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Review Article

Need for Sustainable Utilization and Conservation of *Glycyrrhiza glabra* Linn: A Review

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ABSTRACT

Introduction: *Glycyrrhiza glabra* Linn. a perennial herb belonging to Papilionaceae family. It is markedly found in the sub tropical and warm temperate regions of the world. In India, the plant has wide usage as Liquorice. Anti-inflammatory, spasmolytic, laxative, antidepressant, antiulcer, anti-diabetic are few important pharmaceutical uses. [1] It also has various other uses it has its utility in food, cosmetic, feed, fibre material, dyeing and tobacco industries. [2] As none of the Liquorice yielding species occur in India, the drug is imported from Asia minor, Iraq, Persia and other Central Asian countries. [5] The part used is root which is destructive form of harvesting [9] and the active constituent glycyrrhizin cannot be produced synthetically. [8] Due to these reasons the increasing demand has led to over exploitation and usage of spurious drugs for commercial gain. Hence a thorough review is done to discuss the need of sustained utilization and its conservation methods.
Methodology: A thorough review of available literatures regarding the cultivation, conservation of *Glycyrrhiza glabra* Linn is done.
Relevant e resources are referred to for recent research updates.
Discussion: High demand, indiscriminate exploitation, lack of attention to the development of cultivation practices led to considerable depletion in availability of the plant. To meet the demand, for sustainable utilization we can adopt tissue culture techniques as well as conventional propagation method.
Conclusion: *Glycyrrhiza glabra* Linn having many therapeutic utility & pharmacological activities has the danger of being threatened needed to be conserved. Proper step towards the cultivation and employing sustainable methods in the preservation is important for the availability of the plant.

Keywords: *Glycyrrhiza glabra* Linn. , cultivation, conservation, sustainable utilization

INTRODUCTION

Glycyrrhiza glabra Linn a perennial under shrub belonging to Papilionaceae is abundantly used herb. Its use is seen in Indian, Chinese, Egyptian, Greek and Roman civilization. *Glycyrrhiza glabra* Linn has many therapeutic utility; it is used in the treatment of fever, in upper respiratory tract ailment such as cough, sore throat, bronchitis. [1] It is also used as an antacid, laxative, in wound healing, to enhance complexion of skin, etc. It is used as rasayana, antistress and anabolic agent. Many of its pharmacological activities has been proved - Antitussive and demulcent, Antioxidant, Anti - inflammatory, Thrombin inhibitor, Antiulcerative, Antimicrobial, Antiviral, Anti-diabetic, Hepatoprotective, Anticancer, Drug delivery agent (Asl & Hosseinzaden, 2008). [1] It also has various other uses it has its utility in food, cosmetic,

feed, fibre material, dyeing and tobacco industries. [2]

Distribution

It is markedly found in the sub- tropical and warm temperate regions of the world mainly in the Mediterranean countries, South Europe, Asia Minor, Arab countries. [3]

Different varieties of Glycyrrhiza glabra Linn[4]

1. *G. glabra* var. typica (Spanish liquorice)
2. *G. glabra* var. glandulifera (Russian liquorice)
3. *G. glabra* var. violaceae (Persian liquorice)

Problems faced

None of the liquorice – yielding species occurs in India (Singh et al., 2006). [5] The drug is imported from Asia minor, Iraq, Persia and other Central Asian countries. [5] The part used is root which is a destructive form of harvesting. [9] To meet the high demand the drug is overexploited and also adulterated with roots of *Abrus precatorius* Linn and roots of *Glycyrrhiza uralensis* Fish (Manchurian liquorice) . Stem pieces of *Glycyrrhiza glabra* Linn are also sold in place of root. [3] *Glycyrrhiza glabra* Linn comes under threatened/ depleted (R. N. Chopra's list). [6] *Glycyrrhiza glabra* Linn is an endangered medicinal plant and has been placed in red data book. [7] The active constituents of *Glycyrrhiza glabra* Linn i.e. Glycyrrhizine cannot be produced synthetically. [8]

OBSERVATION AND RESULT

Intense and extensive observation and review of literature and research article, the genuine knowledge and method of Cultivation and conservation of Yashtimadhu (*Glycyrrhiza glabra)* is included in this article. In India cultivation of *Glycyrrhiza glabra* Linn on an experimental scale has been undertaken in several places. It is reported to be cultivated in Jammu, Punjab, Dehradun, Haryana, Gujarat, Madhya Pradesh (Pandey & Dixit, 1980; Singh et al., 1964; Singh, 1984). [10]

Steps to conserve

Through Conventional Propagation method: [3] (predominantly propagated through vegetative parts, mostly rhizomes, stolons or other cuttings). *Glycyrrhiza glabra* Linn can be successfully cultivated in warmer climatic conditions in India which provide longer growing season, but followed by distinct, long winter season to facilitate translocation of assimilates to rhizomes/ roots. Sandy – loam fertile soils having pH of 6 to 8.2 are ideal for better root development. The plant survives in places which receives 50 – 100 cm rainfall annually. Plantation is raised by employing 15 – 25 cm long stolons having 2 or 3 buds from freshly dug root stock; old crowns can also be used as planting material. The cuttings of the underground stem/ root, are planted in the field, 6.8 cm deep in the soil at a distance of 90 × 45 cm. 250 – 300 kg of stem cuttings are required for plantation per hectare. The cuttings begin sprouting in 15 – 20 days after planting. Light and frequent irrigation is necessary during spring season until the sprout of new plant from cut vegetative part. During field preparation, application of farm yard manure at the rate of 10 tonnes per hectare is used to enhance the growth of underground roots. In dry summer season irrigation interval of the crop is 30 -45 days. It is advisable to cut the plants 10 cm above the ground level during early part of November to protect from infestation of fungal diseases. Water logging in field should be avoided which may lead to soil borne diseases which in turn causes root rotting. High yields are obtained from $2^{1/2}$ – 3 year old crop. To get high yield of glycyrrhizic acid, harvest of the crop is done in winter . While storing in polythene lined bags, the permissible moisture content of dry roots should be below 10%.

In vitro culture through micropro-pagation: Many techniques of propagation which could facilitate large scale production of species through various genetic engineering techniques have been developed. In Vitro culture Micropro-

pagation in *Glycyrrhiza glabra* is done from nodal segments through axillary bud proliferation. [10]

Species reintroduction: *Glycyrrhiza glabra* is going to be extinct from the natural habitat so this is propagated in large quantity by micropropagation, Cell Callus and Suspension method. It is grown upto survival period in artificial environment than transferred propagules in natural habitat for well growth and development of Yashtimadhu (*Glycyrrhiza glabra*) is the way of reintroduction. [11]

Thus for collection, Distribution and manufacture of the drugs from threatened plant species we have to follow different act and rules of country. In India it has controlled and regulated under Environment Protection Act 1996, Biological diversity Act 2002. [12]

DISCUSSION

Conventional propagation method:

- The propagation method is destructive and slow as the useful part of the plant (rhizomes) takes years to mature. [7]
- The vegetative propagation of this plant through stem cuttings is also limited by the low rate of multiplication. Seed germination rate of *Glycyrrhiza glabra* Linn is very slow and sowing of crop through seeds, cuttings and rhizomes are season dependent (Gupta et al., 1997). [10]
- Propagation done by vegetative means may affect the quality as it contains systematic bacteria, fungi and viruses. [13]

Micropropagation protocol:

- In vitro propagation of *Glycyrrhiza glabra* Linn from nodal segments through axillary bud proliferation has many advantages as it does not need large amount of raw material, season independent, production of large no of plants in less space, superior planting material can be multiplied. This protocol will provide a method multiplication at a large scale of *Glycyrrhiza glabra* Linn. [10]
- The process of transplantation and acclimatization of micropropagated plants to soil environment continues to be a major setback in medicinal plants micropropagation. [14]
- Tissue cultured medicinal plants are expensive and the returns may not be cost effective.

Species reintroduction: [11]

- As it is time consuming and expensive, clear rationale needs to be developed for carrying out species recovery programme.
- The Indian government not taken much effort for species reintroduction of plants.
- For reintroduction programmes, necessary information on the potential habitat required for the survival of the species has to be identified.
- Maintenance of ecological interactions is a big challenge.
- Monitoring the reintroduced population will ensure that for any unforeseen threats, corrective measures can be taken up.

CONCLUSION

Glycyrrhiza glabra Linn enlisted under threatened species list, the drug is being imported for its varied utility. Conventional propagation method, Micro propagation method, Species reintroduction are the suggestible steps for conservation of the species. Different cultivation techniques are to be implemented for sustained utility of the drug. Usage of an alternative substance in industries can bring down the demand efficiently for duration till the actual source drug is made sufficiently available.

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