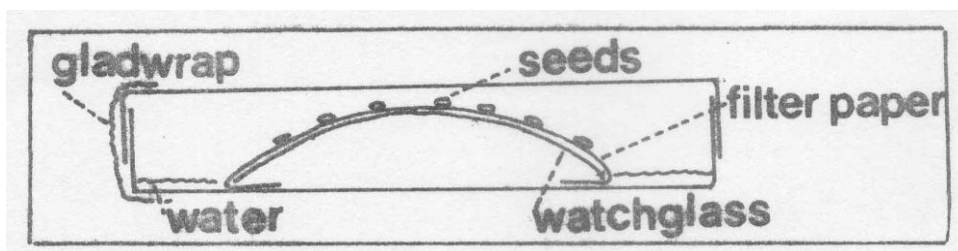


PROBLEM

The environmental conditions that stimulate seed germination are poorly understood for many Australian native plants. You might like to investigate the conditions needed for germination of several related species, particularly those with horticultural value.

INFORMATION

1. Select species for which you can obtain large number of seeds so that you can have a good experimental design. Try and find out when the seeds germinate in the field as this might help you determine the most likely treatments to use. Avoid using orchids as they may have very special requirements like a suitable fungus being present.
2. Factors to investigate include
 - a) Hard seed coats (common in legumes). An impermeable seed coat prevents water uptake. Try nicking the seed coat with a sharp blade or rubbing it with sand paper (don't damage embryo part), or dropping seed into boiling water for 1, 2, 3 etc minutes and then immediately into very cold water. If you have 'softened' seeds they will swell up within 24 hours. They may or may not then germinate ...!
 - b) Germination inhibitor causing dormancy. Some seeds contain substances that prevent germination. These inhibitors are leached out over a period of time (maybe years). This can be hastened by washing seeds in running water. Place them in a cheese cloth bag and tie so they are continually washed for 1 hour, 1 day ... etc. (think hard before you do this in a year with water restrictions!). Other seeds have the inhibitors in the fleshy layers or dry bracts around the outside of the seeds. Test seeds with and without these layers.
 - c) Temperature requirement. Many seeds will germinate only at a particular temperature. You might be lucky and have a range of growth chambers or incubators to use, but if not try germinating seeds out of doors at different times of the year.
 - d) Light requirement. Some seeds require light to germinate (often fairly small ones) or just the opposite – they won't grow except in the dark. Wrapping some dishes in aluminium foil and leaving others exposed to light is a good treatment here.
3. A useful way to germinate seeds is to place 10-100 depending on size of filter paper wrapped around a watch glass in a petri dish as in the diagram. Seal edges of dish with a gladwrap strip.



Other methods are to use sand in seed boxes or put seeds between two layers of capillary matting in a seed box.

4. Examine seeds at frequent intervals and top up water. Remove germinated seeds, i.e. seeds in which the seedling roots (radicle) has emerged. Test to see if remaining seeds are still firm and alive. If they're squelchy they're dead.
5. If necessary, to prevent fungi growing on seeds either treat with a fungicide or drop seeds in 2% sodium hypochlorite for five minutes then wash well. Keep good records as these treatments might themselves stimulate germination.

Source: *Biology Projects for High School Students*, by Prof. Jennifer McComb, School of Environmental and Life Sciences, Murdoch University, Western Australia. Used with permission.

Downloaded from seniorphysics.com/biol/eei.html

DESIGN OF EXPERIMENT

1. Think carefully about how many factors you can test with the number of seeds you have in hand.
2. Do you think it important to know the source and age of your seeds?
3. If you are doing an experiment over a period of a year how might you distinguish between an ageing of the seed (and possible change in internal inhibitors), and the effect of your various experimental treatments.
4. If you do an experiment and nothing germinates do you think it is o.k. to wash and dry those seeds and try something else?

REFERENCES

- Black, M. (1972). Control Processes in Germination and Dormancy (Oxford Biology Readers No. 20) (Oxford University Press).
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- Mayes, A.M. and Poljakoff-Mayber, A. (1975). The Germination of Seeds (Pergamon Press : Oxford) (advanced reading).
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- Villiers, T.A. (1975). Dormancy and Survival of Plants (Edward Arnold : London) (advanced reading).

ALSO

1. Various issues of "Australian Plants" have hints on how to germinate seeds of native plants.
2. The horticultural advisor at Kings Park, Mr. Bob Dixon will give advice to home gardeners.

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