AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly e Newsletter
Volume 3 – Issue 9
Online ISSN: 2582-368X
www.agriallis.com

ENCAPSULATION OF PLANT PROPAGULES OF *Dalbergia sisoo* roxb. (ROSEWOOD) FOR CONSERVATION AND UTILIZATION OF GERMPLASM

Article Id: AL202186

[1]Priyanka Sharma*, [1]Monish Roy and [1]Bidhan Roy

[1]Department of Seed Science and Technology, Faculty of Agriculture, Uttar Banga Krishi Vishwavidyalaya, Pundibari-736165, Coochbehar, West Bengal, India

Email: sprianca133@gmail.com

The genus *Dalbergia* is a silviculturally and economically important tropical genus which classifies more than 100 species of trees, and shrubs and belongs to the family Fabaceae and subfamily Papilionoideae. Among several ecologically important species, *Dalbergia sisoo* has been considered to be one of the essential species. The genus Dalbergia had been accepted in the 18th century by two Swedish botanists, particularly Nils and Carl Dalberg. It is a medium to large, deciduous, long lived tree with spreading and thick branches which attain a height of upto 30m and a girth of 2.4m. It is widely grown for its durable heartwood on well drained sandy soil.

Importance of *Dalbergia sisoo*

It is a rapid growing tree which enhances nitrogen fixation and provides excellent timbers for producing extremely finest furniture and marine grade plywood. Apart from cultivating as a source of leguminous tree, it is also grown as an ornamental tree which is highly valued for fodder in addition to soil conservation. In India, it is considered to be one of the essential leguminous trees for large scale utilization in industrial plantation purposes (Bakshi and Sharma, 2011). Plant parts including bark and wood are generally a potent source of expectorant, anti-helminthic and antipyretic properties. In addition, roots are used as an astringent and leaves are used for treating eye infections and gonorrhoea (Kritikar and Basu, 1975). From the ecological point of view, it plays a fundamental role in environmental conservation and ecosystem balance (Bari et al. 2008).

Constraints of Conventional Propagation Method

Majority of the tropical and ornamental woody species are prone to heterozygosity and hence genetic improvement in these species has become a major constraint. *Dalbergia*

Volume 3 – Issue 9
Online ISSN: 2582-368X
www.agriallis.com

sisoo can be propagated by conventional methods, including seeds, planting suckers, and stem cuttings. But the conventional methods of propagation seems to be laborious, time consuming and provides a negligible or very low rate of multiplication. Propagation through seeds shows poor germination rate in addition to the death of young seedlings even under natural optimal environmental conditions (Anonymous 1989). Since this species is open pollinated and hence the seedlings raised directly by seeds are prone to wide genetic variability and are not true to type. Conventionally propagated seedlings of *Dalbergia sisoo* are susceptible to wilt and collar rot due to the attack by the vectors, particularly *Fusarium vasinfectum* and *Rhizoctonia solani*.

Applications of Biotechnological Advances for Propagation and Conservation

Propagation of *Dalbergia sissoo* (rosewood) through the use of biotechnological techniques, particularly tissue culture and synthetic seed production using different gelling agents, would provide multiple advantages, including fast multiplication of the elite genotypes, quick release of improved cultivars, production of disease free planting materials, conservation and exchange of germplasm (Asthana et al. 2011). Direct and indirect techniques of *invitro* micropropagation and plant regeneration from healthy and friable callus cultures derived from nodal segments (Gulati and Jaiwal, 1996), cotyledonary segments from axenic seedlings in addition to hypocotyl segments (Sharma and Chandra, 1988) have been proven to be a successful protocol for mass multiplication and conservation of this species for future utilization. Another alternative method for conservation and utilization of this economically important tree species is the production and development of synthetic seeds, which is an emerging technique in the field of plant biotechnology and can be defined as an encapsulation of plant tissues, including somatic embryos, shoot buds, axillary buds, shoot tips, cell aggregates etc. that has the potential of developing and converting into a complete plant under *in vitro* or *ex vitro* conditions. In addition, it also offers several advantages particularly easy handling, reduced size of propagules, ease in transportability without losing viability, potential long-term storage, high scale-up production and low cost of production. Such type of work could be very beneficial since unipolar re-growth occurs during the conversion of synthetic seeds into plantlets.

Volume 3 – Issue 9
Online ISSN: 2582-368X
www.agriallis.com

Complexing Materials Used for Synthetic Seed Production

Gelling agents particularly sodium alginate (3%) and $CaCl_2.2H_2O$ (75mmol/L) are considered to be the best for encapsulation of plant propagules, including shoot tips, nodal segments and root primordia as well as its conversion into plantlets.

Optimum Temperature and Period for Storage of Synthetic Seeds

Storage of synthetic seeds at a very low temperature of 4 °C for 8 weeks (60 days) under a tissue culture chamber can be considered to be ideal for successful and safe storage. The viability of synthetic seeds remains invariable upto 60 days but gradually, its conversion frequency decreases after a certain period of storability. Preservation of the viability of encapsulated plant propagules for a period of 60 days offers a wide range of possibilities of using this technique for long term conservation and utilization of this economically important tree species.

Conclusion

Since *Dalbergia sisoo* is an economically important leguminous tree, its conservation through recent biotechnological approaches, particularly *invitro* micro-propagation and synthetic seed production technology, would extremely benefit the environment by maintaining ecological balance. In addition, it would also provide large scale multiplication of this species within a short period of time for further commercialization of this species. Propagation through biotechnological techniques would also enhance the production of disease free planting materials. Hence, encapsulation of viable plant propagules of *Dalbergia sisoo* and conversion into a complete plantlet would aid in long term storage and conservation.

References

Anonymous (1989). The wealth of India: a dictionary of India raw materials and industrial products. Council of Scientific and Industrial Research, New Delhi 4: 7–11

Asthana P, Jaiswal VS, Jaiswal U (2011). Micropropagation of Sapindus trifoliatus L. and assessment of genetic fidelity of micropropagated plants using RAPD analysis. Acta Physiol Plant 33:1821–1829

Volume 3 – Issue 9
Online ISSN: 2582-368X
www.agriallis.com

Gulati A, Jaiwal PK (1996). Micropropagation of *Dalbergia sissoo* from nodal explants of mature trees. Biol Plant 38: 169–175

Kritikar KR, Basu BD (1975). Indian medicinal plants. Vol I New Delhi: M/S Periodical Experts, pp 818-819

Sharma S, Chandra N (1988). Organogenesis and plant formation *in vitro* in *Dalbergia sissoo* Roxb. J Plant Physiol 132: 145–147

Bakshi M, Sharma A (2011). Assessment of genetic diversity in Dalbergia sissoo clones through RAPD profiling. J Forest Res 22:393–397

Bari M A, Ferdaus KMKB, Hossain MJ (2008). Callus induction and plantlet regeneration from in vivo nodal and internodal segments and shoot tip of *Dalbergia sissoo* Roxb. J Bio Sci 16:41–48