

PROBLEM

As you know roots grow downwards and if tipped sideways will curve over to point downwards again. This is called geotropism. There are lots of fairly conventional experiments you can do to find out which part of the root bends, if bending occurs if the root tip is cut off, the relationship between centrifugal force and gravity etc. However you may wish to do something more difficult.

It is known that the first root that comes out of a seed (the radicle) is strongly geotropic. Lateral roots must be less so. Can you measure the strength of geotropism in a radicle and compare it with that seen in 1st order, 2nd order laterals? Is there any difference between plants that have a taproot compared to a fibrous root system? If you cut off the tip of the radicle when it is about 2 cm long is the strength of geotropism altered in the side roots if you measure it about a week later?

INFORMATION

1. Corn, radish, peas and beans are often used.
2. To get nice straight radicles, soak seeds overnight then place in a row in the bottom of a Petri dish with micropyles all pointing to one side. Cut out blotting paper (several layers) or a wad of cotton wool to fit over the seeds, moisten it and hold it in place by putting on the lid. Stand the dish upright so micropyles point down and place it in the dark until roots are 1 ½ -2cm long. Select uniform seedlings for your experiments. You may have to grow seeds in large jars stuck to the glass and kept moist with cylinders of wet paper to get suitable material for experiments on lateral roots.
3. In your reading you will find that auxin is involved in root curving. Experiments with auxin and root bending are not often successful.

DESIGN OF EXPERIMENT

1. How will you measure curvature?
2. How are you going to measure "strength" of geotropism?
3. How are you going to hold the seedlings vertical till you're ready to start the experiment?

REFERENCES

Weier, T.E., Stocking, C.R. and Barbour, M.G. (1974. Botany. An Introduction to Plant Biology (5th ed.) (Wiley : New York) Chp. 20