

**Supplementary Material**

**Variable seed quality hampers the use of *Themeda triandra* (Poaceae) for seed production, agriculture, research and restoration: a review**

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Supplementary Table S1. Summary of *Themeda triandra* germination studies including seed: provenance, treatments, and the main results.

<b>Author/s</b>	<b>Seed provenance</b>	<b>Treatments</b>	<b>Main results</b>
Baxter <i>et al.</i> 1993	Drakensburg and Zululand, Kwazulu-Natal, South Africa	Cold stratification in dark at 5°C for 5, 10, 20 and 30 days for 30°C	80% germination at 30°C after 4-8 months depending on population. 25 °C = optimum germination temperature for after-ripened seed. Alternating: Maximum germination of after-ripened seed was at 30/20°C (99%) Cold: increased germination by 40-60%. Chill time and response varied with population.
Baxter <i>et al.</i> 1994	Drakensburg and Zululand, Kwazulu-Natal, South Africa	a) Dry smoke: Imbibed (0-36 hrs)/non-imbibed seed: smoked for 5, 15, 45 and 90 minutes b) Smoke water: 2% solution c) Ethylene @ 7 concentrations d) ash extracts	a) 5-15 minute smoke exposure at 30°C was optimal (germination increased from 6-36%) and germination increased with imbibation rate b) 20% dilution was best with increase from 10 - 53% germination c) germination did not increase with ethylene or d) ash
Baxter <i>et al.</i> 1995	Drakensburg and Zululand, Kwazulu-Natal, South Africa	Dry smoke from 27 plant species	Smoke from 18 species significantly increased germination. Highest increase was from 6 - 25%.
Baxter 1996	Drakensburg and Zululand, Kwazulu-Natal, South Africa	Numerous (PhD thesis) including light/no light, glume removal, GA, boron, smoke.	Light not needed for germination. Glume removal increases germination but there is still embryo dormancy. GA increases germination but optimal concentrations differ between populations. Boron does not increase germination. Smoke improves germination and can be used as a pre-treatment.

<b>Author/s</b>	<b>Seed provenance</b>	<b>Treatments</b>	<b>Main results</b>
Clarke <i>et al.</i> 2000	New England region, NSW, Australia	Seed cleaned to caryopsis a) 2 levels of smoke water x 2 levels of light b) heat at 80°C for 15 min c) 1 week at 5°C	no significant response
Clarke <i>et al.</i> 2010	4 populations from Walkamin, QLD and 1 from Perth Hills, WA, Australia	a) pre-treatment 50% RH for 4 weeks, 45°C for 1, 2, or 3 months b) GA3 at 100 mg/L or glume removal c) smoke water	a) increase in germination from 5 to 30% b) no increase in germination c) increase in germination by 2-10%
Cresswell & Nelson 1972	Johannesburg region, South Africa	a) 6 micronutrients: cobalt, copper, zinc, manganese, iron and molybdenum b) 0.1 - 100 mg/L gibberelic acid c) boron	a) no significant increase in germination b) 70% germination of fresh seed c) with 0.5 mg/L dormant seed had same germination % as 14 months old seed
Farley <i>et al.</i> 2013	Gympie, QLD, Australia	a) with/without hull b) hulled seed with/without 1.0 mM GA3	a) hull removal increased germination from 10 to 56 ± 4%. B) hulled + GA3 = 88 ± 4% germination
Ghebrehiwot <i>et al.</i> 2012	Trial site, Pietermaritzburg, South Africa	a) nil treatment or 100 °C for 15 minutes b) smoke water/no smoke water	emergence increased from 5% to 30% after smoke water and to 48% with smoke water plus heat
Groves <i>et al.</i> 1982	8 populations: Lae PNG, Katherine, N.T., Mundubbera, QLD, Alice Springs, NT, Tantangara, NSW, Adelaide Hills, SA, Bunbury WA, Hobart, TAS. Australia	Heat and cold stratification	Dormancy, germination and heat cold responses were population dependent

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Hagon 1976	Canberra, ACT, Australia	a) polyethylene glyco 6000l at 0.1 nM b) gibberelic acid	1a) GA3 plus glume removal and 8 H light increased germination from 39% to 80% 1b) Potassium nitrate at 0.2% not better than the control 1d) 24/62°C storage overcame dormancy within one month 2a) germination with 8 H light 83%, in darkness 74%
Seed Information Database (SID), 2023	Botswana	Covering structures removed, + 101mg/l Potassium nitrate (KNO3)	50-80%
Martin 1975	Near Johannesburg, South Africa	Gibberelic acid (concentration unclear)	Hull removal increased germination from 4% to 41%. Addition of gibberelic acid increased germination by a further 25%.
Read & Bellairs 1999	Lithgow, NSW, Australia	smoke water diluted 1:10 with distilled water	Germination increased from 75 - 87%. When cleaned to caryopsis, germination increased from 69-92%
Saleem <i>et al.</i> 2009	unclear	germination after 0, 6, 12 and 18 months.	Germination: 0 & 6 months 24%, 12 months 84%, 18 months 19%
Stevens <i>et al.</i> 2020	Albury, Batemans Bay and Sydney, NSW, Australia	1a) test drought tolerance with polyethylene glycol 8000 2a) heat stratification: for 0, 1, 2 or 3 months in an oven	1a) tetraploids less tolerant of drought 2a) heat at 40°C and 40% RH alleviated dormancy after 2 months