

Orchids as Nutraceuticals

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Nutraceutical is a food that provides health benefits in addition to basic nutritional value. This term was coined by Stephen L. DeFelice in 1989 by combining two words, nutrition and pharmaceutical. He defined nutraceutical as a substance that is a food or a part of food and provides medical or health benefits, including the prevention and treatment of disease (DeFelice 1995). Nutraceutical is therefore an umbrella term covering a variety of products which may range from isolated nutrients and dietary supplements to genetically engineered designer foods, herbal products, and processed foods such as cereals, soups and beverages. Advances in science and technology, increasing health care costs and rising concern to achieve wellness through diet are main factors fueling worldwide interest in nutraceuticals. Not easily falling into the legal category of food or drug, the nutraceuticals include substances which are not traditionally recognized nutrients but have some positive physiological effects on the human body (Pandey *et al.* 2010). Indian civilization is one of those fewer ones that have provided evidence of using foods effectively as medicine (Wildman 2006).

Orchids are known for their stunningly beautiful flowers of incredible size range and curious ornamentation. Exhibiting all the earmarks of a group under active speciation, they represent the pinnacle of monocot evolution. Orchids, more popular as valued ornamentals, are also reputed for their therapeutic properties. In fact, they were first discovered for their therapeutic values and continue to be used as folklore remedies for a variety of human ailments (Vij *et al.* 2013). The word 'Orchis' was used for the first time by Theophrastus to indicate a

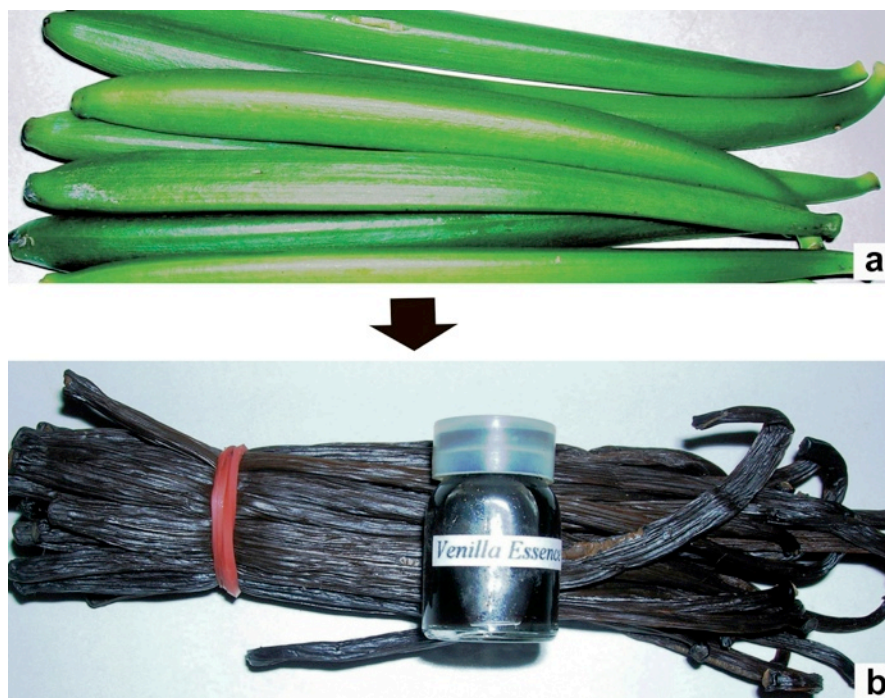


Fig. 1. Fruits of *Vanilla planifolia*. a, Freshly harvested green fruits; b, Processed fruits and extracted Vanilla essence. (Photo: Jagdeep Verma)

plant group whose roots were used in the traditional pharmacopoeia of Greece as antidepressants. Chinese described *Bletilla striata* and a *Dendrobium* species in Materia Medica of Shen-nung (28th Century B.C.), and in many other Chinese writings, orchids symbolize things such as friendship, perfection, numerous progeny, noble and elegant (Reinikka 1995). Even today, Chinese use an orchid product called 'Shihu' which is derived from several *Dendrobium* species and is used as immuno-booster. Moscatilin, derived from *Dendrobium loddigesii*, is known to have anti-cancer activity (Ho & Chen 2003). According to Ng *et al.* (2012) there are many bioactive constituents in various *Dendrobium* species. These include lectins, enzymes (chalcone synthase, sucrose synthase, cytokinin oxidase) and polysaccharides. The polysaccharides display immunomodulatory and hepatoprotective activities, and the alkaloids exhibit antioxidant,

anticancer, and neuroprotective activities. The most important use of orchids as nutraceutical is, however, a nutritious drink – 'salep' that was sold at stalls in streets in London even before the introduction of coffee (Bulpitt 2005). Salep is flour made from grinding the dried tubers of *Orchis maculata* and related orchids, and contains a polysaccharide – glucomannan. Besides good nutritional value, it is a powerful aphrodisiac (Hossain 2011). Vanilla, an aromatic oil, mainly sourced from fruits of *Vanilla planifolia* (fig. 1) and allied species, is another important orchid produce employed widely for flavouring food stuffs. In addition to its antimicrobial properties (Fitzgerald *et al.* 2004), there are several medicinal uses of Vanilla such as relieving nausea and improving food intake in

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Fig. 2. One of the salep yielding Indian species, *Dactylorhiza hatagirea* (D. Don) Soo: A plant growing in natural habitat in northwest Himalaya and an underground palmate tuber (inset) that is ground to obtain salep. (Photo: Jagdeep Verma)

patients receiving chemotherapy, and a diagnostic aroma for Alzheimer's disease (Menashian *et al.* 1992). Roasted tubers of *Gastrodia sesamoides* and *G. falconeri* are eaten as food, whereas *G. elata* is used to treat allergies, hypertension and migraine because of the anticonvulsant effects of gastrodin (Bulpitt 2005).

In India, orchids are represented by more than 1300 species, and have been used in indigenous system of medicines since Vedic period. In 'Charaka Samhita', the medicinal importance of orchids

such as Jeevanti, Jeevak, Rasna, Vridhi, etc., to cure a variety of ailments, is discussed (Kaushik 1983). "Ashtawarga" – a group of eight medicinal herbs which are used for preparation of quality health tonics, consists of four orchid species (*Crepidium acuminatum*, *Habenaria intermedia*, *Malaxis muscifera*, *Platanthera edgeworthii*). *Dactylorhiza hatagirea* (fig. 2), *Eulophia dabia* and *Satyrium nepalense* are the most commonly used Indian species in salep preparation. Chyawanprash is another popular herbal tonic in

India. It is considered as one of the best herbal nutrient products in Ayurvedic medicine as it contains high percentage of Vitamin C, many essential fatty acids, high bioflavonoids, carotenoids and a large amount of bioactive phytochemicals which act as an immune modulator. The orchid species viz. *Habenaria intermedia*, *Platanthera edgeworthii* (*Habenaria edgeworthii*), *Crepidium acuminatum* (*Malaxis acuminata*/*Microstylis wallichii*) and *Dendrobium macraei* (*Ephemerantha macraei*) are important ingredients of Chyawanprash (Kaushik 1983; Hossain 2011). In addition to this, therapeutic importance of Indian orchids in treating ailments like nervous disorders (*Cymbidium elegans*, *Cyripedium pubescens*), hypertension and allergy (*Gastrodia elata*), rheumatism (*Acampe papillosa*), burns (*Coelogyne punctulata*), dermal problems (*Dendrobium monticola*), tuberculosis (*Coelogyne henryi*, *Crepidium acuminatum*), malignancy (*Vanda testacea*), bronchitis and dyspepsia (*Vanda tessellata*), and malaria and dysentery (*Satyrium nepalense*) is well documented in literature (Lawler 1984; Balasubramanian *et al.* 2000; Singh & Rawat, 2011), and suggest their possible use as promising nutraceuticals.

Orchids are not allowed to be exported as per CITES regulations, but tubers for preparation of salep are still smuggled; the annual demand of the species *Dactylorhiza hatageria* (fig. 2) is nearly 19250 tons in some localities of northwest Himalaya (Kala 2004). Poor natural regeneration, unregulated commercial collections and progressive loss of habitats have pushed many orchids to the point of rarity. Several Indian species are facing high threats to their survival and figure prominently in the list of threatened plants prepared by CITES. Ten species (*Paphiopedilum charlesworthii*, *P.*

druryi, *P. fairrieanum*, *P. hirsutissimum*, *P. insigne*, *P. spicerianum*, *P. venustum*, *P. villosum*, *P. wardii*, *Renanthera imschootiana*) have been listed in its Appendix-I, and rest all in Appendix-II.

The therapeutic importance of orchids is due to presence of phytochemical contents (alkaloids, flavonoids, phenanthrenes, terpenoids, etc.); they are, however, mainly used as nutraceuticals because the active principles responsible for their medicinal properties are either to be identified with further accuracy or are yet to be tested on human system. Therefore there is urgent need to link the indigenous knowledge of medicinal plants including orchids to modern research activities so as to accelerate the rate of drug discovery more precisely. According to Krushnamurthy *et al.* (2013), the medicinal future of Vanilla lies in further research on its various constituents and their exact mechanism of action. This is true even for all other orchid species used for their nutraceutical properties.

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