*J. Farm Sci., 33(3): (409-410) 2020*

**RESEARCH NOTE**

# Influence of seed dormancy breaking treatments on seed quality of velvet bean (*Mucuna pruriens*)

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*(Received: December, 2019 ; Accepted: August, 2020)*

The present study was conducted in order to know the influence of different dormancy breaking treatments on seed quality of velvet bean (*Mucuna pruriens)*. The experiment was performed with 7 treatments and 3 replications in a completely randomized design. Seeds were subjected to different treatments *viz.,* Mechanical scarification by using sand paper, immersion in hot water (80 °C) for 15 minutes, Acid Scarification (seeds were soaked in 50 % $H_2SO_4$ for 30 min followed by thorough washing in running water), immersion in cold water at room temperature for 24 hr, subjecting the exposure of seeds to heat at 55 °C for 16 hr in hot air oven, nicking of seeds at abaxial end and control (no treatment). The treated seeds were subjected to various seed quality parameters *viz.*, germination test under laboratory conditions to determine the germination percentage, shoot length, root length and seedling dry weight of *Mucuna pruriens*. Among these treatments, nicking of seeds at abaxial end recorded higher percentage of seed germination (88.67 %) followed by scarification using sand paper (78 %). Similarly, shoot length (14.90 cm), root length (12.07 cm), seedling dry weight (0.261 g), seedling vigour index I (2391) and seedling vigour index II (23) were also maximum in nicking of seed treatment.

**Key words:** Dormancy, Germination, Scarification, Velvet bean,

*Mucuna pruriens,* a leguminous twining herb, has a wide distribution in tropical and sub-tropical regions of the world. It is one of the most important medicinal and fodder legumes. Seed coat-imposed hard seededness is observed in this genus like many other genera of the family. *Mucuna* seeds undergo dormancy immediately after harvest and poses difficult problem in germination and crop establishment when sown immediately. Dormancy is a period in an organism's life cycle where growth and development are temporarily ceased. This minimizes metabolic activity and therefore, helps an organism to conserve energy. Dormancy tends to be closely associated with environmental conditions. The hard seed character in leguminous plants is thought to be due to the thick palisade cell layer. But these have the advantages in the maintenance of the seed quality, preventing post harvest sprouting and are potential reserves of species of the perennial crops. Several investigators have demonstrated the effectiveness of different scarification, cutting and piercing methods (Mohan *et al.,* 2012) for overcoming hard seededness.

The experiment was conducted in Department of Seed Science and Technology, UAS, Dharwad during 2017 to know the influence of dormancy breaking treatments on seed quality of velvet bean. The experiment consisted of seven treatments with three replications and observations were analysed using completely randomized design. Freshly harvested seeds of *Mucuna pruriens* were subjected to the various dormancy breaking treatments *viz.* (i) control (ii) Mechanical scarification by using sand paper (iii) immersion in hot water (80 °C) for 15 minutes (iv) Acid Scarification (seeds were soaked in 50 % sulphuric acid for 30 min followed by thorough washing in running water) (v) immersion in cold water at room temperature for 24 hr (vi) subjecting the seeds to heat at 55 °C for 16 hr in hot air oven (vii) nicking of seeds at abaxial end (a gentle cut to the seed coat anywhere else other than near the radicle or hypocotyl region). Sixteen replicates of 25 seeds each were placed in moist paper towels at 25 °C in the germinator. Observations were recorded for germination, shoot length, root length, seedling dry weight and vigour index after 5 days and the first count was taken on 5$^{th}$ day and final count on 10$^{th}$ day. The percentage of normal and hard seeds were calculated.

The results revealed that nicking the seed coat was most effective for eliminating the dormancy and enhanced the seed germination percentage up to 88.67 % over control (69.33 %) followed by scarification of seeds using sand paper (78 %) . Hot water, hot air oven and sulphuric acid treatment recorded 34.33, 67.67 and 46.33 % germination, respectively and were ineffective in breaking the hard seed coat. The improvement by nicking seed coat may be attributed to easy imbibition of water through the cut area thereby facilitating the onset of germination due to immobilisation of the reserves. This was supported by the significant improvement in the seedling vigour index. The vigour data showed that nicking treatment recorded higher values for root length and shoot length parameters. Similar results were also obtained by Imchen *et al.* (2015) in Gulmohar.

Longer shoot length (14.90 cm), root length (12.07 cm), seedling dry weight (0.261 g), seedling vigour index I (2391) and II (23), were significantly maximum in nicking treatment followed by mechanical scarification using sand paper (14.00 cm, 11.9 cm, 0.258 g, 2020 and 20, respectively). Vigour index I and II was minimum in hot water treatment at 80 °C (606 and 7, respectively) while, rest of the treatments were at par with the control. Although many workers have reported significant improvement in germination with conc. sulphuric acid as in *Neonotonia wightii* by Leonardo *et al.* (2014), *Acacia farnesiana by* Rana and Nautiyal (1989) and in *Parkia biglobosa* by Abubakar *et al.* and Maimuma (2013), in the present study, *Mucuna pruriens* did not show any response to this treatment.

Similarly mechanical scarification using sandpaper was also found to be ineffective for this species. Hot water treatment at 80 °C for 15 min. was lethal to the seeds. Hot air oven treatment for prolonged period of 16 hr might have removed the moisture content of the seeds, therefore it might have recorded less germination. Along with reduction in the germination percentage, these treatments also showed a corresponding decrease in the vigour parameters. This was probably due to considerable injury inflicted to the non-dormant seeds present in the seed

Table 1. Effect of dormancy breaking methods on seed quality parameters of velvet bean

| Treatments | Germination (%) | Shoot length (cm) | Root length (cm) | Seedling dry weight (g) index II | Seedling vigour index I | Seedling vigour |
|---|---|---|---|---|---|---|
| $T_1$ - Control | 69.33(51.94) | 13.83 | 11.83 | 0.255 | 1779 | 18 |
| $T_2$ - Mechanical scarification by using sand paper | 78.00(57.15) | 14.00 | 11.90 | 0.258 | 2020 | 20 |
| $T_3$ - Immersion of seeds in hot water (80 $^0$C ) for 15 min | 34.33(33.05) | 9.33 | 8.23 | 0.198 | 606 | 7 |
| $T_4$ - Acid Scarification(seeds were soaked in 50 % $H_2SO_4$ for 30 min) | 46.33(39.52) | 10.07 | 9.17 | 0.225 | 890 | 10 |
| $T_5$ - Immersion in cold water for 24 hr | 69.00(51.75) | 12.33 | 10.87 | 0.238 | 1601 | 16 |
| $T_6$ - Subjecting the seeds to heat at 55$^0$ C for 16 hr hot air oven | 67.67(50.99) | 10.47 | 9.40 | 0.222 | 1343 | 15 |
| $T_7$ - Nicking of seeds at abaxial end | 88.67(64.79) | 14.90 | 12.07 | 0.261 | 2391 | 23 |
| S.Em.± | 1.90 | 0.28 | 0.41 | 0.004 | 50.5 | 0.51 |
| C.D. (p = 0.01) | 7.78 | 1.18 | 1.71 | 0.016 | 212.8 | 2.15 |

*Figures in the parentheses indicate arcsine root transformed values

population. Similar negative results due to hot water treatments have been reported by Sinha *et al.* (1993) in kasuri methi.

Likewise the shoot length, root length, seedling dry weight, seedling vigour index I and II were maximum in nicking of seeds followed by mechanical scarification using sand paper. The cut area by nicking of seeds and the seeds scarified using sand paper helped in the absorption of water. Since the germination of velvet bean was low from freshly harvested seeds due to hard seed coat, which ultimately reduced the seedling vigour index in hot water, hot air oven, cold water and sulphuric acid treatments. Imchen *et al.* (2015) reported that there was better growth of shoot and root of gulmohar when the seeds were nicked and scarified by sand paper.

## Conclusion

From the results of the experiment, it can be concluded that velvet bean seeds posses hard seed coat dormancy. Nicking of seeds at abaxial end recorded maximum (88.67 %) germination percentage and seedling vigour index (2391). Scarification of seeds using sand paper was next best alternative to overcome seed dormancy in velvet bean.

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