



©Biotechnology Society



www.bti.org.in

ISSN 0974-1453

Review Article

***PITTOSPORUM ERIOCARPUM* ROYAL (AGNI) ENDANGERED MEDICINAL PLANT SPECIES OF UTTARAKHAND AND ITS CONSERVATION**

Prabhakar Semwal, Taranjeet Kapoor, Prashant Anthwal and Ashish Thapliyal*

Department of Biotechnology, Graphic Era University, Dehradun, India

Corresponding author: ashish.thapliyal@gmail.com

ABSTRACT: Nowadays many important medicinal plant species are at a higher risk of extinction because they provide unique active components that have high medicinal values. Increasing demand of these medicinal plant species for pharmaceutical industries, ornamental purpose and its use in traditional culture may endanger them and this may even lead to their extinction forever. In this article we focused on habitat, cause of endangerment and conservation methods of *Pittosporum eriocarpum*, an endangered medicinal plant species (listed in red data book, IUCN). According to WHO report, increasing demand of medicinal plants is expected to reach 5 trillion by the year 2050 in international market. So there are various opportunities for pharmaceutical industry. Our study focuses on conservation strategies regarding the plants habitat and suggesting a creative protocol for its collection, storage and number of medicinal plant species through which we can save or control its endangerment. We also suggest that alternate methods like using advanced biotechnological techniques such as protoplast culture and bioreactors should replace traditional ways of collection of herbal plants from their native habitat which is leading to their endangered status.

Key words: Extinction, pharmaceutical industry, ornamental, *Pittosporum eriocarpum*.

INTRODUCTION

Himalaya is one of the biggest hot spots of biodiversity in the world and offers immense opportunities in various fields of biological domains and associated patterns of sustainable life support systems (Gaur, 2004). The Indian Himalayan Region is well known to have a great range of plant diversity. This region alone supports about 18,440 plant species (Angiosperm: 8,000 spp., Gymnosperm: 44 spp., Pteridophytes: 600 spp., Bryophytes: 1,736. Lichens: 1,159 spp. and fungi: 6,900 spp. (Singh *et.al.*, 1997) According to Samant *et. al.* (1998), out of the total vascular plant species, 1,748 species are of medicinal uses. In India 7500 plant species are used for medicinal purpose out of 17,000 higher plant species (Shiva, 1996). World Health Organization has reported in a survey report that 25% of prescribed human medicines are derived from plants and 80% of the population in developing countries still depends on the traditional and folk system of medicine (Rawat, 2009).

According to WHO, the international market of herbal products is estimated to be US \$ 62 billion which is poised to grow to US \$ 5 trillion by the year 2050 with increasing popular demand for medicinal plants both, in Asia and internationally. This trade is expected to grow to 5 trillion by the year 2050. Aromatic

plants and their products particularly essential oils are also becoming more important. Traditional medicine at the present time is accepted as an alternative for the western medical practice in many countries. In India, demand of medicinal plants is estimated at US \$ 1 billion per years (Sharma, 2004). There are various well known medicinal plant species like *Ginkgo biloba*, *Bacopa monnieri*, *Withania somnifera* and *Acorus calamus* etc but there are some species whose potential is yet to be explored by the scientists. These species of plants are being used in various traditional medicines by the local peoples, one such species is *Pittosporum eriocarpum*.

Pittosporum is a genus of about 200 species in the *Pittosporaceae* family and *Pittosporum eriocarpum* is commonly known as Agni. The species has been categorized as an endangered species by the “International Union for Conservation of Nature” (IUCN, 1998 - Walter and Gillett) which is the world's main authority on the conservation status of species (Walter *et. al.*, 1998). This plant species has been recorded from Shastradhara (Dehradun) and Musoorie in the state of Uttarakhand (India) (Fig. 1). Dhan Singh and Ruchi Goel in 1999 have also reported the plant from Tehri district, Uttarakhand. To the best of our knowledge this species has not been reported from other district of Uttarakhand. It is found

in the form of shrub or small tree and grown on hot rocky slopes up to 2,400M. This plant species is widely used for the best fodder and preparation of traditional medicines, which are used widely in the treatment of narcotic, expectorant, bronchitis etc (Rawat *et. al.*, 2010).



Fig.1 Young Leaves of *Pittosporum eriocarpum* plant

The species can be artificially regenerated by sowing or layering. It is classified as a multipurpose species and is lopped for fodder, fuel wood, suitable for soil conservation and reclamation of degraded sites (Singh *et. al.*, 1999). Padalia *et al* in 2010 reported a case study of *Pittosporum eriocarpum* and geospatial multiple logistic regression approach for habitat characterization of scarce plant population. Important medicinal plants require necessary conservation efforts for protection and sustainable use. There are

already many important medicinal plant species comes under the category of endangered and hence if the exploitation rate is not controlled, it may extinct forever. This article is one of the efforts to increase awareness about the *Pittosporum eriocarpum* and its use.

Cause of Endangerment of *Pittosporum eriocarpum*

There is no one particular cause for endangerment, but many factors are responsible for triggering the endangerments of this plant species. One of the suggested causes is loss of its natural habitat, due to anthropogenic activities in this geographic region. As the human population grows, the more land mankind needs to comfortably survive. Unfortunately, as this improves the lives of humans, it threatens the survival of many plant species. Many news papers reported loss of natural plant habitat caused by an increase in wild fires. While other blame the global warming. As the temperatures rise, more wild fires appear. This causes many plant species to lose their natural habitat. Natural disasters also cause a plant to become endangered if it is distributed to a geographic location.

Other cause is its collection for multiple purposes. When the plants are collected for nurseries, floristic, drug developments etc their number decreases. Rare plants are at a higher

risk of extinction than other plants because of the unique beauty and higher medicinal values they offer. Plant collectors of rare plants are contributing to endangered species of plants. 95% plants in India are used for the medicinal preparation by the various industries and are harvested from wild population in India (Uniyal *et. al.*, 2000). Harvested shoots and leaves of medicinal plants may affect its photosynthetic rate as well as potential for survival and suitable propagation. A large part of human society living in a developed country totally depends on forest and forest products are also responsible for endangerment. An estimated 4,000 to 10,000 species of medicinal plants face potential local, national, regional or global extinction, with subsequent serious consequences for livelihoods, economies and health care systems (Hamilton, 2004).

Conservation of *Pittosporum eriocarpum*

Today we have various scientific methods by which we can conserve or protect these endangered medicinal plant species. The public is unaware about the current extinction crisis. Public awareness can be increased by education and social scientific program. Conservation education can be started from school level and may be enhance through camps or a journey to national and international parks/ Botanical gardens and museums.

Botanical gardens are playing a key role in the conservation of medicinal plants. These gardens contain plant collection for education, research and ornamental purpose.

Cultivation of valuable medicinal plants is one of the best techniques for its protection. We can also use classical methods like cutting, bulbs. Biotechnology tools like plant tissue culture techniques and clonal propagation can be used under biotechnological approaches for conservation of endangered species. Nowadays micro propagation is very popular method which is used for commercial, economical, rapid propagation and *exsitu* conservation of rare, endemic and endangered medicinal plants (Purohit *et. al.*, 1994, Sudha *et. al.*, 1996, Khan *et. al.*, 2009, Tasheva, 2012).

Biotechnology also used for maintaining genetic structure, modified genetic information, and gene expression to obtain new properties with increasing amount and valuable compounds (Butenko *et. al.*, 1999, Verpoorte, 1999, Tripathi *et. al.*, 2003). We can also use cryopreservation technique for germplasm conservation (storage of biological material at ultra low temperature, usually -196 °C for long time.)

CONCLUSION

Main conclusion of our study is that *Pittosporum eriocarpum* is already endangered in IUCN and its high medicinal values can attract everyone it may extinct forever. Most of the medicines derived from plants, and new transgenic approaches could be participate in production of other pharmaceuticals like vaccines, cancer drug and many other important supplements. The production of secondary metabolites can be enhanced using bioreactors. These metabolites play an important role in modulation of many disorders. Increasing demand of this important medicinal plant, lack of scientific knowledge, climate change and anthropogenic activities are responsible for its endangerment. But we can slow/stop these kinds of activities; we can save this or these types of many important medicinal plant species by using various biotechnological approaches. Immediate conservation strategy needs to be developing for these types of important medicinal plant species.

REFERENCES

- Butenko, R.G. (1999). Cell biology of higher plants in vitro and biotechnology. Moskva: FBK– PRESS 160. (In Russian)
- Gaur, R.D. (2004). Vegetational Diversity of Uttarakhand Himalaya and Scope of Regional Development. In Resource Appraisal, Technology Applications and Environmental Challenges in Central Himalaya. H.N.B Garhwal University, Srinagar. 2004.
- Hamilton, A.C. (2004). Medicinal plants, conservation and livelihoods. *Biodiversity and Conservation*. 13:1477-1517.
- Khan, M. Y., Saleh Aliabbas., Kumar, V., Shalini Rajkumar. (2009). Recent advances in medicinal plant biotechnology. *Indian Journal of Biotechnology*. 8: 9–22.
- Padalia, A., Bharti, R.R., Pundir, Y.P.S. and Sharma, K.P. (2010). Geospatial multiple logistic regression approach for habitat characterization of scarce plant population: A case study of *Pittosporum eriocarpum* Royal (An endemic species of Uttarakhand). *J. Indian Soc. Remote Sen.* 38: 513-521.
- Purohit, S.D., Dave, A., Kukda, G. (1994). Micropropagation of safed mulsi (*Chlorophytum borivilianum*), a rare medicinal herb. *Plant Cell Tissue Organ Culture*. (39):93-96.
- Rawat, V.S. and Rawat, Y.S. (2010). Indigenous knowledge and sustainable development in the Tones Valley of

- Garhwal Himalaya. Journal of Medicinal Plant Research. 4(19): 2043-2047.
- Rawat, V.S., Chandhok, A. (2009). Medicinal plants used by tribes of Uttarakashi District of Uttarakhand. Ind. J. Bot. Res. 5(3&4): 169–173.
- Samant, S.S., Dhar, U., Palni, L.M.S. (1998). Medicinal Plants of Indian Himalaya: Diversity Distribution Potential Values. Almora: G.B. Pant Institute of Himalayan Environment and Development.
- Sharma, A.B. (2004). Global Medicinal Plants Demand May Touch \$5 Trillion By 2050. Indian Express 2004
- Shiva, M.P. (1996). Inventory of Forestry Resources for Sustainable Management and Biodiversity Conservation. New Delhi: Indus Publishing Company.
- Singh, D.K. and Hajra, P.K. (1997). Floristic Diversity. In: Biodiversity Status in the Himalaya. Edited by Gujral. British Council, New Delhi, India, 23-38.
- Singh, D. and Goel, R. (1999). *Pittosporum eriocarpum* – an endangered species with its new distribution recorded from Tehri District. Annals of Forestry. 7(2): 185-197.
- Sudha, C.G., Seeni S. (1996). *In vitro* propagation of *Rauwolfia micrantha*, a rare medicinal plant. Plant Cell Tissue and Organ Culture. 44(3):243 – 248.
- Tasheva, K., Kosturkova, G. (2012). The role of biotechnology for conservation and biologically active substances production of *Rhodiola rosea* – endangered medicinal species. The Scientific World Journal, 13pages.
- Tripathi, L., Tripathi, J.N. (2003). Role of biotechnology in medicinal plants. Tropical Journal of Pharmaceutical Research. 2(2): 243–253.
- Uniyal, R.C., Uniyal, M.R., Jain, P. (2000). Cultivation of Medicinal Plants in India: A Reference Book. New Delhi: TRAFFIC India and WWF India.
- Verpoorte, R. (1999). Biotechnology and its role in pharmacognosy. 136-th Brit. Pharm. Conf., Proc. J. Pharm and Pharmacol., Cardiff, Wales, UK.
- Walter, K.S. and Gillett, H.J.(1998). IUCN red list of threatened plants.