



AUSTRALIAN FLORA FOUNDATION

RESEARCH GRANT FINAL REPORT



Soil disturbance trials improve germination and seedling establishment for the nationally Endangered Whibley wattle (*Acacia whibleyana*)



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SUMMARY

Disturbance is an essential ecosystem function that cues germination in plants that only reproduce from seed, but can be missing and challenging to replace for species persisting in isolated remnants within highly modified landscapes. Land managers lack the evidence they need to replace germination cues and suitable seedling conditions, without sacrificing adult plants in ecological burns, to reverse the extinction risk for endangered disturbance-dependent *Acacia* species. We predicted soil disturbance and seeding, together with suitable conditions from canopy cover and watering, would increase germination and seedling establishment in nationally Endangered Whibley wattle (*Acacia whibleyana*). We co-designed management trials to test the relative influence, and logistic feasibility, of three treatments (disturbance by rotary hoe, water supplementation, and seed supplementation) on germination and seedling establishment on Whibley wattle within an agricultural landscape in southern Australia. We then tested the relative influence of these treatments against abiotic (soil salinity Electrical Conductivity, and pH) and biotic (canopy cover and vegetation structure) conditions on seedling development. Using a split-plot design across 200 subplots, we tracked germination and development in **539 Whibley individuals over four years** (2020–2023). We found that Whibley wattle germinates from the natural, undisturbed seedbank, and this increases six-fold in seed supplemented quadrats, but only 3% of 539 emergents developed into established seedlings. **Soil disturbance by rotary hoe was the strongest positive predictor for germination**, but a negative predictor for establishment. **Vegetation structure and Whibley wattle canopy cover were the strongest predictors within the overall strongest model, which included all treatments, for Whibley wattle development.** Soil disturbance is therefore a viable landscape-scale management tool to increase germination in an endangered wattle, but disturbance-triggered threats (e.g. non-native animals and plants) need to be clarified and controlled for seedling establishment. Policy managers can use our findings to inform development of soil disturbance guidelines for threatened plant species where adult plants and seed stocks are limited. Land managers can use our framework to design field trials on growing conditions and control actions (treatments) to reduce threats and further improve Whibley wattle seedling establishment.