



NUTRITIONAL SIGNIFICANCE OF INDIAN BORAGE (*PLECTRANTHUS AMBOINICUS*): A REVIEW

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Abstract

Plectranthus amboinicus belongs to the family Lamiaceae and commonly called borage in English. It occurs naturally in tropics and warm regions of Australia, Africa, and Asia. The plant is succulent, the aromatic herb has the nutritional and therapeutic properties, because of its phytochemical compounds. The leaves of the plant are acrid, bitter, and used in folk medicine for constipation, cold, asthma, cough, fever, skin diseases, and headache. The research work on the plant phytochemicals contains 76 volatiles and 30 non-volatile compounds. The leaves also used often eaten raw or as flavoring agents in preparations of traditional food items. This review article provides the botany and nutritional importance of the herb.

Key words : *Plectranthus amboinicus*, Lamiaceae, Nutritional values, Food additives.

Introduction

Plant-based medicines are very commonly used these days in different types of public health sectors because of their high safety and cost-effectiveness. (Bodner and Gereau, 1988). Traditional practices like Siddha, Ayurveda, folk, Unani, etc have a huge plant-based medicinal approach. Research survey made by WHO, 80 percent of the people on the world is depending on the traditional treatments till now, as they are easily accessible from the ecosystem (Brown and Grenada, 1997; Khan, 2013). The ongoing research on drugs is remarkably inclined towards the compounds and products originating from natural plant sources thereby synthesizing drugs chemically. Currently, many pharmaceutical companies are highly dependable on such plants and products to unravel unidentified plants to explore properties significant for medicinal purposes (Jain and Lata, 1996; Prudent *et*

al., 1995; Khare *et al.*, 2011; Mohanty *et al.*, 2014). The species of plants that belong to the Lamiaceae family are attributed to high commercial significance. The important genera of this family include *Plectranthus*, *Ocimum*, *Mentha*, and *Salvia*. These genera are known for high ethnobotanical benefits. Across the globe, over 300 species of *Plectranthus* are identified (Kumara *et al.*, 2012). It has been reported from the literature survey that *Plectranthus* has very high therapeutic significance. Their horticultural and nutritional characteristics are related to its essential oil-producing property and its aromatic nature.

Botanical Description

Taxonomy

Plectranthus amboinicus (Loureiro) Sprengel belongs to family Lamiaceae and subfamily Nepetoideae. This plant includes about 300 species of subshrubs, annual or perennial. Most of these are succulents (Wagner and

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Lorence, 2016). *P. amboinicus* is of massive significance among its other members as it is an aromatic and a medicinal succulent plant. This plant is regarded for the peculiar smell from its leaves which has very small, uprising soft hairs.

Morphological Features

Plectranthus amboinicus is suggested as a succulent shrub with climbing or creeping habit. Among its wild varieties, the height is reported to be more than 1 m with a width surpassing over 1 m. These are quite fleshy and have a high aroma. The length of the stem reaches up to 30-90 cm and possess tough hairs (Wagner and Lorence, 2016). The morphology of Leaves is detailed as simple and quite thick. The leaf is ovate to suborbicular and has a blunt tip. A very high number of glandular hairs are seen on the lower surface of the leaves. These hairs present give a fostered appearance. (Roshan *et al.*, 2010; Kumara *et al.*, 2011). Leaves are aromatic with a pleasant smell and have a very nice taste. The color of the flower is dull purplish. They are located at the short stem that has a short pedicel and has a dense whorl. The shape of the calyx is bell-shaped; throat has two smooth lips. The lower lip has four small teeth and the upper lip is thin and ovate. A dull purple-colored corolla which is more than four times bigger than calyx which has a tubular structure with a short lip is present (Steam, 1992; Roshan *et al.*, 2010). The color of fruit nutlets is light brown with a length of 0.7 mm and a width of 0.5 mm. They are smooth. It is very difficult to collect the seeds and flowers of these plants (Steam, 1992).

Origin

Wild Relatives and Geographical Distribution

Plectranthus is a word that is derived from Greek, “plectron” which means spur, and “Anthos” which means flower. This name is regarded with the presence of flowers which are spur-shaped in most of the plants belonging to this genus (Steam, 1992). There is no detailed and accurate knowledge of the external features to form a distinction between species of the genus *Plectranthus* many problems for taxonomic naming lead to improper placement of species of very closely related genera like *Englerastrum* *Coleus* and *Solenostemon* (Morton, 1992). Initially, *P. amboinicus* was categorized in the genus *Coleus* and later it was put under the genus *Plectranthus*, however, both the named can be seen in literature there are many synonyms used against this species (Morton, 1992). The revision in the taxonomy of *plectranthus* has been done but at the regional level and therefore a massive misunderstanding has piled up on the same species (Mohanty *et al.*, 2014). The plant *P. amboinicus* grows

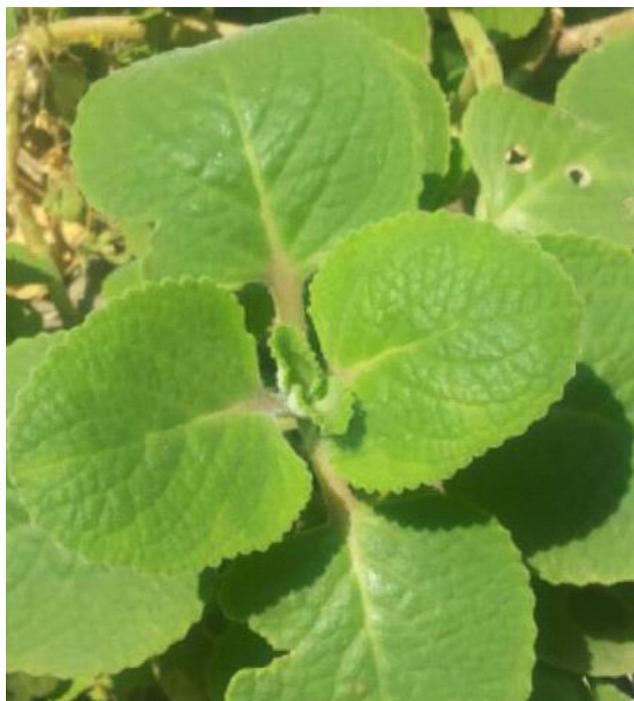


Fig. 1: *Plectranthus amboinicus* plant.

very fast and propagates by stem cuttings. Since the plant sets seed rarely, the vegetative form of propagation is also seen (Staples and Kristiansen, 1999). The plant adapts well in different temperatures when grown in the pot (Steam, 1992). The watering of the plant should be done sparingly. The optimal growth of *P. amboinicus* organic-rich soil, high humidity, and a neutral pH is required. Henceforth, the growth of this plant is easy indoor and thus is a common plant in the homes of northern Europe.

Nutritional Values

The health benefits of a lot of herbal plants are associated with nutritional content. (Lukhoba *et al.*, 2006; Rout *et al.*, 2012). Hence, *P. amboinicus* is a very significant source for compounds that help in increasing the taste and the shelf life of the food. According to the research, a high concentration of minerals like calcium and potassium is present (Lukhoba *et al.*, 2006). These minerals confer huge health benefits by improving the strength of bones and optimize the function of some vital organs like kidney, heart, nerves, and muscles. The iron content in *P. amboinicus* is quite significant at 0.262%. Hemoglobin contains iron and helps the RBC's to carry the oxygen to all parts of the body. Approximately, two-thirds of the iron is constituted by hemoglobin and the deficiency of which causes anemia. Moreover, the plant also contains zeaxanthin is, neoxanthin, leptin, violaxanthin, and carotene. Therefore, *P. amboinicus* can be regarded as a very potent supplement in diet ((Lukhoba *et al.*,

2006; Swamy and Sinniah, 2015).

Use as a Food Additive

To increase the taste and aroma of food, *P. amboinicus* leaves which have a pleasant aroma is used in cooking. In the food trade, this herb is considered as a substitute for oregano. The leaves are especially used during marinating and stuffing the food (Purseglove, 1987) and for flavoring dishes of meat for example lamb, chicken, and beef (Bodner and Gereau, 1988; Brown and Grenada, 1997). For enhancing the taste of smell by negating out the smell of meat with a strong oregano-like flavor is a very common practice. Even in the seafood's like shellfish and fish, it is used to remove the smell (Mohanty *et al.*, 2014). *P. amboinicus* in modern days is used in dishes which has containing tomato sauces (Lukhoba *et al.*, 2006; Mohanty *et al.*, 2014). The raw leaves are often taken with bread in countries like India. These leaves can also be used as a flavouring agent in wine and beer (Morton, 1992; Sandhya *et al.*, 2011). The small and young leaves are crunchy for chewing and have an astringent taste.

Ornamental and Other Social Uses

Plectranthus amboinicus is popularly used for decorations at home by hanging it in attractive baskets as it has a heart-shaped appearance and a very fresh odor is felt upon touching (Mohanty *et al.*, 2014). This plant has a version that has white-edged leaves called "Variegata" is highly attractive as an ornamental plant, more particularly when hanged in the basket or used as a garden border. The plant has a unique ability to show resistance against diseases and can withstand drought by retaining water as it has succulent leaves. The maintenance is quite easy and appears to grow quite beautifully. It is a very popular plant in residential places like home not just because of its nutritional or medicinal value but because of beauty. To remove the body's smell and replace it with fresh smell, the leaves are rubbed on hairs, hands, and bodies (Morton, 1992; Retief, 2000; Swamy and Sinniah, 2015). The essential oils from these plants are used for aromatherapy by health workers. The leaves are mixed with sugar in amazon which behaves as an intoxicant (Prudent *et al.*, 1995). In places like Martinique and Tonga, the leaves are used in perfumes and cleaning textiles (Mohanty *et al.*, 2014; Prudent *et al.*, 1995). In some communities, *P. amboinicus* is used for religious and spiritual by offering spirit when new houses are built. (Morton, 1992; Purseglove, 1987).

Conclusions and Recommendations

Plectranthus amboinicus is a vital plant for

maintaining improved health as it has potential aromatic medical herb when packed with many nutrients and bioactive constituents and thus confer health benefits. The plant has very vast biological significances as it has shown an effective cure for cardiovascular, oral, respiratory digestive urinary, and skin disuses. These biological characteristics are regarded with the essential oils and a wide range of bioactive compounds from the plant. It can be believed that the future of global demand for cost-effective and safer bioactive molecules can be met by these plants. Perhaps, increased research can be done for the identification and isolation of compounds for authentic and effective interpretation from *P. amboinicus*. The research of Phyto-compounds for many compounds is authenticated and established but some of the bioactive molecules and their activity in vivo using model organism is suggested with only a few compounds'. Even till now, there is no scientific proof available for the safety aspect of humans, though it is popularly used in folk medicine. Going ahead, intensive research can be aimed to unleash the potency of these isolated compounds for treating illnesses related to humans.

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