PROJECT 4-4 ROOT PARASITISM BY THE CHRISTMAS TREE

PROBLEM

The West Australian Christmas tree *Nuytsia floribunda* is a "hemiparasite". Although it has green leaves and apparently normal roots it is unable to live unless it makes connections with the roots of other plants from which it sucks nourishment. The connections are called haustoria and the problem is to discover what stimulates the Christmas tree roots to make haustoria. Trees are apparently not very selective as they have been known to latch hopefully onto underground electric cables.

INFORMATION

1. *Nuytsia* seed collected fresh from trees in January-February should be dried until it changes in colour from yellow to light brown. Rub off wings, put in container and pour over hot (not boiling) water. Leave stand overnight, plant about ½ cm deep with stalk end downwards. Germination occurs in about three weeks.

2. It might be better to do field trials as well as pot trials as plants in pots may be slow to form haustoria.

3. Use a variety of test objects – living plant roots; dead plant roots; rods of various diameters of glass, metals, plastic; rods circular, square or triangular in cross section etc. At least a year in the field may be necessary.

4. Seedlings will grow for a year or so without a host. Other root parasites like *Santalum* will survive for longer if leaves are sprayed with chelated iron (1/8 teaspoon per 3" pot). Will *Nuytsia?*

5. Similar experiments could be done with other root parasites like *Santalum spicatum* (sandalwood) *S. acuminatus* (quandong) or *Exocarpus*. The seeds of these may be reluctant to germinate however.

DESIGN OF EXPERIMENT

1. How will you select the place in the field to bury your objects?
   How will you find the stuff you bury in several months' time?
   Are you going to have one harvest or several?

2. Think carefully about your experimental design so that you will distinguish between substance, shape in cross section and diameter of your test objects.

REFERENCES

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Grant, W.J.R. and Buttrose, M.S. (1978). *Santalum* fruit, domestication of the quandong *Santalum acuminatum*. Australian Plants 9 316-9

Herbert, D.A. (1918). The Western Australian Christmas Tree. *Nuytsia floribunda* (The Christmas Tree) – its structure and parasitism. Journal of the Royal Society of W.A. V 72-88 (good stuff, easy to read).

Herbert, D. A. (1924). Root parasitism of Western Australian Santalaceae. Journal of Royal Society of W.A. 11 127-49

Kuijt, J. (1969). The Biology of Parasitic Flowering Plants (University of California Press : Berkely) (interesting to read even if you don't do this project).