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Methods of Increasing Seed Germination of Winged Bean, *Psophocarpus tetragonolobus* (L.) DC.^{1,3}

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Abstract. Seeds of winged bean, accessions TPt-1 and 'Chimbu', treated in dilute H₂SO₄ (8:1 by volume in H₂O) for 5 minutes at 62°C followed by a 5 minute rinse under running tap water gave 96-100% germination with no apparent injury to the emerging seedlings.

Plant establishment of the winged bean, a potentially valuable crop for the tropics and subtropics (1, 4, 7, 9) is a problem due to poor seed germination. The low percentage germination of tropical legumes is attributed to their hard seedcoat and not to seed dormancy (8). Scarification of hard-coated seeds has been achieved by immersion in concentrated H₂SO₄ or in boiling water or exposing them to very low temperatures by immersion in liquid nitrogen (2, 5, 6, 8, 10). Brant et al. used acetone, benzene, chloroform, hexane, petroleum ether, alcohols and sulphuric acid at various concentrations to overcome the poor germination of crown vetch, *Coronilla varia* L. Mechanical scarification has been achieved by abrasion, puncture, or cutting of the seedcoat.

The objective of this study was to find a practical treatment to increase germination percentage of winged bean seeds. Seeds of the accession Tpt-1 (dark brown) and 'Chimbu' (black) were treated by each of 6 methods (400 seeds per treatment): 1) immersion of seeds in 4 times their volume of H₂O at 24°C for 5 min; 2) immersion in 4 times the seed volume of H₂O at 24°C for 16 hr; 3) immersion in 4 times the seed volume of 0.5% NaOCl (10% Clorox) in deionized H₂O for 10 min,

followed by a 5 min rinse under running tap water; 4) immersion in 2 times the seed volume in H₂SO₄ (sp. gr. 1.84) at 24°C for 5 min, followed by a 5 min rinse under running tap water; 5) immersion in 4 times the seed volume of H₂O at 62 ± 1°C for 5 min followed by cooling under running tap water for 5 min; 6) immersion in 2 times the seed volume of diluted H₂SO₄ (sp. gr. 1.84, 8:1 by volume in deionized H₂O) at 62 ± 1°C for 5 min, followed by cooling and rinsing under running tap water for 5 min. In all treatments seeds were gently stirred 2-3 times. Non-treated seeds were used as control.

Seeds were divided into 4 replications of 100 seeds each, placed onto trays lined with 2 layers of Whatman No. 1 filter paper, moistened with deionized H₂O, covered first with Whatman No. 2 filter paper, then 2 layers of paper towels moistened with deionized H₂O and kept in a cabinet in the dark at 25 ± 0.5°C. Seeds were checked twice daily and moistened with deionized H₂O as required. Number of germinating seeds was counted on the 4th, 7th, and 10th days after the treatment.

Table 1. Germination of winged bean seed accessions TPt-1 and 'Chimbu' following seed treatment, February 1979.

Seed treatment ^z	Germination (%)					
	TPt-1			Chimbu		
	Time after treatment			Time after treatment		
	4 days	7 days	10 days	4 days	7 days	10 days
1. 22°C H ₂ O for 5 min	<1 c ^y	39 d	62 de	5 d ^y	58 c	65 b
2. 22°C H ₂ O for 16 hr	7 b	32 d	53 e	19 bc	46 d	55 bc
3. 22°C 10% Clorox for 10 min	0 c	57 c	75 c	15 cd	53 cd	60 b
4. 22°C H ₂ SO ₄ for 5 min	7 b	82 b	88 b	8 d	85 b	99 a
5. 62°C H ₂ O for 5 min	<1 c	62 c	72 c	28 b	58 c	65 b
6. 62°C H ₂ SO ₄ + H ₂ O (8:1 v/v) for 5 min	42 a	96 a	96 a	56 a	100 a	100 a
7. None (control)	40 a	58 c	69 cd	23 b	34 e	46 c

^zExcept in treatments 1, 2 and 7, seeds were rinsed for 5 min under running tap water following warm water or chemical treatment.

^yMean separation in columns by Duncan's multiple range test, 1% level.

Fastest germination for both accessions occurred in the warm, diluted H₂SO₄ solution (Table 1). All of the 'Chimbu' seeds germinated within 6 days after treatment with the diluted H₂SO₄. After 10 days of incubation, however, there was no significant difference in germination between the concentrated and the diluted H₂SO₄ treated seeds. Other treatments gave significantly lower germination.

Based upon the experimental results described above, winged bean seeds are now routinely treated with the diluted H₂SO₄ at 62°C followed by a 5 min H₂O rinse.

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