How to prepare herbarium specimens: short guidelines

By Peter Giovannini

Herbarium specimens are very valuable for botanists because they provide a long-term scientific record of a plant collection. Botanists usually collect plant specimens with the aim of identifying the botanical species, observed in the field, in a herbarium, but they pay less attention to the folk name and local uses of the plants. The latter are usually documented in anthropological studies but often no botanical identification of the plants is carried out.

As ethnobotanists are particularly concerned with the use of plants across cultures, it is particularly important that they create a link between the folk name of the plants they document and their scientific name. In other words, it is important to know which species corresponds to which folk plant name. In order to obtain this information, ethnobotanists collect plant specimens of the plants used in the study site along with their name and their uses. The plant specimens are then dried, and eventually transported to a herbarium, where they are identified by taxonomists, mounted on paper sheets and finally stored in special drawers.

How to prepare herbarium specimens

The process of preparing herbarium specimens can be divided into three stages:

1. Collection of the plant material in the field.

2. Drying and pressing the plant specimens.

3. Botanical identification of the species and mounting the specimens.

1. Collection of the plant material

When collecting plant material for herbarium specimens the researcher should be careful to collect fertile material, i.e. material that includes flowers or fruits produced by the plant, as these are very useful for the identification of the species. The researcher should also take care to collect a representative part of the plant, also including some leaves.

When collecting small herbaceous plants, the collector should take care to include the root system along with the specimens. Several small plants can be included on one herbarium sheet; other species will fit the sheet by bending the stem once or twice. When a species (herbaceous or woody) is too large to fit the herbarium sheet the researcher should choose a representative part of the plant.
When deemed useful, the researcher can also collect a piece of bark from trees. When collecting plant specimens the researcher should take notes on the ecological habitat of the plant and write down features, such as the colours of the flower, or the particular smell of a plant, that are likely to change when the plant is pressed and dried. The collector should also take notes on the habitat, the abundance of the species, the geographical coordinates (with GPS), altitude and assign an unique ID number to the specimen.

Before collecting the specimen it is a good idea to take a photograph of the living species.

2. Drying and pressing herbarium specimens

To prepare herbarium specimens a researcher needs a plant press with straps, corrugated cardboards, adsorbent papers, newspapers and a source of heat. The plant material is laid inside a folded newspaper sheet, taking care that there is no overlap among plant parts (leaves and inflorescence). When this occurs one should cut some plant material. When leaves are removed one should leave the petioles so as not to lose information on how leaves are arranged. One should also take care that both side of the leaves are displayed, as this could be useful for identifying the plant species later. If there are thick fruits the researcher can slice them to reduce the chance of mould growth.

On both sides of each folded newspaper goes an adsorbent paper (One can dry plants also without adsorbent paper but using it will reduce the time needed to dry the plants). Similarly, on each side of the adsorbent paper goes a corrugated cardboard. Many plant specimens can be pressed at the same time by repeating the previous unit - cardboard, adsorbent paper, newspaper page, plant, newspaper page, adsorbent paper, cardboard - and piling them up on top of each other.

Once several units have been piled up we have a stack filled with plants. The stack should be as even as possible; if this is not the case it is best to rearrange the units that compose the stack. The stack is then pressed by means of a plant press, usually two rigid frames made of wood and some straps. The frames are put on both ends of the stack and then bound with the straps. The straps, usually two, are pulled as tight as possible in order to better press and dry the plants.

In my own experience large, flat belts (the ones I used were about 4-5 cm wide) work just as well as straps because they adhere very well to the press frames, allowing them to exert more pressure than a simple rope. Basically, you want a strap that is similar to the belt of an airplane seat, where pressure can be easily changed by pulling the straps through the buckle. Then the plant press is left near a source of heat. This could simply be the sun, if living in a dry area, or a box with light bulbs. Allowing air to flow through the corrugated cardboards is essential for drying the plants thoroughly.

The plant press should be checked regularly to see if it is necessary to tighten the straps again. When the plant press is too loose the specimens will dry with curly leaves. One
must also regularly replace newspaper sheets in order to remove moisture and dry the plants quicker.

3. Botanical identification of the species and mounting the specimens.

Botanical identification is usually carried out with the help of dichotomous taxonomical keys and by comparing with other specimens held in the herbarium. Collaboration with taxonomists is essential to effectively carry out botanical identification.

*Mounting herbarium specimens*

The specimens are mounted on special paper with glue, by sewing them, or with some special tape. A well-mounted plant should fit the sheet well while leaving enough space for a standard label. One should also avoid overlap of plant parts.

*Material available at the ethnobiology lab (MSs Programme, University of Kent)*

- Acid-free paper
- Adhesives
- Paper capsules
- Tags
- Tapes
- Strings

*Labels*

Once the plant species are identified the labels can be prepared and then the specimens can be mounted. The labels should contain the date and site of collection (possibly also the altitude, latitude and longitude) of the plant specimen, the name of the collector, a unique collection number, the species and the botanical family of the plant and the name of the person who determined the species. Ethnobotanical data such as the name and the use of the plant should be specific to the specimens, in other words it should refer only to data observed when collecting the plant and not to the generic literature available on the plant species. This is a very common error among students who prepare ethnobotanical herbarium specimens; they include folk names and uses of the species that have not been observed during the collection but found in the literature. This is conceptually wrong because the specimen is a record of the use and names of that plant in the specific moment and place where the collection was carried out.
Checklist for good herbarium specimens:

1. Plants are well dried and pressed: avoid curling leaves, show both sides of the leaves, well dried leaves should break when tilted.

2. Well-labelled: unique collecting number, only ecological and ethnobotanical data specific to the specimen, date and place of collection, species and family and who determined the species, collector's name.

3. Well-mounted: no overlap between plant parts, good position on the sheet.

4. Fertile specimen: includes flowers and/or fruit.

References:


Freely available on-line at: http://onlinelibrary.wiley.com/doi/10.1525/aa.1932.34.2.02a00130/pdf


On-line:


Herbaria@home
http://herbariaunited.org/atHome/
Advice on recording historic herbarium specimens
HISPID - Herbarium Information Standards and Protocols for Interchange of Data
Standard fields for databasing of herbarium data. Australian, but widely used in other herbaria (including Kew).

John D. Freeman Herbarium at Auburn University – useful advice
http://www.auburn.edu/herbarium/home.html