An integrated methodology for propagation from seed of Perth, Western Australian provenance, native plants©

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Abstract

This paper outlines the methods that I have developed in conjunction with my colleagues, to provide continual improvement to outcomes from our seed propagation work. Some 80% of our propagation is from seed, with the majority sourced from our own in house collections. The underlying issue for successful propagation, is the connection between all the aspects of this work; the seed sourcing, the seed quality assessment, the timings and treatments of seed, the trialling of new methods to achieve germination and the detailed recording of the seasonal results to inform future work.

SEED SOURCING

The level of communication and accuracy of information exchange with the seed collection team is paramount. The precise location and date of collection are of utmost importance as a guide for future collections based upon the germination outcomes. Increasing our seed collection sites, and arranging our seed collection team to make timely and site specific collections, is what I need and ask for.

So much of my work suggests to me that native seed has enormous variability. For example, we recently sourced seed of the same species from five different sites and, despite utilising the same treatment at the same time, only one of the seed batches proved viable.

Another example involves *Gahnia trifida*, a common and often sought after native dampland sedge that propagators often have difficulty in growing. Such was the case for me for some years, until such time as we found stands of the plant that provided highly viable seed. In early times, we had collected seed from isolated and small clumps of plants without success. Upon collecting from large/monoculture size stands we found highly viable seed.

The type of reliability seen in the vegetable/horticultural seed is alien to our Australian native seed. There are likely many factors at work in determining germinability but I am convinced that outside of our scientific understanding of dormancy, nature plays a major role in determining what viable seed is and what is not. Additionally, the quality and integrity of the seed collection is fundamental.

There is an entrenched practice amongst many commercial seed collectors where collections are focussed on seed volumes, and are not necessarily driven by quality of the seed and viability outcomes. Our experience with seed sourced from outside is highly variable and often produces poor outcomes.

The majority of seed we use in our propagation is collected in house and we deliberately collect from a wide range of sites within our market area. The high number of collection sites provides an illuminating insight into what sites produce the best seed.

This part of my work involves very close liaison with our collectors and detailed records of where and when collections are made. Whilst seasonal variances occur, we have developed an excellent data base of the best seed sites for the particular species we seek. We have also developed a comprehensive seed collection manual to guide newly licensed staff to ensure seed is collected at the right times.

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SEED QUALITY ASSESSMENT

A very close assessment of seed is made before decisions are taken regarding treatments and sowing. Unformed (no embryo), badly shaped or discoloured from normal seed are either discarded or treated and bulk sown to achieve whatever. Cut tests and microscopic examination assist us but the best guide is our experience built over the years as to what good seed will look like and where it came from.

When we have ascertained that good seed is present, a decision is made as to utilisation in direct seeding via our auto air-seeding system or manual sowing. Our systems record the numbers of seed to be sown per cell unit on auto seeder or the seed weight per seed tray. Having years of data provides a working range within which we can normally avoid significant under/over sowing.

PREGERMINATION SEED TREATMENTS.

Previous propagators and myself, have developed comprehensive data bases to aid our work. These record date of seed collections, provenance detail down to site level, timings of treatments, type of treatments and outcomes.

Additionally, the timings of sowing for particular species is all important, and we have been surprised by the variance in seasonal temperature preferences that exist for many of our plants. We have no doubt that some propagators do not achieve success on some species as they have chosen the wrong time of the year, have the wrong treatment, and assume the seed is not viable.

Some examples of methods we employ on seeds are:

- Using enzymes to remove fleshy fruits
- Treating damp prone species seed with fungicide pre sowing
- Using a wetting agent when imbibing seed
- Using granulated fungicide when potting damp prone species
- Weathering
- Manual scarification (limited numbers)
- Hot and/or cold water treatment, can be repetitive
- Concentrated acid exposure (H_2SO_4)
- Extended conventional sowing (long term trays)
- Temperature stratification, hot and/or cold
- Extended imbibition, rainwater with wetter (allow seed to swell)
- Smoked water soak
- Physical smoke (often for extended periods)
- Heat (up to 100°C)
- Exposure to light (surface sow)
- Light deprivation
- Extended burial
- Inoculants and fungi added to selected species
- Exposure to plant hormones, e.g. gibberellic, jasmonic, and abscisic acids
- Exposure to potassium nitrate

Importantly, we have found that a combination of the above treatments has achieved or improved results. An example of nature's strange ways with seed germination was the research undertaken recently on *Persoonia longifolia,* that showed summer rain events were necessary to trigger germination in the following cooler months.

NOTABLE SUCCESSES

The integrated nature of my work as outlined has given rise to some outstanding results on what would normally be difficult and recalcitrant species. These include;

- *Adenanthos* sp.
- *Baumea* sp.
- *Dasypogon*
- *Hibbertia* sp.
- *Lepidosperma* sp.

- *Lomandra* sp.
- *Spinifex* sp.
- *Triodia* sp.

Success achieved with our seed work has also allowed us to source material with genetic traits that have given rise to selection of stock plants and provided items to take into tissue culture.

NEW CHALLENGES

There are still many plants in our market that we are not able to grow from seed as the secrets to unlocking dormancy have not been found. We continue to work on these and utilise available research material and references to guide us. Often previous success within the genus gives you a guide to a start point.

CONCLUSION

My work in propagation from seed is most stimulating and I am fortunate to have the opportunity of working in this field. I have taken a long term view on my work and over time, my knowledge has increased to the benefit of the Natural Area nursery business. It is also to be hoped that this paper will encourage others to work on their propagation from seed, and thereby widen the range of plants available to landscapers and those undertaking ecological restoration.