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VEGETATIVE PROPAGATION OF *HITCHENIA CAREYANA* BENTH. (ZINGIBERACEAE) THROUGH STEM CUTTINGS

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ABSTRACT

Hitchenia careyana Benth. (Zingiberaceae) is one of the rare wild gingers having good potential ornamental value. They are poorly cultivated in the gardens because of the limited availability of planting materials. A new technique for its vegetative propagation using stem cuttings is standardized for the rapid multiplication of this plant (first of its kind in the family Zingiberaceae). Single noded stem cuttings were sprouted in a medium of clean river sand and hardened in poly bags filled with a mixture of soil, sand and cow dung in equal ratio. Stem cuttings showed high rate of sprouting (98%) and the plantlets survived well in the soil.

Key words: *Hitchenia careyana*, Ornamental ginger, propagation, stem cuttings, Zingiberaceae.

INTRODUCTION

Many Zingiberaceae members like *Alpinia purpurata* (Pink ginger), *Curcuma* spp. (Hidden or Surprise ginger) *Etilingera elatior* (Torch ginger), *Hedychium* spp. (Butterfly gingers) etc. are cultivated as cut flower crops and ornamental plants. *Hitchenia careyana* (Praying mantis ginger) is an under exploited wild ginger having good potential as a cut flower and an ornamental plant. Initial studies proved that it is a promising plant for domestication as it is adaptable for a wide range of climate.

The genus *Hitchenia* is represented by 3 species, in which 2 are present in India. Among them, *H. caulina* (Garah.) Baker is endemic to Peninsular India and commonly known as Indian arrowroot used for paper making and rhizomes for the extraction of arrowroot. *H. careyana* is mainly distributed in the forest areas of North-East India and also seen extended to South-Eastwards (Jain & Prakash, 1995).

The plant is a rhizomatous perennial herb, almost reaching a height of 2-3 m. It produces a number of tillers from the rhizome and forms a clump within a year. Leaves are large, sub sessile with shining, glossy upper side. The spikes are produced at the tip of the

aerial stem. The size of the spike varies from 12-25 cm with many recurved bracts arranged spirally on a stalk. The bracts are green with white margin and fused to form a pouch. Each bract subtends 3-7 flowers. The flowers are purple to violet and resemble a 'praying mantis'. The flowers open from base to top of the inflorescence with 2-6 numbers in a day, which will continue for 10-15 days.

The cultivation practices of *Hitchenia* are similar to that of other ornamental ginger. It can be grown at garden in pits of 60 x 45x 45 cm filled with soil and farm yard manure in 3:1 ratio or in large pots filled with soil, sand and cow dung in equal ratio. The plant loves filtered sunlight and well-drained soil rich in organic matter.

The field surveys conducted for ginger, *H. careyana* could be found only in isolated patches in evergreen forests. The restricted distribution in few clumps may be probably due to the absence of seed setting. The deforestation activities in North-East India especially Jhum cultivation which eradicate vast area of vegetation is a threat to plants like *Hitchenia*. Therefore *ex situ* conservation measures has prime importance for the existence of such ginger. Domestication and popularization will surely enrich its population.

Praying mantis ginger can be propagated by means of suckers/rhizomes like other ginger. But the number of plantlets produced in a year is limited. It can also be propagated by bulbils arise from the base of inflorescence but it is seasonal and limited in availability. The demand for planting material cannot be fulfilled only by these conventional methods. The present study is an attempt for rapid multiplication of *H. careyana* using stem cuttings.

MATERIALS AND METHODS

The propagation trial was conducted using the *H. careyana* accessions collected from Nagaland maintained in Calicut University Botanic Garden. Selected tillers were cut from healthy mother plant using a garden secature and the leaves were peeled off with sheaths to expose the stem with nodes. Tillers of different age including flowered and non-flowered tillers were used for the collection of stem cuttings. The stems were cut into pieces of 8-12 cm in a way that each cutting possesses one node at the middle. Generally 4-10 cuttings were obtained from a tiller based on the size and vigour.

Prepared cuttings were placed horizontally in plastic trays (30x30x6 cm) having drainage holes filled with clean river sand and covered with a thin layer of sand (2-3 cm deep). Cuttings were kept 3-4 cm apart without touching each other. A total number of 50 cuttings were sowed to determine the percentage of sprouting. The trays were maintained under shade net, irrigated regularly to keep sufficient moisture. Cuttings were observed frequently at an interval of 15 days by careful removal of the covered sand. Well-sprouted cuttings were carefully pulled out from the sand without damaging the roots and transplanted to poly bags filled with 1:1:1 mixture of soil, sand and well dried cow dung. The propagation trial was repeated in different seasons.

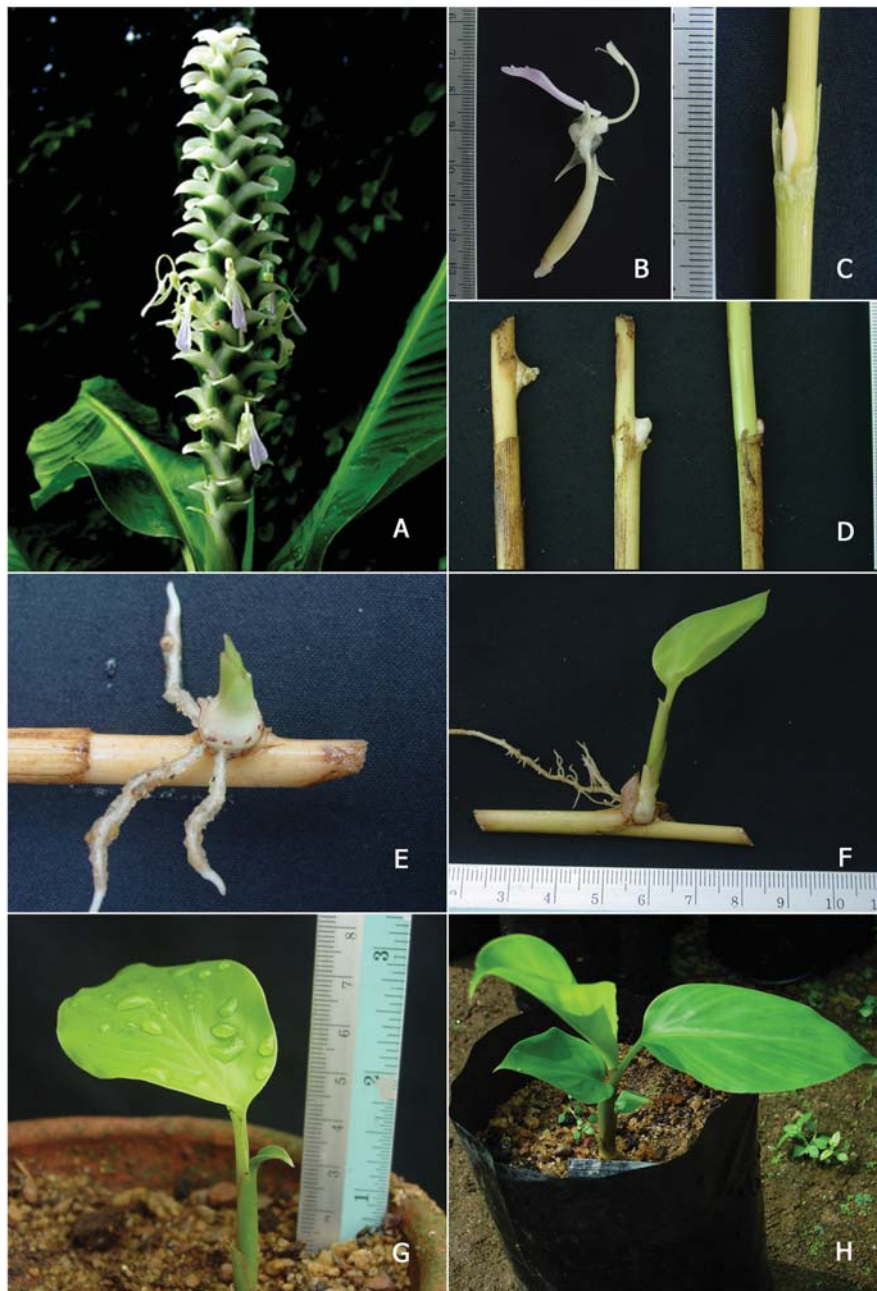


Plate 1. *Hitchenia careyana*: A. Inflorescence; B. Flower; C. Single node cutting after removal of leaf sheaths; D. Initiation of nodal buds after 15 days; E. Development of roots and buds after 30 days; F. Developing bud after 45 days; G. Developing plantlet after 60 days; H. Plantlet after 90 days.

RESULTS AND DISCUSSIONS

Nodal buds of the cuttings protrude within few days and showed sign of sprouting within 15 days after sowing. It produced 2-3 primary roots within 30 days and the first leaf and secondary roots gradually appeared in most of the cuttings within 45 days. The sprouted cuttings transplanted at this stage to potting mixture survived well and became ready for field planting within 3 months. The propagation was successful throughout the year.

Stem cutting propagation is not employed in Zingiberaceae members due to the absence of true stem and it is propagated by means of rhizomes, which is a modified underground stem. Most of the genera have pseudostem made of leaf sheaths. True aerial stem with nodes and internodes are present in genera such as *Alpinia*, *Amomum*, *Elettaria*, *Globba*, *Hedychium* and *Zingiber* (Sabu, 2006). The successful sprouting of stem cuttings in *H. careyana* is due to the presence of stem with active nodal buds.

Stem cutting propagation has a number of advantages over conventional methods. It is less expensive which do not need much technical skill and there is high rate of success (98%). Applying this simple technique more number of plantlets can be produced from a mother plant than that of rhizome propagation. Stem cuttings are easy to transport for long distances than rhizomes due to smaller size and low mortality rate. The plantlets produced through stem cuttings are also convenient for transportation because of smaller size. The cuttings during sprouting stage can be used as propagule for mutation treatments to induce variability. Further studies are needed to evaluate this method in other gingers having true stem.

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