7*x* was facultative while the 11*x* was an obligate aposporous. Their parents (GGPS 8*x* – 1 and 3/29/2) were also facultative and thus believed to carry genetic information for both apomictic as well as sexual modes of reproduction. Segregation of genes determining mode of reproduction in progenies may be the cause of this variation. Apomixis and its components are under genetic control[4]. It may be noted that all the pedigree discussed here (6*x*, 8*x*, 7*x* and 11*x*) had a common 4*x* ancestor (IG 04-164). This plant had very high B_{III} forming capacity which was utilized to generate 6*x* (3/29/2) and 8*x* (GGPS 8*x* – 1) cytotypes[3]. In fact, GGPS 7*x* – 1 and GGPS 11*x* – 1 represent backcross derivatives of IG 04-164. It may be observed that high B_{III} forming capacity from IG 04-164 was inherited to subsequent generations, i.e. 3/29/2 and GGPS 8*x* – 1 (refs 3 and 6). Formation of B_{III} hybrids is explained by uncoupling events between the two apomixis components, viz. apomeiosis and parthenogenesis. This resulted in loss of parthenogenetic capacity of the egg cell, and hence required fertilization of the (unreduced) egg cell for development (zygotic embryogenesis). Such hybrids with 3*n* constitution are resources for adding monoploid genomes[12], manipulating ploidies[13] as well as identification of genes modulating in response to change in ploidy and mode of reproduction[5,8,14].

Guinea grass is a model system for both apomixis and polyploidy research. It has shown a high flexibility to tolerate a great range of ploidies (3*x* to 11*x*) and chromosome numbers (2*n* = 24 to 88)[3,15,16]. Being perennial and vegetatively propagated, all these plants representing various ploidies can be easily maintained and simultaneously analysed. Similarly, this crop has demonstrated 'elasticity' in tolerating modifications in typical seed development patterns, especially the deviations from two maternal: one paternal genome ratios in the endosperm. Suitably enriched ploidy series, as reported in the present study in guinea grass, offers a system to understand this mechanism, especially in view of ploidy-dependent modifications in traits as well as evolution of polyploids. Nonetheless, it would be more interesting to generate higher ploidies following the same approach.

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Artificial pollination of Dove Orchid (*Peristeria elata* Hook.) in India for multiplication

The Neotropical orchid genus *Peristeria* Hook. includes seven species distributed from Costa Rica in Central America to the Amazonia, lowlands of Bolivia and Brazil (South America)[1]. Among these is *Peristeria elata* Hook., better known as Dove Orchid or Holy Ghost orchid, a native of Costa Rica, Panama, Venezuela and Colombia[2]. For over a century this species has been under cultivation in Kerala, southern India for its strikingly beautiful dove-shaped flowers which are also uniquely fragrant. Kumaranasan (1873–1924), one of the modern poets and social reformers of Kerala wrote a poem on this orchid which was published in the Malayalam magazine *Athmaposhini* in 1916. What enchanted the poet was the little dove look-alike, formed by the column and the lip, inside the flower and the ethereal fragrance. He called it '*Kapothapushpam*' ('*Kapotham*' in Malayalam means a dove and 'pushpam', a flower) reminiscent of the dove-shaped interior of the flower.

In its home country *P. elata* Hook. is called Dove Orchid due to the apparition of a dove formed by the beaked anther, column and the lip, all of which together constitute a dove in flight. The resemblance is so striking that the natives of Panama and the Spaniards call this 'El Spirito Sancto', or flower of the 'Holy Ghost'[3]. The plants are found at low to medium elevation under shaded conditions on the margins of grasslands and on rocky outcrops in the forest[4]. Though once common in the native country, this species has now become rare obviously due to over collection[5].

When this species is in bloom in South India, especially in the garden of our

Figure 1. ***a***, Kumaranasan; ***b***, Dove Orchid.

Figure 2. ***a***, Flowers of Dove Orchid; ***b***, Kumaranasan's poem 'Dove Orchid'; ***c***, Fruits of artificial pollination burst releasing dust-like seeds; ***d***, Seedlings of Dove Orchid in culture flask.

Institute during June–October, several visitors enjoy the beauty of the flowers and the unique perfume, which smells like pure 1,8-cineol[6]. A detailed study of the chemistry of the volatile constituents of the flowers of *P. elata* revealed the identity of more than 30 compounds[7]. Of these, 1,8-cineole, phenol, 2-phenyl ethanol and 2-phenylethyl acetate are considered the main compounds for the fragrance. In its home country, the flowers attract as many as 16 species of euglossine bees[8], while *Eufriesea concava* is the actual pollinator of *P. elata*[9]. Euglossine bees, also known as orchid bees, belong to the tribe Euglossinae. It has about 200 species in five genera and is mostly neotropical in distribution, except one which is also found in the US[10]. Natural fruit setting is not possible in India due to the absence of the specific pollinator. Vegetative multiplication through splitting of pseudobulbs is easy but slow and the demand for Dove Orchid increased during each flowering. Hence we resorted to artificial pollination.

Plants used for the present study were grown in the orchidarium of JNTBGRI. More than 20 plants in bloom were used for the experiments. About 100 pollinations were conducted during a period of three months. A single pollinium or a part of it was used for pollination. The pollinium was pushed inside through the small horizontal opening leading to the stigma. The receptivity of stigma and pollen viability were estimated after several pollination trials. The stigma was found receptive in the first three days of flower opening. Pollinia were viable for a period of 10 days. One-month-old refrigerated pollinia also responded positively. The optimum maturity of the capsule for green pod culture was determined after testing a series of capsules harvested at different times ranging from 90 to 190 days. It was found that the capsules with 150–160 days of maturity were ideal for maximum germination.

The mature seeds were dusted in liquid medium[11] supplemented with peptone (1 g/l). Protocorm development took place after 2–3 weeks in culture. Protocorms were sub-cultured in Mitra basal medium supplemented with coconut water. Coconut water enhances both shoot and root development. Seedlings with sufficient roots were de-flasked and hardened. One-year-old seedlings were prepared for distribution. About 5000 seedlings were distributed to the public and majority of the plants distributed produced flowers after two years.

Thus in about ten years, plants of Dove Orchid that we distributed have spread across the entire state of Kerala and beyond.

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Mega crystals of uraninite and euxenite in the mica pegmatite mine-dumps near Talupuru, Nellore district, Andhra Pradesh

Fine-sized uraninite has been reported earlier from the Sankara mine within the Nellore Schist Belt (NSB), Andhra Pradesh (AP), India[1]. Here, we report the occurrence of euhedral mega uraninite (UO_2) crystals and euxenite (niobate and titanate of yttrium, heavy rare earths and uranium) from the mica mine-dumps of mica pegmatites located near Talupuru (Survey of India toposheet No. 57 N/11; lat. 14°18′24″N: long. 79°40′55″E) (Figure 1) in NSB. The Archaean NSB, with an overall N–S trend and a westerly arcuate disposition, extends over 200 km in Nellore and Prakasam districts of AP. It comprises mainly two distinct litho-stratigraphic units, viz. (i) the lower, high-grade metamorphic schists (hornblende schist and amphibolite with ± garnet and biotite) and associated migmatites in the eastern, central and southern parts, and (ii) the upper metavolcanics (Kandra volcanics) and metasediments, mainly in the western, northwestern and southwestern parts. Within the NSB, a cluster of economically important Proterozoic pegmatites occur in an area of 100 × 20 km, starting from Ojili in the south to Udaigiri in the north, which is popularly known as the Nellore Mica Belt (NMB; due to it being an economically important source of muscovite mica)[2]. Rajeswari, Yashoda Krishna, Bhavani Shankar, Radha Krishna, Parlapalle and Kattubadipalle mica mines are located around Talupuru occur in the west-central part of the NMB; the first two are working mines. The size (m) of the studied mine-dumps is as follows: Rajeswari mine: 15 (length) × 5 (width) × 1 (height); Yashoda Krishna: 50 × 5 × 0.5; Bhavani Shankar: 25 × 3 × 1; Radha Krishna: 50 × 3 × 1; Parlapalle: 15 × 3 × 0.5, and Kattubadipalle: 20 × 3 × 0.5. The dumps of these mines were examined for radioactivity using a scintillometer and the radioactive material was separated. From this

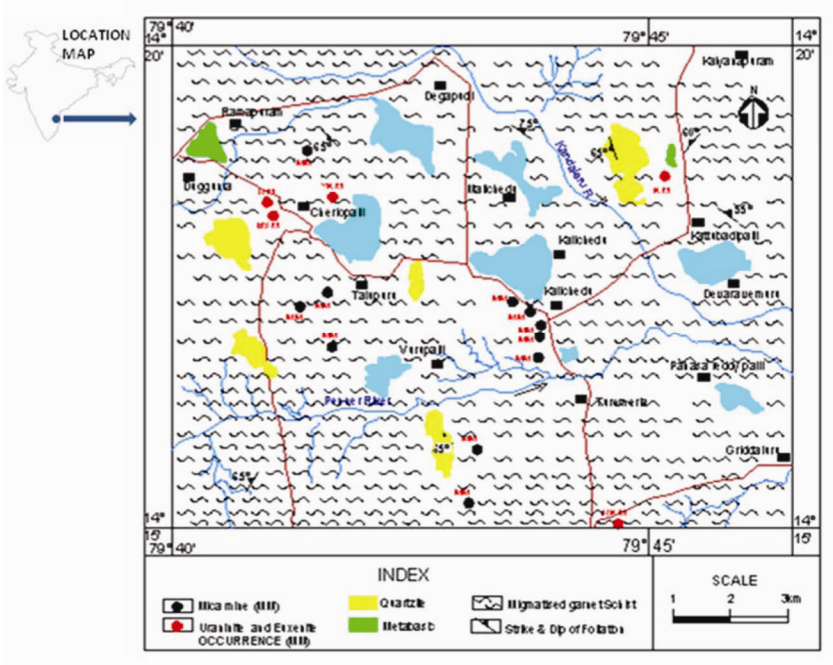

Figure 1. Geological map of part of Nellore mica belt showing uraninite–euxenite occurrence, Nellore district, Andra Pradesh, India (toposheet no. 57N/11, 12 and 15).