A Review on Endangered Medicinal Plant *Nardostachys jatamansi*: An Important Himalayan Herb

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ABSTRACT

*Nardostachys jatamansi* DC is a well-known medicinal and fragrant plant. It is used as an Ayurvedic medicine that can be found in a wide range of formulations. Details about medicinal plants can also be found in the Quran, the Bible, and other texts. Mental weakness, skin disorders, digestive problems, epilepsy, hysteria, and syncope have all been treated with this plant. The *N. jatamansi* root and rhizome extracts are used to treat a variety of neurological problems, including anxiety. Jatamansone, Sesquiterpenoid, Spirojatamol, patchouli alcohol, Jatamol-A and nardostachone are some of the most prominent phytochemicals found in *N. jatamansi*. Anticonvulsant, antispasmodic, antibacterial, antipyretic, antifungal, antidote, antiemetic, and analgesic are only a few of the therapeutic properties found in *N. jatamansi* components and phytochemicals. *N. Jatamansi* is expected to play a significant role in the rapidly growing field of herbal products and the management of potential health issues. This article discusses some of the plant’s main ingredients, biological activities, and medicinal properties that can be used to treat a variety of diseases.

Keywords: *Nardostachys jatamansi*, conservation, roots and rhizome, Chemical constituents

INTRODUCTION

*N. Jatamansi* is a perennial, aromatic, herbaceous plant with a height of 10-60 cm. Rhizome of the plant is small, grey, woody and coated with the reddish-brown, tufted, fibrous remains of dead leaves’ petioles (Pant et al., 2021a). The leaves of the plant are rosette-shaped, *lanceolate* (Naya et al., 1988). Light purple flowers with a campanula shape. The *N. jatamansi* species from August through September blooms. The plant species has been employed in Ayurvedic and Unani treatment for the time of many years ago (Nautiyal et al., 2003). The main commercial portion of the plant is root and rhizome, which extracts have been utilised in over 26 Ayurvedic treatments and many other formulations (Airi et al., 2000; Sharma et al., 2016; Rautela et al., 2018). The rhizome of jatamansi is used in the manufacture of medicinal oils and oils have numerous properties as an aromatic additive to restore hair problems (Kirthikar et al., 1993). The plant’s roots are get to generate a necessary oil that has been proven to have antibacterial, antifungal, hypotensive, and anticonvulsant effects (Arora et al., 1958; Rao et al., 2005). Different Himalayan region photograph of the plant is shown in Figure-1.
HISTORICAL BACKGROUND

*N. jatamansi* plant has been used from ancient times for healing systems for ages. Since the Ayurvedic times in India, the plant has played an important function. It is also used as a medicinal system for other medicinal systems such as Unani in ancient Greek and Arab scripts, as well as ancient Egypt, Rome, and Islamic scripts. In Medieval European cuisine, *N. jatamansi* is frequently used to season meals, particularly as part of a spice blend. Hippocrates recommended a wine drink that was sweetened and spiced (Singh et al., 2013). The plant’s rhizomes were also utilised in Ayurvedic medicine as a bitter tonic, stimulant, antispasmodic, epilepsy treatment, and hysteria treatment (Jha et al., 2012). The plant has been used to make fragrances and dyes, and it is economically important.

DESCRIPTION OF THE SPECIES

*Nardostachys jatamansi* DC is the scientific name of plant.

**Family:** Caprifoliaceae  
**Synonyms:** *Nardostachys jatamansi* DC

**Nepali name:** Jatamansi, Bhulte, Jataman  
**Spikenard** is the English name for this plant.  
Jatamansi, Balchhad, and Bhulte are some of the trade names for this plant.
Table-1: Plant parts, different extracts and their biological activities.

<table>
<thead>
<tr>
<th>Plant Part</th>
<th>Extract</th>
<th>Activity</th>
<th>Reference</th>
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</thead>
<tbody>
<tr>
<td>Leaves</td>
<td>Crude extract</td>
<td>Constipation</td>
<td>Khan and Gilani, 2011</td>
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<td></td>
<td>Crude extract and subsequent fractions</td>
<td>Enzyme inhibition activity</td>
<td>Khuda et al., 2014</td>
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<td>Roots</td>
<td>Extract in dichloromethane</td>
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<td>Essential oil, methanolic chloroform and aqueous extract</td>
<td>Antioxidant activity</td>
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<td>Rhizome</td>
<td>Aqueous and methanoic extract</td>
<td>Anti-inflammatory activity</td>
<td>Shubhan et al., 2007</td>
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<tr>
<td></td>
<td>Oil and extract</td>
<td>Antioxidant activity</td>
<td>Pandian and Nagarajan et al., 2015</td>
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<tr>
<td>Whole plant</td>
<td>Hydrodistilled oil</td>
<td>Topical anti-inflammatory activity</td>
<td>Agnihotri et al., 2011</td>
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<td></td>
<td>Ethanolic extract</td>
<td>Anxiety</td>
<td>Yan et al., 2011</td>
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</tbody>
</table>

\textit{N. jatamansi} botany and taxonomy

Jatamansi is the most well-known of the herbs listed in the literature. The plant has several stems that are 15–45 cm long. Leaves are of two types, radical and cauline. Radical leaves are cordate–ovate, 2.5–8 cm, toothed or sinuate, long-stalked, while cauline leaves are few, small, entire, or lobulate (Bell, 2004). Flowers are white or tinged with pink and occur in flat-topped corymbose clusters on erect, nearly leafless peduncles. Flowers are unisexual; male and female flowers appear on different plants. The fruit is small, about 4 mm in length, coated and flavoured (Weberling et al., 1975). Corolla is funnel-shaped with five lobes. Fruits are crowned with a persistent pappus-like calyx. Flowering and fruiting occur from March-April. Seeds ripen in April-May. The oil is greenish in colour and has a terrible musk pod-like odor (Pradhan and Paudel, 2014).

OCCURRENCE AND DISTRIBUTION

The jatamansi species is found in subalpine to alpine environments. The herb grows best between 3300 and 5000 meters above sea level (Nayar et al., 1988). The \textit{N. jatamansi} plant is critically endangered and a few others are due to over-exploitation of the rhizome. Jatamansi production trials at three altitudes (low-1800 m, intermediate-2200 m, and natural environment-3600 m) using vegetative propagules and seedling transplantation procedures under various treatments (Nautiyal et al., 2003).

PHYTOCHEMISTRY

Both volatile and non-volatile components have been found in \textit{N. jatamansi}. Sesquiterpenes make up the majority of volatile chemicals, while nonvolatile extracts are dominated by sesquiterpenes, coumarins, lignans, alkaloids, and steroids (Chatterjee et al., 1997; Rastogi et al., 1990). Sesquiterpene was later discovered in abundance in both groups, with higher levels of accumulation. Jatamansone is a sesquiterpene that can be found in concentrations as high as 0.7 percent. The chemical contents of \textit{N. jatamansi} and discovered a new sesquiterpene acid, nardin as well as a new pyranocoumarin. Several coumarins were already discovered apart from these two (Hoerster et al., 1977; Rastogi, 1991; Singh et al., 2009). The roots of the jatamansi plant contain significant amounts of sesquiterpenes and coumarins, which are primarily responsible for the needed oil. This plant’s major secondary metabolite are dihydro jatamansin, jatamansinol, seselin, oroselone, nardostachyin, jatamansic acid nardosinone, jatamol A, jatamansinone, valeranal, spirojatamol. Actinidine is another alkaloid that has been discovered (Rucker et al., 1978; Rucker et al., 1993; Bagehi et al., 1990) (Table-1).

PLANT REPRODUCTION

According to Pant et al. (2021b), the plant will be cultivated in vitro concentration at the different concentrations of phytohormone (BAP, IBA, Kinetin and NAA). Seeds and rhizome cuttings can both be used to propagate \textit{N. jatamansi} with the former being the preferred method. Seeds treated with gibberellic acid (GA3) for 48 hours and rhizomes also treated with GA3 for 48 hours both show rapid germination. Sand: farmyard manure (1:1:1) media have been shown to be appropriate in October at lower altitudes and in May at higher elevations (Chauhan and Nautiyal, 2007).

BIOLOGICAL PROCESSES

Antioxidant activity: \textit{N. jatamansi} causes organisms to become more resistant to stress. Restraint stress (RS) is one of the most common stressors in experimental medicine. The outcome of \textit{N. jatamansi} on RS-induced alterations in several indices, along with the act of its
antioxidant activity rats were given different quantities of ethanolic extracts of \( N. jatamansi \), tracked by five days of immobilization stress. No clinical indication of toxicity was seen in rats given varying amount of NJE, and an in vitro investigation revealed NJE’s free radical scavenging capability, as indicated by its low IC50 value (Bhattacharya et al., 1999).

The antioxidant properties of \( N. jatamansi \) root aqueous extract were investigated. Haloperidol was given to male albino rats to induce catalepsy. However, all drug-treated groups showed a substantial reduction in cataleptic ratings and appear greatest reduction. (Lyle et al., 2009; Rasheed et al., 2010).

Nootropic: In both young and old mice, the ethanolic extract of \( N. jatamansi \) was given in different quantities; the extract improved remembrance in young mice, whereas in older animals, it restored age-related forgetfulness. As a result, \( N. jatamansi \) could be a beneficial drug in the treatment of dementia in the elderly (Joshi et al., 2006; Karkada et al., 2011).

Nervous system: In vitro activity of methanolic and successive water extracts of \( N. jatamansi \) and for in vitro acetylcholinesterase activity in the nervous system water extracts were appear to be fewer activity than other types of extracts like methanolic (Vinutha et al., 2007).

Antidepressant activity: Rats have given an alcoholic preparation of the roots of \( N. jatamansi \) DC. Serotonin (5-HT), 5-hydroxyindoleacetic acid (5-HIAA) nor-epinephrine (NE), dopamine (DA) were given to examine how they were affected. Acute oral administration of NE and DA did not affect the levels of 5-HT and 5-HIAA, but it significantly elevated the levels of 5-HT and 5-HIAA (Prabhu et al., 1994).

**MEDICINAL CHARACTERISTICS AND USES OF JATAMANSI**

The plant has been used since ancient times for various medicinal purposes, and it is a highly regarded healing system in Ayurveda (Bhatt et al., 2015). Only a few clinical trials have been carried out (Sahu et al., 2016). Because of its antioxidant properties, it takes action to boost memory and avoiding cell damage helps with anxiety and sleeplessness (Suriya et al., 2016). Purinima et al. (2015) describe that because of its antifungal and antioxidant properties, using Jatamansi oil on the skin improve infections and prevents aging. Jatamansi also promotes hair growth by increasing follicular size and lengthening the hair growth period. Hair growth can be enhanced by using Jatamansi oil Nakot et al., 2006. Hair can also benefit from jatamansi root paste, which helps to strengthen and grow hair (Gottumukkala et al., 2011; Patel et al., 2015) Many medicinal property is found in \( N. jatamansi \) plant oil is used to smooth, and healthy hair; cure disorder of illness, loss of balance, mental disorders, heart problem and many other various problems (Figure-2; Joshi et al., 2006; Razack et al., 2012; Jadhav et al., 2009).

![Figure-2: Different Pharmacological activities of \( N. jatamansi \) plant.](image-url)
N. Jatamansi has many benefits some are:

1. Anxiety: The herb jatamansi can help with anxiety symptoms. The imbalance of the body is the primary cause of anxiety. Anxiety symptoms can be alleviated with the use of jatamansi. This is owing to its Tridosha balancing property as well as a unique Medhya impact.

2. Epilepsy: Jatamansi is used to treat epilepsy symptoms. Epilepsy is known as Apasmara in Ayurveda. Seizures are a common occurrence in epileptic patients. A seizure occurs when the brain experiences aberrant electrical activity, which causes uncontrollable and rapid body movements. It is possible that this will result in unconsciousness.

3. Sleeplessness: Jatamansi can help you have a good night’s sleep. According to Ayurveda, it renders the nervous system sensitive, resulting in insomnia. Because of its balancing properties, jatamansi soothes the nervous system.


5. Healing of wounds: Jatamansi and its oil promotes rapid wound healing, reduce swelling, and restores the skin’s natural texture. The combination of Jatamansi oil with coconut oil aids wound healing and lowers inflammation.

6. Anti-Wrinkle Treatment: Wrinkles appear because of age, dry skin, and a lack of moisture in the skin. According to Ayurveda jatamansi and its oil aid to reduce wrinkles and boosting the skin’s moisture content. It also aids in the removal of excessive dryness, softens, and nourishes the skin.

7. Loss of hair: When applied to the scalp, jatamansi oil helps to reduce hair loss and encourage hair growth. This is owing to the fact that hair loss is mostly caused by an in the body. Jatamansi or its oil helps to prevent hair loss. It also encourages hair development and eliminates dryness (Pant et al., 2020)

8. Antidepressant: Because jatamansi extract has antidepressant properties, it may be good for persons who are depressed due to sleep disorders (Sahu et al., 2016).

9. Antihyperglycemic: In a rat model, the rhizome of jatamansi showed a significant antihyperglycemic effect.

10. Anticonvulsant: The roots of jatamansi increased the seizure threshold significantly.

11. Anticancer Agent: A 95 percent ethanolic extract of the roots of jatamansi was found to have a strong inhibitory effect on the proliferation of neuroblastoma cell lines in an in vitro research.

12. Internal uses: Jatamansi affects the digestive, circulatory, urinary, neurological, and skin systems, as well as the reproductive system.

13. Nervous system: Jatamansi primarily affects the nervous system. It is a tonic for the mind and body. It is known as bhutaghna or rakshoghna because it is effective in treating convulsions and pain, as well as epilepsy, hysteria, and syncope. The bulbous root, flowers are also used as a brain tonic in various conditions, and it is useful in memory loss. One of the best sedatives for headaches is jatamansi.

14. Circulatory system: Cardiac depressive and hypotensive medication for the circulatory system. The best drug for anasarca and hypertension is jatamansi.

15. Digestive system: It acts as an appetizer, digestive laxative, and cholagogue, and is beneficial during pregnancy. It possesses vataprashaman karma and is an analgesic and laxative. Jatamansi is utilised for loss of appetite, stomach distension, abdominal pain, and amoebiasis because of this karma. By acting as a cholagogue, it can also help with liver enlargement and jaundice.

16. Urinary system: It stimulates the kidneys and increases micturition, making it useful in the treatment of dysuria and cystitis.

CONCLUSION

This review presents all of the available information on this critically endangered medicinal plant species, highlighting the significant knowledge gap in key areas of its biology. N. jatamansi is a medicinal plant with a wide range of uses. It is a significant herb in Ayurvedic medicine. According to the current review, N. jatamansi possesses a wide range of biological activities, boosting its use. Because of its therapeutic characteristics, it is a very beneficial plant. N. jatamansi is a significant medicinal plant used in the Ayurvedic and Unani systems to treat a variety of ailments. The various animal experiments show a considerable influence on the various activities outlined in traditional treatises.
REFERENCES


