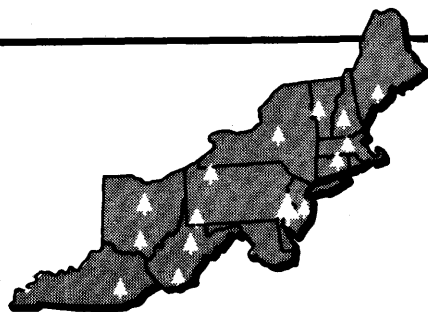


1974

Northeastern Forest Experiment Station



FOREST SERVICE, U.S. DEPT. OF AGRICULTURE, 6816 MARKET STREET, UPPER DARBY, PA. 19082

A GUIDE TO COLLECTING AND PRESERVING PLANTS

Abstract—In this paper, we discuss how to collect and preserve plant specimens. Plant pressing, mounting, and labeling techniques are also outlined.

This is a guide to collecting and preserving plant specimens. Specific information is presented to assist forest botanists and others who want to know "how to do it." This guide covers three major areas: (1) collecting plant specimens, (2) pressing and drying plant specimens, and (3) mounting and preserving plant specimens. General techniques are discussed in each area, and illustrations are used to clarify specific points.

COLLECTING PLANT SPECIMENS

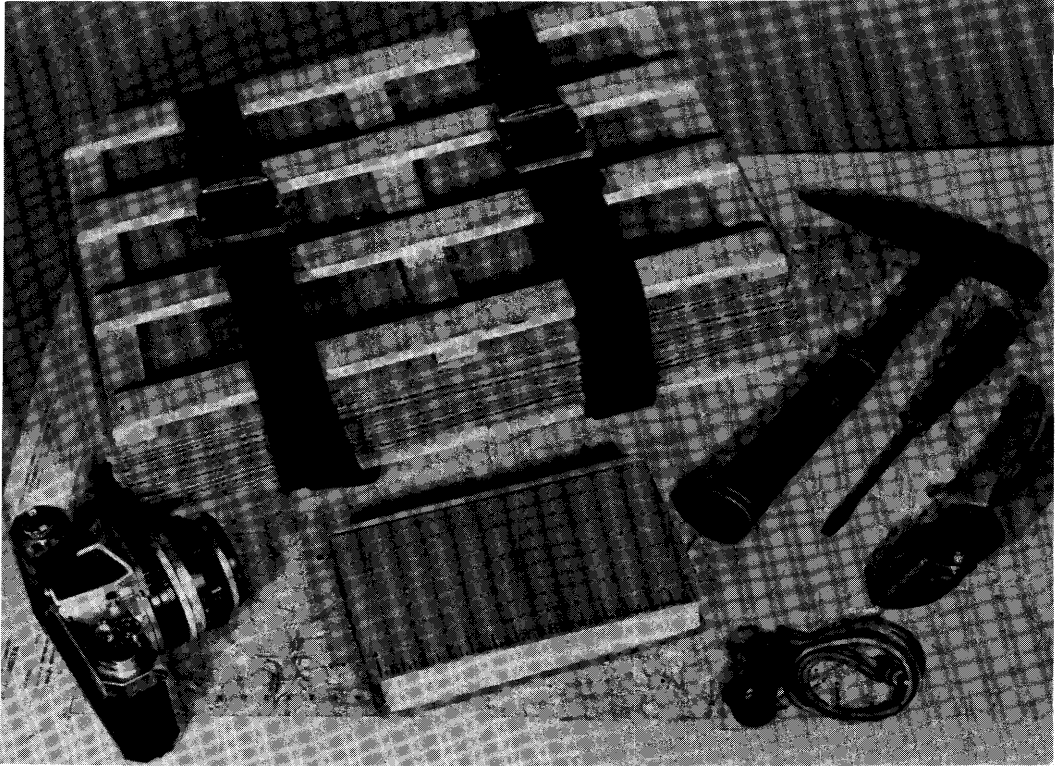
When collecting plants, get all plant parts in as many stages of development as possible. Buds, leaves, flower parts and fruits will aid in identification. If a plant has a unique characteristic that distinguishes it from other species of the same genus, be certain to include this feature with the collected specimen.

Field Materials

A good plant identification manual is essential. Manuals such as those by Matthews (1927), Gray (1950), Cobb (1956), Petrides (1958), Peterson and McKenny (1968), and Seymour (1969) are available for given locales. For information as to what source reference to use in a particular area, contact the botany department of a nearby college or university.

In addition to having a plant identification manual, it is highly desirable to have certain basic tools and materials for collecting plants in the field (fig. 1). These include the following: field notebook, 100-foot tape, compass, topographic map, pencil, hand lens (10X), geologist's hammer, screwdriver, pruning shears—small knife, plant press, plastic collection bags or vasculum; and camera.

Figure 1.—Some essential tools for collecting and pressing plant specimens.



DOCUMENTING PLANT COLLECTION DATA

A general description of the area in which a plant is collected provides valuable information on the plant's habitat. Record this information in the field at the time the collection is made.

When making entries in the field notebook, include the information outlined below:

1. Species name, scientific and common. (If a plant identification is not possible in the field, then code the information recorded for the collected specimen so that the data can be related to the plant after it has been identified.)
2. Date of collection
3. Name of collector
4. Specific location where collected
5. Average plant size
6. Other distinguishable characteristics, such as color and fragrance of fruit and flowers
7. Soil characteristics including soil type, soil texture, drainage, slope aspect, site expo-

sure. Use a soil map (Soil Conservation Service) to acquire this information.

8. Associated plant species
9. Additional environmental or plant descriptive information that may be pertinent to a particular plant specimen

Make a sketch of the plant's location, using permanent points for references, and put it in the field notebook. This will assist you in returning to the area. In certain instances, a photograph of the plant growing in its habitat may be of interest and could be attached to the herbarium mounting sheet.

REMOVING PLANT SPECIMENS FROM THE SOIL

A plant specimen must be removed from the soil carefully. Try to remove all the roots and upper stems without disfiguring the plant. A small geologist's hammer, a pick, or a long screwdriver can be used. Once the specimen has been uprooted, remove all foreign matter

from the plant by washing, shaking, and, in certain instances, using hand pruning shears to remove dead plant parts.

After the plant has been removed from the soil and cleaned, place it in a portable press. If a press is not used in the field, then place the plant in a sealed plastic bag or a vasculum. When the plant is temporarily stored in this manner, place wet moss around it to prevent or minimize wilting.

Be aware that in most states a collector must have permission from the landowner to remove plant specimens. Respect the rights of the owner, and ask before removing any plants.

PRESSING AND PRESERVING SPECIMENS

Pressing

After the plant specimens have been collected, press them. Some collectors use portable presses similar to the one shown in figure 1. They place specimens in the presses while they are out in the field. This practice prevents wilting and insures preservation of the plant's shape and color. Most presses consist of a series of ventilator sheets (corrugated material) to absorb moisture and to allow air to circulate between the layers of plant material. As it may be difficult to carry ventilators to the field when collecting, specimens can be pressed between newspapers in the field. However, the specimens will become discolored or spoil if ventilators are not inserted between them within 12 hours after collection.

To press, first place the specimen inside a pressing sheet—a standard sheet of newspaper that is folded in half. Using a small pencil or wire, arrange the plant so that all the leaves, stems, roots, and the other plant parts are not needlessly folded or bent to give a misleading or unnatural appearance. Then insert the pressing sheet containing the specimen between two blotters. If the specimens are small and have thin leaves that retain little moisture, three to five pressing sheets can be placed between two blotters. However, for the best results, place blotters and ventilators between each pressed specimen and the next.

When pressing thick-stemmed woody plants (larger than $\frac{1}{4}$ -inch in diameter), use a polyurethane foam mat as illustrated in figure 2.

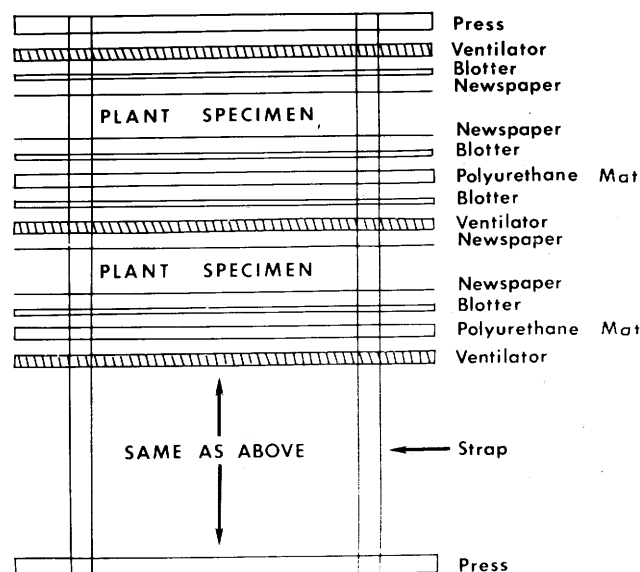
A specimen identification card can also be attached inside the pressing sheet using information from the field notebook. However, because the cards are often misplaced during plant pressing, some collectors prefer to write a number on the newspaper and put the complete information in the field notebook.

Next, place the press in an oven at a temperature of 120°F, until the specimens are dry. Plants usually dry in 24 to 72 hours, but larger woody or thick-stemmed plants may take longer. Generally, a plant's natural colors are better preserved with fast drying than they are with slow drying. Also, for the best results, change the blotters daily.

When a portable field press is used, recheck the plants for proper arrangement and identification before placing the press into the drying oven.

For those interested in collecting and preserving small water plants such as algae, float the plant on rice paper and then put into a newspaper to dry. Then attach the rice paper and plant to a mounting sheet. Sass (1958)

Figure 2.—An illustration of a cross-sectional view of a plant press.



gives further details on mounting and preserving such small plant materials.

Other plant parts such as nuts, cones, seeds, etc., which are not normally pressed, can be placed in a box or plastic bag with an identification tag. After drying, these plant parts can be attached to the mounting sheet along with the plant.

FUMIGATION

Fumigate plants to kill all living organisms that could damage the specimens. Do this after the specimens have been dried. Place the pressing sheets containing the specimens in a fumigation box (fig. 3), which is slightly larger than the pressing sheets. Several specimens can be fumigated at one time, depending on plant thickness. Cover the bottom of the fumigation box with fumigant and sprinkle the fumigant on the outside upper surface of the

paper for each specimen. Place an open dish with the fumigant material on top.

Close the fumigation box and make it airtight by using masking tape. Leave the specimens in the box for 7 days. Then remove the specimens from the fumigation box, and mount them permanently. Insert them in a genus cover folder and store them in a permanent steel or wooden cabinet. Several commonly used fumigants are paradichlorobenzene, carboxide, or mystax. Fumigation should be done in a well-ventilated room. Manufacturer's recommendations for fumigants vary; read directions carefully.

MOUNTING SPECIMENS

Mounting Procedure

After pressing, drying, and fumigating, the specimens are ready for mounting. The following procedure has been used with excellent results: Brush the surface of a plastic or glass plate (20" × 15" × 1/4") with an adhesive. Then remove the specimen from the pressing sheet with forceps and place it on the plate. Use the tips of the forceps to carefully press the plant into the adhesive. After the underside of the plant has been coated with the adhesive, lift the specimen and transfer it to a permanent mounting sheet. It is desirable *not* to place the thickest part of the plant in the center of the mounting paper because a bulge will develop when you place several mounted specimens in a stack. After mounting, allow the specimens to dry for 48 to 72 hours.

A very thick stem or woody plant will need additional bonding to hold it on the mounting sheet. Plastic adhesive applied from a tube or a squirt oilcan to form a ribbon across the thick parts of stems, seeds, or flowers has proven very satisfactory.

The stickiness of the adhesive is very important. In a dry atmosphere, the adhesive may tend to become thick. If it is too thick, the specimen will be difficult to transfer; and if it is too thin, the specimen will not adhere properly to the mounting sheet.

To be certain that the specimen sticks to the mounting sheet, place a piece of wax paper on top of the mounted specimen. Then put a

Figure 3.—A mounted sugar maple specimen being fumigated.



sheet of polyurethane foam over the wax paper and add weights. A board is often used, and weights are placed on top of the board. You can put about four mounted specimens, separated by wax paper, into a stack before using a sheet of polyurethane material.

The importance of a well-mounted herbarium specimen cannot be overemphasized. Additional information on collecting, identifying, pressing, and mounting techniques is presented by Lawrence (1955), and Smith (1971).

IDENTIFICATION LABELS

Another step in the mounting process is to make an identification label for each specimen. Normally, a gummed label about $3\frac{1}{2} \times 2\frac{1}{2}$ inches or a 3×5 card is placed in the lower right-hand corner of the mounting sheet. It should include the following typed information:

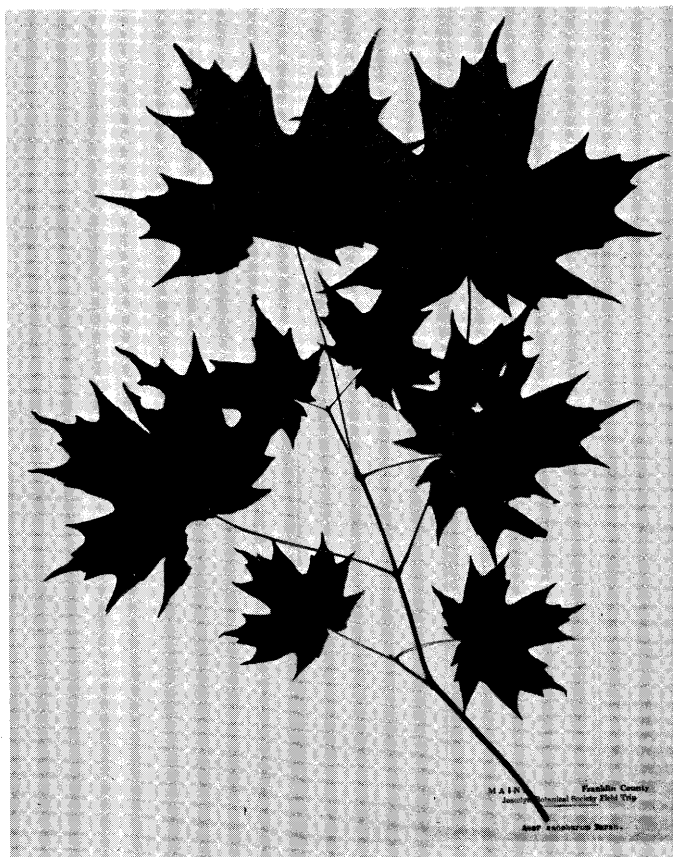
1. Scientific name
2. Common name
3. Precise location where collected
4. Associate plants
5. Soil characteristics
6. Date of collection
7. Authority identifying specimen
8. Name of collector
9. Name and address of herbarium (if plant used for herbarium purposes)

If 3×5 cards are to be used, attaching them to the mounting sheet can be a problem. Normally, glue is applied to the card with a brush; but if it is applied to the entire underside of the card, the glue may cause the card to curl. To prevent curling, apply glue only along the card margins.

OTHER INFORMATION

If you cannot identify a plant specimen, contact a local university or college botany department, private herbarium, or the U.S. Forest Service Herbarium, USDA, Washington, D.C. Often the complete specimen and all available data will have to be presented or sent in an uncrushable container to the identifier. In some instances, plant collectors have been able to identify specimens from photo-

Figure 4.—A mounted plant specimen that can be identified from the photograph.



graphs of mounted plants (fig. 4), and these photographs can be sent in place of the actual specimen. In many cases, a picture of the plant in its natural habitat will be sufficient for identification; and only a minimum number of plants need to be collected. Thus living plants can be preserved for future use.

Occasionally, data from collected plants are used in electronic data processing machines (Beschel and Soper 1972). This electronic processing is particularly useful in larger herbariums.

For those desiring to preserve the color and shape of the plants in a three-dimensional effect, plastics can be very useful. A specimen can be mounted between plastic sheets, or it can be embedded in a plastic mold or casting, giving a very lifelike portrayal of the plant (Specht 1950).

REFERENCES

- Beschel, R. E., and J. H. Soper.
1970. THE AUTOMATION AND STANDARDIZATION OF CERTAIN HERBARIUM PROCEDURES. *Can. J. Bot.* 48: 547-554.
- Cobb, Boughton.
1956. A FIELD GUIDE TO THE FERNS AND THEIR RELATED FAMILIES IN NORTHEASTERN AND CENTRAL NORTH AMERICA. Peterson Field Guide Series, Houghton Mifflin Co., Boston, 281 p., illus.
- Gray, Asa.
1950. MANUAL FOR BOTANY. American Book Co., New York, 1,632 p., illus.
- Lawrence, George H. M.
1955. AN INTRODUCTION TO PLANT TAXONOMY. The Macmillan Co., 179 p.
- Matthews, F. Schuyler.
1927. FIELD BOOK OF AMERICAN WILD FLOWERS. G. P. Putnam's Sons, New York and London, 558 p., illus.
- Peterson, Roger T., and Margaret A. McKenny.
1968. A FIELD GUIDE TO WILD FLOWERS. Houghton Mifflin Co., Boston, Mass., 420 p.
- Petrides, George A.
1958. A FIELD GUIDE TO TREES AND SHRUBS. Peterson Field Guide Series. Houghton Mifflin Co., Boston, Mass., 431 p., illus.
- Sass, John E.
1958. BOTANICAL MICROTECHNIQUE. The Iowa State Coll. Press, Ames, Iowa, 3rd Ed., 228 p.
- Seymour, Frank C.
1969. THE FLORA OF NEW ENGLAND. The Charles E. Tuttle Co., Rutland, Vt., 596 p., illus.
- Smith, C. E., Jr.
1971. PREPARING HERBARIUM SPECIMENS OF VASCULAR PLANTS. USDA Agric. Inf. Bull. No. 348, 29 p., illus.
- Specht, Randolph C.
1950. PRESERVING THE COLOR AND SHAPE OF FLOWERS. Fla. Eng. and Ind. Exp. Sta., Univ. Fla. Bull. Series No. 41, 29 p., illus.

—GEORGE M. KEISER

Forestry Research Technician
USDA Forest Service
Northeastern Forest Experiment Station
Burlington, Vt.