INTRODUCTION
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The orchids are botanically interesting for their pollination complexities, weakly developed barriers of reproductive isolation, undifferentiated embryos and, dependence upon a suitable mycorrhizal association for germination in nature. They culminate one of the evolutionary lines of monocotyledonous plants and are still in an active state of speciation. These account for about 7% of the total flowering plants (Pijl and Dodson, 1966) and their numerical strength in terms of number of species has been recently assessed by Atwood (1986) at 19,218. The orchids are cosmopolitan in distribution but their major speciation has occurred in tropics and subtropics where congenial growth conditions, high humidity and thick vegetation, prevail. The ease with which orchids hybridize, at levels ranging from interspecific to plurigeneric, indicates that evolution of their taxonomic and biological species has failed to synchronise. Terrestrial habit is primitive in these plants but epiphytic mode, representing 73% species, has been effectively utilized during their species diversification. Incidentally, their habitat specificity makes them excellent indicators of environmental degradation.

The orchids possess beautifully coloured and intricately fabricated flowers and represent an order of royalty in the world of ornamental plants. Besides enjoying national flower
status in Columbia (Cattleya trianae), Costa Rica (C. skinneri),
Singapore (Vanda Miss Joaquim), Sri Lanka (Dendrobium aracanthine),
Panama (Peristeria elata) etc., these account for multimillion
dollar cutflower industry in countries such as Singapore, Japan,
Thailand, Germany and U.S.A. The orchid flowers are considered
sacred in Thailand and used in religious ceremonies. In India,
the flowers of Rhynchoestylis retusa and Aerides multiflora
are adorned by the ladies as symbols of sanctity and womanhood.
The orchids are rich in phytochemical contents (Alkaloids,
flavonoids, carbohydrates, glycosides etc.) and their utility
in the local medicines for treating insanity (Epipactis
latifolia), nervous disorders (Cymbidium elegante), rheumatism
(Acampe papillosa), skin disorders (Dendrobium alostrum),
miscarriage (Kuloes phleoida), stomach disorders (Linaria
rostrata), toothache (Arethusa bulboza) etc. is well documented
(Handa, 1985). Goodvara subescence and Ansellia humilis are
used as antidote for snake bite and bad dreams, respectively.
The essence vanillin obtained from unripened fruits of
Vanilla planifolia is, however, the most important commercial
product of this group of plants. An ethnobotanical review of
orchids by Lawler (1984) reveals their varied utility as
source of food (Cymbidium canaliculatum, Dendrobium salaccense,
Nigritia uniflora, Satyrium bicornis, Thevlmitza antennifera),
gums and glues (Acathephiium martianus, Apilaeum hyemale,
Catasetum stratum, Cymbidium canaliculatum, Goydorum nutans,
Orchis morio), narcotics (Cyprisidium spectabile, Epidendrum
radiatum, Oncidium cubollete, Spathoglottis plicata), poisons (Dise chryostachya, Eulophia virens, Thecostele collina) etc. Curiously enough the milk cattle in north-eastern India are fed on dendrobies and other orchids to enhance their milk yield (Pempahishey, 1974).

It is for their beauty and utility that the orchids have been subjected to extensive collections. Depletion of their delicately balanced habitats, under the duress of physical (forest fires, soil erosion, land slides) and biotic (forest fellings for agricultural, defence and developmental purposes) factors, has further impaired the size and distribution frequency of their ever shrinking natural populations. According to a recent estimate of International Union for Conservation of Nature and Natural Resources (IUCN), about 10% of the world flora is dangerously rare or under the threat of extinction. The orchids, in particular, are the greatest sufferers in this respect. Many of these have already disappeared, while others figure prominently on the list of endangered plants. The situation is further aggravated since the orchids are slow growers and need a variety of factors for their continued reproduction in nature. In this connection, it is worthwhile to mention that as orchid germination in nature is dependent upon a suitable mycorrhizal association, only those seeds which contact congenial habitats, germinate, while others perished as such. Several measures for in situ (Orchid reserves, sanctuaries) and ex situ (orchidaria, botanic...
gardens) conservation of orchids using conventional techniques have been suggested but these have met with limited success.

Haberlandt (1902) conceived the idea of cell totipotency but his attempts to culture isolated cells in vitro to understand the problem of differentiation and cellular interrelationship failed due mainly to inadequate knowledge of plant nutrition. The regenerative potential of excised cells, tissues, and organs from a variety of plant species was assessed by several subsequent authors and the concept of cell totipotency was fully realized by Steward and coworkers (1958) who successfully raised Dactylorhiza plants from root cells. Since then the utility of tissue culture techniques to maintain genetic uniformity of the regenerants, understand their physico-morphogenetic responses, and to significantly shorten their life cycles has been firmly established. A large number of economically viable and endangered plant species have been subjected to these techniques with a view to multiply identical clones and unravel morphogenetic problems. While several species respond readily, recalcitrant behaviour of the others is attributed to lack of proper knowledge about nutrition and/or physiology of the interacting systems (Heller, 1953, Bell, 1953; Ernst et al., 1978).

Ever since Knudsen (1921) successfully bypassed the fungal requirement for germination of Cattleya seeds by
providing sucrose enriched nutrition in vitro, the technique of symbiotic germination has aroused considerable interest in orchid propagation. According to Wuthner (1959), germination frequency and survival rate of seedlings is significantly improved in vitro. While several hybrids and other recalcitrant taxa have successfully germinated in vitro, the utility of this technique in cutflower industry where pure lines are desirable, is limited, because the orchids are outbreeders and generate a lot of variability in the progenies.

Morel (1960) successfully used shoot meristems for raising viral free *Cymbidium* clones and his mericloning technique opened new vistas in orchid micropropagation. Several orchids have been cloned despite imminent injury to the mother plant in the sympodial taxa and its sacrifice in the monopodial ones (Hamilton, 1964; Champagnat and Morel, 1969; Kim et al., 1970; Lindemann et al., 1970; Sagawa and Shoji, 1971; Vajrabhaya and Vajrabhaya, 1970; Kunisaki et al., 1972; Teo et al., 1973; Intuwong and Sagawa, 1975; Stewart and Button, 1975; Reisinger et al., 1976). With a view to save the mother plant, subsequent investigations attempted to assess the regeneration potential of less valuable plant parts so as to identify alternate and effective explants for micropropagation. Successes have been achieved to regenerate identical clones from roots (Goh, 1970; Champagnat, 1971; Churchill et al., 1972; Tanaka et al., 1976; Stewart and Button, 1978; Kerbauy, 1984a, b; Mathews and Rao, 1985; Chaturvedi

The nutrient requirements of orchids in vitro are variable and according to Mitra (1986) these vary even during different stages of development. A large number of culture media have been devised on more or less empirical basis to satisfy the requirement of different orchid species but a universal culture medium for orchids is yet to be formulated. Lack of comprehensive data on mineral requirement of orchids coupled with lack of knowledge of comparative data on all these media used on the same brood of orchid seedlings makes it difficult to assess their optimal requirements (Withnner, 1959).

The orchids are well represented in India with over one thousand species (Sarkar, 1985) in climate ranging from tropical to temperate and these include as many as 280 endemic
ones (Jain and Mehrotra, 1984). North-eastern India, Himalayan ranges and the western Ghats are the main centres of orchid distribution in the country. The medicinal utilities of many Indian species is well documented, several of these find applications to cure minor ailments whereas Acampe papillosa, Dendrobium alpestre, Epipactis campestris, Habenaria aquinata, H. Intermedia, Microstilis wallichii, Orchis latifolia and Zeuxine strateumatica are extensively used as rejuvenating and/or aphrodisiac drugs in Ayurvedic system of medicines. An orchid based industry is, however, still to be established in the country despite the fact that the ornamental potential of Indian orchids is increasingly realized both at home and abroad and several indigenous species particularly in the genera Calanthe, Coelogyne, Cymbidium, Dendrobium, Paphiopedilum, Phalaenopsis and Vanda have been used as parents to produce novel hybrids in countries other than India.

Indian orchids have been dangerously collected for medicinal and export (illegal) purposes. With the result that their natural populations are progressively on decline. Many species are on the verge of extinction and/or have become dangerously rare. Clandestine destruction of their natural habitats, under the pretext of agricultural and other developmental projects, has further added to the misery of Indian orchids. Subrahmaniyan and Sree Madhavan (1970) assessed the gravity of the situation and identified several orchid...
species which are faced with threat of extinction. A recent estimate by IUCN places 147 Indian orchid species on the list of threatened plants. As a remedial measure, the Government of India, on the recommendations of BSI and other concerned agencies, has imposed a complete ban on the export of overexploited species. Attempts have also been made by State Governments to allow their natural regeneration in certain selected forest reserves and/or sanctuaries in Arunachal Pradesh, Manipur, Orissa, Sikkim etc. But techniques to ensure rapid multiplication of the commercially viable and/or endangered genotypes are yet to be developed.

Despite the fact that attempts have been made to micropropagate orchid genotypes at several places in India, much remains to be investigated about the behaviour and nutritional aspects of different species in vitro. Present studies initiated, under the supervision of Professor (Dr.) S.P. Vij, Botany Department, Panjab University, Chandigarh, are a step further in this direction. These deal with 19 species of botanically interesting and/or commercially viable orchids with a view to assess:

i) the asymbiotic germination response of seeds during different developmental stages.

ii) the morphogenetic response of the germinating entities and;
iii) the regenerative potential of stem, leaf, root, tuber and rhizome explants in vitro.

Attempts have also been made to analyse the optimum nutrient requirement of the explants in different species by subjecting these to a variety of media combinations. The effect of different growth regulators and adjuncts has also been studied during germination/regeneration and differentiation.