

Propagation Techniques

The following brief introduction on how to propagate native plants has been condensed from the [Container Tree Nursery Manual, Volume 6](#) (USDA Forest Service, Agriculture Handbook 674, May 1999).

Introduction – Plant propagation is both a science and an art. The science of plant propagation requires a knowledge of plant physiology, nursery cultural practices, and characteristics of the particular plant that you want to grow. The art of plant propagation cannot be taught in a book or classroom, however, because it consists of specific technical skills that must be acquired through innate ability or experience and often requires a certain "feel." Good plant propagators are said to have a "green thumb."

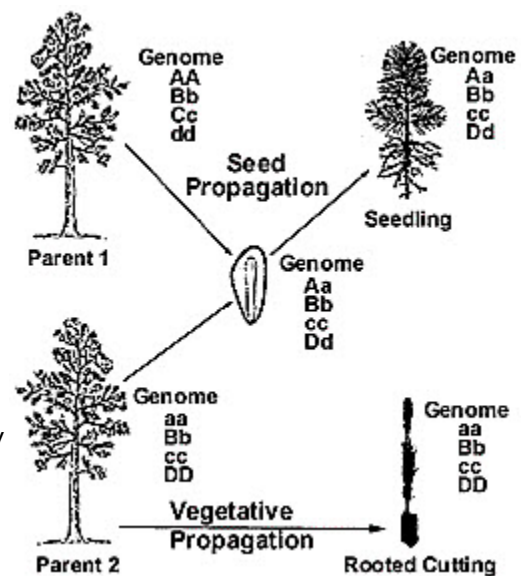
Planning – Successful nursery management begins with planning. Crop planning is one of the most important, yet often neglected, aspects of seedling culture. One big decision is to determine which propagation method will be most effective and economical for the crop species. Both the biology of the species and the objectives of the outplanting project must be considered. If it is possible to propagate a plant either by seed or vegetatively, then the amount of genetic variability that is desired in the crop must be considered.

Figure 1. *Plants propagated from seed look different from their parents and each other because they contain a mixture of genetic characteristics of their parents. Vegetative propagation, on the other hand, produces exact duplicates of the parent plants.*

Sexual reproduction results in a mixture of genetic characteristics in the offspring, so each plant will appear slightly different from its parents and each other. Because maintenance of genetic diversity is so important in ecosystem management and restoration projects, seed propagation is encouraged whenever possible. It is easier to capture and preserve biodiversity with seeds than with vegetative propagation (Figure 1).

Availability of propagation material, time constraints, and economics must be considered. Many native plants do not produce good seed crops each year, so it may be impossible to obtain enough seeds. This is especially true for emergency projects, such as fire restoration, when crops must be grown in a very short time. As for economics, seed propagation is almost always less expensive than vegetative propagation, which involves more hand labor and often requires special equipment and structures.

Type of nursery –Native plants can be produced in either container nurseries or bareroot nurseries. Although some natives are produced bareroot, most are grown in containers because they offer more flexibility in scheduling, and can be grown in a shorter period. In particular, the size and shape of native plant seeds limits how they can be grown. Most commercial conifers have relatively small, smooth seeds that can be easily sown in bareroot seedbeds. Most other natives, however, have seeds that are very small, irregularly-shaped, or have appendages that make mechanized sowing difficult if not impossible. All these characteristics make container propagation much more attractive.



Seed propagation –Native plants can be grown several ways from seeds. Direct seeding is the traditional method and consists of placing seeds directly into the growth container or seedbed and allowing them to germinate in place (Figure 2). Seedlings either can be allowed to grow to shippable size or transplanted into larger containers or into beds in a bareroot nursery. A second option is to sow seeds into shallow trays, keep them moist, and then hand-sow the germinating seeds ("germinants") into containers. A third technique consists of sowing seeds into shallow trays and allowing them to germinate and the seedlings to emerge. The young "emergents" are then transplanted into containers to finish their development. Sowing germinants or transplanting emergents must be done carefully to reduce the possibility of root deformation.



Figure 2. *The variable sizes, shapes, and appendages of most native plants seeds make hand sowing in containers the most practical propagation method.*

Vegetative propagation – Although they vary considerably in technique, all vegetative propagation methods are a form of asexual reproduction. The objective is to make multiple "copies" of an individual plant or select group of plants with similar genetic composition (Figure 1). Species that root easily can be propagated with rooted cuttings (Figure 3). This process involves collecting stem sections, treating the lower part with rooting hormones, and then either inserting ("striking") them into trays filled with growing medium until they form roots ("pre-rooting") or "direct striking" them into the growth container. Another techniques is "layering", which consists of inserting a section of stem or root that is still attached to the donor (parent) plant into a favorable rooting environment until roots develop. The rooted section is then cut from the parent plant and transplanted into the growth container.

Grafting is a very specialized propagation technique in which shoots or buds from one plant are surgically implanted into another. The newest and most rapidly developing vegetative propagation technique is micropropagation. This involves a series of sterile laboratory techniques in which small sections of plant tissue are chemically stimulated to form multiple shoots and are then rooted. The resultant "explants" are transplanted to growth containers and raised under normal culture.

Figure 3. *Rooted cuttings are the most common vegetative propagation method for native plants.*

Some species can be propagated either by seeds or vegetatively, and the decision depends on the objective of the outplanting project. Quaking aspen is a good example. Aspen seeds are very small and difficult to handle because they are enclosed in a ball of cottony material. Seeds can be cleaned relatively easily, but are generally sown manually into growth containers because of their small size. If the objective is to retain the physical characteristics of a specific ecotype or clone, however, aspen can be propagated vegetatively from root sprouts, which are rooted and then transplanted to growth containers.



<http://npr.rngr.net/propagation/techniques>