J. Biodivers. Conservation 9(3): 67-73 ISSN: 2457-0761 (online)
2025 http://www.aprfjournal.in

Review Article

Habit, Habitat, Distribution, and Cultivation of Sarpagandha (*Rauvolfia serpentina*): a Threatened Medicinal Plant of India

Bhagwati Prashad Sharma[1], Vikas Tailor[2], Tekameren Walling[3], Rajkumari Supriya Devi[4] and Kadambini Das[5*]

[1]Department of Botany, Sidharth Government College Nadaun, Himachal Pradesh, India

[2]Department of Biology, Swami Vivekanand Government Model School, Block Asind, Bhilwara, Rajasthan, India

[3]Department of Botany, Sao Chang College, Tuensang, Nagaland, India

[4]Ambika Prasad Research Foundation, Odisha, India

[5]University Department of Botany, Babasaheb Bhimrao Ambedkar Bihar University, Muzaffarpur, Bihar, India

*Email-Id: das.kadambini88@gmail.com; ORCID: https://orcid.org/0000-0001-5343-1363

DOI: https://doi.org/10.5281/zenodo.17070853

Article Details: Received: 2024-08-02 | Accepted: 2024-09-07 | Available online: 2024-09-08

Abstract: *Rauvolfia serpentina*, commonly known as Sarpagandha belongs to the Apocynaceae family. This plant is an important medicinal resource in Indian Therapeutic Systems and has various applications. Due to its widespread use, it is often extracted a lot from the wild, which has led to its status as a threatened species. Therefore, cultivation of this plant is more important than its continued extraction from its natural habitat. Keeping this in view, this study aims to compile information on its growth habits, habitat and cultivation methods. The findings of this study will be useful for cultivating *Rauvolfia serpentina* and will help in raising awareness about the need for sustainable use and conservation of this species.

Keywords: Medicinal plants, sustainability, threatened plants, over-exploitation, cultivation methods

Introduction

Rauvolfia serpentina, commonly known as Sarpagandha, belongs to the Apocynaceae family. It is an important medicinal plant in Indian therapeutic systems and has a variety of uses. Sarpagandha is a perennial undershrub native to the Indian subcontinent and East Asia (Raj and Lal, 2008). It has been a vital component of traditional medicine for centuries, particularly in Ayurveda, due to its therapeutic properties (Lobay, 2015). Sarpagandha is known for its reserpine content, an alkaloid used to treat hypertension, anxiety, and insomnia (Kamyab et al., 2021). Despite its medicinal significance,

Sarpagandha faces threats from overharvesting and habitat loss, leading to its classification as an endangered species (Figures 1-3).

Figure 1: Habit and habitat in wild

Figure 2: Habit and habitat in cultivated land

Figure 3: Flowers and fruits of Sarpagandha

The present study aims to provide an overview of the habit, habitat, distribution, and cultivation practices of Sarpagandha, emphasizing its significance and the need for conservation (Mishra et al., 2020).

Habit and Habitat: Sarpagandha is an erect evergreen plant that is woody and perennial typically growing to a height of 75 cm to 1 m. The leaves are lanceolate, pale green, and arranged in whorls of 3 to 5. They range in colour from light green to dark green and have a soft texture. The plant produces white and pink-coloured flowers with a long, narrow tubular corolla, indicating its adaptation for psychophilous pollination (Mishra et al., 2020). The flowers are arranged in cymes and are often white with a violet tint. The inflorescence features red pedicels and a calyx with a white corolla that may have red markings. The corolla is salver-shaped and cylindrical. The fruits are drupes, about pea-sized, and turn purple-black when ripe, with ovoid seeds. The roots are tuberous, stout that is pale brown and rarely branched (Mishra et al., 2020). This plant thrives in tropical forests, deciduous forests, and shady areas, primarily found in the lower regions of the tropical Himalayas, at an altitude of up to 1000 m above sea level. It prefers well-drained, humus-rich clay soil with a pH of 4 and requires high rainfall ranging from 250 to 500 cm and temperatures between 10 to 38°C (Mishra et al., 2020). During the field survey in Jharkhand and Odisha, the fourth author observed Sarpagandha near the *Shorea robusta* tree.

Distribution: The plant is widely found in tropical Himalayas and the lower hills of Himachal Pradesh, Uttaranchal, Jammu and Kashmir. It also grows at moderate altitudes in Sikkim, North Bihar, Uttar Pradesh, Bengal, Konkan, Assam, Odisha, Jharkhand, Andaman Islands and Deccan Peninsula, particularly along with the Western Ghats of Travancore. Its distribution is influenced by ecological factors such as climate, soil, and moisture (Mishra et al., 2020). In the Deccan region, it is often associated with bamboo forests (Mishra et al., 2020).

Cultivation: Cultivation practices are vital for the conservation of Sarpagandha, as these can help to alleviate pressure on wild populations and ensure a sustainable supply of this plant material (Mishra et al., 2020). Sarpagandha can be propagated through seeds, root cuttings, stem cuttings, and leaf cuttings, with seed propagation being the most common method (Figure 4). The seeds are typically sown in May, and the seedlings are transplanted to the cultivation field in August. The plant thrives best in frost-free tropical to sub-tropical climate with sufficient irrigation. Intercropping with soybeans and onions or garlic is also feasible in Sarpagandha plantations. The plant prefers slightly acidic to neutral soils, and clay-loam to silt-loam soils rich in organic content are ideal for commercial cultivation. Sarpagandha flourishes in hot, humid conditions and can be grown in full sun and partial shade. It is well-suited for tropical and subtropical regions and benefits from the seasonal monsoon rains.

The optimal temperature for growth ranges from 10 to 30ºC (Mishra et al., 2020). The nursery should be established in a partially shaded area with sufficient irrigation facilities. Propagation can be accomplished through vegetative including stem cuttings, root cuttings, root-stumps, and leaf cutting (Mishra et al., 2020). Organic manures such as, Farm Yard Manure (FYM), vermicompost, and green manure etc. can be utilized based on the specific needs of the species. To prevent diseases, bio-pesticides may be prepared from ingredients such as neem (including kernels, seeds and leaves), Chitrakmool, Dhatura and Cow's urine (Mishra et al., 2020). This plant thrives in regions receiving at least 150 cm of rainfall. During periods of high temperatures and low rainfall in the rainy season, regular irrigation is essential. It is recommended to provide 15 to 16 irrigations, which translates to watering every 20 days in summer and every 30 days in winter. Harvesting occurs 18 months after planting, specifically in December when the plant sheds its leaves. About 8-10 days before uprooting, the crop should be irrigated, and the above-ground foliage should be cut before the roots are unearthed. The roots must be cleaned, washed, and then dried in shade. Care should be taken to avoid damaging the outer bark of the roots, as it contains the highest concentration of alkaloids (Mishra et al., 2020).

Conservation Status and Future Prospects: Sarpagandha is classified as an endangered species due to overharvesting, habitat loss, poor reproduction (low seed viability and poor rates of seed germination and vegetative propagation), and lack of cultivation methods. The roots of the plant are the primary source of reserpine, which has led to extensive harvesting of these, threatening the plant's survival. To protect Sarpagandha and ensure its continued availability for medicinal purposes, conservation efforts such as cultivation and sustainable harvesting practices are essential. Additionally, research into the plant's ecological requirements, genetic diversity, and breeding programs can contribute to its conservation and sustainable utilization.

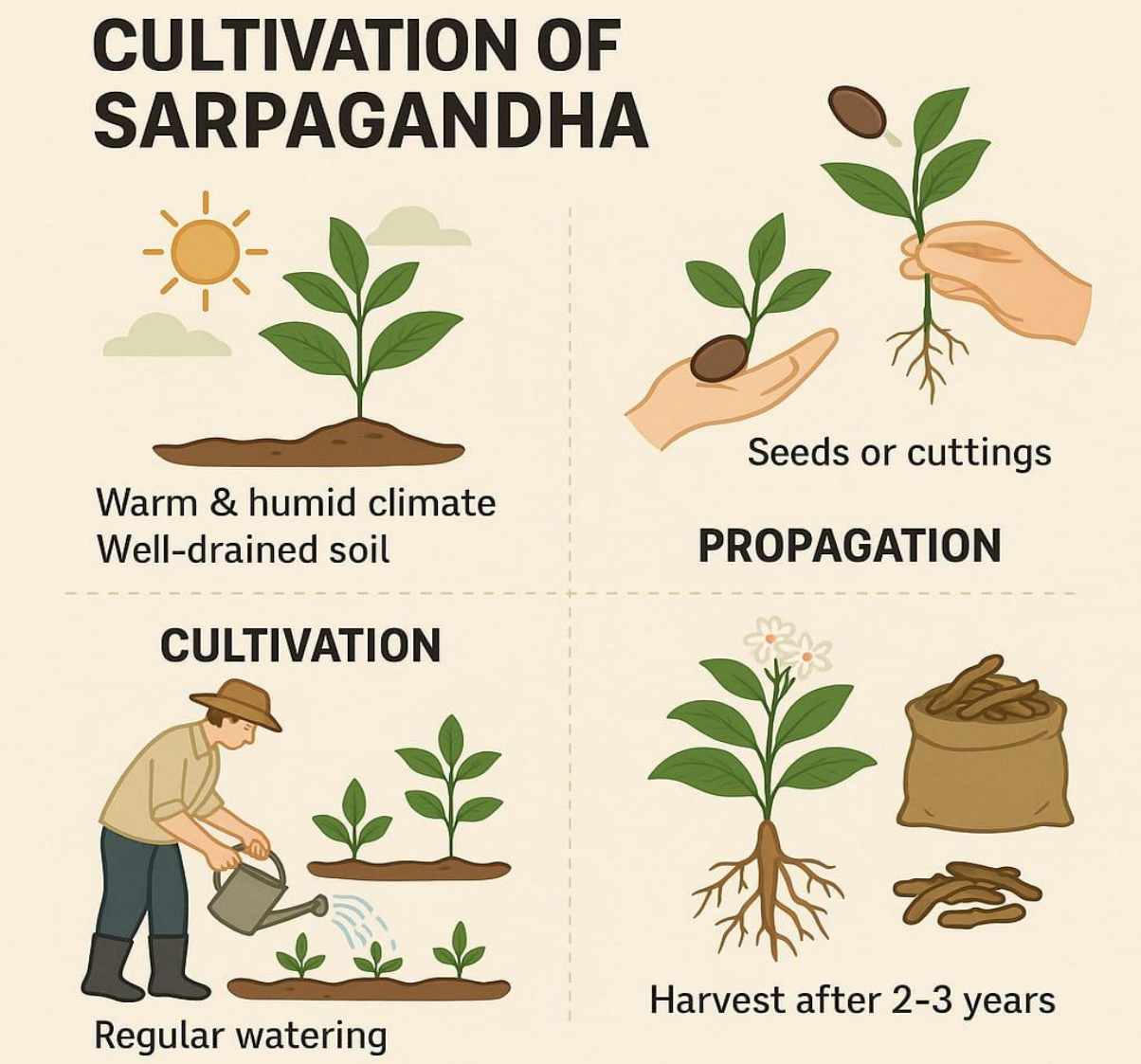

Figure 4: Step wise illustration on cultivation of Sarpagandha

Conclusion

Sarpagandha is a valuable medicinal plant with a rich history of traditional use. Understanding its characteristics, habit, habitat, distribution, and cultivation practices are essential aspects of its conservation and sustainable utilization. Efforts to protect Sarpagandha and promote its cultivation can help ensure the long-term availability of this important plant species. By recognizing the significance of Sarpagandha and taking steps to conserve it, we can preserve the medicinal and ecological benefits it provides for future generations.

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