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METHOD FOR THE CONSERVATION OF RARE ENDANGERED AND THREATENED MEDICINAL PLANT SPECIES

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ABSTRACT

Herbal substance from medicinal plant are the world's most valuable, but they are disappearing rapidly. There has been evidence that indigenous and traditional medical practices have the potential to boost the immune system and alleviate a variety of deadly diseases (directly or indirectly). An analysis of world happenings, improvements, and prospects for strategy and methodology involved in the conservation and sustainable use of medicinal plant resources is provided in this article. At the state, national, or international level, there is limited information in the literature about endangered plants, including Indian medicinal plants. Our recommendation was to take into account both conservation strategies (such as in situ and ex situ conservation practices and cultivation practices) and resource management (such as good agricultural practices and sustainable use solutions) for the sustainable use of medicinal plant resources. The application of biotechnological approaches can increase yield and alter potency (for example, tissue culture, micropropagation, synthetic seed technology, and molecular marker-based approaches).

Keywords: Endangered plants, threatened medicinal plants, conservation, GAP.

INTRODUCTION

Various compounds derived from secondary metabolites of plants are incorporated in pharmaceutical, flavoring, agrochemical, fragrance, color, biopesticide, and food additive. There are various edible plant material/chemical that can be obtained from the plant world, including alkaloid, carbon compound, essential oil, resin, nitrogen, glycoside, hydrogen, tannin, and gum, among others. As an added bonus, most of these compounds are therapeutically effective. A pharmaceutical or therapy can be developed from them as a starting point. New medicines can be found in medicinal plants around the world. Around 118 of the top 150 prescription medications in the US are derived from natural sources, while 90% of the more than thousand three hundred medicinal plants used in Europe come from wild sources. Additionally, up to eighty percent of individuals in undeveloped country totally depend on herbal medicines for their basic healthcare, while approximately quarter of medications in many countries come from wild plant. [1].

Herbal medicines, natural health products, and plants' secondary metabolites have become more popular worldwide due to the rising demand for herbal medicine. Further, plant-based compounds are becoming harder to obtain as a result of increased competition for cultivable lands and increasing populations. Approximately 100 to 1000 times more plants are being exterminated today than would naturally occur, and we lose at least one major drug candidate every two years [2]. Globally, between 50,000 and 80,000 flowering plant species are used as medicines, according to the World Wildlife Fund and the International Union for Conservation of Nature. Habitat loss and overfishing have resulted in the extinction of 15,000 of these species. It has been recommended to

employ both in situ and ex situ conservation methods for their protection, as well as to construct systems for species inventorying and tracking their status. It is possible to conserve medicinal plants with diminishing supplies by sustainable use of wild resources.

We examine medicinal plants available around the world and ways to preserve them and use them sustainably on this page. Even though extinctions and habitat damage have been a growing concern for decades.

Reason for endangering and safe guard

Organizing both governmental and non-governmental organizations, it is called the International Union for Conservation of Nature (IUCN). Based on indicators of extinction risk, the IUCN's "Red List of Threatened Species" provides information on extinction risks and species distribution. IUCN classification identifies species based on quantitative criteria and assigns them a threat category, such as extinct, extinct in nature, critically endangered , endangered , vulnerable , near threatened , least concern , and data deficient . [3]. extinction among the 50–80 thousand flowering plants used for medicine. The factors contributing to this phenomenon are population growth, increasing consumer demand, overfishing, overharvesting, and habitat destruction. Moreover, 20% of the population has already reached the limit of their resources due to human consumption and population growth.

It is not the same all over the world to find medicinal plants. It is found in China and India that there are the greatest amounts of medicinal plants, followed by Colombia, South Africa, and the United States. Also, Chinese, Indian, Kenyan, Ugandan, Tanzanian, and Nepalese medicinal plants are thought to be at greatest risk of going extinct in the near future. Despite this, not all therapeutic species of these plants are affected equally by harvesting pressure. All of these factors are relevant to species rarity, yet they do not account for specie susceptibility to overexploitation, indiscriminate collection, or unchecked deforestation. Furthermore, some biological traits are associated with the likelihood of these plants becoming extinct. The range of distribution, species diversity, and growth rate are also considered in addition to habitat specificity, population size, reproductive system, and range of distribution.

Recent decades have seen an increase in the demand for therapeutic plants. North America, Europe, and Asia have experienced an increase in wild resource demand of 8–15% annually. As well, crossing a certain threshold irreversibly reduces the plants' ability to reproduce. Species endangered by climate change are being prioritized and conservation strategies are being developed by nations around the world. They also serve as a framework for policy decisions about conservation and multilateral agreements. Increasing human populations and anthropogenic activities have contributed to the "sixth mass extinction." Compared to background extinction rates, species extinction rates have increased a hundred- or thousand-fold. [4].

Initiatives by the Indian government

Besides these, there is no information available about how much botanicals are consumed by folk healthcare traditions that are not codified or commercial and which are primarily based on plant materials that are specific to a particular region or ecosystem. Approximately a million traditional healers and 140 million rural households use them. It is significant to note that 72% of the 242 species with high commercial demand (> 100 MT annually) are obtained from wild plants—roots, bark, wood stems, or the entire plant.

There is no disregard by the government for endangered medicinal plants. As a part of the Department of AYUSH (now Ministry of AYUSH), the Indian Government established the National Medicinal Plants Board (NMPB) in 2000 to investigate all issues relating to medicinal plants. NMPB has worked to protect and enhance medicinal plant species as well as promote their production on agricultural land to satisfy the ever-increasing demand for these plants. For the overall growth of the nation's medicinal plant industry, the NMPB, Ministry of AYUSH, is currently implementing the following two programs:

1. Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants
2. Centrally Sponsored Scheme of National AYUSH Mission (NAM)

By planting medicinal plants in their natural habitats and enhancing their resources through the Central Sector Scheme, as well as by establishing Medicinal Plant Conservation and Development Areas, herbal gardens are developed as ex-situ methods of conservation. In the NAM scheme, the Ministry of AYUSH is encouraging farmers to cultivate medicinal plants at large scale on their land to reduce the pressure on wild medicinal plants. In addition to subsidies, the Ministry of AYUSH covers 30%, 50%, and 75% of the cultivation costs for medicinal plants, including endangered species. [5].

Conservation strategies

Some strategies to conserve medicinal plants include:

1. Ex-situ conservation
2. In-situ conservation.

Ex-situ conservation:

A good complement to in situ conservation is ex situ conservation, especially for medicinal plants whose growth is slow, their abundance is low, and their susceptibility to disease affects replanting. Threatened species are protected by using this method away from their natural habitats. Additionally, it is possible to obtain replanting seeds from formerly wild medicinal plants that are grown in gardens far from their natural habitats to maintain their potency. There are two types of botanical gardens: botanical gardens and seed banks.

Seed banks

Botanic gardens do not effectively preserve the biological and genetic diversity of wild plant species as effectively as seed banks do. For the purposes of preserving natural populations, seed banks make it relatively easy for researchers to evaluate and test plant samples. [6].

Botanic gardens

Biological gardens play a vital role in ex situ conservation because they play a role in conserving rare and endangered species and ecosystems. By developing propagation, cultivation, domestication and variety breeding protocols, botanic gardens can contribute further to the conservation of medicinal plants. A diverse flora is present in the crops, both ecologically and taxonomically, as a result of a variety of species grown together under similar conditions. [7].

In-situ conservation:

In their natural habitats, medicinal plants produce secondary metabolites that cannot be expressed in cultures and can provide therapeutic properties. Our ability to preserve natural communities as well as native plants can be achieved by preserving whole communities in situ [8]. Worldwide, in situ conservation efforts have been focusing more on protecting areas and developing ecosystem-based conservation methods than species-based ones [9]. The success of in situ conservation depends on compliance with rules, regulations, and habitat requirements. The primary objective is to protect the natural habitat and ecosystem of an endangered species, while preserving its ecosystem at the same time. Nature reserves and wild nurseries are popular places for people to visit.

Natural reserves

There are some locations where medicinal plants are being destroyed or degraded because their habitats have been destroyed. By protecting important natural habitats, medicinal plants' habitats, ecosystem contributions, and medicinal functions can be conserved, assessed, and determined. Natural reserves protect and restore biodiversity. [10].

Wild nurseries

Natural wild plant habitats cannot all be designated as protected areas due to costs and competing land uses. In addition to creating wild nurseries in protected areas, natural habitats, or places nearby to their natural habitats, there are several ways to cultivate and domesticate endangered medicinal plants. Wild nurseries can provide an effective way to preserve medicinal plants from overexploitation, habitat degradation, and invasive species. [6].

Cultivation practices

Plant species are also protected by good agricultural practices (GAPs) in addition to ex situ and in situ conservation methods. In addition to using the right amount of water, nutrients, and optional additives, a variety of practices can boost yields and quality of target products. Despite the fact that wild plants tend to be more effective than those grown at home, the cultivation of medicinal plants at home is a common and widely accepted practice. It can aid in the treatment of problems such as poisonous components, pesticide contamination, and low levels of active compounds in medicinal plants. [12].

Growing attention has been paid to organic farming's ability to develop sustainable medicinal plant production systems that are integrated, compassionate, environmentally friendly, and economically viable. In order to be considered organic farming, pesticides, fertilizers, and herbicides must be absent from the crop. In addition to providing soil nutrients, organic fertilisers also enhance soil stability by facilitating medicinal plants' growth and synthesis of essential substances. [13].

Plant tissue culture

Medicinal plants threatened with extinction can also be preserved using tissue culture. By using tissue culture, it is possible to recreate a whole plant using only a few plant tissues. Traditional methods can be improved in a number of ways, including the following:

- The cultivation of disease-free plants
- Maintain genetic diversity among plant species.
- Reproduction rate of plants is higher
- Faster and year-round production

Somatic embryogenesis

Plant tissue or cell can produce somatic embryos that can be transformed into new plants through somatic embryogenesis. A number of medicinal plants have been treated successfully using this approach.

Cryopreservation

Cryopreservation involves storing cells and tissues in liquid nitrogen (-196°C), which stops cellular division, metabolic processes, and biochemical reactions. Plants can be regenerated from frozen cells here. Therefore, this method affords a better opportunity to protect endangered medicinal plant species, such as Rauvolfia serpentine, D. lanalta, and A. belladonna..

Others

Sustainable use of medicinal plants should be encouraged along with conservation strategies and good harvesting practices. Protecting medicinal plants that grow slowly and are in short supply is important. Tissue cultivators around the world rely on Plant Cell Technology for high-quality goods and services. There are a variety of media options available, including MS media, agar, gellan gum, Plant Preservative Mixture (PPM), culture containers, Biocoupler (TM), and masks for your convenience.

CONCLUSION

In spite of the existence of numerous guidelines for the preservation and sustainable use of medicinal plants, only a small fraction of these have been able to provide adequate protection for these plants by conserving them in natural reserves and botanical gardens. To ensure the availability of these priceless resources for future generations, researchers and policy makers will be able to create strategies for their effective conservation and cultivation.

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