

SAMPLING TECHNIQUES USED IN DENDROCHRONOLOGY

Laboratory of Tree-Ring Research

In dendrochronological studies, a tree is usually selected for sampling which: (1) is not too close to other trees, as competition may overshadow climatic response; (2) has no subsurface supply of water, e.g. near a spring or perennial stream; and (3) has no outward appearance of injury or disease.

Sampling may be made by taking a cross section or, more conveniently, by the use of the Swedish increment borer, a precision tool designed to remove a small core from a living tree without harming the tree. The tip of the borer has a razor-sharp cutting edge with external screw threads which serve to draw the borer into the tree as the handles are turned. A fifteen-inch borer is a common size, but they can be obtained up to forty-eight inches in length.

The borer is assembled and aimed toward the assumed center of the tree and held at right angles to the long axis of the trunk. It is pressed firmly against the bark in a crevasse to assure an immediate grip and the handle rotated slowly but steadily to the right. After the tip is firmly anchored in the wood, pressure need not be exerted on the borer except to turn the handle.

The borer is turned into the tree until the depth of penetration is believed to be sufficient to include the pith. The core, still attached to the tree at the cutting-tip end of the borer, is removed with the aid of the "spoon" extractor. This spoon is inserted into the borer to its full length, and the borer withdrawn one complete turn. This causes the core to break

away from the tree at the cutting edge of the borer.

As the spoon is withdrawn, the toothed edge near the tip pulls the core from the borer. The borer is then withdrawn from the tree by turning the handle in a counter-clockwise motion and, if it spins in place, by exerting a slight outward pressure at the same time.

Increment cores are fragile and must be handled with care. Before it is removed from the spoon, the core should be numbered. A sheet of paper can be formed into an envelope, and after the core has been removed from the spoon, it can be placed in the envelope, taking care that the small part of the bark does not break off the core. The paper is wrapped around several times to give stability. Soda straws or corrugated cardboard sections are good containers for individual specimens if one has many specimens to handle. In the latter type, the cores are laid down between the corrugations and the "board" is then rolled into a tight bundle of the cores taped in place.

After the core has been sealed in the envelope, the field number for that particular core should be marked on the outside of the envelope and site and specimen data recorded. Such data usually includes:

1. Exact geographic location, such as township, range, and section
2. Slope and exposure
3. Soil conditions (type and depth)
4. Associated plant growth (species and areal density)
5. Relation to other trees
6. Physical characteristics of the tree such as diameter of stem, height of crown, and general overall appearance, and
7. Any natural or man-made disturbance, such as lightning or fire damage, excessive grazing, lumbering, etc.

In the Laboratory, the cores are mounted in a grooved board to facilitate

handling and storage. This Laboratory has found the following type of mount to be most useful. A piece of clear wood is cut into strips three-eighths of an inch wide by one-half of an inch high, and of a sufficient length to match that of the borers. One of the narrow sides is grooved to hold half of the core and the shoulders are sloped. Cores should be air dried before mounting so that they will not shrink and crack. When cores break in the field, sequential numbering of fragments will aid in reconstructing the core for mounting.

The specimen number and important notes (species, site, and collection date) are put on the mount. A thin stream of permanent glue (a plastic glue is preferred because it will not crystallize) is spread evenly in the groove and core inserted with the bark end to the observer's right. The original vertical cell structure is placed in the groove at a 35° tilt with the angle toward the observer. The cell alignment can be seen by examining the broken inner end and the sides of the core. The sample is pressed firmly into the groove and a string is wrapped tightly and evenly around the core and mount to hold the core firm while the glue is drying.

The labeling on the specimen mount should be in phase with the data on site and specimen cards and with the permanent Laboratory system of identification.