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Effect of Pre-Germination Treatments on Freshly Harvested Seeds of *Berberis Lycium* Royle.

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ABSTRACT

Present investigation was carried out in Silviculture and Agroforestry Department of Dr. Y S Parmar UHF, Nauni, Solan (H.P) during time span of 2017-18. *Berberis lycium*, an evergreen shrub native to the Himalayas is employed in a number of medicinal compositions. The plant is currently at a vulnerable stage and in danger of going extinct. The poor germination occurs as a result of its hard seed coat keeping it dormant for an extended length of time. In order to reduce dormancy, increase germination and promote seedling development, the current study evaluates several pre-sowing seed treatments which was afterwards grown on potting medium through, seeds dropping in urine of cows for about 6 hr growth on Soil+Sand+FYM in the ratio of (1:1:1) yielding maximum germination of seeds (65.33%), seedling length (19.78cm) and dry seedling weight (0.072g).

Key Words: Dormant, Himalayas, Kashmal, Vulnerable.

INTRODUCTION

Berberis lycium Royle. is widely used medicinal plant (Bhattacharjee, 2008). Plant is evergreen, spiny shrub, sub-erect or erect, which grows to a height of 2-4m with a thick woody shoot belongs to the family Berberidaceae. *Berberis lycium* occurs in the Himalayan region amongst at an height of about 850-3500m from sea level at mean values (amsl) on steep angles to moderate (Sharma *et al*, 2017). Berberine, a major constituent of this plant is now well known to possess anti-inflammatory property (Sood *et al*, 2013). The flowering season starting out of April-May month, September-October with season of fruiting between June-July (Gupta *et al*, 2015). Numerous biotic and abiotic factors lead to poor germination of seed. According to a literature search was having quite minute data about species germination. Therefore, taking into consideration significant of such critical species of shrub having improper development, researching effectiveness concerning seed treating of pre-sowing and bagging mixture over germinating and seedling growth of *Berberis lycium*.

MATERIALS AND METHODS

Test was carried out in premises of Majhgaon nursery located at Silviculture and Agroforestry Department, Dr. Yashwant Singh Parmar University of Forestry and Horticulture, during 2017-2018 situated at 76˚ 11' E longitude and 30˚ 5' N latitude. Fruits of *Berberis lycium* collected from the vicinity of university campus. After collecting, fruits were rubbed with a hardened exterior in removing pulp after soaking in water avoiding sunlight de-pulped seedling were dehydrated in shades. Prior to sowing of seed, processed through fungicide in countering attacks from fungal infection which destroys every seed growth. *Berberis lycium* seed were exposed to four various processing consisting of T_1 (Control), T_2 (Immersion in hot water (80˚C) for 30 min), T_3 (Immersion in Sulphuric acid (80.00% conc.) for 5 min), T_4 (Immersion in cow urine for 6 hr) to breaking of seed dormancy thereby improving germination of seed germination and seedling growth. Post processing of pre-sowing phase, in root trainer seeds were sown that were positioned inside poly house specially built for this purpose.

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Table 1. Effective treatment of pre sowing seed and mixture potting on germinating percent of *Berberis lycium* in standard nursery condition

Pre sowing treatment	Potting mixture				Mean
	M_1	M_2	M_3	M_4	
T_1	33.33(35.24)	36.00(36.84)	38.67(38.43)	40.00(39.20)	37.00(37.43)
T_2	38.67(38.43)	40.00(39.22)	41.33(39.94)	42.67(40.76)	40.67(39.60)
T_3	40.00(39.20)	42.67(40.74)	41.33(39.97)	57.33(49.21)	45.33(42.28)
T_4	42.67(40.76)	45.33(42.30)	46.67(43.07)	65.33(53.99)	50.00(45.03)
Mean	38.67(38.41)	41.0(39.77)	42.00(40.36)	51.33(45.79)	

Transformed values (angular transformation) are represented through parenthesis values

Table 2. Seedling length effectiveness of pre-sowing seed potting mixture and treatment of *Berberis lycium* in standard nursery condition

Pre sowing treatment	Potting mixture				Mean
	M_1	M_2	M_3	M_4	
T_1	8.33	7.78	8.35	7.82	8.07
T_2	10.00	10.55	10.02	10.64	10.30
T_3	11.40	11.50	12.88	11.35	11.78
T_4	14.28	13.23	18.18	19.78	16.37
Mean	11.00	10.77	12.36	12.39	

Table 3. Effectiveness of seeds pre sowing treatment and potting mixture on shoot length of *Berberis lycium* in standard nursery conditions

Pre sowing treatment	Potting mixture				Mean
	M_1	M_2	M_3	M_4	
T_1	4.60	4.17	4.98	5.22	4.74
T_2	5.70	6.07	5.30	5.71	5.69
T_3	5.30	5.07	6.57	6.21	5.79
T_4	7.00	7.07	9.75	9.85	8.42
Mean	5.65	5.59	6.65	6.75	

Table 4. Effectiveness of seed pre sowing process and potting mixture on root length of *Berberis lycium* in standard nursery conditions

Pre sowing treatment	Potting mixture				Mean
	M_1	M_2	M_3	M_4	
T_1	3.73	3.61	3.37	2.60	3.33
T_2	4.30	4.48	4.72	4.93	4.61
T_3	6.10	6.43	6.31	5.13	5.99
T_4	7.28	6.17	8.43	9.93	7.95
Mean	5.35	5.17	5.71	5.65	

Table 5. Effectiveness of seed pre sowing process and potting of mixture on dry root weight of *Berberis lycium* in standard nursery condition

Pre sowing treatment	Potting mixture				Mean
	M_1	M_2	M_3	M_4	
T_1	0.014	0.012	0.021	0.021	0.017
T_2	0.015	0.023	0.018	0.027	0.021
T_3	0.016	0.026	0.029	0.032	0.026
T_4	0.025	0.030	0.037	0.043	0.034
Mean	0.018	0.023	0.027	0.031	

Table 6. Effectiveness of seed pre sowing process and potting of mixtures on dry shoot weight of *Berberis lycium* in standard nursery situations

Pre sowing treatment	Potting mixture				Mean
	M_1	M_2	M_3	M_4	
T_1	0.008	0.008	0.007	0.010	0.008
T_2	0.008	0.008	0.008	0.010	0.009
T_3	0.010	0.012	0.013	0.014	0.012
T_4	0.015	0.015	0.021	0.029	0.020
Mean	0.010	0.011	0.012	0.016	

Table 7. Effectiveness of seed pre sowing process and potting of mixtures dry seedling weight of *Berberis lycium* in standard nursery situations

Pre sowing treatment	Potting mixture				Mean
	M_1	M_2	M_3	M_4	
T_1	0.022	0.020	0.029	0.030	0.025
T_2	0.023	0.031	0.026	0.037	0.029
T_3	0.027	0.038	0.042	0.046	0.038
T_4	0.040	0.045	0.059	0.072	0.054
Mean	0.028	0.034	0.039	0.046	

Table 8. Effectiveness of seeds pre sowing process and potting mixture on collar diameter of *Berberis lycium* in standard nursery situations

Pre sowing treatment	Potting mixture				Mean
	M_1	M_2	M_3	M_4	
T_1	0.75	0.57	0.72	0.71	0.69
T_2	0.87	0.74	0.85	0.77	0.81
T_3	0.73	0.25	0.47	0.67	0.53
T_4	1.12	0.98	1.08	0.89	1.02
Mean	0.87	0.64	0.78	0.76	

Further, the seeds were sown in root trainers containing four different mixtures M_1 (only Sand), M_2 (only Soil), M_3 (Sand+Soil having 1:1 ratio) and M_4 (Sand+Soil+FYM consisting of 1:1:1 ratio). With randomized block design test were executed having three repeated patterns of processing. With every iteration, seeds were sown with 100 samples.

Test outcomes was noted down having two un-sequentially chosen sowing seedlings out of every process and cautiously up-rooted making sure that roots were intact without breaking at conclusion pertaining to season of growing. The observations namely, seedling length (centimeter), germination percentage (%), root length (centimeter), shoot length (centimeter), dry weight of shoot (gram), dry weight of root (gram) collar diameter (millimeter), and dehydrated weight of seedlings (gram). Shoot length were calculated culminating out of collar region of shoot from apex region where as length of root was noted down initiating from root region of collar to tip of roots and information were presented in centimeter as unit of measurements. Diameter of collar were recorded from the assistance of "digital vernier caliper" and shown in millimeter on scale. Plant's dry weight, root and shoot were written down out of recently accumulated seedlings and represented with grams as a measure of weight. Germination percentage was calculated as:

$$\text{Germination percent (\%)} = \frac{\text{Total number of seeds germinated}}{\text{Total number of seeds sown}} \times 100$$

Different germination feature's information researched in current study was investigated statistically through Randomized Block Design (RBD) Factorial process as explained by Panse and Sukhatme (2000). Standard error of mean appropriately (S.Em.±) having crucial difference (C.D) are computed on 5 per cent level of probability.

RESULTS AND DISCUSSION

Outcomes with respect to germination, seedling growth and biomass parameters such as germination percentage (Table 1), seedling length (Table 2), shoot length (Table 3), root length (Table 4), weight of dehydrated roots (Table 5), weight of dehydrated shoot (Table 6), entirely dry seedling weight (Table 7) and collar diameter (Table 8) were found maximum with when seeds treated with cow urine for 6 hr. The least germination percentage, seedling length and total dry seedling weight were noted down in regulated system. Remaining process was also seen to be important in controlling. Identical outcomes were depicted too by Pal *et al* (2020) by using various urines of cow concentrations on germination of seed and Karonda developments (*Carissa carandas* L.) seedling. Cow urine at 25 per cent performed better in terms of seed germination (78.15%), seedling length (12.20cm) and dry shoot weight (3.24gram). Raghu *et al* (2016) also discovered that soaking *Embelia ribes* seeds in cow dung slurry resulted in the highest germination rate (83.33%) when compared to a control (16.50%).

Urine of Cow consists of urea, iron, progesterone, uric acid and estrogen having effectiveness of inhibitory responds to seeds germinating (Dilrukshi, 2009). Cow urine showed better germination it may because of developing promotors existing in cow urine joined consisting of elongated time spans of soaked sees that assists in seed coat unstiffening that rises penetrability because of dispersion and initial appearance of radical triggering germinating shoot growth and seedling vigor (Basavaraj *et al*, 2002; Misra *et al*, 2002). Akhter *et al* (2006) also depicted effective inhibitory of various cow urine densities against germination of *Bipolaris sorokiniana*. Urine of Cows consists of extensive uses in farming, as an instance insecticidal and antifungal, like proved through many literatures (Thakur, 2004; Kambar *et al*, 2013; Kishore *et al*, 2015; Verma *et al*, 2022).

CONCLUSION

The present findings indicate that processing of seeds through urine of cows for six hr then sown treated seed in germinating media (Soil+Sand+FYM in ratio 1:1:1) showed better germination, seedling growth and dry biomass of the seedlings other than used potting mixtures. The whole plant used as medicinal purpose as well as Berberine is major compound present in root parts of plant and having anti-inflammatory properties. Present aim of study will help in improve seed germination through using best combination for future investigation.

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