from sale of heliconia sucker per hectare

But in case of sucker production, the heliconia types *viz., Golden Torch* (H-2), *Lady Di* (H-3), *Choconiana* (H-5) and *Eden Pink* (H-6) produced more numbers of suckers per hectare due to their high suckering ability (Fig. 3). The highest income through the sale of suckers was recorded in *Golden Torch* (Rs.65, 744) followed by *Lady Di* (Rs.59, 328) and other types *viz., Sexy Pink* (H-8), H-9 (*Wagneriana*) and H-10 (*Eden Pink*) recorded the lowest income from sucker due to their low suckering habit under coconut plantation.

The heliconia types *Golden Torch* (H-2), *Hybrid type* (H-6), *Sexy Pink* (H-8) and *Wagneriana* (H-9) recorded a total income of more than one lakh rupees by sale of flower and suckers from an area of one hectare under coconut plantation. Hence it is recommended to grow these heliconia types for increasing the income from coconut plantation.

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