

13. Collecting plant specimens for identification

For a conservation ecologist, an ability to identify the major and/or common native plants is very important. In some cases it is not possible to identify species in the field. In these instances, you may need to collect a small specimen (or take good photographs).

A herbarium specimen is a permanent record of a plant observation at a particular site, and may be useful to verify the identity of a plant. If you intend to collect plant material, you should follow the guidelines below.

Collecting

A collecting permit is required by law if you want to collect plant material from certain areas (e.g., national parks, forest / conservation parks, and scientific, scenic, nature, wildlife and special purpose reserves). Permission must also be sought in order to collect from places such as public gardens, council plantings, exotic plantation forest, private land etc. Permits/permission can be obtained from the appropriate administering authority (e.g., Department of Conservation, district or regional councils, forestry companies, private owners etc.)

Look around and familiarise yourself with the species that occur at a site. How abundant is each species?

Before taking any plant material, ask yourself whether it is appropriate to collect specimens:

- Do you have permission to collect specimens?
- How common is the plant at the site?
- Would taking a specimen destroy the plant?
- Do you think the plant may be a threatened species?
- Would photos be adequate?

If you do not have permission to collect at the site, you must gather information about the plant in other ways.

If you do have permission to collect, you may still decide it is inappropriate to take a specimen, depending on the answers to the questions above.

An ideal herbarium specimen must be as representative as possible of the population it comes from, it must have accurate collecting data recorded, and it must be well preserved.

A specimen can be one plant, a portion of one plant, or several small plants of the same species collected from a single site at the same time. Material collected from a plant at different times of the year must not be mounted on one sheet.

Each herbarium sheet must display one species only.

Do not over-collect or deplete populations of native plants by taking more material than is necessary. If a plant is scarce in an area, collect only small representative portions. Take care not to damage the surrounding vegetation or habitats in the process of collecting.

Choosing a plant specimen

Don't be tempted to collect more material than you really need. Keep in mind the size of your herbarium sheet. If a specimen is particularly large (e.g., a tree fern frond), it can be either folded to fit, or spread over two or more sheets.

Look at the plant and decide carefully which portions would most accurately represent it overall. Bear in mind such characters as:

- Characteristic vegetative features (leaf forms, stipules, ligules etc.)
- Reproductive structures (flowers, fruit etc.).
- Reproductive structures are often the most important characters used in plant identification.

Field notes

Every herbarium sheet should have an information sheet attached to it. It is important to gather additional information about the plant specimen at the time of collection. Colours, shapes, sizes and odours can change during the drying process, so it is important to note these features while the specimen (and your memory) is still fresh. The following basic details should be noted:

Name: Name of the collector.

Date: Date when the specimen was collected.

Locality: Be precise; use the following format: 1. Country, 2. Ecological region (e.g., Northland), 3. Closest city/town, 4. Name of property and/or area, 5. actual location (e.g., off edge of milking shed near pond). If you can, obtain a grid reference and altitude of the position (from a GPS unit or topographical map).

Habitat: Include details of the site where the plant was found e.g., physical conditions (wet? dry? exposed?), soil type (sandy? peaty?), aspect (north facing? south facing?) type of vegetation cover (tall forest? open pasture? scrub?), associated plant species.

Habit: Include details of form (e.g., tree, shrub, climber), height and/or breadth, abundance.

Stems: For tree species, "guesstimate" of height, note bark colour and texture, do buttresses occur, are there thorns? For herbaceous plants, note the presence of hairs and the smoothness, the shape of the stem in cross-section etc.

Leaves: How are the leaves arranged (e.g., alternate, opposite, simple, compound), what is their colour, is it the same on both sides, shape, texture, and sheen. Is the plant evergreen or deciduous? Does it show heterophylly (different shaped leaves on the same plant, different adult/juvenile leaves)?

Flower and/or inflorescence (group of flowers): Note their size, shape and colour if they are present. Also note their position e.g., terminal, axillary. Is the plant monoecious (male and female flowers on the same plant) or dioecious (male and female flowers on separate plants).

Fruit / seeds: Note colour, shape, size, dispersal mechanism etc.

Other information: Anything not covered above that will help to identify the specimen.

What to do with fresh plant material

To minimise damage to specimens, fragile plant material should be placed **immediately** into a temporary plant press at the collecting site. Use an old telephone book or something with a hard cover and absorbent pages. Arrange the specimen on one page of the book, folding it over to the next page if it is too large. Close the book on the specimen and keep everything in place by securing the covers together with a couple of large rubber bands (cut-up car inner tubes are ideal).

More robust material can be placed into a large plastic bag with a moistened paper towel inside, and transferred to a plant press later.

Ideally, all specimens should be transferred to a plant press within 24 hours. If necessary, plant material can be kept in the fridge for a few days, but delicate objects are likely to deteriorate.

Specimens may then be deposited at one of the main herbaria in Auckland (Auckland Museum, AK), Wellington (Te Papa, WELT), or Lincoln (Landcare Research, CHR). If you are preparing the specimen for your own herbarium, follow the guidelines below for pressing and drying specimens. It is advisable to check with the curators of the herbaria before submitting material to them.

Pressing and drying plant material

When dry, plant material is brittle and difficult to manipulate. In order to finish up with a collection of useful herbarium specimens, you will need to be careful about arranging the fresh plant material in the drying paper and plant press. Once the drying process is finished, any mistakes are difficult to reverse.

1. In order to avoid mix-ups, a small temporary label indicating what the sample is, where it was collected from, or to which set of collecting notes it belongs, should be attached to each specimen before placing it in the plant press.
2. Place the fresh specimen on an open fold of newspaper (one thickness is sufficient). Take care to arrange the specimen so all features can be seen.
3. Place the single fold of newspaper containing the specimen between several more layers of drying paper (newspaper) or absorbent material.
4. Place a corrugated cardboard ventilator sheet (from a cardboard box) between the layers of drying paper to ensure an adequate flow of air within the press (Figure 1, overleaf). Several specimens in such an arrangement can be stacked on top of one another to form the press.
5. Place the stack on top of a piece of 5-ply (or other wood) of sufficient size, and place another piece of 5-ply on the top.
6. A weight (heavy books, etc.) should then be placed on top of the stack so that a “reasonable” pressure is being applied to the plant material. Another good option is to “squeeze” the stack using ratchet tie-downs.
7. The drying process occurs most effectively in an area of warm circulating air. Good results can be obtained using a hot water cupboard, a radiator heater, or even the sun. However, it is imperative to change the drying papers regularly (i.e. change the papers twice a day for the first three days, then at least once a day until all the moisture has been removed from the specimens. Most plant material will dry within 1–3 weeks. However, drying times will

vary greatly, depending on specimen bulk, resins, succulence etc. Use of a microwave oven is not recommended as material tends to cook or catch fire. Seed viability may also be destroyed.

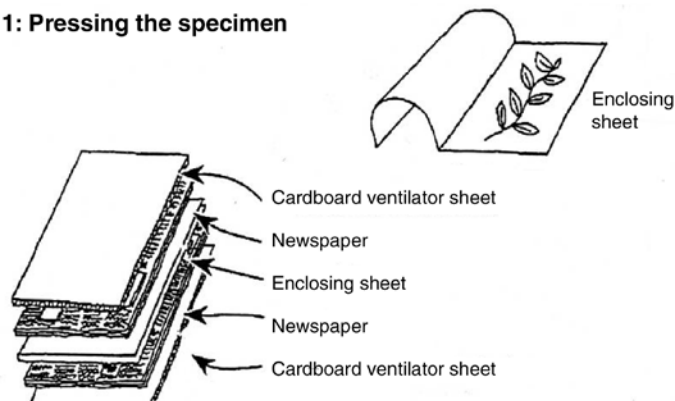
8. A useful test to use to ascertain when specimens are properly dry is to press the plant material to your lips. If it feels cold to the touch, or is limp and flexible, it will not be dry.

Mounting specimens

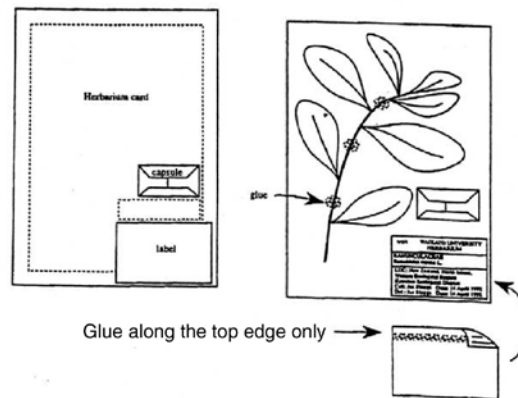
If you can, mount your specimens on card. This will display the specimen and data in a way that allows observation and detailed study, and also it will preserve the specimen. If you cannot get hold of card, then paper will do.

Make sure all working surfaces and hands are clean before starting this procedure to avoid making dirty marks on the herbarium sheet.

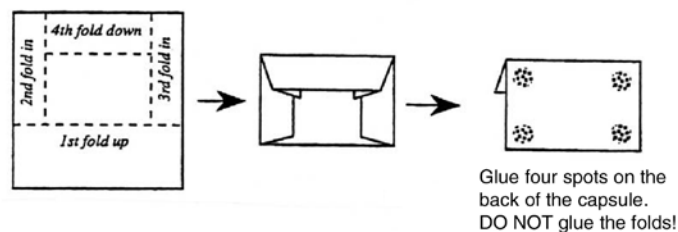
1: Pressing the specimen



2: Placement on the herbarium sheet



3: Folding a paper capsule



1. Remove all extraneous material from the specimen such as soil, mud, and any other plant species that may be mixed up with the sample.
2. Before gluing, arrange the plant specimen, label, and any paper capsules on

the sheet so everything fits without hanging over the edges (Figure 2). Bear in mind the following possibilities: Display the best side of the specimen, it may be necessary to remove some leaves to reveal obscured features. Turn some leaves over to show both surfaces. Large specimens can either be cut and mounted on more than one sheet, or bent to fit in a V, M, or N shape.

3. Once the arrangement is complete, apply PVA glue to selected areas on the underside of the plant specimen and place it on the card. Avoid gluing parts that may be useful in identification (e.g., nodes, floral parts). Instead concentrate the glue at internodes, stems, and leaf midribs. Use only enough glue to provide a firm attachment to the card or paper.
4. Affix the data label to the bottom right hand corner of the card or paper (see labelling specimens). Position it approximately 5mm from the edge, and attach by gluing along the top edge only. Note: Labels should be complete before being glued on the sheet.
5. Affix a paper capsule to the card if required. Fold and glue capsules according to instructions in Figure 3. Place small items, such as seeds, inside a small plastic bag in the capsule. If flowers are plentiful, remove several from the specimen and place them in the capsule for easy study.
6. Leave the specimen to dry on a clean flat surface. PVA glue takes about half an hour to set. Specimens can be kept in place with small weighted objects while drying.

Labelling specimens

It is essential that you include a label with every specimen. The data label is a very important part of a herbarium specimen. It contains information that the plant specimen cannot show by itself. Look carefully at the example below and be sure to follow the same format.

Note: Labels must be clearly worded and legible. Correction fluids or masking tapes should not be used on herbarium labels as they can deteriorate and peel off over time. Labels should be filled out by the collector where possible.

EXAMPLE OF A SPECIMEN LABEL

NTHLPOLY	NORTHLAND POLYTECHNIC, WHANGAREI, NEW ZEALAND
Family: Fabaceae	
Scientific name: <i>Sophora tetraptera</i>	Common name: Kowhai
Place of collection: New Zealand, Northland, Whangarei, Pukenui bush, by creek outside D.O.C. hut. Grid reference: NZMS 260 S14 123 456	
Collector: David Attenborough	Date collected: 14 April 2006
Determinator: David Attenborough	Date of identification: 14 April 2006
General information and notes: A small spreading tree commonly found throughout the country. Member of the nitrogen-fixing family Fabaceae, found throughout the temperate regions of the world. Growing in macadamia nut orchard under the shade of totara and matai trees. Often flooded area. Flowers absent.	

Identification books

FERNS AND LYCOPHYTES

To make the most of identification keys in the books mentioned below, it is useful if you have a fertile portion of your fern specimen to work with, and if possible, a whole frond from base to tip. Some fern species have separate vegetative and fertile parts, and there is often a range of variation in size, colours, and shapes within a species.

Brownsey, P.J. and Smith-Dodsworth, J.C. 2000: **New Zealand ferns and allied plants**. Bateman.

Crowe, A. 1994: **Which native fern?** Viking Press.

Heath, E. and Chinnock, R.J. 1974: **Ferns and fern allies of New Zealand**. A.H. and A.W. Reed Publishers.

GYMNOSPERMS

To identify gymnosperms, it is useful to have samples of both adult and juvenile leaves, male/female cones/fruit, and some idea of the appearance of the bark.

Salmon, J.T. 1980: **The native trees of New Zealand**. Reed Publishing (NZ).

Salmon, J.T. 1986: **A field guide to the native trees of NZ**. Reed Publishing (NZ).

Poole, A.L.; Adams, Niall M.; Adams, Nancy M. 1994: **Trees and shrubs of New Zealand**. Government Printer, Wellington.

Smith-Dodsworth, J.C. 1991: **New Zealand native shrubs and climbers**. David Bateman.

Wilson, H. and Galloway, T. 1993: **Small-leaved shrubs of New Zealand**. Manuka Press.

ANGIOSPERMS

Some books contain perfectly workable keys based on vegetative characters. Generally however, most identification keys for angiosperms are based on floral or fruiting characters. This means it is to your advantage to collect examples of both flowers/fruit and vegetative parts where possible. Use fresh plant material during identification. Plant characters are often altered and manipulation is difficult when plant material is dried and/or wilted.

Crowe, A. 1997: **The life-size guide to native trees and other common plants of New Zealand's forest**. Viking Press. (Good for angiosperms and gymnosperms).

Dawson, J. and Lucas, R. 2000: **Nature guide to the New Zealand forest**. Godwit.

de Lange, P.; Rolfe, J.; St George, I.; Sawyer, J. 2007: **Wild orchids of the lower North Island**. Department of Conservation, Wellington.

Salmon, J.T. 1980: **The native trees of New Zealand**. Reed Publishing (NZ).

Salmon, J.T. 1986: **A field guide to the native trees of NZ**. Reed Publishing (NZ).

Poole, A.L.; Adams, Niall M.; Adams, Nancy M. 1994: **Trees and shrubs of New Zealand**. Government Printer, Wellington.

Johnson, P. ; Brooke, P. 1989: **Wetland plants in New Zealand**. DSIR Publishing, Wellington.

