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Short Communication

Seed Polymorphism and Germination Behavior of Shankhpushpi (*Evolvulus alsinoides*)

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Evolvulus alsinoides (Linn.) Linn. (Fam. Convolvulaceae) is a common weed found during rainy season in gardens, lawns, agricultural fields along roadsides, etc., and also cultivated for medicinal uses. The plant contains alkaloids, viz., evolvine, betaine, etc., and has got antidysenteric and antiseptic properties. Shankhpushpi is used as a brain tonic in increasing memory, nervous debility, etc. (Chemexcil, 1992).

Seed polymorphism is an important adaptation in the desert plants. It ensures an efficient segregation in seed dispersal and is significant in the wide distribution of many plant species (Harper *et al.*, 1970; Sen, 1977). A number of plant species growing in desert conditions are found to develop some form of seed dimorphism or polymorphism (Sen, 1982; Sen and Kasera, 1994). Dormancies of seeds, especially those of arid zone plants are biologically significant in spreading and delaying the germination mechanism. It generally helps in overcoming unfavourable season by preventing the growth of embryo during seed maturation (Chancellor, 1984). Various methods have been described to break and shorten the dormancy and initiate germination (Sen, 1977, 1982). The present study enumerates the seed polymorphism and various methods to break the hard seed coat dormancy in *E. alsinoides*.

Seeds of *E. alsinoides* were collected from the experimental field, Jodhpur, during September-October 1999. Seeds collected were polymorphic and had different color, weight, size and viability. Data on 100-seed weight and size were recorded in pentaplicate. The seed viability was tested with TTC method (Porter *et al.*, 1947; Mitter, 1993). The seed size was measured by ocular micrometer. Germination studies were carried

Table 1. Color, weight, size and viability in polymorphic seeds of E. alsinoides

Type	Color	Weight 100 seeds (mg)	Size (mm)		Viability (%)
			Length	Breadth	
A	Black	117.00	1.55	0.83	100.00
B	Dark brown	127.00	1.63	0.80	60.00
C	Light brown	116.00	1.63	0.85	80.00
CD		0.3747**	NS	NS	15.42**

NS = Non-significant and ** = Significant at 1% probability level.

Table 2. Effect of different treatments on seed germination of E. alsinoides under laboratory conditions (observations were taken after 10 days)

Treatments	Duration (min)	Germination (%)
Control	-	0.00
Mechanical scarification	-	100.00
Mechanical secarification + 24 h washing	-	83.33
CD		0.430**
Hot water (55-60°C)	0	0.00
	5	6.66
	10	10.00
	15	0.00
	20	3.33
	25	0.00
CD		0.451**
H_2SO_4 scarification	0	0.00
	1	10.00
	2	6.66
	5	16.66
	10	30.00
	15	60.00
	20	66.00
	25	80.00
	30	43.33
CD		4.208**
HNO_3 scarification	0	0.00
	5	6.66
	10	6.66
	15	10.00
	20	6.66
	25	0.00
CD		1.161**

** = Significant at 1% probability level.

out under controlled laboratory conditions. For the removal of hard seed coat dormancy the pretreatments were acid scarifications (Conc H_2SO_4 and HNO_3, 1-30 minutes), and hot water (55-60°C) pretreatments for different durations (5-25 minutes). For mechanical scarification, seeds were scarified with sand paper and kept for germination in petridishes. The experiments were performed in triplicate with each petridish containing 10 seeds under continuous light at 26±2°C. The data were statistically analysed after Gomez and Gomez (1984).

In *E. alsinoides* seeds with black, dark brown and light-brown color have been observed (Table 1). Remarkable differences were observed in seed weight and viability. The viability of seeds in A, B and C types was 100%, 60% and 80%, respectively. The data for seed weight and viability were significant at 1% probability level, while non-significant for seed size. Owing to this variability in seeds, the occurrence of polymorphism can lead to better establishment of the plant species in varied ecological conditions.

Results reveal that increase in the duration of acid scarification enhanced the percentage of germination. Conc. H_2SO_4 pretreatment for 25 minutes was found to be optimum, beyond which it decreased. Cent per cent germination was observed when the seeds were subjected to mechanical scarification (Table 2), while mechanical scarification followed by 24 hour continuous washing in running tap water 83.3% seeds showed germination. No promising results were observed in hot water and HNO_3 pretreatments. The data were significant at 1% probability level for all treatments.

In most of the desert plant species the seeds indicated a high percentage of germination after certain pretreatments (Sen, 1977). Seed coat inhibition to imbibition of water is probably the most common cause of dormancy and it can be removed by

different means in different species (Amen, 1968). Hard seed coat dormancy plays an important role in the germination of desert seeds. Acid scarification macerated the sub-cuticular and other layers to make the passage for water and gases to get in, which enabled easy imbibition of water followed by easy seed germination (Sen, 1977; 1982). Mechanical scarification is another device for breaking the hard seed coat dormancy to increase the germination of seeds. In the present studies, 25 minute concentrated H_2SO_4 and mechanical scarification treatments resulted in maximum germination percentage in *E. alsinoides*.

Thus, it can be concluded that seeds of *E. alsinoides* possess hard seed coat dormancy, which can be removed by acid and mechanical scarifications. Hence, for the large scale multiplication (*E. alsinoides*) under field conditions, seeds could be treated either by conc. H_2SO_4 (25 min) or mechanical scarification for obtaining maximum germination.

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