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HARD SEEDEDNESS IN KHESARI (*LATHYRUS SATIVUS*) GERMPLASM

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Hardseededness is widely known in pulses and affects germination counts in field and laboratory conditions. The critical evaluation of hardseeds in 1,279 accesions of *Lathyrus sativus* indicated considerable variation for hardseed percentage in the accessions tested. The role of environment in causing hardseededness in this crop was also noted. Mechanical scarification with fine sand paper proved to be an effective method of removing seed coat impermeability to ensure the water uptake in order to record the actual germination percentage of germplasm accessions, which is a pre-requisite for their longterm conservation in the National Genebank.

Key words : *Lathyrus sativus*, hardseededness.

Khesari (*Lathyrus sativus*) is one of the important pulse crop in India. It is grown throughout India, especially in Northern, Central and Western India upto an altitude of 1200 mts. In India, it occupies approximately 4% of the total area under pulse crops and constitutes about 3% of the total pulse production (Anonymous, 1962). Despite its seed containing neurotoxic alkaloides, the crop is attracting attention because of its high protein content and tolerence to biotic and abiotic stresses. Efforts are being made to collect and store variability/genetic diversity in this crop which can subsequently be utilized in tailoring acceptable varieties with low neurotoxic substances. With this view in mind, a number of germplasm accessions of *Lathyrus sativus* were collected, their seed multiplied and sent to NBPGR for longterm conservation. In the prescribed practice of viability testing, prior to conservation of germplasm, it was observed that the accessions exhibited varied degree of hardseededness and caused difficulties in recording actual germination data. The present study was therefore, undertaken to study the extent of hardseededness and method of overcoming this problem.

MATERIALS AND METHODS

The experimental material for the present study comprised of three lots of *Lathyrus* germplasm. The first lot consisted of 1070 germplasm accessions collected from Madhya Pradesh. The seed was grown and multiplied at Indira Gandhi Krishi Vishwa Vidhyala (IGKVV), Raipur during the Rabi 1993 -94 season. The second lot had 69 germplasm accessions which were grown and multiplied during Rabi 1993-94 season at Issapur farm of NBPGR, New Delhi and the third lot of 140 germplasm accessions was grown at NBPGR, Regional Station Akola, Maharashtra during the same period.

About 500 gms seeds of each accession was received for their longterm conservation in the National Gene Bank at NBPGR Hqrs, New Delhi. Sample of 200 seeds was drawn from each accession and used for germination test by keeping the seeds between moist towel paper in 4 replications, each consisting 50 seeds. The seeds were planted and kept in a slanting position in a germinator maintained at 20°C and 90% relative humidity (ISTA, 1985). After 10 days of incubation, the counts of normal, abnormal, hard and dead seeds were taken and their percentages computed.

The seeds of accessions showing more than 15% hardseededness but otherwise exhibiting good germination, were gently scarified with a fine grade sand paper for approximately 1 minute and kept for germinaton. The germination counts were recorded as per the method described above.

RESULTS AND DISCUSSION

The results of the present investigation reveal the variability with regard to hardseededness in the *Lathyrus* germplasm screened for germination. The extent of hardseeds in the range of 1-10% under Akola and Raipur conditions was 47.14 and 36.47% respectively, while under Delhi conditions 33.33% accessions had hardseededness ranging from 71-80%. Although 5.79% accessions recorded hardseeds in the range of 81-90% under Delhi none of the accessions studied exhibited hardseededness beyond 90%.

Impermeable seed coat leading to hardseededness is a common feature in most of the legume crops. Such seeds will not germinate readily when placed under conditions considered favourable for germination due to their impermeable seed coat. The seeds of *Lathyrus sativus* like majority of the leguminous crops also exhibit hardseededness. Although hardseededness on one hand may be beneficial for maintenance of seed quality during storage, on the other hand, it may be undesirable as it may require certain specific treatments (physical/chemical) to overcome the dormancy due to impermeable seed coat and may also lead to staggered germination and a non uniform crop in the field.

This variation in percentage of hardseeds observed in various accessions of *Lathyrus* germplasm could be due to genotypic differences in the various accessions studied. Hardseeds develop when the seeds mature and lose moisture in accordance with relative humidity. Therefore, the environment through relative humidity has an effect on the rate of development of impermeability and the proportion of seeds which are actually impermeable at any stage during ripening and drying. Lebedeff (1947) observed in *Phaseolous vulgaris* that cultivars of a species could differ in their water permeability and that the differences are heritable. Similarly, distinct differences in degree of seed coat dormancy have been noted for several legume species (Bebawi and Mohamed, 1985, Bhattacharya and Saha, 1990 Lopez and Aviles, 1988).

The hardseed character in most of the legumes is thought to be due to thickening of palisade layer cells. Hardseededness in such seeds can be broken by softening the seed coat through various physical and chemical treatments.

Table 1. Distribution of hard seeds in Lathyrus germplasm

	Akola		Delhi		Raipur	
Range (% Hard Seeds)	Total acc. (140)	% of total accessions	Total acc. (69)	% of total accessions	Total acc. (1070)	% of total accessions
1-10	66	47.14	19	27.5	401	36.47
11-20	19	13.57	0	0	85	7.94
21-30	2	1.42	0	0	2	0.19
31.40	3	2.14	0	0	0	0
41-50	0	0.0	0	0	1	0.09
51-60	0	0.0	7	10.1	0	0
61-70	1	0.71	16	23.18	0	0
71-80	0	0.0	23	33.33	0	0
81-90	0	0.0	4	5.79	0	0
91-100	0	0.0	0	0	0	0
Total acc. with hard seeds	91	64.98	69	99.9	489	45.68

The most commonly practised method is mechanical scarification developed by Hughes (1915). Tomer and Kumari (1991) obtained 80-78% germination in *Vigna mungo* by scarification with sand paper against 28.70 percent in the control. In the present investigation rubbing *L. sativus* seeds

gently over a fine grade sand paper for approximately one minute resulted in removal of hardseededness and normal germination of all hard seeds. This method is very effective, quick, cheap, safe and is suitable for assessing seed viability of *Lathyrus sativus* in genebanks where seeds are received in limited quantities and high seed viability is a pre-requisite for storing the seeds for posterity.

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