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Growth and flowering pattern of commercial heliconia varieties in coconut ecosystem

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Abstract

A field experiment was conducted at the Indian Council of Agricultural Research-Central Plantation Crop Research Institute, Regional Station, Kayamkulam, Kerala, during 2012-2016 for identifying potential commercial heliconia varieties suitable for intercropping in the coconut ecosystem. The experiment revealed that heliconia varieties *viz.,* Iris, Kawauchi, Sunrise and She are suitable as intercrops in coconut gardens. A combination of the varieties She and Sunrise can be planted in 1:1 ratio for year-round production of marketable inflorescences. Variety Iris can be planted at 1.25 x 1.25 m spacing, whereas the others require spacing of 75 x 75 m. Heliconia intercropping resulted in higher productivity of the main crop (coconut) as well. This may be due to the micro habitat's higher moisture retention, which might have resulted in the percentage reduction of fallen nuts in coconut.

Key words: Coconut (*Cocos nucifera* L.), flower, Heliconia, intercrop

Introduction

Coconut plantations 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 the total land area available. The soil resources and under storey sunlight in plantations can be utilized effectively by growing compatible intercrops that do not affect palms' growth and yield. With changing lifestyles and increased urban affluence, floriculture has assumed a definite commercial status in recent times, particularly during the past 2-3 decades. Flowers (both cut and loose) are grown in an area of 3.05 lakh ha with a production of 30.63 lakh MT (includes 23.01 lakh MT of loose flowers and 7.62 lakh MT of cut flowers during the year 2019-20 (http://nhb.gov.in). Dry flowers constitute a significant component of Indian floricultural exports amounting to nearly 60%. During the year 2018-19, India exported floricultural products worth Rs. 571.41 Crores (APEDA 2020). Appreciation of the potential of commercial floriculture has resulted in the blossoming of this field into a viable agri-business option. The majority of cut flowers, such as rose, gerbera, etc., require controlled climatic conditions for cut-flower production, whereas Heliconias are tropical ornamental crops that can even be grown under the natural micro-habitat of the coconut ecosystem (Ramachandrudu and Thangam, 2012; Nihad, 2013). The demand for ornamental Heliconias has increased, both in national and international markets, and its cultivation had become a significant factor in the agricultural economy of many countries (Jerez, 2007; Nihad *et al*., 2018). There is excellent potential for floriculture in coconut gardens, especially shade-loving Heliconias, ornamental gingers and foliage plants on a commercial scale in coastal belts of India as there is ample scope for intercropping in coconut gardens.

The economic part of Heliconia is highly modified leaves called bracts. The inflorescence in Heliconia may be erect, pendulous or spiralling in the shapes of bird's beak, lobster claws or fan-shaped and of reds, pinks, gold, oranges and splashes of a mixture of colours (Castro *et al*., 2007). Heliconias are emerging specialty cut-flower with high market demand due to their wide range of unique colours and enhanced vase life. The genus has about 250 identified species along with a large number of hybrids and cultivars. Among them, selected varieties have commercial importance fetching market prices ranging from $2 to 18 per inflorescence (HSPR Newsletter, 2003; Nihad *et al*., 2018). The requirement of light for growth and flowering varies with species (Nihad *et al*., 2019). The main criteria used by the farmers for marketing Heliconia inflorescence are the number of open bracts and the length of the inflorescence (Costa *et al*., 2006). Heliconias has two types of growth habits, *viz*., spreading and clumping. The spreading types fill and colonize quickly and are capable of covering a substantial area of land in a few years. The clumping types grow slowly and new pseudostems develop on the edge of the clump and the centre of the clump hollows out (Nihad *et al*., 2016).

In general, Heliconia flowers under a wide range of light intensity (Broschat and Svenson, 1994). However, subsequent studies revealed that the light requirement varies from species to species (Bruna and Kress, 2002). Even geographically widespread or abundant species of Heliconia can be detrimentally affected by the environmental changes associated with light intensity (Bruna *et al*., 2002). Light is an essential prerequisite factor for plant growth and development. It has long been known that photoperiodic conditions bring about the transition from vegetative to reproductive development as distinguished from conditions that influence flower buds' subsequent development (Wurr *et al*., 2000). In addition, physiologically, light has both direct and indirect effects. It affects metabolism directly through photosynthesis and indirectly in growth and development (Dai *et al*., 2009). The growth and flowering of some Heliconias such as *H. psittacorum* were known to be limited by light intensity (Broschat *et al.,* 1984). Yet, some other species appear better adapted to slightly shaded conditions and were easily injured under full sunlight in the tropics (Criley, 1995; Nihad *et al*., 2013).

In the shade loving heliconias, plant height, leaf number, leaf area, numbers of suckers, number of spikes, number of flowers/ bract and vase life were the highest in 25% shade, followed by 50% shade (Sheela, 2008). Accordingly, the research questions we proposed include whether heliconia could be successfully cultivated as an intercrop under coconut plantations? Also, our research hypothesis involves the evaluation and identification of the promising clumping type of commercial heliconias suitable for the existing coconut-based cropping system in the coastal region. Hence, this research was conducted at ICAR-Central Plantation Crops Research Institute, Regional Station, Kayamkulam Kerala, during 2012-16.

Materials and methods

The experiment was conducted for four years during 2012-2016 at ICAR-Central Plantation Crops Research Institute (Regional Station), Kayamkulam, Kerala, India (90 8' North latitude, 76030' East longitude and 3.05 m above mean sea level). The soil of the experimental site is sandy loam of the order Entisol with pH of 5.7, 0.15% organic carbon, 397.3 kg/ha of available N, 53.1 kg/ ha P2O5, 122.3 kg/ha available K,O, 0.022 % Ca, 24.6 ppm Mg, 1.12 ppm Mn, 13.4 ppm Fe, 1.39 ppm Cu and 2.2 ppm Zn. The average maximum and minimum temperature experienced during the study period (September 2012 to August 2016) were 32.43 and 24.30^{o}C, respectively. The mean evaporation was 4.28 mm/day with RH of 90.78% (FN) and 75.01% (AN). Photosynthetically Active Radiation (PAR), total illumination and total radiation of the site during the study period were estimated using Light meter Model Li-250, Li-COR serial number LMA 2505. The average values during peak hours (11 am to 2 pm) are presented in Table 1.

Table 1. Photosynthetically active radiation (PAR) of the experimental site

Parameter	Open space	nter space
PAR (μ mol $s^{-1}m^{-2}$)	1253	937
Total illumination (Wm^{-2} μA)	4981	2278
Total radiation (Wm^{-2})	13184	8068

The experiment was laid out in Randomized Block Design (RBD) with six varieties as treatment and four replications. Plots of size 4 x 4 m were taken in the interspaces of the coconut garden, planted at 7.5 x 7.5m spacing, leaving an area of two-meter radius from the base of the palms. Heliconia stumps were planted during the first week of September 2012 in beds at 1 x 1 m spacing with a plant density of 16 plants/plot. Six heliconia varieties having higher market demand and commercial value were selected for the study (Table 2). Uniform sized good quality heliconia rhizomes collected from an authorized heliconia nursery of Kerala state (Saubhagya orchid, Nalanchira, Thiruvananthapuram, Kerala, India) were used for the study.

Table 2. Details of the Heliconia varieties studied

Treatment	Name of variety	Parentage/ Species	Price per inflorescence (Rs.)	Plant stature	Inflorescence colour
V1	Iris	*Heliconia stricta*	20-40	Tall	Crimson Red
V2	Kawauchi	*H. bihai* x *H. caribaea*	35-40	Tall	Reddish Brown
V3	Sunrise	*Heliconia stricta*	30-35	Medium	Dark Red
V4	She	*H. orthotricha*	30-35	Medium	Pink
V5	Jacquini	*H. caribaea* x *H. bihai*	45-50	Tall	Yellowish Bract With Red
V6	Caribbean Red	*H. caribaea*	40-60	Tall	Red

Biometric observations were recorded considering the requirement of cut – flower industry at monthly intervals, during the study period, from the selected plants leaving the border effect and the mean values were recorded (Nihad *et al.,* 2016). The growth parameters *viz*., plant height, suckering habit, number of leaves, leaf area, collar girth and plant spread were recorded monthly. The plant spread was recorded by measuring the distance of rhizomes in North-South and East-West directions (Nihad *et al*., 2018).

Leaf area of the plants was calculated from the first fully opened leaf using the equation.

Leaf Area (cm^2) = $(1.72 + 0.35 \text{ x leaf length})^2$ (Bruna *et al*., 2002)

The flowering pattern of different varieties were recorded by counting the number of inflorescences produced per clump at bimonthly intervals during February, April, June, August, October and December for the years 2013 and 2014. The seasonal flowering pattern was estimated by counting the number of flowers produced per clump at a bimonthly interval for assessing the flowering season of the varieties. Observations on inflorescence and spike parameters were taken at quarterly intervals during the peak flowering period (February 2014) up to 24 months (January 2016) (Nihad *et al*., 2018). The yield parameters of coconut *viz*., number of leaves/palm, nuts above the size of a fist, the percentage difference between the number of nuts above fist size and mature nuts at the time of harvest of the coconut palms in the intercropped area were recorded at six-monthly intervals from September 2012 to August 2016.

Growth and yield parameters of heliconia varieties were analysed in Randomised Block Design. Growth and flowering pattern recorded at bimonthly intervals were analyzed in FRBD for assessing the seasonal growth pattern. Differences in parameters were compared using replicated measures analysis of variance (ANOVA) with respect to different varieties. Duncan's multiple range test (DMRT) was used to measure the specific differences between means.

Results

Growth parameters such as plant height, collar girth, number of suckers and leaves per clump were recorded during February, April, June, August, October and December during 2013, 2014 and 2015, respectively (Table 3). The mean value shows significant differences in growth parameters. Variety Kawauchi recorded the maximum height (375.8 cm) and collar girth (18.9 cm). Varieties Sunrise and She had medium stature (158.6cm and 121.5cm, respectively) with more leaves. Caribbean Red's variety recorded the lowest suckering habit (8) and leaf number (26).

Growth and flowering pattern: From the growth parameters (Table 4 to 10) it is evidentif that heliconia plants recorded an increased

Table 3. Growth performance of Heliconia varieties under coconut ecosystem (mean values of growth parameters were recorded in the months of Feb., April, June, Aug., Oct., Dec. during 2013, 2014 and 2015)

Treatments	Plant height (cm)	Number of suckers	Number of leaves	Collar girth (cm)
Iris	223.2	30.4	79.9	10.9
Kawauchi	375.8	19.3	56.3	18.9
Sunrise	158.6	23.1	69.5	10.1
She	121.5	21.5	65.9	7.4
Jacquini	225.9	16.4	43.1	14.5
Caribbean Red	205.1	8.1	25.9	15.5
LSD (*P*=0.05)				
Treat	6.8	1.4	3.5	0.6
Season x Treat	16.5	3.3	8.5	1.5

Table 4. Plant height (cm) of Heliconias grown under coconut ecosystem

Month Treat.	March 2014	May 2014	July 2014	September 2014	November 2014	January 2015	Treatment mean
Iris	228.9	252.9	243.5	178.9	206.5	228.6	223.2
Kawauchi	394.8	391.4	356.5	368.3	362.9	381.3	375.8
Sunrise	152.2	170.6	170.1	131.6	140.4	186.8	158.6
She	130.0	88.8	126.2	127.7	125.6	130.6	121.5
Jacquini	248.8	206.0	237.4	230.6	222.7	209.7	225.9
Caribbean Red	243.6	198.9	171.5	200.6	208.5	207.8	205.1
Monthly mean	233.0	218.1	217.5	206.3	211.1	224.1	
LSD (*P*=0.05)							
Treatment				21.99			
Season				12.05			
Season x Treatment				53.87			

Table 5. Suckering habit of heliconias grown under coconut ecosystem

Treatment	March 2014	May 2014	July 2014	September 2014	November 2014	January 2015	March 2014
Iris	23.0	33.8	27.8	31.5	31.3	35.0	30.4
Kawauchi	15.5	16.8	19.8	22.5	26.0	15.0	19.3
Sunrise	16.8	19.8	22.3	29.5	31.0	19.5	23.1
She	13.5	18.3	18.5	29.5	23.0	26.5	21.5
Jacquini	12.0	13.3	13.5	17.5	19.5	22.5	16.4
Caribbean Red	5.0	6.5	7.0	7.0	9.3	14.0	8.1
Monthly mean	14.3	18.0	18.1	22.9	23.3	22.1	
LSD (*P*=0.05)							
Treatment				3.43			
Season				2.04			
Season x Treatment				8.42			

Table.6. Leaf number of Heliconias grown under coconut ecosystem

Treatment	March 2014	May 2014	July 2014	September 2014	November 2014	January 2015	Treatment mean
Iris	81.8	61.8	72.0	82.5	83.3	98.5	79.9
Kawauchi	53.8	46.0	66.5	67.5	55.5	48.8	56.3
Sunrise	60.8	56.3	81.3	101.0	71.0	46.8	69.5
She	63.3	53.0	62.5	89.0	66.3	61.3	65.9
Jacquini	28.8	35.8	40.8	49.3	54.0	50.3	43.1
Caribbean Red	14.0	20.3	30.0	21.8	37.8	32.0	25.9
Mean	50.4	45.5	58.8	68.5	61.3	56.3	
LSD (*P*=0.05)							
Treatment				7.98			
Season				4.74			
Season x Treatment				19.55			

vegetative growth during their peak flowering period (March to November 2014 and January 2015). The maximum plant height (Table 4) was recorded in variety Kawauchi (375.8 cm) during the period and the lowest in variety She (121.5 cm). Among them, variety Iris recorded a higher number of suckers. The suckering habit (Table 5) was more during the peak flowering season and the variety Caribbean Red had a poor growth performance with a lower suckering habit. The mean number of leaves (Table 6) was recorded significantly higher in variety Iris, Sunrise, She and Kawauchi, whereas the leaf area (Table 7) was recorded the highest in Kawauchi (3561.2 cm2) followed by Iris. The variety Kawauchi recorded the highest collar girth (18.9 cm) followed by Jacquini and Caribbean Red (Table 8). The variety Iris recorded the highest plant spread in East-West (114.9 cm) and North-South (117.8 cm) directions (Table 9 and Table 10, respectively).

The flowering pattern of the varieties during 2013 (Fig. 1) and 2014 (Fig. 2) varied with variety and Iris had a peak flowering season from August to December, mid flowering season from January-March, and lean season April-May. Kawauchi had only one flowering season from August to December. Variety Sunrise had a peak flowering season from October to March and mid-season from July to September, whereas variety She had a peak flowering season from December to March, May to September. Variety Jacquini and Caribbean Red had a peak flowering season from May to November (Fig. 3).

Yield parameters: Variety Iris, Kawauchi, Sunrise and She recorded a higher number of marketable inflorescence (Fig. 4) during the reproductive phase of the crop. Varieties Jacquini and Caribbean Red were poor performers under coconut canopy with lesser production of marketable inflorescence. Caribbean Red had a longer vegetative phase with fewer numbers of inferior inflorescences with choked spikes. Kawauchi had bigger inflorescences with higher peduncle length and bract width. Even though variety She recorded lesser inflorescence length (58.2 cm), the spike characters (length and width) were superior compared to the variety Sunrise (Table 11).

Influence of intercropping on the main crop (coconut): The coconut palms in the intercropped area recorded an increased number of leaf production, number of nuts above fist size and substantial reduction in the percentage of fallen nuts (Fig. 5).

Table 7. Leaf area (cm^2) of Heliconias grown under coconut ecosystem

Treatment	March 2014	May 2014	July 2014	September 2014	November 2014	January 2015	Treatment mean
Iris	1176.9	1450.2	1553.8	1006.2	1293.1	1074.8	1259.2
Kawauchi	3096.5	3441.1	4307.2	3154.0	3595.8	3772.5	3561.2
Sunrise	612.1	416.3	712.8	557.1	501.0	602.1	566.9
She	459.6	351.8	368.3	288.5	466.9	436.8	395.3
Jacquini	1366.1	1069.9	860.0	786.8	1024.3	902.3	1001.6
Caribbean Red	1323.2	874.6	763.2	601.5	646.8	827.5	839.4
Monthly mean	1339.1	1267.3	1427.6	1065.7	1254.7	1269.3	
LSD (*P*=0.05)	Treatment=78.5		Season=50.81		Season x Treatment=192.4		

Table 8. Collar girth (cm) of Heliconias grown under coconut ecosystem

Treatment	March 2014	May 2014	July 2014	September 2014	November 2014	January 2015	Treatment mean
Iris	11.8	11.3	9.9	12.1	10.2	10.1	10.9
Kawauchi	19.3	19.2	17.7	18.5	18.9	19.6	18.9
Sunrise	10.0	10.4	9.5	12.4	9.4	9.2	10.1
She	7.1	6.8	7.1	8.5	7.9	7.2	7.4
Jacquini	14.1	14.2	14.1	16.1	14.7	13.8	14.5
Caribbean Red	15.9	14.4	14.1	19.2	15.0	14.6	15.5
Monthly mean	13.0	12.7	12.1	14.4	12.7	12.4	
LSD (*P*=0.05)	Treatment=1.24		Season=0.69		Season x Treatment=3.04		

Table 9. East-West plant spread (cm^2) of Heliconias grown under coconut ecosystem

Treatment	March 2014	May 2014	July 2014	September 2014	November 2014	January 2015	Treatment mean
Iris	118.1	107.0	106.8	119.0	112.9	126.0	114.9
Kawauchi	48.5	47.3	53.2	60.3	58.9	70.3	56.4
Sunrise	44.2	41.8	58.3	66.8	67.8	50.9	54.9
She	52.0	40.5	59.8	70.3	63.0	67.0	58.7
Jacquini	40.5	42.0	44.0	56.8	60.0	76.6	53.3
Caribbean Red	23.9	25.9	31.2	30.0	48.5	50.1	34.9
Monthly mean	54.5	50.7	58.9	67.2	68.5	73.5	
LSD (*P*=0.05)	Treatment=7.07		Season=4.33		Season x Treatment=17.32		

Table 10. North-South plant spread (cm^2) of Heliconias grown under coconut ecosystem

Treatment	March 2014	May 2014	July 2014	September 2014	November 2014	January 2015	Treatment mean
Iris	95.5	89.0	112.0	139.1	141.7	129.8	117.8
Kawauchi	38.5	51.0	47.0	54.5	60.8	65.5	52.9
Sunrise	44.2	51.5	48.2	57.3	62.5	47.0	51.8
She	40.5	50.5	48.0	61.5	65.0	66.6	55.4
Jacquini	38.3	36.8	45.8	47.6	53.8	66.0	48.0
Caribbean Red	15.5	25.3	19.8	27.6	35.3	31.8	25.9
Monthly mean	45.5	50.7	53.5	64.6	69.8	67.8	
LSD (*P*=0.05)	Treatment=10.84		Season=6.64		Season x Treatment=26.56		

Table 11. Influence of intercropping in inflorescence characters of Heliconia varieties when grown under coconut ecosystem

Variety	Inflorescence Length (cm)	Number of bracts	Peduncle length (cm)	Bract width (cm)	Spike length (cm)	Spike width (cm)
Irish Red	105.5	7.2	64.5	3.8	37.5	20.4
Kawauchi	127.0	8.4	91.0	5.0	37.2	25.3
Sunrise	81.2	4.9	58.2	4.2	23.0	19.2
She	58.2	4.5	33.5	3.0	28.6	19.5
Jacquinii	108.9	3.8	78.0	3.8	31.4	26.0
Carrebean Red	79.0	5.7	55.2	3.5	28.6	16.2
LSD (*P*=0.05)	11.9	0.9	7.5	0.2	2.8	2.3

Discussion

The growth and performance of shade-loving heliconias are affected under high sunlight conditions prevalent in the tropics (Broschat *et* al., 1984; Nihad *et al*., 2015). The length of the inflorescence stem and the number of opened bracts are the main criteria used by florists to define the inflorescence quality of heliconias (Costa *et al*., 2006). The present study indicated that the performance of heliconia varieties, namely Iris, Kawauchi, Sunrise and She were superior in the microhabitat of coconut ecosystem. These varieties recorded higher growth performance during its reproductive phase. The plant height was lesser after the flowering season as the inflorescences were harvested along with its pseudostem at the soil level. The inflorescence length was directly related to the plant height (Broschat and Svenson, 1994). Heliconia varieties with higher plant height produce longer inflorescence. The inflorescence length decides the aesthetic appeal and further usefulness for floral decoration (Thangam *et al*., 2014). In the present study *H. stricta* varieties Iris and Sunrise recorded superior peduncle length, comparable to its performance under ambient conditions (Costa *et al*., 2009).

The impact of photosynthetically active radiation (PAR) on suckering habits depends on species (Catley and Brooking, 1996) and its adaptability to the microhabitat. The suckering habit was better in Iris, Kawauchi, Sunrise and She indicating its suitability for growth under coconut canopy. Suckering habit in heliconia indicates its commercial viability as a cut flower crop. Profuse suckering habit is considered a desirable trait in the commercial cultivation of heliconia (Thangam *et al*., 2014). The number of suckers can be considered as an indicator to quantify the expected number of flower yields as the sucker production in heliconia is positively correlated with the number of inflorescences (Costa *et al*., 2006). In the present study, the number of suckers was higher during the peak flowering period, which might be due to the reduction in the period for the emergence of new suckers (Catley and Brooking, 1996). Iris recorded the highest plant spread among the varieties in north-South and East-West directions (more than 1 m). This indicates that variety Iris requires a broader spacing of 1.25 x 1.25 m when grown as an intercrop in coconut plantations. The other varieties can be grown at a lesser spacing of 75 x 75 cm.

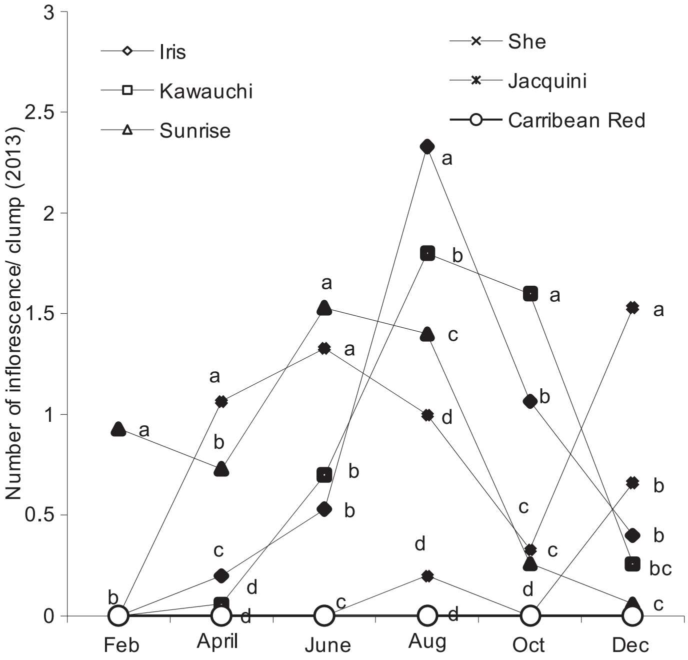

Fig. 1. Flowering pattern of Heliconia varieties (during 2013) when grown as an intercrop in coconut ecosystem

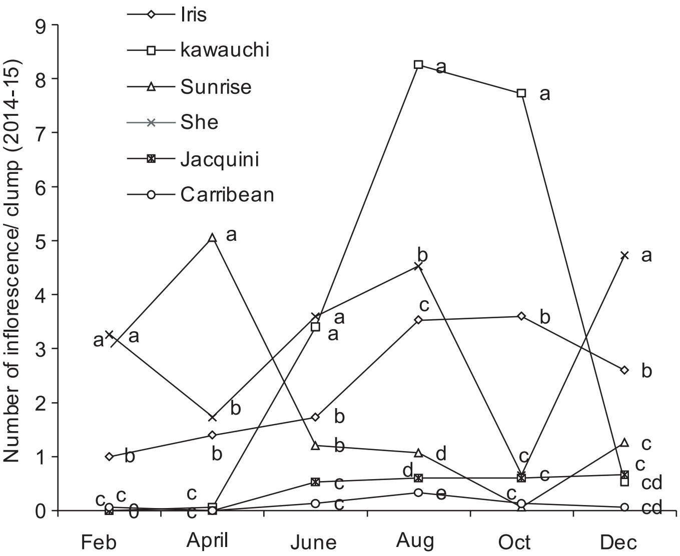

Fig. 2. Flowering pattern of Heliconia varieties (during 2014) when grown as an intercrop in coconut ecosystem.

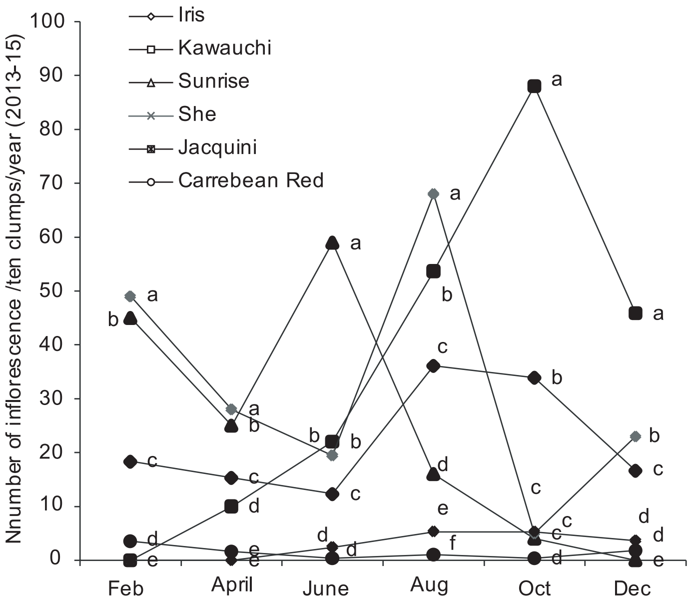

Fig. 3. Seasonal flowering pattern of Heliconia varieties when grown as an intercrop in coconut ecosystem

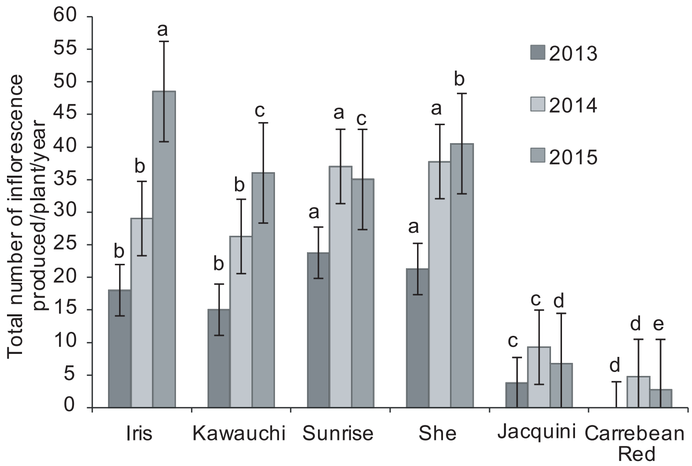

Fig. 4. Flower yield of Heliconia varieties under coconut ecosystem (number of inflorescences per clump per year).

Flowering in heliconia is controlled by photoperiod (Criley and Kawabata, 1986; Criley and Lekawatana, 1995; Sakai *et al*., 1990) and leaf number (Criley and Kawabata, 1986; Kwon, 1992). The number of leaves per shoot was an indicator to inflorescence emergence and it varied with species (Cabral and Benedetto, 2010; Rocha *et al*., 2010). The number of leaves was higher during the peak flowering season irrespective of the varieties as heliconias produces a sufficient number of leaves at the flowering time (Cabral and Benedetto, 2010). Varieties Jacquini and Caribbean Red showed an increasing trend in the number of leaves and suckers during its reproductive phase (March to January), which might be due to the increased vegetative growth and reduced flower production, resulting in the retention of more shoots per clump for a longer duration (Nihad *et* al., 2014). The delay in floral initiation would have resulted in additional development of leaves (Ferreira and Pires, 2005). A higher leaf area was observed in varieties with robust growth. The leaf area was lower in Sunrise and She, which might be due to the higher number of leaf production. The leaf area was higher before the onset of the peak flowering season, which helps the plant increase its interception of light and photosynthetic efficiency.

The rate of production of marketable inflorescences was higher in Iris, Kawauchi, Sunrise and She indicating its suitability for introducing as intercrops in coconut gardens. Variety Jacquini produced fewer marketable flowers, whereas Caribbean Red recorded a prolonged vegetative phase and produced inferior inflorescences. The quality of inflorescence is affected by abiotic stresses (Achard *et al*., 2006; Nihad *et al*., 2018), stating the suitability of the varieties under the microhabitat.

The variety Iris produces inflorescence throughout the year with a lean production during April-May. Variety Kawauchi recorded only one flowering season, which coincides with the peak market demand for cut flowers. Varieties Sunrise and She had two flowering seasons, of which a combination of these varieties planted in a 1:1 ratio assures year-round production of inflorescences (Fig. 3). The productivity and quality of heliconia inflorescences are influenced by the growing environment (Catley and Brooking, 1996), which firmly states the suitability of the particular varieties in the coconut ecosystem.

The growth of heliconias positively influenced the yield parameters of coconut palms grown in the intercropped area. There was an increase in the production of leaves and nuts. The percentage of fallen nuts was found to be reduced after the experiment. The increased yield of coconut palms was due to reduced button shedding. This might be due to increased soil moisture retention as heliconias were grown under irrigated conditions. Intensive intercropping in the interspaces of coconut makes use of the unutilised natural resources and favours the micro-niche for the growth of coconut.

Our investigation reveals that heliconia varieties, namely, Iris, Kawauchi, Sunrise and She, are suitable for cultivating as intercrop in coconut. The variety Iris produces inflorescence throughout the year, whereas Kawauchi limits its production to only one flowering season. Nevertheless, this study suggests planting varieties Sunrise and She in a 1:1 ratio to ensure the year-round harvest of quality heliconia inflorescences. Also, the scientific basis for the positive influence of heliconia intercropping over the yield attributes of coconut warrants further investigation.

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