

Post harvest dormancy in Pigeon pea (*Cajanus Cajan L.*) and their methods to overcome

Lambat Prachi¹; Charjan Sanjiv²; Lambat Ashish³; Patil Shanti⁴

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Abstract

Five genotypes Pigeon pea were sown during 2013. The seeds after harvesting, threshing and processing were evaluated for their hardheadedness 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 hardheadedness in Pigeon pea. 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 60 seconds have been found most effective for breaking seeds coat dormancy and also significantly highest germination percentage compared to the above mentioned treatments under taken in the present investigation.

Keywords: Pigeon pea | dormancy | hard seed coat | germination | seedling vigour | field emergence

Introduction

Seeds dormancy is defined as the state in which seeds are prevented from germination even under favorable conditions for germination. The impermeability of seed coat to water is typical example of exogenibility 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 seeds 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 highly heritable. However, the available literature does not clearly state the developmental stage in which the seed develops into hard seed. Hardheadedness in Pigeon pea creates problems in testing for germinability under

For correspondence:

¹Shri Mathuradas Mohata Science College, Nagpur

²College of Agriculture (Dr. PDKV's) Nagpur

³Sevadal Mahila Mahavidyalaya, Nagpur

⁴College of Agriculture (Dr. PDKV's) Nagpur

Email: lambatashish@gmail.com

laboratory conditions. Due to this state of affair there is 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 hardheadedness in Pigeon pea.

Materials and Method

Five genotypes of Pigeon pea viz. C-11, TAT-10, ICPL-87119, BDN-2 and ICP-8863 were used in the various phases of this study, produced in Kharif, 2013. Hard seeds which did not imbibe water were sorted out from the normal seeds which imbibe water. To evolve a quick method for breaking hardheadedness in five genotypes of Pigeon pea, the hard seeds were subjected to concentrated sulphuric acid (for 60 and 90 seconds), hot water (100°C for 180 and 240 seconds), sand scarification (100°C 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 $25 \pm 2^\circ\text{C}$ constant and relative humidity 85%), for acid treatment, the 100°C for 180 and 240 seconds) seeds were soaked in concentrated sulphuric 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 seeds 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

Pigeon pea tested for different methods of breaking the hardheadedness are presented in Table 1. The overall comparisons of mean among and within genotypes and treatments for both normal seedling and hard seed percentage showed that concentrated sulphuric acid for 60 seconds was the most effective treatment for reducing hard seeds 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 over 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 shown as Pigeon pea genotypes to the treatment with sulphuric acid.

Conclusion

The results obtained in the present investigation indicate that concentrated sulphuric acid treatment for 60 second has been found more effective for breaking hard seed coat dormancy in Pigeon pea. The result

confirms the finding of Charjan and Tarar (1990), Sing and Tomer (1993) and Cherian *et al.* (2011). Effectiveness of concentrated sulphuric acid, hot water and hot air oven treatment for breaking hardseededness 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 Singh. (1989), Charjan and Tarar. (1991), Singh and Tomer. (1993) and Cherian *et al.* (2011).

S.N.	Treatments	C-11			TAT-10			ICPL-87119			BDN-2			ICPL-8863		
		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	82	2	16	87	3	10	85	7	10	82	6	12	85	5	10
	(ii) 60 seconds	99	1	0	96	4	0	93	7	0	95	5	0	94	6	0
3	Hot water treatment (100°C)															
	(i) 120 seconds	83	2	15	80	3	17	82	3	15	80	2	18	79	3	18
	(ii) 180 seconds	90	3	7	92	3	5	90	5	5	91	5	4	92	5	3
4	Sand Scarification (100°C)															
	(i) 240 seconds	77	5	18	74	3	23	77	3	20	72	3	25	75	2	23
	(ii) 480 seconds	89	4	7	91	3	6	90	3	7	92	5	3	90	3	7
5	Hot air oven (140°C)															
	(i) 15 seconds	89	5	24	72	3	25	70	4	26	74	4	22	73	2	25
	(ii) 30 seconds	86	6	8	89	5	6	87	4	9	89	3	8	88	4	8

N- Normal Seedlings, Ab- Abnormal seedlings, H- Hard seeds.

Table 1: Effect of different treatments on Germinability of Pigeon pea

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