Effect of pre-planting seed treatment options on dormancy breaking and germination of *Ziziphus mucronata*

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Introduction *Ziziphus mucronata* (Buffalo thorn) is a multipurpose tree, widely adapted to a range of ecological conditions and tolerant of extreme climatic conditions, including frost and drought (Venter & Venter, 1996). It is a valuable fodder tree for livestock and game animals, especially in the drier parts of Africa (Rothauge *et al.* 2003). Similar to many other leguminous species, establishment is constrained by low and erratic germination of the seed, which has been attributed mainly to the physical barrier of the stony endocarp and dormancy associated with seed coat impermeability . This experiment aimed to compare the suitability of various seed treatment options as practical methods to break seed dormancy and enhance germination.

Material and methods *Z. mucronata* seeds were isolated from the dried fruit by light hammering on a concrete floor covered with a cloth sheet. Seeds were subjected to the following pre-planting treatment options: untreated seed (control); scarification using sandpaper; immersion in boiling water for 1 or 5 minutes; and immersion in 94% sulphuric acid for 10, 20, 30 or 45 minutes. Treated seeds were placed in petri dishes on moist filter paper and kept in a germination compartment adjusted to day/night temperature of 30/20°C with 12h of light. Germination of seeds was counted every day while non- germinating seeds were categorized into hard and dead after 15 days. The data were subjected, after arcsine transformation, to analysis of variance and means were compared using Tukey's test at the threshold of $P<0.05$. Arcsine transformed means were back transformed for presentation.

Results Hard seed percentage was significantly ($P<0.05$) lower than the control in seeds subjected to sandpaper scarification or treated with sulphuric acid for >/=10 minutes (Table 1). However, sulphuric acid treatment for >/=20 minutes was the most effective way to break hard seed dormancy. Regardless of its duration, boiling water treatment was not effective to break hard seed dormancy for *Z. mucronata.* Scarification with sandpaper or sulphuric acid treatment for 20 minutes significantly ($P<0.05$) increased the percentage germination compared to the control but the latter also resulted in significantly ($P<0.05$) higher seed death (Table 1).

Table 1 Effect of pre-planting seed treatment options on germination rate and proportions of hard and dead seed remaining of *Z. mucronata* after 2 weeks' incubation

Treatment options	Seed (%)		
	Hard	Germinated	Dead
Control	77.7a	10.7b	11.6d
Sandpaper scarification	23.9c	65.4a	10.7d
Immersion in boiling water for 1min	52.2abc	26.8ab	21.1cd
Immersion in boiling water for 5min	57.4ab	11.0b	31.7cd
Immersion in 94% H_2SO_4 for 10min	49.5bc	12.0b	38.5bcd
Immersion in 94% H_2SO_4 for 20min	2.2d	57.5a	40.4abc
Immersion in 94% H_2SO_4 for 30min	0d	37.2ab	62.9ab
Immersion in 94% H_2SO_4 for 45min	0d	31.5ab	68.5a

Means followed by the same letter within a column differ significantly at $P<0.05$

Conclusions Scarification using sandpaper was the best way to maximize germination without increasing the risk of seed death significantly. The duration of immersion was critical in the case of sulphuric acid treatment; 20 minutes was the optimum time of immersion.

References

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