

PROBLEM

To find whether there is a scientific basis for the observation that various species of plants can inhibit the growth of other plants.

INFORMATION

1. It has been known for a long time that some plants grow well together while in other cases one plant seems to prevent the growth of another by the chemicals it produces. This is termed allelopathy. Organic and inorganic substances including growth regulators can be leached from the leaves or roots of plants by rain, influencing the growth of nearby plants of the same or different species. Volatile substances are also known to be effective. Plants that are affected can be of the same species and/or different species. Insects too can be repelled.
2. There is much non scientific literature on companion plants, and some of these observations might be explained by allelopathy.
3. This is a very difficult area to research as you have to distinguish carefully between allelopathy and the possibility that one species is shading another, or it is competing more effectively for available water and nutrients.
4. When root exudates are suspected, test plants can be watered with water draining from the pots of other plants or grown in aqua-culture using water in which another species is or was growing.
5. Seed germination is used as a measure of extract toxicity – ones like lettuce that give a reliable germination are often used.
6. Amongst the many local examples you might investigate are the following:
  - a) *Kalanchoe daigremontiana* produces plantlets from notches on its leaves but those that fall onto soil below the mother plant grow very slowly due to a toxin produced by mother plant roots. Does the local *Kalanchoe* (mother of millions) or other plants that reproduce in a similar vegetative way have any method of inhibiting the growth of the new plantlets?
  - b) Aqueous extracts from eucalypt leaves and litter may inhibit seed germination. Do the gum trees in the bush near you have lots or only a few seedlings under them?
  - c) Can you get morning glory to grow on jacaranda?

DESIGN OF EXPERIMENT

1. How will you first prove that allelopathy exists in your system?
2. How will you then find out where the toxin is coming from?
3. How are you going to measure “growth” of your plants?
4. Think very carefully about your “controls”.

REFERENCES (all advanced reading)

Rice, E.L. (1974). Allelopath (Academic Press : New York)

Atsati, P.R. and D.J. O'Dowd (1976). Plant defence guilds. *Science* **193** : 24

Muller, C.H., Muller, W.H., Haines, B.L. (1964). Volatile growth inhibition produced by aromatic shrubs. *Science* **143** : 471-3