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Original Research Article

Variability studies in 'Peacock Ginger', *Kaempferia elegans* Wall. (Zingiberaceae)

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Abstract: *Kaempferia elegans*, commonly called 'Peacock Gingers' is a plant comes under the family Zingiberaceae got wide popularity among floriculturists due to its very attractive patterned foliage and purple coloured flowers. The plant is widely adapted to tropical climate and grown all over India, Myanmar and Malaysia. The present study carried out to understand the variations of plants collected from different localities of South India. All the accessions were conserved in the Calicut University Botanical Garden, Malappuram, Kerala and same was used for variability studies. Different vegetative and floral characters are observed on maturity, analyzed and recorded. Various steps involved in domestication and different propagation methods are also discussed.

Keywords: Peacock Ginger, *Kaempferia elegans*, variability, Zingiberaceae.

Introduction

Gingers are the queen flowers of the plant world under the family Zingiberaceae with outstanding beautiful foliage and unusual flowers. About 1200 species of gingers are distributed in world and nearly 250 species are cultivated as ornamental plants. Around 200 species of gingers are present in India, of which about 60 species are ornamentals. The ornamental potential of many Indian members are yet to be exploited. Considering their ornamental value, the study in this field is inevitable. The important genera with high ornamental values are *Alpinia, Boesenbergia, Curcuma, Etlingera, Globba, Hedychium Kaempferia, Larsenianthus, Zingiber etc* (Sabu, 2006). Prabhu *et al.,* (2010), Prasanth *et al.,* (2010) and Thomas *et al.,* (2010) are the recent studies towards the domestication and development of potential ornamental gingers in India.

The genus *Kaempferia* L. includes about 70 species, and two- third of which are found in Asia and the remaining one-third in Africa (Kam, 1980). *K. elegans* Wall. is a beautiful ornamental ginger coming under this genus enjoy a special position in the botanical kingdom with their elegance in form, shape, size and enchanting colour shades. It was described as a small herbaceous perennial found commonly in Tropical countries. The plant is cultivated as ornamental ground cover because of its beautiful patterned leaf and the purple shaded flowers. The plant produces leaves and flowers during May to October and become dormant in summer months of January-April.

Materials and Methods

The live plants and rhizomes collected from South Indiawere domesticated in the Calicut University Botanical Garden (CUBG), situated at Malappuram Dist., Kerala, India at a latitude of 11^0 25'-45' and longitude of 75^0 45'-58' for further trials and experiments. Six accessions of *K. elegans* were selected for the present study and each accession was split in to 12 replications. 8" earthen round porous pots were used for domestication,. The planted material was grown in potting mixture prepared by mixing river sand, cow dung and soil in 1:1:1 ratio. The plants were grown under 50% shade provided artificially. The temperature varied from 20° to 30° C and the humidity was around 80%. The plants were irrigated regularly. The morphological and reproductive characters like plant height, leaf number, leaf length and breadth; length of inflorescence, peduncle and spike; number of flowers per inflorescence and flower size, length and breadth of calyx, corolla, labellum, stamen, anther, epigynous glands and ovary were observed on maturity and the data were recorded. The quantitative data were analyzed to study variability of characters. At the time of collection, parameters such as nature of the soil, altitude, longitude and latitude of the place, climate, rainfall, distribution of species, abundance, associated species *etc*. were noted.

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Results and Discussion

Habit and Habitat:

Kaempferia elegans is growing in almost all regions of India and neighboring countries. The species sheds off its leaves during the month of November and produces new sprouts from May onwards. The plant produces flowers profusely and sets seeds. The plant can be propagated through seeds and rhizomes.

Soil parameter of the place of the domestication:

The collected plants were grown in potting mixture, containing soil conditioners to provide the plant with nutrients, support, adequate drainage, and proper aeration. Fertilizers were also supplied on a standard basis for better growth.

Propagation methods:

Peacock ginger is propagated by rhizomes and seeds. It is vegetatively propagated by rhizomes, and both mother rhizome and split-rhizome can be used for planting. They are easy to cultivate and they are relatively resistant to disease and pests.

Study of variability:

Each accession was planted with 12 replications in Completely Randomized Design (CRD) method and they are observed regularly. Both vegetative and reproductive characters were analyzed. The plant is a rhizomatous herb, spreading on the soil, roots fleshy, strongly aromatic, aerial stem is absent. Leaves 2-5, orbicular in shape 14.8-17.9 x 9.7-11.5cm, apex acute, lower surface shining, light green turning dark, glabrous, upper surface rough, pubescent along midrib, variegated with dark brown and green alternate distinct radiating bands. The inflorescence length is 7.6-9.6cm with peduncle length 0.8-2.9cm and spike length 2.8-3.7cm. About 6-11 flowers seen in a single inflorescence, purple with a white circular patch in the centre, 6.3-7.5cm length. Bracts and bracteoles present, a range of 11-16 bracts are seen in a inflorescence, each bract subtending single flower. Calyx tubular, 1.9-2.2 x 0.5-0.6cm, slightly pubescent. Corolla 1.7-2.17 x 0.2-0.38cm, 3-lobed at the tip, acuminate and glabrous. Labellum size varies from 2.38-2.9 x 2.25-3.07cm. Staminodes 2, one lateral and one dorsal staminode; 2.06-2.6 x 1.48-2cm. Fertile stamen single 1.14-1.4, anther 0.3-0.4, dithecous, connective produced above the anther forming broad, recurved hood, white towards the base and lilac towards tip. The epigynous glands 0.33-0.59cm long. Ovary inferior, tricarpellary, syncarpous, trilocular, 0.25-0.36cm and cream coloured.

Among the 22 morphometric plant/flower characters studied biometrically, length of stamen, anther length, length of epigynous glands, length of spike, number of flowers per inflorescence, flower length, breadth of calyx, length of petals, breadth of petals, staminode length, staminode breadth, plant height, leaf number showed statistically significant variation between accessions. The plant collected from Pattambi, Palakkad Dist., Kerala showing a better growth compared with other accessions, leaves are more thick and darkly coloured with larger lamina and large anther crust.

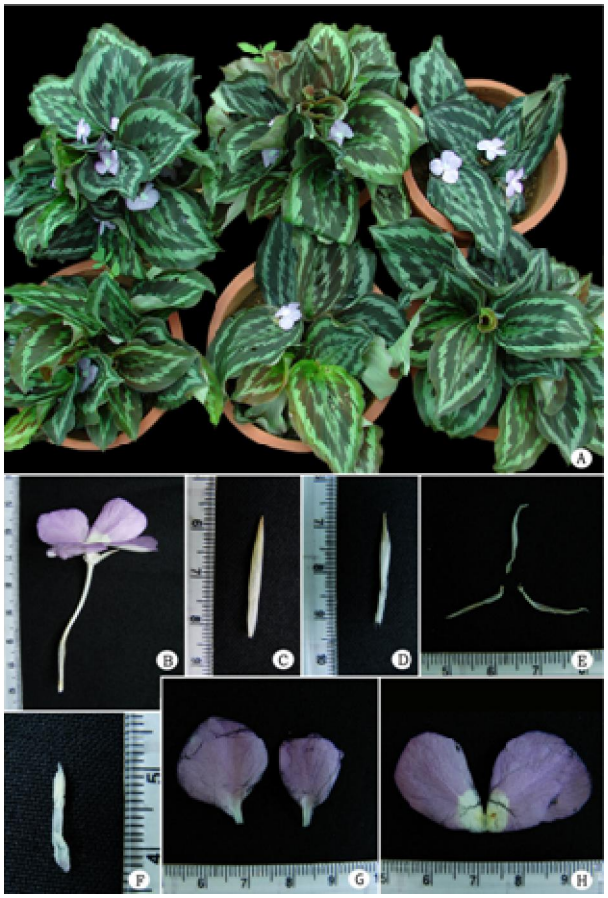

Plate.1: *Kaempferia elegans* Wall. A. Habit; B. Flower; C. Bract; D. Calyx; E. Corolla lobes; F. Stamen; G. Lateral staminodes; H. Labellum.

Selection of best performing accession:

Performance analysis showed that Accessions No. 5 (CUKEL 5, Coll. No. 94883, Pattambi, Palakkad Dist., Kerala) performed best followed by 4, 3, 6, 2 and 1. The superior accession can be selected and used for further studies and variety release protocols.

Table.1: Overall Performance Index

Accession No.	Overall Performance Index	Rank
1	17.55	VI
2	18.74	V
3	18.98	III
4	19.07	II
5	21.86	I
6	18.88	IV

Table.2: Variability studies in *Kaempferia elegans*

S. No	Character	Mean	Range	SD	CV	CD@5%
1	Plant height (cm)	17.44	13-22	4.06	23.28	3.52
2	Leaf number	3.11	2-5	1.36	43.73	0.74
3	Leaf length (cm)	15.94	15-17.9	1.18	7.40	NS
4	Leaf breadth (cm)	10.49	9.7-11.5	0.59	5.62	NS
5	Standing duration of inflorescence	26.73	30-41	5.40	20.20	NS
6	Length of peduncle (cm)	1.48	0.8-2.9	0.81	54.73	NS
7	Length of spike (cm)	2.92	2.8-3.7	0.44	15.07	0.57
8	Length of inflorescence (cm)	8.31	7.6-9.6	0.59	7.10	NS
9	Number of flowers per inflorescence	8.32	6-11	2.74	32.93	3.39
10	Flower length (cm)	6.87	6.3-7.5	0.47	6.84	0.52
11	Length of calyx (cm)	2.10	1.9-2.2	0.08	3.81	NS
12	Breadth of calyx (cm)	0.56	0.5-0.6	0.05	8.93	0.08
13	Length of petals (cm)	1.95	1.7-2.17	0.14	7.18	0.16
14	Breadth of petals (cm)	0.31	0.2-0.38	0.04	12.90	0.03
15	Labellum length (cm)	2.66	2.38-2.9	0.18	6.77	NS
16	Labellum breadth (cm)	2.74	2.25-3.07	0.25	9.12	NS
17	Staminode length (cm)	2.41	2.06-2.6	0.18	7.47	0.20
18	Staminode breadth (cm)	1.77	1.48-2	0.19	10.73	0.24
19	Length of stamen	1.26	1.14-1.4	0.13	10.31	0.08
20	Anther length (cm)	0.34	0.3-0.4	0.04	13.33	0.03
21	Length of epigynous glands (cm)	0.45	0.33-0.59	0.08	17.78	0.05
22	Length of ovary (cm)	0.29	0.25-0.36	0.02	6.90	NS

Conclusion

Peacock ginger is a very good ornamental crop for our garden as a nice ground cover and good indoor plant. The attractive feather pattern on the leaves is very attractive and lasts throughout the season. Based upon the Overall Performance Index, the better accession (Acc. No. 5) has been selected for future studies and the plantlets were supplied to societies and local peoples for the popularization of this species.

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