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EFFECT OF CHEMICAL AND MECHANICAL SCARIFICATION ON GERMINATION OF *LATHYRUS* SEEDS

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ABSTRACT

Five genotypes of *Lathyrus* were sown during 2015. The seeds after harvesting, threshing and processing were evaluated for their hardseedness dormancy. The findings of the present study indicate that concentrated sulphuric acid, hot water, sand scarification and hot air oven methods are effective for reducing hardseedness in *Lathyrus*. All the above mentioned treatments showed injuries effect to the seed embryo by increasing the dead seeds and abnormal seedlings except concentrated sulphuric acid treatment. In general concentrated sulphuric acid treatment for seconds have been found most effective for breaking seeds coat dormancy and also significantly highest germination percentage compared to the above mentioned treatments undertaken in the present investigation.

Keywords: *Lathyrus*, dormancy, hardseed coat, germination, seedling vigour, field emergence.

INTRODUCTION

Seed dormancy is defined as the state in which seed are prevented from germination even under favorable conditions for germination. The impermeability of seed coat to water is typical example of exogenability are known as hard seeds. This impermeability may be due to the presence of a cuticle and a well developed layer of palisade cells or both. Cutin deposits have been reported by Thronton (1968). The development of hard seed has been reported to be influenced both by genotypic and environmental factors (Puri and Laudlaw, 1984).

Most of the legume crop plants produce hard seeds to varying percentages. Most workers have found this trait to be heritable. However, the available literature does not clearly state the developmental stage in which the seed develops into hard seed. Hardseedness in *L*athyrus creates problems in testing for germinability under laboratory conditions. Due to this state of affair, there is a great problem under field condition in securing uniform germination and good crop stand for maximum crop production. The present study was undertaken to evaluate the methods to overcome hardseedness in *Lathyrus* (*Lathyrus sativus L.*)

MATERIALS AND METHODS

Five genotypes of *Lathyrus* viz., Ratan, Prateek, Mahateovra, Pusa-24 and Nirmal were used in the various phases of this study, produced in Kharif, 2015. Hard seeds which did not imbibe water. To evolve a quick method for breaking hardseedness in five genotypes of *L*athyrus, the hard seeds were subjected to concentrated sulphuric acid (60 and 90 seconds), hot water (100^0C for 180 and 240 seconds), sand scarification (100^0C for 15 and 30 seconds).

For germination test in laboratory, the germination medium used was rolled towels paper under controlled conditions (i.e. temperature at 25 ± 2^0 C constant and relative humidity 85%), For acid treatment, the *Lathyrus* seeds were soaked in concentrated sulpuric acid for the specified duration with constant stirrings (Dharmalingam *et al.* 1973). Seeds were thoroughly washed in running water after the acid treatment and the germination was tested in quadruplicate with 100 seed in each replication. The germination count was taken on the 8th day and germination percentage was recorded on the basis of normal seedlings (ISTA, 1985).

RESULT AND DISCUSSION

The data for the five genotypes of Lathyrus tested for different methods of breaking the hardseedness are presented in Table 1. The overall comparisons of mean among and within genotypes and treatments for both normal seedling and hard seed per centage showed that concentrated sulphuric acid for 60 seconds was the most effective treatment for reducing hard seed content. It was followed by hot water for 180 seconds sand scarification for 480 seconds, hot water 120 seconds, hot air oven 30 seconds, sand scarification 240 seconds, concentrated sulphuric acid of 30 seconds and hot air oven 15 seconds. All the treatments showed injurious effect by increasing the abnormal seedling except concentrated sulphuric acid for 60 seconds. There is no germination in control (untreated) seeds Duran and Tortosa (1985) has clearly explained the effect of concentrated sulphuric acid on seed coat of *Sinapsis aruensis* and conclude that it was the rapid dessication produced by concentrated sulphuric acid and not its hydrolytic capacity which seems to cause fragmentation of integuments and thus allowing

the passage of water to the embryo. A similar mode of action can also be proposed for the response shown as *Lathyrus* genotypes to the treatment with sulphuric acid.

CONCLUSIONS

The results obtained in the present investigation indicate that concentrated sulphuric acid treatment for 60 second has been found most effective for breaking hard seed coat dormancy in Lathyrus. The result confirms the finding of Charjan and Tarar (1990), Sing and Tomer (1993) and Cherian *et. al.* (2011).

Effectivness of concentrated sulphuric acid, hot water and hot air oven treatment for breaking harseedness was also reported in related crops by Borikar *et. al.* (1985), Radhakrishnan *et al.* (1989), Rana and Nautiyal (1989), Tomer and Maguire (1989), Verma and Sing (1989), Charjan and Tarar (1990), Sing and Tomar (1993) and Cherian *et al.* (2011).

Table 1 : Effect of different treatments on Germinability of *Lathyrus*

S. N.	Treatments	Ratan			Prateek			Mahateora			Pusa-24			Nirmal		
		N	Ab	H	N	Ab	H	N	Ab	H	N	Ab	H	N	Ab	H
1.	**Control (Untreated hard seeds)**	0	0	100	0	0	100	0	0	100	0	0	100	0	0	100
2.	**Concentrated sulphuric acid**															
	i) 30 seconds	80	3	17	87	5	8	88	4	12	82	6	12	80	9	11
	ii) 60 seconds	98	2	0	98	2	0	96	4	0	94	6	0	91	9	0
3.	**Hot water treatment (100°C)**															
	i) 120 seconds	80	2	18	81	6	13	82	8	10	83	5	12	80	4	16
	ii) 180 seconds	89	2	9	90	5	5	92	8	0	93	7	0	88	6	6
4.	**Sand scarification (100°C)**															
	i) 240 seconds	75	6	19	71	5	24	76	4	20	72	3	25	75	5	20
	ii) 480 seconds	88	2	10	90	2	8	92	2	6	93	4	3	91	2	7
5.	**Hot air oven (140°C)**															
	i) 15 seconds	62	6	32	68	4	28	65	5	30	66	4	30	64	4	32
	ii) 30 seconds	84	4	12	88	2	10	86	5	9	89	3	8	88	3	9

N-Normal seedlings **Ab- Abnormal seedlings** **H-Hard seeds**

REFERENCES

Borikar, S. T., Singh, A.R. and Katkade, J. L. 1985. Effect of pretreatment of greengtam (*vigna radiata*) seed with certain chemicals on its germination, seed res. 13(1):192-194.

Charjan, S. K. U. and Tarar, J. L.1990. Methods to overcome hardseedness in soybean (*Glycine max L.*) New Agriculturist 1 (1) : 71-74.

Cherian S., Lambat A., Gadewar R., Bhandari P., Charjan S., Lambat P. 2011. Postharvest dormancy in mungbean and their methods to overcome. Proceeding of International Conference in Agricultural Engineering held at Chonburi, Thailand on dated 31 March -1 April 2011.

Dharmalingan, C., Madhavrao, S and Sunderaraj, D. 1973. Pregermination treatment of testing testing seeds (*Tephrosa purpures pers.*) to improve germination. Seeds research. 1: 58-62.

Duran, J.M. and Tortosa, M.E. 1985. The effect of mechanical and chemical scarification on germination of Charlok (*Sinapsis arvensis L.*) seds, Seeds Science and Technology. 13:155-163.

ISTA, 1985. International rules for seeds testing. Seed Science and Technology. 13: 299-513.

Puri, K. P. and Laudlow, A. S. 1984. The effect of temperature on components of seed yield and seed quality of hard red winter wheat from production field. J. App. Seed Production. 2 : 18-23.

Radhakrishnan, J., Mahadevoppa, M., Joshi, S. and Prasad, T. G. 1989. Dormancy studies in Cassia sericae, Seeds Research. 17 (2) : 118-121.

Rana, U.,and Nautiyal, A. R. 1989. Coat imposed dormany in *Acacia Famesiana* seeds. Seeds Research. 17 (2) : 122.

Singh, K.J. and Tomer, R. P. S. 1993 Sudies on hard seeds in black-gram (Vigna mungo (L). Heper, Seeds Research. Special Vol. 2 : 919-923.

Thornton, M. L. 1968. Seed dormancy in watermelon. Proceedings Association Official Seed Analyssts. 58: 80 – 84.

Tomer, RPS and Maguire, J. D. 1989. Hard seed studies in alfalfa. Seeds Research. 17 (1) : 29-31.

Verma, O. P. and Sing, P. V., 1989. Methods to overcome hardseedness in Mungbea. Seeds Reaerch. 17 (20) : 197-198.