SHORT COMMUNICATION

Enhancing Seed Germination in Wild Medicinal Germplasm of Cold Arid Deserts

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Unrestricted exploitation of the wild medicinal plants with no attention to their cultivation has placed them on the verge of extinction. Propagation and cultivation studies are among the most important tools for *ex situ* conservation and sustainable utilization of medicinal and aromatic biodiversity. Propagation through seeds is a slow process as seeds exhibit dormancy. International Seed Testing Rules does not include these medicinal species because most of these are of Indian origin. Therefore, present work was undertaken to develop dormancy breaking protocols for better propagation and *in-situ* conservation of some medicinal plant species through cultivation technology. The seeds of twenty-six medicinally important species were received from NBPGR, Shimla station (jointly collected by Forest Research Laboratory, Leh and NBPGR) for long-term conservation at National Genebank. On testing their viability, six species showed poor germination because of dormancy. Three of the species viz. *Physachlaina preatle* (Decne) Miers (IC 394042, Solanaceae), *Cicer microphyllum* (IC 394064, Fabaceae) and *Sophora macrophora* (IC394052, Fabaceae) showed thick glossy hard seed coat and were subjected to acid scarification with concentrated Sulphuric acid for varying time periods. Rest of the three species viz. *Urtica hyperborea* Jacq. ex Wedd. (IC394066), *Aconogogum tartiosum* (IC394067), *Hippophae rhamnoides* ssp. *turkstenica* Rousi (IC394073) were given chilling treatment at 5°C for 7 days and 15 days as per Tables 1 and 2. After the treatment the seeds were subjected to germination tests using two replicates of 25 seeds each per treatment. Seeds were placed in sterilised plastic petriplates with double layer Whatmann No. 1 filter paper moistened with 5 ml of distilled water. The germination test was carried out in dark at 20°C.

The percentage of normal seedlings and hard seeds were calculated from the total number of seeds placed. Emergence of radicle was used as indicative of germination. Data thus generated was subjected to analysis of variance.

The results indicated that in *Physachlaina praeatle* concentrated sulphuric acid treatment given for 10 minutes increased the germination to 96% while shorter duration (one and five minutes) were not effective. Longer duration of 20, 30 and 60 minutes resulted in increased number of dead seeds and were thus lethal. In case of *Sophora macrophora*, acid scarification for 10 and 20 minutes resulted in 50-55 percent increase in germination against control where dormancy was 100%. The most successful treatment was found to be the exposures for 30 minutes and 60 minutes but number of dead seeds increased in 60 minutes. The wild chickpea (*Cicer microphyllum*) showed 100% dormancy in control. Acid scarification for 10 and 20 minutes partially successful in breaking the hardseededness. Thirty and sixty minutes of seed treatment with concentrated sulphuric acid resulted in 94-100% germination. The seeds of *Urtica hyperborea* showed near complete dormancy and were given chilling treatment. Chilling for 7 days resulted in 64% increase in the germination whereas longer exposures of 15 days

Table 1. Effect of Acid Scarification on seed germination

Sulphuric Acid Treatment	Species					
	Physachlaina preatle		*Sophora macrophora*		*Cicer microphyllum*	
	Normal seed	Hard seed	Normal seed	Hard seed	Normal seed	Hard seed
10 min.	96	4	44	56	34	72
20 min.	44	8	52	48	44	54
30 min.	4	8	88	4	94	6
60 min.	4	8	88	4	100	–
Control	12	88	4	92	6	92

CD at 5%= 6.73

Table2. Effect of Cold stratification on seed germination

Chilling Treatment	Species					
	Urtica hyperborea		*Aconogogum tartiosum*		*Hippophae rhamnoides*	
	Normal seed	Hard seed	Normal seed	Hard seed	Normal seed	Hard seed
7 days	64	30	64	26	90	6
15 days	90	8	90	6	96	-
Control	10	82	6	90	6	90

CD at 5%= 6.88

resulted in 90% germination. In *Aconogogum tartiosum* (IC-394067) only 6% germination was recorded in control. Chilling for 7 days increased the germination by 64% while for 15 days resuluted in 90% germination. In *Hippophae rhamnoides* spp. *turkstenica* the control showed only 6% germination whereas chilling for 7 and 15 days resulted in above 90 and 96% germination, respectively.

The purpose of giving any physical/chemical treatment to any hard seed is to soften the seed coat and facilitate the germination by easy imbibition of water. A standard set of rules for uniform germination and dormancy breaking technique for most of the agricultural and horticultural crops have been devised by International Seed Testing Association (ISTA). For gene bank purposes, International Bureau of Plant Genetic Resources (IBPGR), Advisory Board on Seed Storage had also formulated a set of rules which are basically ISTA Rules with slight modifications. Most of the medicinal plants, being wild in nature, exhibit dormancy and pose problems during conservation programmes. Information on standard procedures for their germination and breaking dormancy is lacking. Among the presently investigated species, three species showed coat imposed dormancy in which the hard seed coat acts as a barrier to uptake of water thereby restricting the germination. Any physical or chemical scarification can abrase the seed surface for easy imbibition of water, thereby facilitating the onset of germination (Bewlay and Black, 1985). Such work has been reported in *Plantago ovata* (Stebbins and Day, 1967), in *Commiphora mukul* (Dalal *et al.*, 1989). Ahmed *et al.* (1990) had also reported the beneficial effect of concentrated sulphuric acid scarification in different species of *Indigofera.*

Chilling the horticultural crop seeds is a common practice. Bewlay and Black (1985) reported that chilling induced build up of gibberellic acid in hazelnut seeds which is essential for dormancy breaking, as dormant non-chilled hazelnut embryos germinate only when exogenous supply of gibberellic acid is ensured in the medium. ISTA (1985) recommends it for many temperate species like *Silybum marianum*, *Papaver rhoes* and *Apium graveolens*. Raina *et al.* (1994) had shown that chilling at 3°C for 15 days enhanced the germination by 70% in *Swertia chirata*. In the present study, a 100% increase was observed in *Urtica hyperborea, Aconogogum tartiosum* and *Hippophae rhamnoides* ssp. *turkestenica.*

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