

## DESCRIPTION, PRODUCTION TECHNOLOGY, AND USES OF SOME MEDICINAL ORCHIDS

L C De, D R Singh, Raj Kumar, and Promila Pathak<sup>1</sup>

ICAR-NRC for Orchids, Pakyong - 737 106, Sikkim, India

<sup>1</sup>Orchid Laboratory, Department of Botany, Panjab University, Chandigarh - 160 014, U T, India

### Abstract

Orchids are the most diverse group amongst the angiosperms. Phytochemically, they have been reported to contain alkaloids, triterpenoids, flavonoids and stilbenoids. These plants are widely used in traditional Chinese medicines. Medicinal orchids have curative properties and are used in making medicines as these contain active ingredients. In the present investigation, description, production technology, and uses of some medicinal orchids are briefly described.

### Introduction

IN INDIA, traditional systems have remained quite separate from Western medicine. Spain, with a high medicinal herb biodiversity has been a good supplier of high quality material commonly from harvesting in the wild. The development of the medicinal plant production needs a trade regulation framework that has been delayed by the lack of understanding between pharmacist and herbalist. On the other hand, 150 species are threatened in Europe and especially in Albania, Hungary, Spain and Turkey by unselective collection and over use. The most threatened species are Pheasant's eye (*Adonis vernalis*), Bearberry (*Arctostaphylos uva-ursi*), Arnica (*Arnica montana*), Island moss (*Cetraria islandica*), Sundew (*Drosera rotundifolia*), Yellow gentian (*Gentiana lutea*), Liquorice (*Glycyrrhiza glabra*); some species belong to *Gypsophila* spp. (*Ankyropetalum gypsophiloides*), Bogbean (*Menyanthe trifoliata*), orchid family, peony family, *Paeonia* spp., primula family (*Primula* spp.), Butcher's broom (*Ruscus aculeatus*), some species of genus *Sideritis*, and species of genus of thyme and oregano (*Origanum* spp., *Thymbra* spp., *Thymus* spp.).

Orchids are the most diverse group among the angiosperms and they are cultivated for attractive flowers. There is no doubt that the Chinese were the first to cultivate and describe orchids, and they were almost certainly the first to describe orchids for medicinal use. Reinikka in 1995 reports a Chinese legend that Shên-nung described *Bletilla striata* and a *Dendrobium* species in his *Materia Medica* of the 28th century BC. Some species like *Dendrobium nobile*, *Eulophia campestris*, *Orchis latifolia*, *Vanda roxburghii* and *V. tessellata* have been documented for their medicinal value. Phytochemically, orchids have been reported to contain alkaloids, triterpenoids,

flavonoids and stilbenoids. *Ashtavarga*, a group of eight medicinal plants is vital part of Ayurvedic formulations like *Chyawanprash* and four plants *i.e.*, *Riddhi*, *Vridhhi*, *Jivaka* and *Rishbhaka* belong to family Orchidaceae.

The orchids are widely used in traditional Chinese medicines. In India, work has been carried out on chemical analysis of some medicinally important orchids like *Eulophia campestris*, *Orchis latifolia*, *Vanda roxburghii*. *Dendrobium macraei* is another important orchid used in Ayurvedic medicine as it is reported to be source of *Jivanti*. *Cypripedium parviflora* is widely used as an aphrodisiac and nervine tonic in Western herbal medicines.

Many medicinal orchids are reported to contain alkaloids and have antimicrobial activities. Recently, studies have indicated isolation of anthocyanins, stilbenoids and triterpenoids from orchids. Orchinol, hircinol, cypripedin, jibantine, nidemin and loroglossin are some important phytochemicals extracted from orchids. Some of the medicinal orchids along with distribution, parts used, and medicinal properties have been described by some workers (Bhattcharjee and De, 2005; De *et al.*, 2015; Gutierrez, 2010; Pathak *et al.*, 2010; Rao, 2004; Singh and Duggal, 2009).

In the present investigation, description, production technology, and uses of some medicinal orchids *i.e.*, *Dendrobium nobile*, *Habenaria intermedia*, *Malaxis muscifera*, *Orchis latifolia*, *Pholidota articulata*, *Rhynchostylis retusa* and *Vanda tessellata* are given below.

***Dendrobium nobile*** Linn.

Common Name

Singapore Orchid

*Description*

Perennial herb. *Pseudobulb* is erect or arching, 60-90cm tall caducous, leathery, glossy green leaves. *Inflorescence* is 1 to 3 flowered, short and arises from the upper nodes of the old leafless pseudobulbs. *Flowers* fragrant, long lasting, 10cm in diameter, waxy, *Lip* with white margin, produced during April- May.

*Production Technology*

The cool growing *Dendrobium* orchid group thrives well in temperatures ranging between 10°C and 24°C. Low temperature and short days could change the concentration of endogenous growth regulators leading to the induction of flowering in sympodial orchids. All species of *Dendrobium* orchids require warm bright light (2500- 3000 foot candles). They should get at least 12-14 hrs of light each day, year round. Conventionally, dendrobiums are easy to propagate through keikis that produce along old canes or by division of pseudobulbs. Long cuttings (10-12cm) also can be taken from a healthy, old and leafless canes keeping three nodes on each cutting and placed in moist *Sphagnum* moss for rootings. Commercially, *Dendrobium* hybrids are usually either seed-propagated or clonally propagated through tissue culture of apical or lateral buds that proliferate as protocorm like bodies. Fresh air and good circulation are essential for orchid production. Continuous light breezes make a good source of carbon dioxide for photosynthesis. In orchids, foliar feeding is found to be ideal. Frequent application of fertilizers at low concentrations is the best way of feeding orchids. A concentration of 0.2 to 0.3 % of 30:10:10 (N:P:K) at vegetative stage and 10:20:20 (N:P:K) at blooming stage are applied for quality flower production. Sometimes, fresh coconut water and diluted cow urine are also useful as foliar sprays. The potting medium of *Dendrobium* orchid should be loose, friable as well as well drained. Orchids are light feeders and they require nitrogen from beginning to two-third of their life cycle. During rest period, they do not need any fertilizers. During flower initiation and inflorescence development, plants are fed with less nitrogen, more phosphorus and potassium. During the blooming time, a small level of nitrogen and phosphorus and high levels of potassium are maintained. In orchids, foliar feeding is found to be ideal. A potting medium consisting of charcoal, brick pieces and coconut fibre in equal proportions is ideal for vegetative growth and flowering of epiphytic orchids like *Aerides*, *Dendrobium* etc. In case of *Dendrobium*, a potting mixture of cocochips/ cocopeat + brick pieces + tree bark (1:1:1) is ideal. Most orchids are damaged by overwater rather than under watering. Over watering

leads to root rot and many other diseases. Most orchids prefer water of pH 5.0-6.5. Watering with lower or higher pH or with high levels of dissolved minerals can hamper nutrient uptake. Frequent watering is essential under high sunlight and high temperature conditions. The single dominant factor which affects the cultivation of these orchids is humidity which should be maintained 70-85% in summer and 40-55 % in winter.

*Medicinal Uses*

Fresh or dried stems are ideal. These are rich in dendrobine, nobilonine, 6-hydroxydendrobine, dendramine, dendroxine, 6-hydroxydendroxine, 4-hydroxydendroxine, dendrine, 3-hydroxy-2-oxydendrobine. They enhance the physical fitness. It is a commonly used drug for stomachache and epigastric pain. It is a major medicine for the treatment of hepatobiliary diseases, such as hepatitis, cholecystitis, gallstones and others; it strengthens tendons and bones, relieves joint pain, and cures rheumatism. Modern pharmacological research also showed that it can improve stress ability, prevent or stop fatigue, increase hypoxia tolerance, promote circulation, dilate blood vessels, and lower blood cholesterol and triglycerides. Clinical studies have indicated that it not only enhances activity of insulin, but also significantly reduces and changes blood sugar levels back to normal. The drug kills certain cells of malignancies, such as lung cancer, ovarian cancer, and promyelocyticleukemia. It was also experienced as one of the best eye tonics in the eyes of ancient physicians because of its nourishing and eyesight-improving properties. It nourishes the skin. Modern pharmacological studies confirmed that it contains many trace elements, which are closely related to human health and longevity. Hence, the drug has more comprehensive anti-aging effect as compared to other herbs.

***Habenaria intermedia*** D. Don*Common Name**Riddhi**Description*

Semi-terete orchid of 25cm length. *Leaves* are rounded at the base, long acuminate to 10cm long and 5 to 7 nerved. *Inflorescence* 4 to 6 flowered. *Flowers* are 5cm across, white or greenish.

*Production Technology*

The mean annual rainfall is 100 to 150 cm and mean

annual temperature is between 10°C -15°C. Tubers are recommended for the propagation of this species. The compost consisting of rich loamy soil, well rotten manure and one sixth each of shredded *Osmunda* and chopped tree fern fibre is ideal for the growth and flowering of these plants. Direct raising of plants from tubers either by half or full tuber with apical portion intact gives the best results. Planting is done on raised beds in rows at an optimum spacing of 20 x 20 cm.

#### Medicinal Uses

The drug belongs to the group of the "Eight Tonic Herbs", known as *Ashtavarga*, which is rejuvenating and age sustaining. It is an ingredient of *Chyawanprash*.

***Malaxis muscifera*** (Lindl.) Kuntze

#### Common Name

Jeevak

#### Description

Terrestrial orchid. *Pseudobulbs* stem like, rather small, clustered. *Leaves* paired, sessile or short stalked upto 10 cm long. *Inflorescence* is up to 45 cm long, many flowered raceme. *Flowers* very small, yellowish green in colour.

#### Production Technology

This species is found in sub-alpine areas and is frequently distributed in meadows, forests, shrubberies and grassy slopes in the temperate Himalayas. It grows in loose sandy loam soil, rich in humus, chiefly on upper stratum of organic layer, in the wet localities. The requirement of mean annual rainfall ranges between 1000 mm and 1500 mm, and the optimal mean annual temperature range is 10°C -15°C. Mature bulbs may be collected from the wild sources in the rainy season. About 2,50,000 nodal segments or 1,25,000 bulbs are required for planting as a sole crop in one hectare of land at a spacing of 20 cm × 20 cm. Mycorrhizal association is necessary for increasing nutrient uptake efficiency in this orchid. Application of FYM and leaf mould at 40-50 tonnes per hectare is optimum for the crop growth. The crop matures in five months and the tubers are ready to be harvested when dormancy sets in during the last wk of October or first wk of November.

#### Medicinal Uses

It is used as tonic. The root is traded in the name of *Rsabhakah* or *Jeevak*. In Ayurvedic texts, *Chyawanprash* is classified under the group of

Rasayana, used to maintain the body's integrity for delaying the ageing process, enhancing longevity and improving digestion. It is a polyherbal formulation comprising of more than 50 medicinal plants ingredients. *Rsabhaka* (*Malaxis muscifera*) is one of the important ingredients of *Chyawanprash*.

***Dactylorhiza incarnata*** (L.) Soó (= *Orchis latifolia* Linn.)

#### Common Name

Cuckoo flower

#### Description

Herbaceous perennial herb, leafy orchids. *Tubers* entirely oblong or palmately lobed. *Stem* fistular up to 90cm long. *Tubers* paired, lobed and palmate. *Leaves* 15cm long. *Spike* cylindrical, densely flowered, up to 15cm long. *Flowers* 2cm long, variable in colour from pink to purple to almost pure white.

#### Production Technology

This species is distributed in the Western Himalayas and Kashmir between 3000-4000m altitude. In temperate region, they are grown in the open field. Otherwise, they grow well in full sun or partial shade. Rich and porous lime rich compost is suitable. The seed depends upon a symbiotic relationship with a species of soil dwelling fungus which acts as food supply for the plant until it is able to obtain nutrients from decaying material in the soil. Another way to grow the plant is division of tubers. Division of the tubers is done as the flowers fade out. Division can also be done when the plant has a fully developed rosette of leaves but before it comes into flower.

#### Medicinal Uses

Tubers are rich in starch, mucilage, sugar, phosphate, and loriglossin. Tuberous roots are cooling, emollient, aphrodisiac, and rejuvenating and nervine tonic. These roots are used to cure dysentery, diarrhoea, chronic fever, cough, wounds, cuts, burns, fractures and general weakness.

***Pholidota articulata*** Lindl.

#### Common Name

Rattle Snake orchid

#### Description

Epiphytic herbaceous orchids with jointed, two leafed, cylindrical, 10 cm long pseudobulbs. *Leaves* thickly membranous, many nerved, elliptic, acute, short

stalked up to 10cm long and 4cm broad. *Inflorescence* up to 15cm long, drooping, many flowered. *Flowers* upto 1.25cm across, musk scented and yellowish white.

#### *Production Technology*

It is grown in a compost mixture consisting of equal parts of *Osmunda* fibre, *Sphagnum* moss and coarse sand and broken crocks. They require moist atmosphere and semi-shaded locations.

#### *Medicinal Uses*

The whole plant is used as a tonic and as bone jointer. Bulbs are used in the treatment of bronchitis, stomach ache and toothache.

#### ***Rhynchostylis retusa*** (L.) Blume

Cat's Tail orchid

#### *Description*

Epiphytic herb. *Stems* stout and woody, clothed with sheaths of fallen leaves, up to 60 cm long. *Leaves* leathery, strap shaped, linear, deeply channelled, gracefully arching, upto 30 cm long and 2.5 cm broad. *Inflorescence* pendulous, compact, many flowered, cylindrical, upto 60 cm long. *Flowers* 1cm across, fragrant, long lasting, white, spotted with bluish purple.

#### *Production Technology*

These plants require high humidity, moderate shade and plenty of water during active phase of growth. They need bright light with the intensity of 3000-4000 foot candles and strong air movements all the times. These orchids are ideal for hanging baskets. They grow well in large chunks of tree fern fibre or in a media of chunks of hardwood charcoal. A day temperature of 30°C -32°C and night temperature of 24°C -25°C and relative humidity of 80% in summer and 60-70 % in spring and winter are ideal for their active vegetative growth and flowering. Plants should be watered heavily while actively growing, but aeration around the roots must be excellent, allowing the roots to dry rapidly after watering. For plants grown in pots or baskets, the medium must never become water logged or soggy. These plants are heavy feeders and respond very well with the dilute solution of 0.3% NPK (20:20:20) sprayed, twice a month.

#### *Medicinal Uses*

Roots are effective against rheumatism. Plants are used to cure asthma, tuberculosis, cramps, epilepsy, vertigo, palpitation, kidney stone and menstrual

disorders.

#### ***Vanda tessellata*** (Roxb.) Hook. ex G. Don

#### *Common Name*

#### *Rasna*

#### *Description*

Epiphytic herb with scandent stem, 60 cm long. *Leaves* keeled, linear-oblong, leathery, recurved, channelled to 22.5 long and 2.5 cm broad. *Inflorescence* sub-erect to 45 cm long, 6 to 8 flowered. *Flowers* 5 cm across, *sepals* and *petals* tessellated, yellow with brown lines and white margin, *lip* bluish dotted with purple.

#### *Production Technology*

All *Vanda* orchids require high light levels. On an average, they require a light intensity of 4000 foot candles. Flat leaved vandas need a winter night temperature of 10°C -12°C and a summer day time temperature of 22 °C -25°C, they are capable of tolerating higher and lower temperatures for short periods only. Adult plants are watered once a wk in the winter time and every day during summer. Vandaceous orchids require humidity upto 70-75%. They are easily propagated by cuttings of the shoots along with roots or air layerings. Rapid large scale multiplication is possible through tissue culture using shoot tips, axillary buds and roots as explants. Potting mixture should consist of cocochips + brick pieces + leaf fern (1:1:1).

#### *Medicinal Uses*

The paste of leaves is effective against fever. It is ingredient of *Rasna Panchaka Quatha*. In Ayurvedic medicine, it is used in the treatment of arthritis and rheumatism. The leaf juice extract is used in the treatment of otitis media. The root is effective against scorpion sting and for curing bronchitis.

## References

- Bhattacharjee, S. K. and L. C. De. 2005. *Medicinal Herbs and Flowers*. Aavishkar Publishers & Distributors, Jaipur, Rajasthan, India.
- De, L. C., A. N. Rao, P. K. Rajeevan, Promila Pathak, and D. R. Singh. 2015. Medicinal and aromatic orchids -An overview. *Int. J. Curr. Res.*, **7**(9): 19931-35.
- Gutierrez, R. M. P. 2010. Orchids: A review of uses in traditional medicine, its phytochemistry and pharmacology. *J. Med. Plant Res.*, **4**(8): 592-638.
- Pathak, Promila, A. Bhattacharya, S. P. Vij, K. C. Mahant, Mandeep K. Dhillon, and H. Piri. 2010. An update on

2016)

DE ET AL.- MEDICINAL ORCHIDS

the medicinal orchids of Himachal Pradesh with brief notes on their habit, distribution, and flowering period. *J. Non Timber Forest Products*, **17**(3): 365-72.

Rao, A. N. 2004. Medicinal orchid wealth of Arunachal

Pradesh. Newsletter of *Envis Node on Indian Medicinal Plants*, **1**(2): 1-5.

Singh, Amritpal and Sanjiv Duggal. 2009. Medicinal orchids: An overview. *Ethnobot. Leaflets*, **13**: 351-63.