Brushing up your field techniques for A-level biologists

Field techniques for students who want to study biology at university that you can do in your garden

Field techniques are important for lots of degrees and for many ecology-based careers that you may want to do in the future, but lockdown has meant that many A-level students haven't had the chance to learn these essential techniques. These activities will give you the chance to improve your techniques and hone your identification skills.

Each of the ideas below are meant as a starting point. Everyone will have a different area to survey, but, to gain the most from these activities, try and think of a hypothesis you can test before you start, then how you can get enough results to statistically test your results. Your biology course will have taught you chi-squared, t-tests, standard deviation, and Simpson's biodiversity index, to give you a start. You could also use mark release recapture to determine population sizes and Mann Whitney U test.

The equipment you need for these tests is deliberately vague, but you don't need to buy anything!

You will need:

- a 0.5m square of wire - this could be made out of hangers. If you haven't got any wire, then string will do
- Some paper cups or plastic tumblers and small plates to cover them
- A trowel or a small spade
- Your phone
- The app Seek, by iNaturalist- don't be put off that this is a children's app, it is a very good way of identifying species that is quick and much easier than using keys
- Tippex, a metallic felt pen or coloured nail varnish
- Dough and food dyes, or plasticine
- Thin wire
- A long thin stick such as a metre rule or a bamboo cane
- A large white sheet of paper or a pillowcase

Download Seek onto your phone (available from App store or Google play- this is a free app), and familiarise yourself with it in the garden trying to identify things that you already know to start, so that you get the feel of it . To get identification down to species level, you will need to light up 7 dots on your phone screen. Note, you can either download this app and iNaturalist and upload your observations and contribute to the scientific records community or use the programme without uploading anything.

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Leaf miners
If you have holly in your garden or exercise area, or on your daily exercise walk, look for evidence of leaf miners. Looking closely will allow you to see the larvae within the mines.
Using Seek, identify the species of holly. Determine, by counting the number of leaves and plotting a running mean, how many leaves you will need to sample to determine the number of leaf miners. Note size of miners and number per leaf. If you can safely, determine the effect of abiotic factors such as pollution (is the bush on a busy road normally!), aspect etc., affect the miner load.

Pit fall traps
In different area of the garden set up pit fall traps by burying a plastic tumbler such that the edge comes into contact with the surface of the soil. Support a small plate about 3 cm above the cup, using stones or sticks, to avoid species escaping and water getting in. Leave overnight and check and identify species.
Repeat this in different areas of the garden, noting how the plant cover etc. varies and whether this affects the species found.
You could also mark species with a pen or Tippex- remembering the criteria for good results- marking in a non-harmful fashion, allowing time to re-integrate etc., and carry out a population estimate for some of the species. Beetles are good for this as they are easier to handle and not affected by the marks.

Bird feeding
Set up a bird feeding experiment by making up different 1cm diameter spheres of coloured dough or plasticine onto plastic plates in the garden. Place where you can observe and leave. Determine how different colour combinations affect the species of bird visiting the table. Determine whether certain colour combinations attract different species of bird more than others, whether there is a feeding hierarchy on the table, whether certain species visit at the same time etc.

Pollinators
Carry out a pollinator survey in the garden. Check for bees that visit the flowers in the garden use and identification chart, available free online to determine which species visit which plants, but also examine for the presence of hoverflies, beetles, and other insects.
Investigate whether the flower colour affects the number and variety pf species.

Tree beating
Get a pillowcase or sheet of paper and gently hit the leaves of a tree, catching what falls from them. Examine the number of species. Determine how this varies between species of tree.

Hedge survey
If you have a hedge, identify the species of plant within the hedge and then determine which other species are present. You can use a transect here, by making a quadrat out of a hanger to help you.

Compost survey
Carry out an invertebrate survey of a compost heap. Aim to identify species all found down to species level. Identify the plant material within the heap and see how this affects the invertebrates within.

Transects
Carry out a random transect to determine the number of a species of wildflower in your garden. Don't pick daisy or dandelion, consider something like selfheal or plantain.

Ladybirds
If you have access to tweezers and small dish, do ladybird larva survey in your garden. They particularly like nettles - hence the tweezers - but also elder. Determine population size and whether there are native or harlequin ladybirds.

Vertebrates
If you would like to do some vertebrate surveying, think about visiting Amazon and ordering a cheap trail cam. Search the edges of your garden for signs of entry and pathways, then place the camera out overnight.

We hope you enjoy these techniques.
Don't forget to get your whole household involved – its fun!

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