



Short communication

Interspecific hybrid developed in *Epidendrum* orchid from the cross *E. radicans* Pav. ex. Lindl. x *E. xanthinum* Lindl.

R. Devadas, R.P. Medhi and S.P. Das

NRC for Orchids, ICAR, Pakyong, Sikkim-737 016, India

E-mail: r.devdas@gmail.com

ABSTRACT

An interspecific *Epidendrum* hybrid was developed using *E. radicans* (known as 'fire star orchid', 'ground-rooted orchid') as female parent and *E. xanthinum* known as 'yellow orchid' as male parent. The selected line (NRCO-Epidendrum cross/2005-01) was characterized for morphological and floral traits. Flower size (3.5 cm x 3.4 cm) of selected line was bigger than both parents, with bright saffron-orange colour (RHS 44A). Dorsal sepal size (1.8 cm x 0.6 cm), lateral sepal size (1.9 cm x 0.7 cm), petal size (1.8 cm x 0.6 cm), lip size (2.3 cm x 2 cm) and column size (1.1 cm x 0.2 cm) were bigger than in parents. Shape and fimbriated side lobes of lip with deep cleft of anterior margins was similar to the male parent (*E. xanthinum*), except colour. The F₁ progeny of 'NRCO-Epidendrum cross/2005-01' flowered with different red-orange to yellow shades is categorized broadly into three types: Red-orange, Orange-yellow and Yellow. Epidendrums are popularly known as 'Crucifix orchid' and 'Poor man's orchid', have a long flowering period with 2-3 flowerings in a year, and are easy to multiply. These attributes are ideal for popularizing this plant in India as a potted plant as well garden plant.

Key words: Epidendrum hybrids, interspecific hybridization, epiphytes, fimbriated lip, clefted anterior lobe

The genus *Epidendrum* was named so by Carolus Linnaeus in the year 1763, referring to its epiphytic growth habit (meaning derived from the Greek words, *Epi-*"on" and *dendron-*"tree"). *Epidendrum* is often considered a mega-genus consisting of around 1500 species from the neotropical. origin (Hagsater and Arenas, 2005), similar to the genus *Dendrobium* from the old world tropical origin Asia and largely spreading from Carolina, North Louisiana to South Argentina, Mexico, throughout West Indies, Andes and Brazil. However, many species synonymous with *Epidendrum* have been segregated out and resurrected into more than seventeen genera. These species are generally characterized by their reed-stem, growing like tufts, floriferous, bearing flowers with free and spreading sepals, slit rostellum, fringed lip adnate to the column with colour ranging from white, red, orange, green to yellow. This genus, exceptionally, also consists of a few terrestrials and lithophytes by habitat. Epidendrums are popularly called 'Crucifix orchid' and also 'Poor man's orchid', as they are one of the easiest growing orchids and need little attention, unlike the popular *Cymbidium* and *Phalaenopsis* hybrids.

Need for interspecific hybrids in Epidendrum orchids:

Orchid breeding is carried out mainly by commercial firms and is still in its infancy in India. Acclimatization and

introductions do not suffice for improving plant wealth in India (Randhawa and Mukhopadhyaya, 1986). Epidendrums are easy to multiply, have a long flowering period with 2-3 flowering spells in a year, suited to tropical & sub-tropical conditions. These attributes are ideal for popularizing these orchids in India as potted garden plants. Synthesis of hybrids using rare and endangered species for commercial purposes will reduce the pressure on their wild relatives (Kishor and Sharma, 2009). Orchids can also be introduced from other countries for commercial use for developing hybrids, as there is no restriction on this at present as per 'Convention on International Trade in Endangered of Wild Flora and Fauna' (CITES).

Variability in commercial *Epidendrum* varieties is very low. With an objective to create variability, hybridization was carried out using *E. radicans* Pav. ex. Lindl. and *E. xanthinum* Lindl. as parents, in 1999-2000. The exact origin and collection details of these species were not recorded at this center and there are no scientific reports on introduction of these species in to India, except for a report on *E. radicans* as an alien species by Rao and Mohanan (1983). This species, *E. radicans*, is grown for cut flower and as a potted plant (Teob, 1989). Hence, attempts have been made

earlier to develop an efficient micropropagation method (Chen *et al.*, 2002).

Hybridization and *in-vitro* programme:

Epidendrum radicans, popularly known as the 'fire star orchid' and 'ground-root' orchid, was used as the female parent (Fig. 1) and *E. xanthinum* (Syn. *E. secundum*, now called *E. ellipticum* var. *flavum* Lindl.) (Fig. 2) known as the yellow orchid, was used as the male parent. Hybridization was done by emasculating flowers of the female parent by removing the anther cap and pollinia (that are four in number, with two clusters). Then, fresh pollinia collected from the male parent were attached to the stigma of the column for pollination. Even though the stigmatic surface is highly sticky pollen bags were used for covering the inflorescence to avoid cross pollination by insects. Flower colour turned dark and the floral lip dried up in 3-4 days, when pollination was successful. Mature, ellipsoid capsules harvested at 4-5 months. Seedlings were raised *in-vitro* from seeds contained in capsules, and, flowering was observed after two years planting. Observations on flower colour variations among the progeny and clones selected are described below and presented in Table 1. Morphological characters were recorded at the full bloom



Fig 1. Flower of *Epidendrum radicans*



Fig 2. Flower of *Epidendrum xanthinum*



Fig 3. Flower of NRCO-*Epidendrum* cross-2005-01

stage and colour of flowers was recorded with the help of 'Royal Horticultural Society colour chart'.

Description of selected F₁ progeny of 'NRCO-Epidendrum cross/2005-01':

The F₁ progeny of 'NRCO-Epidendrum cross/2005' has flowers of red-orange to yellow shades (Fig. 3). Flower colour variation was categorized broadly into three types: Red-orange, Orange-yellow and Yellow (Fig 6 & 7). The data of the selected F₁ line (NRCO-Epidendrum cross/2005-01) along with its parents are presented in Table 1. Flower size (3.5 cm x 3.4 cm) of selected line was larger than in both parents, with bright saffron-orange colour (RHS 44A). Floral characters like dorsal sepal size (1.8 cm x 0.6 cm), lateral sepal size (1.9 cm x 0.7 cm), petal size (1.8 cm x 0.6 cm), lip size (2.3 cm x 2 cm) and column size (1.1 cm x 0.2 cm) were relatively larger than in either parent, except the width of the dorsal sepal and petal. However, the shape and fimbriated side lobes of the lip and deep cleft of the anterior margins of selected F₁ line were similar to that of the male parent (*E. xanthinum*) excepting colour. Flower colour of the F₁ selected line fell in between colour of the female parent (*E. radicans*) with orange (RHS 28A/25A) and red colour (RHS 53B) being that of the male parent (*E. xanthinum*). The mid lobe and disc colour of F₁ hybrid line was similar to that of the female parent with yellow colour (RHS N25D). But, in the male parent, the disc was of the same colour as sepals and petals, except the colour of crested teeth. In the selected line and *E. radicans*, inflorescence was observed to be a corymbose racemose (Fig. 4) and flowers were closely paniculated, whereas in *E. xanthinum*, the peduncle was as long as the stem recurving and pendulous with sparse flowers (Fig. 5).



Fig 4. Corymbose racemose inflorescence of *Epidendrum radicans*

A hybrid, *E. xobrienianum* (natural cross), derived from *E. evectum* x *E. radicans* reported by John Veich and Sons, (1884-1894) has been recognized by the Royal Horticultural Society, UK, an internationally recognized orchid registration authority. But, *E. evectum*, shown as *E.*



Fig 5. Inflorescence of *Epidendrum xanthinum*

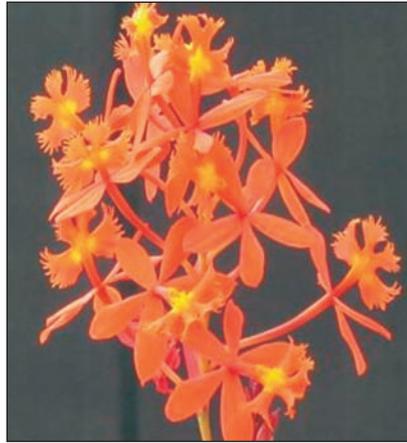


Fig 6. Inflorescence of NRCO-*Epidendrum cross-2005-01*



Fig 7. Flower colour variation among F_1 progeny of NRCO-*Epidendrum cross-2005* (From right: 1-Maroon-red group, 2 & 3-Orange group, 4-Yellow group)

Table 1. Morphological characters* of *E. radicans*, *E. xanthinum* and their hybrid (selected clone)

<i>E. radicans</i> (Female parent)	
Plant	Height : 24-58 cm, Leaves : green, flat & concave, 6-11, 11 cm x 2.7 cm, ovate-oblong, acute-emarginate, less pigmented
Flower	Peduncle: slender, terminating into corymbose racemose inflorescence, pedicel straight, yellow in colour; Flowers: 20-25, size 3.4 x 3.15 cm, resupinate, Dorsal sepal: 1.8 x 0.65 cm, orange (RHS 28A/25A), Lateral sepals : orange (RHS 28A/25A), 1.75 x 0.68 cm, Petals – smaller than sepals, 1.3 x 0.7 cm, orange; Lip : 3 lobed, 1.8 x 1.6 cm, yellow (RHS N25D), side lobes fimbriated & slightly darker at margins, mid lobe disc crested with 03 bright yellow teeth, anterior lobe moderately clefted, Column : short, 2 auricles, semi-terete, 0.8 x 0.2 cm, Anthers : 4, yellow & cap yellowish green
<i>E. xanthinum</i> (Male parent)	
Plant	Height 41:74 cm; Leaves : medium green, 8-12, 8.7 cm x 2.6 cm, oblong-lanceolate, obtuse tip
Flower	Peduncle : as long as the stem, curving, terminating into curving and pendulous racemose & loosely paniculated, Flowers: 13-15, size 3.5 x 3.3 cm, red (RHS 46B), Dorsal sepal: 1.8 x 0.6 cm, red (RHS 46B); Lateral sepals: 1.6 x 0.6 cm, red (RHS 46B); Petals : 1.6 x 0.8 cm, red (RHS 53B); Lip : 1.9 x 1.8 cm, flat, 3 lobed, side lobes deeply fimbriated & red, mid lobe crested with 03 bright prominent bright yellow teeth, anterior lobe deeply clefted & reflexed; Column : moderately long, 0.9 x 0.2 cm; Anthers : 4, yellow & cap yellowish green
NRCO-Epidendrum cross/2005-01	
Plant	Height: 32-51 cm; Leaves : 9.2 cm x 2.4 cm, dark green colour, more pigmented, ovate oblong, acute-emarginate,
Flower	Peduncle: slender, terminating into corymbose racemose inflorescence (Fig. 6), pedicel straight, yellow colour; Flowers: 15-23, size 3.5 x 3.4 cm, resupinate; Dorsal sepal-1.8 x 0.6 cm, orange (RHS 44A); Lateral sepals : 1.9 x 0.7 cm, orange (RHS 44A); Petals : smaller than sepals, 1.8 x 0.6 cm, orange (RHS 44A); Lip : 3 lobed, 2.3 x 2 cm, orange (RHS 44A), side lobes tripartite, fimbriated & colour similar to sepal colour, mid lobe disc yellow (RHS N25D) crested with 03 bright yellow teeth, anterior lobe deeply clefted; Column : long with auricles, semi-terete, 1.1 x 0.2 cm, darker orange (RHS 47 B); Anthers: – 4, yellow & cap yellowish green

* at the time of flowering and based on two years' data (2005-06 & 2008-09)

jamiesonis, is a synonym for the former (RHS, UK). However, Epidendrum hybrids developed through systematic breeding were not reported after this and efforts in this direction are lacking. Hence, this new line developed by us can be useful as germplasm stock, and further improvement can be made through mutation breeding, introgression and by hybridization with its close relatives like *Cattleya*, *Oncidium* etc.

ACKNOWLEDGEMENT

The authors thank Ms. Geetamani Chhetri, Technical Person (under 'DUS Testing on Orchids') and Shri. K.B. Gupta (NRC for Orchids, Sikkim) for field assistance.

REFERENCES

- Chen, L.R., Chen, J.T. and Chang, W.C. 2002. Efficient production of protocorm like bodies and plant regeneration from flower stalk explants of the sympodial orchid *Epidendrum radicans*. *In Vitro Cell. Dev. Biol. Plant.*, **38**: 441-445
- James Veitch & Sons (1887-1994) A manual of Orchidaceous plants cultivated under glass in Great Britain, Part VI Coeloglyne and Epidendrum. James Veitch & Sons, Royal Exotic Nursery, 544, King's Raod, Chulesa, S.W.
- Kishor, R. and Sharma, G.J. 2009. Intergeneric hybrid of two rare and endangered orchids, *Renanthera imschootiana* Rolfe and *Vanda coerulea* Griff. Ex (Orchidaceae): Synthesis and characterization. *Euphytica*, **165**:247-256 (DOI 10.1007/s10681-008-9755-9)
- Hagsater, E. and Arenas, M.A.S. 2005. Epidendrum. In: Genera Orchidaceum. Pridgeon A M, Cribb P, Chase M.W. and Rasmussen (eds). V. 4. Oxford University Press, Oxford, pp 236-251
- Rao, A.V.N. and Mohanan, M. 1983. Alien Orchids in South India. 1. Cultivation of Epidendrum-Radicans in the National Orchidarium, Yercaud, TamilNadu, India. *J. Econ. Taxon. Bot.*, **4**:343-346
- Royal Horticultural Society, United Kingdom (<http://www.rhs.org.uk/plants/registerpages/orchiddetails.asp?ID=126444>)
- Teoh, E.S. 1989. Orchids of Asia. Times Books International Publishers, Singapore.

(MS Received 22 September 2009, Revised 8 September 2010)