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Research Note

Per se performance of heliconia cultivars for yield and quality under Eastern ghats

A. Sankari[1], M. Anand[2], R. Arulmozhiyan[3] and K. Kayalvizhi[4]
[1, 2]Horticultural Research Station, Tamil Nadu Agricultural University
[3]Professor (Hort), ADAC&RI, TNAU, Trichy
[4]Ph.D.Scholar, Department of Floriculture & landscaping, HC&RI,CBE
E-mail: sathatnau@yahoo.co.in

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Abstract
The experiment was conducted at Horticultural Research Station, Tamil Nadu Agricultural University, Yercaud during 2010 – 2011 with 38 Heliconia cultivars. The different types of Heliconias were collected from different sources and evaluated for their performance under Eastern Ghat. The biometric and flowering characters *viz.*, plant height(cm), plant spread in East-West and North-South direction(cm), leaf length (cm), Leaf breath (cm), number of leaves per plant, number of suckers per plant, length of spike (cm), length of stalk (cm), Girth of stalk and number of spikes /clump/year were recorded. The results indicated that, based on the height of the plant, Heliconias can be classified into three categories viz., tall types, medium types and dwarf type. Among the heliconia accessions, Parakeet, Black Cherry, Golden Torch Sunshine, Lady Di, Strawberry Cream, Alancarli, Tropics, Dwarf Jamaica, Kenya Red, Alex Red, Andromeda, Petracover, Sexy Scarlet, Sexy Pink, and Gyana are dwarf types. Princess of Darkness, Wagenariana, Indonesian Wax Ginger and Auria are tall types. H.r*ostrata*, Lataspathy, Barbados Flat, Caribean Cream, Jacqualine and Angusta are medium types. The pseudostem of all the heliconia accessions is glabrous except Shee. Dwarf types are found to be promising under sub-tropical conditions compared to Medium types and tall types. The results revealed that cv. Princess of Darkness recorded the highest plant height (6.5m), plant spread in East-West direction (2.1 m) and North-South (2.6m). The highest number of leaves was recorded in Temptress (22), maximum leaf length of 120 cm in Lobster Claw and the maximum leaf breadth in *H. bihai* Yellow dancer. Maximum sucker production was recorded in Wagenarian (24), *H. caribean* Falsh and Barbados Flat (23). Maximum stalk length was observed in Angusta (77.0 cm). It could be concluded from the present investigation that the out of 38 types of Heliconia accessions, Lady Di, Strawberry Cream. Alancarli, Tropics, Dwarf Jamaica, Kenya Red, Alex Red, Andromeda, Petracover and Gyana were identified as best performers under Eastern Gaht conditions. The year round blooming was found to be good in these best cultivars with floral quality and yield and recommended for cut flower production under Shevaroy condition of Eastern Ghats.

Key words
Per se performance, Heliconia, genotypes, Eastern Ghats

Heliconia is a popular cut flower with varied fantastic forms and rich colour. Heliconias are considered as an important member in the specialty flowers category. The recent cut flower market strategy has made Heliconias an important player in the global market. Eastern Ghats is the subtropical place of our country is blessed with conducive climatic conditions for growing Heliconias. Since the market potential is getting momentum for Heliconias, the appropriate growing conditions at Eastern Ghat is used to cultivate Heliconias in a scientific way with coupled target of bringing out quality beautiful flowers and high yield. Considering the importance of Heliconias, a study was taken up on "Evaluation of Heliconia (*Heliconia* sp. L.) genotypes suitable for Eastern Ghat". Under this study, Heliconia germplasm was raised by collecting planting materials from across the country and by adding the native cultivars also. A group of 38 genotypes of Heliconia assembled was evaluated for their acclimatization in Eastern Ghat and for consistent performance in growth and yield. In three years study, focusing the major objectives like evaluation of genotypes, identifying the longevity among the genotypes through vase life study were carried out. The results obtained from this study would be a base to develop a strong breeding programme for Heliconias and to identify the best genotypes suitable for Eastern Ghat.

The experiment was conducted at Horticultural Research Station, Tamil Nadu Agricultural University, Yercaud during 2010 – 2011 in randomized block design with two replications under open conditions..The different types of Heliconias were collected from different sources are furnished in table 1,2 and evaluated for their performance under Shevoroys. The experiment was laid out in a randomized block design with two replications. The collected accessions were planted in spacing of 90 x 90 cm. Five plants from each accessions were taken for recording observations in the he biometric and flowering characters *viz.*, plant height(cm), plant spread in East-West and North-South direction(cm), leaf length (cm), Leaf breath (cm), number of leaves per plant, number of suckers per plant, length of spike (cm), length of stalk (cm), Girth of stalk and number of spikes /clump/year. The data recorded were statistically analysed as per Panse and Sukhatme (1967).

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Per se performance is one of the important pre-requisites for selection of superior parents. In any breeding programme, it is essential to eliminate the undesirable types, which can be achieved by studying the mean performance of the genotypes. The variations among the growth parameters might be due to their diversified origin and also evolution of the particular genotype as a morphotype in their specific geographical location. This offers scope for selecting genotypes with fantastic forms, rich colour and profuse flowering with market preference Janet (2012).

The results of variance revealed significant difference for all the characters studied under the experiment, there by indicating the variability among the genotypes and high potential for crop improvement through selection. The mean performance of the varieties is presented in Table 1 and 2. A significant variation in growth was observed among the genotypes with regard to plant height, leaf length, leaf breadth, number of leaves, spike length, flower yield, number of florets per bract and vase life under Eastern Ghats conditions.

Significant differences were recorded among the genotypes for plant height. The plant height ranged from 0.80 cm to 6.5m. Maximum height (6.5m) was observed in Princess of Darkness and minimum height (0.80cm) was recorded by Petracover. According to Kress (1990), Heliconia species found in open areas achieves a larger size than those restricted to natural shade. This finding has given a positive lookout for the genotype Princess of darkness to try its habitat in open field and if it happened it is really a great advantage for the Heliconia growers. Nazia (2007) and Swarnapriya (2010) are in accordance with the findings of the present study in heliconia.

Among the 38 genotypes evaluated for identifying superior plants for the trait plant spread, 16 genotypes have shown better performance in East-West direction than the North-South direction. This might be due to exposure of the plant to more sunlight hours both in the sunrise and sunset when composed North-South direction. Despite the direction, the overall spread in all the genotypes are equally posed and produced almost a square canopy. The plant spread in East-West direction ranged from 0.6 m to 2.6 m. Maximum plant spread in EW direction (2.6m) was observed in Auria and the least plant spread (0.6 m) was observed in FireFlash and Kenya Red. The data showed highly significant differences for plant spread in North South direction and the plant spread ranged from 0.60 m to 2.8 m. The genotypes *viz.*, Auria, Barbados Flat and Princess of Darkness recorded maximum plant spread of 2.6 m and the genotype Parakeet recorded minimum plant spread of 0.6 m. The enhanced proportionate growth of Princess of Darkness both in vertical and horizontal when composed with other genotypes might be due to the genetic makeup of the genotype and species differentiation (Berry and Kress, 1991). Obviously, selection of Heliconias with good plant spread may in turn has a chance of producing more shoots or large clumps which is a favourable outcome in an evaluation trial and results are in line with Criley (1998) and Costa *et al* (2011).

The number of leaves demonstrated significant difference among genotypes for this trait. Atehortua (1998) claimed that the flowering of Heliconia might begin when a given number of leaves are present on the pseudostem which varies according to genotypes. Therefore, from a practical point of view, the number of leaves observed at the time plant growth may be a useful indicator for good producers to quantify the plants expected to bloom for market planning (Rocha *et al* (2010). From experiment results it is clearly noted that the genotype Temptress under exhibiting higher leaves (22.0) resulted with profuse flowering trait and it showed the good adaptability to Eastern Ghat conditions. The lowest number of leaves per plant (12) was observed in the genotype Fire flash. Further, a detailed monitoring of this trait for the other genotypes is required to allow the use of number of leaves as an indicator of flowering.

The data showed that the genotypes highly varied significantly with respect to the length of the leaf. The length of the leaf ranged from 25 cm to 120 cm. The genotype Lobster Claw recorded maximum leaf length (120.0 cm) and the genotype Princess of Darkness recorded minimum leaf length (18.0 cm) and that was found to be statistically on par with the genotype Marginata Luta. The genotypes showed the significant differences for the leaf breadth and it ranged from 12.0 cm to 58.0 cm. The highest leaf breadth (58.00 cm) was observed in *bihai Yellow Dancer* and the lowest leaf breadth (12.0 cm) was observed in Indonesian Wax Ginger. Leaf in different positions on the plant have a different absorption potential of sunlight for photosynthesis when exposed to different degrees of sunlight and leaf area (leaf length and breadth) will depend much on it (He *et al.* 2006). The *per se* performance shows a variation in leaf production with different length and breadth could be due to genetic character of the genotypes. These results are in line with the earlier findings of Bautista (2009) and Yursi and Tsan (2011).

The length of the flower spike is an important attribute for selection since it is used for floral decoration (Swarnapriya, 2010). The length of the flower spike ranged from 26.0 cm to 67.0 cm. The highest spike length (67.0 cm) was observed in the genotype Princess of Darkness. The lowest spike length (26.0cm) was observed in the genotype

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Caribean. Varied length was obtained in the present study as the nature of inflorescence is different from species to species and a variation of erect or pendent, composed of bracts in one plane or spirally arranged was noticed. The mean values for the length of the spike in the present study showed the genotype Princess of Drakness recorded higher values when compared with other genotypes. However the genotype developed pendant flower spike which is not suited for cut Heliconia type (Costa *et al*., 2009) but can be effectively grown as a pot plant. The length averaging more than 45 cm can be considered among the genotype during selection programme for this trait. The cultivars Parakeet, Black Cherry, Golden Torch, Alex Red, Angusta, Auria Arrawack and H.bihai Yellow Dancer recorded more than 45 cm stalk length. Most of the cultivars recorded stalk length of more than 45 cm. Higher spike length similar to the study was also observed by Pavan Kumar et al (2011) and Janet (2012) in Heliconia.

The genotypes showed significant differences for the number of spikes per clump. The data ranged from 12 to 31. The highest number of spikes per clump (31.0) was recorded by the genotype Lady Di which was found to be statistically on par with the genotype Alancarli, Andromeda which recorded 30.0 spikes per clump and the lowest number of spikes per clump (12.00) was recorded by the genotype *H. rostata.* Similarly findings were also been reported by Mitchell (2009); Gallnow *et al*.(2010) and Yursi and Tsan (2011).

Yield is a highly complex phenomenon and it depends on the factors like variety or genotypes used, light, relative humidity, growing medium and other growing conditions. Variation accounted in number of flowers per clump, an yield contributing trait was good in the genotype 'Parakeet, Petracover, Alancarli, Lady Di, Diroj, Fireflash Kenya Red, Black Cherry, Andromeda, Strawberry Cream and sexy Pink. From this current investigation, it was clearly understood that by the presence of optimum leaves in its growth phase and number of flowers per clump were having positive correlation with each other (Rocha *et al.*, 2010; Swarnapriya, 2010).

From the present investigation, it could be concluded that out of 38 types of Heliconia accessions, Lady Di, Strawberry Cream. Alancarli, Tropics, Dwarf Jamaica, Kenya Red, Alex Red, Andromeda, Petracover and Gyana performed well under Eastern Ghats conditions and also observed that year round blooming was found to be good for thes cultivars with floral quality and yield and they are recommended for cut flower production under Shevaroy condition of Eastern Ghats.

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Table 1. Performance of Heliconia accessions for vegetative characters under Eastern Ghat

Name of the cultivar/variety /accessions	Plant height (m)	East-West (cm)	North-South (cm)	Leaf length (cm)	Leaf Breadth (cm)	Number of leaves per plant	Number of suckers /plant
Parakeet	1.2	0.9	0.6	25	28	15	15
Black cherry	0.9	0.75	0.75	44	38	10	20
Golden torch	0.9	1.5	1.2	56	29	12	15
Petracover	0.8	0.7	0.8	30	28	14	16
Alex Red	1.1	0.9	0.9	36	27	16	18
Fire flash	1.2	0.6	1.1	37	22	12	14
Kenya red	1.2	0.6	1.2	58	28	17	16
Alancarli	1.1	0.75	0.9	42	25	16	16
H.raulianaia	2.4	2.0	2.1	58	40	20	18
Hot-rio-night	2.6	2.1	2.1	85	38	18	17
Shee	1.9	1.9	1.9	30	36	16	21
Bihai Pink	1.5	1.2	2.1	32	30	14	19
Iris	1.4	1.9	1.8	52	38	20	17
Oriole orange	1.1	1.4	2.1	42	37	13	18
Temptress	1.2	1.9	2.1	30	38	22	9
H.rosata	1.4	1.9	0.9	34	58	15	19
H.caribeanflash	2.6	2.1	1.9	50	40	18	23
Caribean	3.6	1.8	1.5	42	45	19	19
Tropics	1.5	0.8	0.9	48	37	14	21
Barbados flat	2.7	2.2	2.8	52	45	16	23
Angusta	1.2	0.9	2.1	62	42	15	16
Auria	2.8	2.6	2.8	58	56	13	16
H.bihai yellow dancer	4.8	1.1	1.5	48	58	18	16
Arrawack	3.6	1.5	1.6	36	42	17	17
Jacqualine	1.9	1.5	1.5	58	36	17	18
Sexy scarlet	1.2	1.2	1.5	78	28	18	20
Sexy pink	1.9	0.9	1.4	67	33	14	12
Strawberry cream	1.8	1.2	1.5	72	15	15	15
Diroj	1.4	0.9	1.6	38	18	16	20
Lady di	1.6	0.9	1.4	68	19	17	14
Andromeda	1.8	1.1	1.5	38	25	17	16
Lathyspathi	1.3	1.3	1.3	65	18	18	18
Petroortiz	2.3	1.3	1.5	75	19	19	12
Marginata luta	1.9	1.5	1.4	110	24	12	10
Lobster claw	2.5	1.3	1.6	120	20	14	18
Indonesianwax ginger	2.5	2.5	1.8	95	12	17	12
Wagenariana	5.1	1.6	1.8	19	21	19	24
Princess of darkness	6.5	2.1	2.8	18	18	18	18
SEd	0.08	0.06	0.07	3.26	1.43	0.70	0.57
Cd	0.16	0.12	0.14	6.50	2.86	1.41	1.15

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Table 2. Performance of Heliconia accessions for flower characters under Eastern ghats

Name of the cultivar/variety/accessions	Length of spike (cm)	Length of stalk (cm)	Girth of stalk (cm)	Number of spikes/clump/year
Parakeet	28	45	3.9	24
Black cherry	25	48	4.1	22
Golden torch	38	51	3.8	23
Petracover	40	42	2.4	28
Alex Red	48	46	3.1	22
Fire flash	42	50	4.3	23
Kenya red	25	25	4.0	28
Alancarli	41	36	3.4	30
H.raulianaia	44	42	3.2	19
Hot-rio-night	38	46	3.9	15
Shee	40	40	3.6	17
Bihai Pink	49	52	3.6	24
Iris	38	43	3.3	19
Oriole orange	35	50	3.4	15
Temptress	32	36	2.5	18
H. rosata	39	30	3.1	12
H. caribeanflash	37	43	2.8	19
Caribean	26	48	2.6	17
Tropics	28	46	4.1	14
Barbados flat	28	58	3.5	17
Angusta	29	67	3.6	17
Auria	36	65	3.2	17
H. bihai yellow dancer	26	58	3.5	15
Arrawack	22	63	3.5	20
Jacqualine	29	58	2.9	15
Sexy scarlet	48	70	3.5	23
Sexy pink	58	50	3.2	28
Strawberry cream	52	43	4.2	26
Diroj	50	48	2.4	25
Lady di	53	52	2.2	31
Andromeda	42	51	2.6	30
Lathyspathi	51	50	2.1	26
Petroortiz	37	40	1.6	20
Marginata luta	46	43	2.3	22
Lobster claw	39	46	2.4	19
Indonesian wax ginger	39	42	2.2	20
Wagenariana	58	67	2.2	16
Princess of darkness	67	72	2.4	18
SEd	1.55	0.88	0.11	0.95
Cd	3.10	1.75	0.21	1.90