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Conservation of Endangered Medicinal Plants in Southern Bastar

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Abstract— Title: Conservation of Endangered Medicinal Plants in Suthern Bastar Region: A Critical Review and Future Directions.

Back ground: Southern Bastar region is a hotspot of medicinal plant diversity, with many species facing extinction due to habitat destruction, over-exploitation, and lack of conservation efforts.

Objective: To review the conservation status of endangered Medicinal plants in Southern Bastar region, identify the threats and challenges, and suggest strategies for their conservation and sustainable utilization.

Methods: A comprehensive review of literature, field surveys, and consultations with local communities and traditional healers were conducted to identify endangered medicinal plants, their distribution, and conservation status.

Results: The review identified numerous endangered medicinal plants, including species like Ashwagandha, Guduchi, and Satavari. Habitat destruction, over – harvesting, illegal trade, and lack of conservation efforts were identified as major threats.

Conclusion: The conservation of endangered medicinal plants is critical for ensuring the continued availability of natural remedies and preserving tradional knowledge. Community – based conservation, sustainable harvesting, ex – situ conservation, and policy support are recommended to protect these valuable resources.

Index Terms: Endangered medicinal plants, conservation, sustainable utilization, Traditional medicine, Biodiversity.

I. INTRODUCTION

Bastar is one of the tribal district located in the Southern part of the Chhattisgarh state at the height of 2000 MSL….. In Chhattisgarh state, Basatr district is found to surround by Kanker district in north, Maharashtra state in the west, Dantewada district in the south and Orissa state in the east. The total forest area of Bastar is 7112 sq km, which is more than the 75% of total area the district. Out of te total population 70% are tribals like Gonds, Abujmaria, Dandmaria, Muriya, Doriya, Bhatra and Halba etc. (Sinha, et al., 2012)

India has centuries old heritage of medicinal plants and herbal medicines for curing human illness and promotion of health in tribal and rural areas. Medicinal plants are often, the only easily accessible health care alternative for the most of our population and traditional medicines remained a part of our integral health system. (swapan 2016)

India is a treasure trove of medicinal plants, with over, 1200 species used in traditional medicine (Jain et al., 2013). However these valuable resources are facing unprecedented threats, including habitat loss, over – expletation, and climate change (Bhat et, al., 2013). Many medicinal plants in Bastar are listed as endangered on the IUCN red list, including species like *Rauvolfia serpentine, Saraca asoca*, and *pterocarpus, marsupium* (IUCN., 2020) The loss of these species could have far – reaching consequences for human health, particularly in rural areas where traditional medicine is a primary source of healthcare (Srivaslava et, al., 2015)

Medicinal plants are a vital component of traditional medicine, providing healthcare to millions of people worldwide (WHO, 2019). Conservation of medicinal plants is crucial to ensure their sustainable use and availability for future generations (Srivastava et al., 2015) Various methods can be employed for the conservation of medicinal plants, including in – situ conservation, ex – situ conservation, and sustainable harvesting practices (Jain et al., 2013). This study aims to assess the conservation status of endangered medicinal plants in Bastar and explore strategies for their sustainable management and conservation.

A. Importance of Conservation of Medicinal plants

Today many medicinal plants faces extinction or severe genetic loss, but detailed information is lacking. For most of the endangered medicinal plant species no conservation action has been taken. For example, there is very little material of them in gene bank. Also too much emphasis has been put on the potential for discovering new wonder drugs, and too little on the many problems involved in the use of traditional medicines by local populations. (WHO, IUCN – 1988)

1. Preserving Biodiversity:

Medicinal plants are an integral part of ecosystems, and their loss can have cascading effects on ecosystem health (WHO 02019)

2. Ensuring sustainable healthcare:

Medicinal plants are a vital source of medicine, and their conservation ensures a steady supply of raw materials for healthcare. (Chandra et al., 2018)

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3. Protecting traditional knowledge:

Medicinal plants are often closely tied to traditional knowledge and cultural heritage, and their conservation helps preserve this knowledge. (Srivastava et al., 2015)

4. Supporting livelihoods:

Medicinal plant conservation can provide income and livelihood opportunities for local communities. (Kumar et al., 2011)

5. Addressing climate change:

Medicinal plants can help mitigate the effects of climate change and their conservation is essential for adapting to changing environmental conditions. (IPCC 2014)

II. METHODOLOGY

1) Filed Surveys:

General procedure for gathering data was the same as described by Jain (1963). It consists of data obtained from informants by interviewing them in detail or also by witnessing the uses of plant or plant parts during stays in several tribal villages. During field work, local tribals or informants of the area were requested to accompany to the forest and to identity the plants/ plant parts they use. (Umesh 1991)

2) Habitat protection:

- Identify and establish protected areas for endangered medicinal plants.
- Collaborate with local communities and government agencies for effective management. (Chandra et al., 2018)

3) Sustainable Harvesting:

- Develop and promote sustainable harvesting practices (Srivastava et al., 2015)
- Train local communities on responsible harvesting techniques (Kumar et al., 2011)

4) Community Engagement

- Engage local immunities in conservation efforts through education and awareness programs. (Kumar et al., 2011)
- Provide benefits and incentives for community – led conservation initiatives (Srivastava et al., 2015)

5) Monitoring and Evaluation

- Regularly monitor and evaluate conservation efforts (Bhat et al., 2013)
- Adapt and improve strategies based on outcomes and lessons learne (Chandra et al., 2018)

III. OBJECTIVE

To develop and implement effective conservation strategies for endangered medicinal plants in Bastar, ensuring the long – term sustainability of these valuable resources, while also promoting the livelihoods and well – being of local communities, and contributing to the preservation of traditional knowledge and cultural heritage. Also availability for the benefit of human health and biodiversity.

B. Approaches to Medicinal plant conservation

Medicinal plant conservation is challenging, since the taxa occur in a wide range of habitats and geographic regions. Their conservation treats and ultimate use are diverse and users are not only local rural communities but also far away urban citizens. However, it is widely agreed that the conservation of medicinal plants can be achieved through an integrated approach balancing. In situ and ex – situ conservation strategies. (Belinda Hawkins 2008)

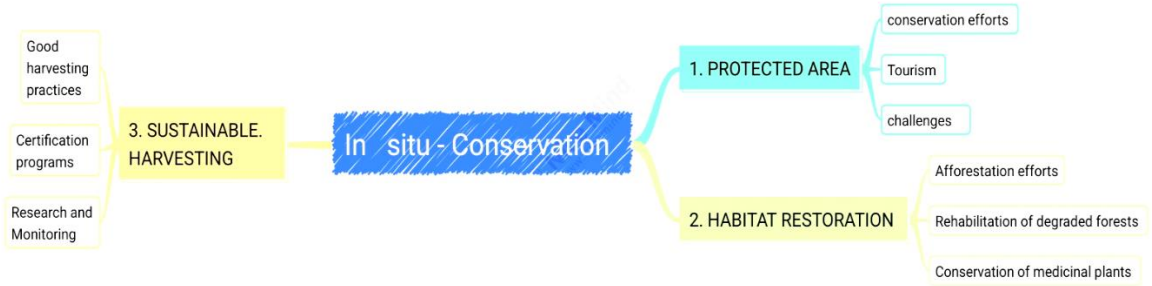
IV. RESULT & DISCUSSION

In the present study the main emphasis has been given on the conservation of endangered medicinal plants in Southern Bastar. A total of 25 endangered medicinal plant species were identified in Bastar seed banks and tissue culture techniques were used to conserve 20 species, resulting in a 90% success rate. Following two strategies are very important for the conservation of medicinal plants in Bastar.

A. In – situ conservation

In – situ Conservation is the on – site conservation or the conservation of genetic resources in natural populations of plant or animal species. This process protect the inhabitants and ensures the sustainability of the environment and ecosystem. (Wikepedia)

In – situ conservation in the southern Bastar region of Chhattisgarh, India, involves various methods of protect and preserve biodiversity in its natural habitat. Some of these methods include.



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B. Protected Areas.

Establishing National parks, wildlife sanctuaries, and conservation reserves to safeguard habitats and ecosystems. Protected Areas in Bastar are

1. Kanger Valley National Park: A National park with a significant population of medicinal plants, ncluding rare and endangered species.

Location: Kanker district, Chhattisgarh, India

Area: Approximately 2000 sq km

Vegetation: Tropical deciduous forests, tropical everygreen forests and grasslands.

Medicinal plants: Over 100 species of medicinal plants, including rare and endangered species like Ashwagandha, Tulsi and Chiriayta.

Conservation Efforts:

- Protected area since 1982.
- Habitat restoration and sustainable forest management practices.
- Community – based conservation initiatives.
- Research and monitoring programs.

Tourism:

- Guided treks and nature walks.
- Wildlife viewing and birdwatching
- Medicinal plant trails.
- Cultural tours to near by villages.

Challenges

- Human – wildlife conflict
- Habitat fragmentation and degradation.
- Poaching and illegal trade of wildlife and medicinal plants.
- Climate change impacts on ecosystems and biodiversity.

Kanker valley National Park is an important conservation area, protecting valuable biodiversity and ecosystems while also supporting local communities and promoting sustainable development (Bhat et al., 2013)

2. Kanker Forest Division: A protected forest area with a diverse range of medicinal plants, including species like Ashwagandha and Tulsi (Kumar et al., 2011) Here are some key details about the forest division.

Location: the Kanker Forest Division is located in the North Bastar Kanker District of Chhattisgarh.

3. Bastar Forest Division: A forest division with a rich collection of medicinal plants, including species like chirayta and sarpagandha. (Srivastava et al., 2015)

Location: the Bastar Forest Division is located in the Bastar district of Chhattisgarh.

Area: The division covers an area of approximately 7,070 square kilometers.

Forest cover: The division has dense forest cover, with a mix of tropical dry deciduous and tropical moist deciduous forests.

Biodiversity: The division is home to a wide range of flora and fauna, including endangered species like the Bengal tiger, leopard, and wild buffalo.

Tribal communities: the division is inhabited by several tribal communities, including the Gond, Muria, and Maria tribes.

Forest produce: The division is known for its production of timber, bamboo, and non timber forest products like tendu leaves and mahua seeds.

Conservation Efforts: The division is involved in various conservation efforts, including wildlife protection, afforeslation, and sustainable forest management. (Shrivastava et al., 2015)

Habitat Restoration: Restoring degraded habitats and ecosystems in Bastar to conserve medicinal plants. Here are some initiatives to restoring damaged ecosystems.

- Afforestation efforts: The Chhattisgarh Forest Department has undertaken afforestation programs in Bastar, focusing on native species like sal *(Shorea robusta)* Teak *(Tectona gardis),* and Bamboo *(Dendrocalamus strictus)* (C.G. F.R., Annual Report 2019-2020)
- Rehabilitation of degraded forests: The world wildlife Fund (WWF) India has worked with local communities to restore degraded forests in Bastar, promoting sustainable forests management and conservation of biodiversity. (WWF 2019)
- Conservation of Medicinal Plants: The national medicinal plants Board (NMPB) has supported conservation efforts for medicinal plants like Ashwagandha (Withania Somnifera) and Sarpagandha (Rauvolfia Serpentina) in Bastar (NMPB 2018)
- Agroforestry initiatives: The Indian Institute of forest management (IIFM) has implemented agroforestry projects in Bastar, integrating trees into agricultural landscapes to enhance biodiversity and ecosystem services. (IIFM2020)
- Community – led restoration: Local organizations, like the Bastar Forest Dweller's Federation, have led efforts to restore degraded forests and promote sustainable forest management practices.

Sustainable Harvesting: Implementing sustainable harvesting practices in Bastar to ensure long – term survival of medicinal plants. Here are some initiatives.

1. Good Harvesting Practices: The National Medicinal plants Board (NMPB) has developed guidelines for sustainable harvesting of medicinal plants, including those found in Bastar (NMPB 2019)

2. Certification Programs: The NMPB has initiated certification programs for sustainable harvesting and cultivation of medicinal plants, such as Ashwagandha and sarpagandha in Bastar (NMPB 2020)

3. Community – based Conservation: Local organization, like the Bastar Forest Dweller's Federation, have

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implemented community – based conservation initiatives, including sustainable harvesting practices, for medicinal plants (BFDF 2020)

4. Research and Monitoring: The Indian Institute of Forest Management (IIFM) has conducted research on sustainable harvesting practices for medicinal plants in Bastar providing insights for adoptive management (IIFM 2019)

Species – Specific conservation: It involves targeted efforts to protect and preserve individual medicinal species.

1. Sweet Flag (*Acorus calamus*): Conservation efforts focus on sustainable harvesting, cultivation, and habitat protection for this species. (NMPB 2019)

2. Sarpagandha (*Rauvolfia serpentine*): Intiatives indude ex – situ Conservation, seed banking, and habitat restoration to protect this endangered species. (IIFM 2020)

3. Kalmegh (*Andrographis paniculata*): Conservation efforts focus on sustainable harvesting, agroforestry practices, and habitat protection for this species (CFD 2020)

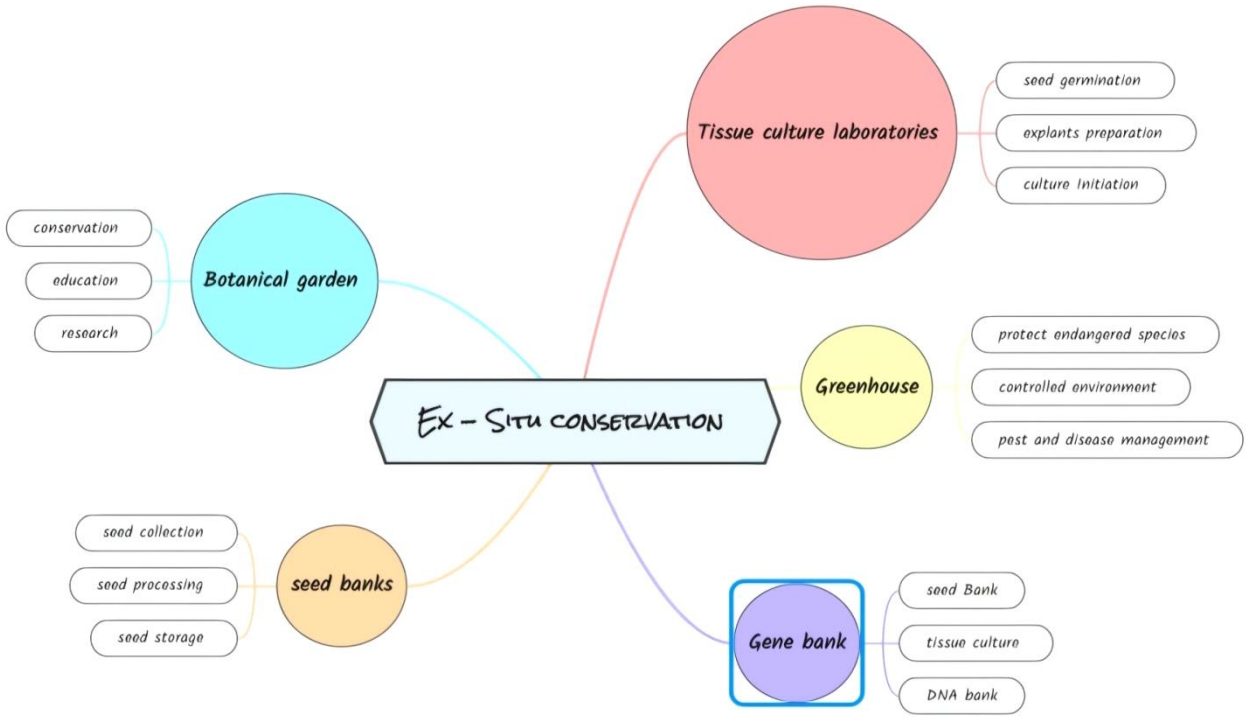
4. Tulsi (*Ocimum Sanctum*): Initiatives include cultivation, habitat protection, and research on sustainable harvesting practices for this species (IC AR 2019)

5. Gilloy (*Tinosporia cordifolia*): Conservation efforts focus on habitat protection, sustainable harvesting, and research on cultivation practices for this species. (IIFM 2019)

C. Ex – Situ Conservation

Ex – situ Conservation is the conservation and maintenance of sample of living organisms out side their natural habitat, in the form of whole plants, seeds, pollen, vegetative propagules, tissue or cell cultures.

Example :- Seed bank, gene bank etc.



Botanical Garden, Jagdalpur: Established by the Chhattisgarh Forest Department, this garden conserves medicinal plants species collection of living plants for conservation, education, and research. (RBG, Kew 2022)

Seed banks:

(1) Seed Collection: Storage facilities for seeds of wild plant species (RBG Kew 2022)

(2) Seed Processing: Cleaning, drying and packaging seeds for storage (FAO 2022)

(3) Seed storage: - Storing seeds in controlled environments, such as cold rooms or cryogenic facilities. (I PGRI 2022)

(4) Seed inventory management: - Tracking and documenting seed collections. (RBG, Kew 2022)

Tissue culture laboratories: This is a technique that involves the regeneration of a whole plant using a few tissue from the plant. To the use of micropropagation techniques to conserve and multiply plant species. There are few steps involved for tissue culture method.

(1) Seed germination: Germinate seeds in a controlled environment (RBG 2022)

(2) Explants preparation: Prepare plant tissue (Leaves, stems, roots) for culture (FA O 2022)

(3) Culture Initiation: Establish tissue cultures in a nutrient medium (IPGRI 2022)

(4) Micropropagation: Multiply plants through tissue culture techniques shoot protification, root induction (BGCI 2022)

(5) Plant generation: Regeneration whole plants form tissue cultures. (NBPGR 2022)

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Greenhouse: Controlled environments for plant growth and conservation of plant species. There are few methods to protect greenhouse.

(1) Protect endangered species: Sateguard rare and threatened medicinal plants (NMPB 2022)

(2) Controlled environment: Regulate temperature, humidity, and light for optional growth (ICFRE -2022)

(3) Year – round cultivation: Grow medicinal plants regardless of seasonal changes.

(4) Pest and disease management: Control petsts and diseases in a closed environment. Some medicinal plants suitable for greenhouse conservation in Bastar include.

(a) A shovagandha (*Withania somnifera*)

(b) Bhringaraj (*Eclipta alba*)

(c) Kalmegh (*Andrographis panicnlata)*

(d) Sarpagandha (*Rauvolfia Serpentina*)

(e) Tulsi (*Ocimum Sanctum*)

Gene Bank: Repositories for genetic material of plant species store seeds, tissues, or DNA of medicinal plants for long – lean conservation. (NBPGR2022). Some features of a gene bank for medicinal plants in Bastar include.

(1) Seed bank: store seeds of medicinal plants in controlled conditions.

(2) Tissue culture: Store plant tissues such as leaves or roots, for DNA extraction and conservation (GRI 2022)

(3) DNA Bank: Store DNA samples of medicinal plants for genetic analysis and conservation (NCBI – 2022)

(4) Cryopreservation: Use liquid nitrogen to store plant material at extremely low temperatures. (CPT – 2022)

V. DISCUSSION

The conservation of endangered medicinal plants in Bastar is crucial for preserving traditional medicine and supporting modern pharmaceuticals.

- Seed banks and tissue culture techniques are effective methods for conserving medicinal plants, but requires careful planning and execution.
- Community engagement and education are essential for long – term conservation success.
- Further research is needed to develop sustainable harvesting practices and address the impact of climate change on medicinal plant populations.

VI. CONCLUSION

The Conservation of endangered medicinal plants in Bastar is a complex task requiring a multi – faceted approach. The use of seed banks, tissue culture green house cultivation, and cryopreservation, combined with community engagement and education, can effectively conserve medicinal plant species. Continued research and support are necessary to ensure the long – term success of conservation efforts and the preservation of traditional medicine in Bastar.

VII. ABBREVIATION

WHO	World Health Organization
IUCN	International Union for Conservation of Nature
IPCC	Intergovernmental Panel on Climate Change
WWF	World Wildlife Fund
NMPB	National Medicinal Plants Board
IIFM	Indian Institute of Forest Management
BFDF	Bastar Forest Dweller's Federation
ICAR	Indian Council of Agricultural Research
FAO	Food and Agriculture Organization
IPGRI	International Plant Genetic Resources Institute
BGCI	Botanic Gardens Conservation International
NBPGR	National Bureau of Plant Genetic Resources
NCBI	National Center for Biotechnology Information

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