



## **Nature's Pharmacy: Orchids and Their Vital Role in Herbal Medicine – A Review**

<sup>1</sup>Rahul Dev\*, <sup>2</sup>Anil Kumar Jangid

<sup>1</sup>M. Pharm (Pharmacology), Department of Pharmacology, Lords University, Alwar, Rajasthan [rahulxpharma@gmail.com](mailto:rahulxpharma@gmail.com)

<sup>2</sup>M. Pharmacy (Pharmaceutics), Department of Pharmaceutics, Lords University, Alwar, Rajasthan [anilpharma15@gmail.com](mailto:anilpharma15@gmail.com)

### **INTRODUCTION**

Herbal plants are staging a comeback and herbal 'renaissance' is happening all over the globe. The herbal products today symbolize safety in contrast to the synthetics that are regarded as unsafe to human and environment. Although a large variety of medicinal plants is available, but orchids (flowering plants) have their own value by virtue of their great contribution in the medicinal plants world. Orchid family (Orchidaceae) is the second largest family of flowering plants with approximately 20,000 species with more than 850 genera. This diversity increases towards the tropic; where the epiphytic species predominate that almost constitute 73% of the family [1]. According to the botanists Orchidaceae family contains the largest number of species than any other family of flowering plants. [2, 3, 4].

### **Economical Importance**

Since orchids are primarily valued for their exquisite blooms, they are a vital resource for the world's horticultural sector. These plants are particularly popular because of the lovely colour and shape of their blossoms, which adds to their outstanding ornamental value. The black orchid, *Paphiopedilum wardii* (Figure 1), is one of the most well known beautiful orchid species. This lovely species was first described in 1950 [5] and has mottled, dark green leaves with reddish purple patterning on the underside of the leaf. Orchids are also eaten as food in several parts of Africa [6]. In tropical and subtropical forests, where they are mostly epiphytic, orchids are most plentiful.

Orchids have significant commercial value. Food and beverages are flavoured with vanilla; the tissues of *Gastrodia* are an important natural medicine [7]. Vanilla comes from several species of perennial vines of the genus *Vanilla*.



Figure 1. *Paphiopedilum wardii*.

### **Indian perspective and its herbal importance**

There are over 1,150 species spread throughout several states in India. Arunachal Pradesh alone is home to 601 species, or about 52% of all known species in India. Many of these species are uncommon, endangered, or decorative. With differently altered vegetative and floral structures, shapes, and colours, orchids exhibit a wide range of habits. India is home to a vast array of orchid species, with hilly areas experiencing orchid blooms virtually all year round

[8]. There are certain orchids native to India. Because many species are rare and decorative, their natural populations have been overfished. *Arundina*, *Cymbidium*, *Coelogyne*, *Dendrobium*, *Paphiopedilum*, *Renanthera*, and *Vanda* are among the nearly extinct species in the genus. Numerous orchids such as are included in the provisional list of 150 endangered plants in India are *Acanthephippium sylhetense*, *Anoectochilus sikimensis*, *Aphyllorchis montana*, *Arachnanthe clarkei*, *Arundina graminifolia*, *Cymbidium macrorhizon*, *Dendrobium densiflorum*, *Didickea cunninghamii*, *Eria crassicaulis*, *Galeola lindleyana*, *Gastrodia Exilis*, *Paphiopedilum fairanum*, *P. druryi*, *Pleione humilis*, *Renanthera imschootiana*, *Vanda coerulea*, *V. pumila* and *V. roxburghi*[9]. Since the time of the Vedas, orchids have also had significant therapeutic benefits. Currently available for purchase, "Shihu" is an orchid product crafted from multiple *Dendrobium* species. It is advised for rehydration, indigestion, antipyretic effects, and to raise blood white cell counts. It's interesting to note that moscatilin, which is derived from *Dendrobium loddigesii*, is used by the Chinese for treating stomach and lung cancer. It also exhibits antiplatelet properties[11]. Commercial cultivation of *Gastrodia elata* is utilised for treating allergies, as well as for headache and tiredness relief. This mixture is found in many herbal formulae for the treatment of migraine, hypertension, and convulsions [12, 13]. The plant also contains gastrodin, which has anticonvulsant properties. Alkaloids have been reported to be present in many medicinal orchids[14]. Recent works have reported isolation of anthocyanins, stilbenoids and triterpenoids from orchids. Orchinol, hircinol, cypripedin, jibantine, nidemin and loroglossin are some important phytochemicals reported from orchids [15].

## HIGHLIGHTS IN ORCHID HISTORY

Confucius, the Chinese philosopher, grew orchids in the fifth century BC. Dioscorides, a Greek botanist, physician and pharmacologist mentioned orchids in his work "De Materia Medica" ("Of Medical Matters") published around 60 AD. This work remained a reference manual till the Middle Age (1,400 - 1,500 AD) [16]. The term orchid was coined by Theophrastus as anatomy of the plants resemble with testicles. Greek word orchid literally means testicles [17]. This may account for use of orchids as aphrodisiacs in ancient civilizations. When we study the history of ancient Alternative systems of medicine Ayurveda and Traditional Chinese Medicine (TCM) are on the forefront [18]. The Chinese were the first to write books about orchids. In 1233, Chao Shih-Keng wrote *Chin Chan LAN P'u*, and described 20 species and how to grow them. In 1247, Wang Kuei-hsueh wrote his *Treatise on Chinese orchids*, and described 37 species [19].

Cultivation of orchids started in earnest in the 19th century. At that time orchids were brought to Europe by companies or individuals who financed collecting expeditions. Today there is a wealth of knowledge about growing orchids and modern propagation methods have driven prices to affordable levels [20].

## STRUCTURAL COMPONENT OF ORCHID FLOWERS

The intricate blossoms of orchids, which set them apart from all other plant families, are well known. The orchid blossoms have a glistening lustre and are erratic in size and shape. They can smell like fresh lavender oil, lemons, or cloves and can be found alone or in spikes. However, a few have a really offensive odour [20]. The flower contains sepals, petals, lip & column.

- 1. Sepals:** Although they may look like petals, they are actually the glorified remains of the flower bud. There is usually three of approximately equal size.
- 2. Petals:** Orchids always have three petals. Two are "normal" and the third becomes a highly specialized structure called a lip.
- 3. Lip or Labellum:** The lower petal of an orchid, used by the flower to provide a 'landing platform' for its pollinator.
- 4. Column:** A finger like structure that carries the orchid's reproductive organs – the stigmatic surface (female organs) & the Pollinia (male organs) located under the Anther Cap [21].

## TAXONOMY

The International Code of Botanical Nomenclature (I.C.B.N.) and the International Code of Nomenclature of Cultivated Plants (I.C.N.C.P.) govern the naming of orchids. The I.C.B.N. has standardized classification of plants and imposed the following endings:

Table :-

Family	aceae	Example: Orchidaceae
Tribe	eae	Example: Vandaeae.
Subtribe	inae	Example: Sarcanthinae.

Below the subtribe are the genera (singular = genus).

Examples: *Cattleya*, *Dendrobium*, *Phalaenopsis*.

Within the genera are the names identifying individual plants.

Example: *Phalaenopsis amabilis* or *Phalaenopsis Ever Spring*.

Names of species are not capitalized: *Phalaenopsis amabilis* designates a species, i.e. a naturally occurring plant. Names of hybrids (man made crosses) are always capitalized. Until a new hybrid is registered it will be identified by the name of its parents, separated by an X. For example: *Phalaenopsis amabilis* x *Phalaenopsis violacea* or *Phalaenopsis* (*amabilis* x *violacea*) or *Phalaenopsis amabilis* x *violacea* or, in abbreviated form, *Phal. Amabilis* x *violacea* [22].

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## PHYTOCHEMISTRY OF ORCHIDS

Pharmacologically most studied chemical component in orchids are mainly alkaloids, bibenzyl derivatives, flavonoids, phenanthrenes and terpenoids which are present in leaves, roots, flowers and whole plant [23]. Recent works have reported isolation of anthocyanins, stilbenoids and triterpenoids from orchids. Orchinol, hircinol, cypripedin, jibantine, nidemin and loroglossin are some important phytochemicals reported from orchids. Some of the phytochemicals isolated from orchids along with biological source have been tabulated [24, 25].

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## MEDICINAL PROFILE OF ORCHIDS IN DIFFERENT REGIONS OF WORLD

### Asia

Majority of the cultivated orchids are native of tropical countries in Asia and occur in their greatest diversity in humid tropical forest of India, Burma, South China, Thailand, Malaysia & Philippines. Indian dendrobiums, cymbidiums and Vandas (Indian orchid) have played a major role in the development of modern orchid industry in the world. In Asia china, India and Japan are the leaders in orchid producers. [26, 27, 28].

**In India** work has been carried out on chemical analysis of some medicinally useful orchids. *Eulophia campestris*, *Orchis latifolia*, *Vanda roxburgii* are some important plants to mention [29]. *Asthavarga* is important ingredient of various classical Ayurvedic formulations like *Chavyanprasa*. Out of eight constituents of *Ashtavarga*, four have been reported to be orchids. These four orchids are as follows:

1. Bulbs of *Malaxis muscifrea* (*Jivaka*)
2. Pseudo-bulbs of *Malaxis acuminata* (*Rishbhaka*)
3. Roots of *Habenaria intermedia* (*Riddhi*)
4. Roots of *Habenaria edgeworthii* (*Vriddhi*) [30].

### Europe

William Turner in the first English Herbal (1568) gave four main uses, including the treatment of alcoholic gastritis [31]. Eleven years later, Williams Langham reported anti-pyretic, anti-consumption and anti-diarrhoeal effects [32]. John Parkinson in 1640 still thought that tubers increased fertility in men [33]. Ottomans extracted 'Salep' from the dried tubers. In the East, Salep was (and is) mainly made from *Orchis morio*, but it could be made in the UK from *Orchis mascula*, the early purple orchid or from *Orchis maculata* or *Orchis latifolia*. Orchids, presumably as Salep, were dispensed in London in Oliver Cromwell's time, and before the introduction of coffee, hot drinks of Salep were sold at stalls in the streets of London [34]. In the first century AD, Dioscorides, who was a Greek working as a Roman military physician, wrote his *De Materia Medica*, including two terrestrial orchids. [35]. He adopted and promoted the 'Doctrine of Signatures' whereby plants were used for medicinal purposes according to their resemblance to parts of the human anatomy, for example by shape or colour. Naturally this led to orchid tubers being used to heal diseases of the testicles, and to stimulate lust. Moreover if given to men as whole fat new tubers this was supposed to produce male progeny, and if the shrivelled old tubers were given to women, this should produce female children [36].

### Africa

In African region particularly in Tanzania, Zambia, and Malawi orchids are mostly important for their tubers which are used as a source of food, and are therefore traded within and across the countries. The tubers are collected from the wild and processed into a meatless sausage locally called chinaka, chikande and kikande which is consumed as relish or just as a snack. [37]. Twelve orchids currently used as medicine in Malawi. Nine of these are used for stomach complaints and two for fertility problems. Interestingly, two species, *Cyrtorchis arcuata* is also employed to treat diabetes or skin infections and *Eulophia cucullata* to prevent epilepsy. An infusion of the leaves and pseudobulbs of *Bulbophyllum maximum* is used to protect against sorcery, and *Tridactyle tricuspis* to treat madness [38].

### American Orchid

In America, vanilla is the most well-known and frequently used orchid. The most well known orchid product is the fragrant oil extracted from vanilla seed pods. *Vanilla planifolia* is the most significant species of vanilla [39]. Its current medical applications are limited to reducing nausea and increasing food intake in chemotherapy patients [40], as well as acting as an aromatherapy to detect Alzheimer's disease and other conditions.

American folk medicine still uses the roots of *Arethusa bulbosa*, sometimes referred to as bog-rose or dragon's mouth orchid, to treat toothaches [41].

## ROLE OF ORCHIDS IN VARIOUS DISEASES

More recent ethno pharmacological studies show that orchids are used in many parts of the world and in treatment of a number of diseases.

Table -

SR. NO.	SPECIES	MEDICINAL USE	REFERENCES
1	Anoectochilus formosanus	Chest and abdominal pains, diabetes, fever, nephritis, hypertension, impotence, liver spleen disorders, and pleurodynia, antiinflammatory agent	Satish et al. (2003) [42]
2	Anoectochilus roxburghii	Treatment of fever, pleurodynia, snake bite, lung and liver disease, hypertension, and malnourished children	Fan et al. (1997). [43]
3	Bletilla Formosana	Is associated with the lung, stomach and liver meridians and has a bitter taste and cool properties	Lin et al. (2005) [44]
4	Bletilla striata	Treatment of sores, ulcers and chapped skin, heal wounds, reduce swelling, and promote regeneration of tissue. Have been used to treat pulmonary tuberculosis and as hemostatic agent	Luo et al. (2007), Chang (1977) [45,46]
5	Bulbophyllum kwangtungense	Treat pulmonary tuberculosis and as hemostatic agent, promote the production of body liquid and reduce fever	Wu et al. (2006) [47]
6	Bulbophyllum odoratissimum	Treat tuberculosis, chronic inflammation and fracture	Chen et al. (2007) [48]
7	Calanthe discolor	hair restoring	Yoshikawa et al. (1998) [49]
8	Calanthe liukiensis	hair restoring	Yoshikawa et al. (1998) [49]
9	Catasetum barbatum	Febrifuge, anti inflammatory	Shimizu et al. (1988) [50]
10	Cephalantheropsis gracilis	Cancer	Wu et al. (2006) [51]

## REFERENCES

- Dreeler R (1981). *The Orchids: Natural history and classification*. Harvard University Press. Cambridge, MA.
- Pillon Y, Chase MW (2006). Taxonomic exaggeration and its effects on orchid conservation. *Conserv. Biol.* 21(1): 263-265.
- Chase MW (2005). Classification of Orchidaceae in the age of DNA data. *Curtis's Botanical Magazine* 22(1): 2-7.
- Chase MW, Cameron KM, Barrett RL, Freudenstein JV (2003). DNA data and Orchidaceae systematics: A new phylogenetic classification. In Dixon KW, Kell SP, Barrett RL, Cribb PJ (eds) *Orchid conservation. Natural History Publications, Kota Kinabalu, Sabah* pp. 69–89.
- Turner W (1568). *The first and seconde partes of the Herbal of William Turner, doctor in Phisick, lately oversene, corrected and enlarged with the Third Parte. Cologne (original publication 1551).*
- Hamisy CW (2007). Development of conservation strategies for the wild edible orchid in Tanzania. Progress report for the Rufford Small Grants Foundation. [www.ruffordsmallgrants.org/files/orchidreport202007 [1].doc]. Accessed in September, 2008.
- Griesbach RJ (2002) Development of Phalaenopsis orchids for the mass-market. In: Janick J, Whipkey A (eds) *Trends in new crops and new uses*. ASHS Press, Alexandria, USA.
- Sudharsan T Anitha, Tamilarasi V.S. Introduction to Floral diversity of Arunachal Pradesh.
- Orchidsasia-Vanam Orchids Portal site (1998-2005) INTRODUCTION TO ORCHIDS.
- HO CK, Chen CC, Moscatillin from the orchid *Dendrobium loddigesii* is a potential anticancer agent. *Cancer invest* – 2003, 21:729-36.
- Chen CC, Wu LG, Ko FN, Teng CM. Antiplatelet aggregation principles of *dendrobium loddigesii*. *Nat prod* 1994;57:1271-4.

12. [www.purtango.com/Library/gastrodia.html](http://www.purtango.com/Library/gastrodia.html).
13. An SJ, Park SK, Hwang IK, Choi SY, Kim SK, Kwon OS, Jung SJ, Baek NI, Lee HY, Won MN, Kang TC. *Gastrodin decreases immuno reactions of gama-amino butyric acid shunt enzymes in hippocampus of seizure – sensitive gerbils.* *J Neurosci Res* 2003; 71:534-43.
14. S.M. Khasin, P.R. Mohana Rao. *Medicinal Importance of Orchids. The Botanica.* 49: 86-91(1999)
15. Fossen T, Ovstedal DO. *Anthocyanins from flowers of orchids Dracula chimaera and Dracula cordobae.* *Phytochem* 63(7): 783-7(2003).
16. *Venamy Orchids, Copyright 2002 Venamy Orchids. A Comprehensive Guide to orchid. Culture.venamy@orchidsusa.com.*
17. Stewart, J. & M. Griffiths. *Manual of Orchids. Timber Press, Portland, Oregon (1995).*
18. G.A. Stuart. *Chinese Materia Medica. Taipei. Southern Materials Centre. A translation of an ancient Chinese herbal (1984).*
19. Berliocchi L (2004). In: Griffiths M, ed. *The Orchid in Lore and Legend. Portland OR, Timber Press pp. 128-132.*
20. *Venamy Orchids, Copyright 2002 Venamy Orchids. A Comprehensive Guide to orchid. Culture.venamy@orchidsusa.com.*
21. *Linda's orchid pages 1996-2011.*
22. *Venamy Orchids, Copyright 2002 Venamy Orchids. A Comprehensive Guide to orchid. Culture.venamy@orchidsusa.com.*
23. Rosa Martha Pérez Gutiérrez, *Orchids: A review of uses in traditional medicine, its Phytochemistry and pharmacology. Journal of Medicinal Plants Research Vol. 4(8), pp. 592-638, 2010*
24. Fossen T, Ovstedal DO. *Anthocyanins from flowers of orchids Dracula chimaera and Dracula cordobae.* *Phytochem* 63(7): 783-7(2003).
25. V. Anuradha, N.S. Prakash. *Aeridin: A phenanthropyran from Aerides crispum. Phytochemistry.* 48(1): 185-186 (1998).
26. Chen CC, Wu LG, Ko FN, Teng CM. *Antiplatelet aggregation principles of Dendrobium loddigesii. J Nat Prod* 1994; 57:1271-4.
27. Ho CK, Chen CC. *Moscattillin from the orchid Dendrobium loddigesii is a potential anticancer agent. Cancer Invest* 2003; 21:729-36.
28. [[www.puretango.com/library/gastrodia.html](http://www.puretango.com/library/gastrodia.html)]
29. M.R. Uniyal, M. Uniyal. *Medicinal Plants and Minerals of Uttarakhand Himalaya. Baidyanath, Ayurved Shodh Sanstha, Patna (1977).*
30. M.R. Uniyal. *Astavarga? Sandigdha Vanaushadhi. Dhanwantri Partrika. Sri Jwala Ayurvedh Bhawan Aligarh (1975).*
31. Turner W. *The first and seconde partes of the Herbal of William Turner, doctor in Phisick, lately oversene, corrected and enlarged with the Third Parte. Cologne, 1568 (original publication 1551).*
32. Langham W. *The Garden of Health. London, 1579.*
33. Parkinson J. *Theatrum Botanical: The Theatre of Plants (or a Universall and Compleate Herball). London, 1640.*
34. [[www.botanical.com](http://www.botanical.com)] a modern herbal by Mrs M. Grieve. Search on 'Orchids'.
35. Berliocchi L. In: Griffiths M, ed. *The Orchid in Lore and Legend. Portland OR, Timber Press, 2004. ISBN 0-88192-616-7.*
36. Dioscorides Pedanius. *De Materia Medica Frankfurt edition 1543 or De Materia Medica libra quinque 572 (In Imperial Library at Vienna).*
37. Hamisy CW (2007). *Development of conservation strategies for the wild edible orchid in Tanzania. Progress report for the Rufford Small Grants.*
38. Morris B. *Children of the Wind—Orchids as Medicines in Malawi. The Orchid Review* 2003; 111:271-7.
39. Berliocchi L. In: Griffiths M, ed. *The Orchid in Lore and Legend. Portland OR, Timber Press, 2004. ISBN 0-88192-616-7.*
40. Menashian L, Flann M, Douglas-Paxton D, Raymond J. *Improved food intake and reduced nausea and vomiting in patients given a restricted diet while receiving cisplatin Chemotherapy. J Am Diet Assoc* 1992; 92:58-61.
41. [www.gomestic.com](http://www.gomestic.com). *Facts about orchids.*
42. Satish MN, Abhay PS, Chen-Yue L, Chao-Lin K, Hsin-Sheng T (2003). *Studies on tissue culture of Chinese medicinal plant resources in Taiwan and their sustainable utilization. Bot. Bull. Acad. Sin.* 44: 79- 98.
43. Fan ZN, Xiao HS, Fan XH, Wu WS (1997). *Study on tissue culture of Anoectochilus roburghii. Journal Fujian Normal University (Nat Sci Ed)* 13: 82-87.
44. Lin YL, Chen WP, Macabalang AD (2005). *Dihydrophenanthrenes from Bletilla formosana. Chem. Pharm. Bull.* 53: 1111-1113.
45. Luo H, Lin S, Ren F, Wu L, Chen L, Sun Y (2007). *Antioxidant and antimicrobial capacity of Chinese medicinal herb extracts in raw sheep meat. J. Food Protection* 70: 1440-1445.

46. Chang S (1977). *New Medical College Dictionary of Chinese Crude Drugs*: Shanghai Scientific Technologic Publisher: Shanghai.
47. Wu, B, He, S., Pan, Y.J. 2006. New dihydrodibenzoxepins from *Bulbophyllum kwangtungense*. *Planta Medica* 72: 1244-1247.
48. Chen Y, Xu J, Yut H, Qin CW, Zhangt Y, Liu Y, Wang J (2007). *Bulbophyllum Odoratissimum* 3,7- Dihydroxy- 2,4,6- trimethoxyphenanthrene. *J. Korean Chem. Soc.* 51: 352-355.
49. Yoshikawa M, Murakami T, Kishi A, Sakurama T, Matsuda H, Nomura M, Matsuda H, Kubo M (1998). Novel indole S,O-bisdesmoside, calanthoside, the precursor glycoside of tryptanthrin, indirubin, and isatin, with increasing skin blood flow promoting effects, from two *Calanthe* species (Orchidaceae). *Chem. Pharm. Bull.* 46: 886-888.
50. Shimizu M, Shogawa H, Hayashi T, Arisawa M, Suzuki S, Yoshizaki M, Morita N, Ferro E, Basualdo I, Berganza LH (1988). Antiinflammatory constituents of topically applied crude drugs. III. Constituents and anti-inflammatory effect of Paraguayan crude drug "Tamandá cuná" (*Catasetum barbatum* LINDLE). *Chem. Pharm. Bull.* 36: 4447-4452.
51. Wu P, Hsu Y, Jao C (2006). Indol alkaloids from *Cephalanceropsis gracilis*. *J. Nat. Prod.* 69: 1467-1470.