Seed Collection and Cleaning©

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INTRODUCTION

The process of seed collection and cleaning has many facets and considerations when the goal is to produce viable seed of a desired species that can be used for production of these desired species. The most common and economical method of producing plants is to grow them from seed. Many fine points must be considered when collecting and cleaning seed to ensure that the fruits of the collectors' efforts will be rewarded with a bounty of clean and viable seed.

The planning process for collecting seed may begin as early as decades in advance as in the case of establishing a seed orchard expressly for that purpose or perhaps 2 years in advance when scouting the timing of pollen release with conelet production and the weather conditions associated with these events. For most people this planning involves spotting trees or shrubs with an obvious seed crop and trying to decide how to most easily collect it.

For most collectors, the crop is usually checked for proper species identification, maturation, ripening, and abscission. Consideration should also be made as to the genetic background of the trees or shrubs from which you are considering collecting. The phenotype is a good indicator of what the offspring will also look like. Very often, heavy crops of seeds are produced on some of the most unworthy specimens of their species. It is best to avoid these plants unless you are absolutely desperate for seed. Many seeds are found in parks and cemeteries and other public places and although these areas and specimens are the easiest for collecting, they present other special problems regarding the lineage of these plants. Many species have a wide geographic range and although a species may be native to your area, the particular specimen from which you wish to collect may be only marginally hardy, as its origin may be hundreds of miles south of the specimen's location. A good example of this is the *Cornus florida* which has a southern range into the Deep South and a northern extreme of mid and northern Pennsylvania.

When scouting apparent seed crops, always test small lots of seed from different portions of the trees or shrubs to be collected to determine if the seeds are sound, meaning containing fully formed cotyledons. This simple test, often called "the jackknife test" is your first defense against wasting time collecting unsound seed. Acceptable levels for sound seed vary from species to species, i.e., acorns are usually floated and expected to be near 100% sound while some of the true fir species may have only 35% sound seed in a good year.

HARVESTING EQUIPMENT AND SUPPLIES

Labels and permanent markers are a necessity to keep track of seed collections. Important things to record are: date of collection, species name and location of collection, the collector, and the storage date since collection, including any germination test results.

Gathering the necessary supplies for collection depends on the crop to be collected. One thing often overlooked is the safety equipment. A small first-aid kit and a cell phone are two very easily carried items that could save your life in the event of a serious injury. A safety harness and plenty of good rope is also a necessity if any tree climbing is involved. Anyone in the seed business has heard plenty of stories about collectors falling out of the tops of trees and being seriously injured or killed. Some of the specialized equipment should include saws, poles, ladders, ropes, tubs, buckets, and tarps. Other equipment might include bamboo poles for flailing seed, motorized air blowers, man lifts, or a device called a nut wizard for collecting acorns from the ground. On a commercial scale there are tree-shaking machines such as are used in pecan orchards; however, most seed collection production for nurseries is accomplished by skilled collectors who know the "tricks of the trade."

COLLECTION TECHNIQUES

The most common and sure-fire technique of seed collection is hand picking and stripping of seed from branches. Picking seed by hand is best when flailing or other more aggressive methods are not practical. This method is usually the most costly per pound of seed collected but is often the only practical way. Species such as elderberry (*Sambucus canadensis*) are easily and practically collected in this manner. Another factor that should be carefully considered is the anticipated frequency of the current and future seed crops that you expect to collect. Many conifers may produce a good seed crop only once every 3 to 5 years, therefore every effort must be made to harvest all possible seed in an abundant seed year.

A second and usually productive method of collection is that of flailing the seed to tarps spread below the seed tree or shrub. A 4-mil sheet of standard white opaque poly works very well combined with an 8- or 10-ft bamboo pole. In good locations, this method has produced as much as 100 pounds of fruit of species such as *C. florida* and *Prunus serotina* in less than 2 h. With this method the timing of fruit ripening and abscission must be carefully watched, including the weather conditions leading up to a successful collection. One good wind and rain storm after a period of ripening can put all of your intended collection on the ground and forever lost.

Climbing and shaking trees from up in the branches and also flailing from these high perches is also highly productive under the right conditions, but is also the most dangerous and should only be attempted by the most agile climbers. In these situations, a harness and rope should be used; however, many climbers find the harness to be highly impractical so some will climb without the benefit of a harness. Climbing trees to collect seed can be dangerous. The price of the seed usually parallels the risk inherent in the seed's collection and the species scarcity.

The seed of most western species of conifers and other conifers in the eastern U.S.A. are usually collected by gathering cones from the ground that the squirrels have recently cut from the tree. The squirrels cut the cones for their winter food supply and always cut a lot more than they will use. When you see evidence that the squirrels are eating the whole cone then you can expect the seed to be good. Sometimes the cones are only partially eaten which indicates that there isn't any more good seed in that cone or perhaps in other cones from the same tree. It is wise to pay close attention to the experts, the squirrels.

Eastern white pine is a species whose cones the squirrels infrequently cut as they are usually glistening with resin droplets that repel squirrels and collectors alike.

Disposable gloves and a solvent like mineral spirits is a necessity. White pine cones must be picked in a bucket truck in an orchard situation or the wild trees must be climbed and the cone-bearing limbs cut so as to drop to the ground for hand picking. White pine limbs are very brittle and a climber must not leave the bole or trunk of the tree. The cones are almost always just out of reach making limb cutting the only practical way to collect seed. Another tree that is brittle, large, and impractical to climb to reach the seed is the American sycamore. Most collecting from this tree is accomplished by waiting for the fruit to drop to the ground in the spring, when it may be collected from the forest floor. Sometimes when a nursery owns the trees, the seed-producing trees are cut down with chain saws onto carefully placed tarps where a years' worth of seed may be obtained quickly from one or two trees.

A fairly new and inexpensive device called a nut wizard is utilized when collecting the nut tree species. The nut wizard is a rolling wire cage on a long handle which picks up nuts as quickly as you can roll over the nuts, without bending over except to dump the basket of nuts into a container. With this device, buckets of nuts can be picked up within minutes.

SEED CLEANING

When handling freshly picked fruit or cones, care must be taken to not let the seed overheat or mold during handling. A rule most seed collectors follow is to never use plastic bags to hold seed or cones due to the danger of mold and overheating the seed. Cones of conifers should be stored only in burlap or other material that can breathe and most often are immediately spread out in the open to pre-dry before going to a kiln. Many fruits need to be softened by soaking in water for a period before maceration. This period will vary depending on the temperature, the species and the ripeness of the seed being soaked. Plastic buckets may be used for fruits like *Prunus* species for soaking prior to maceration. A good rule with seed soaking is to watch for bubbles or foam from fermentation. When this occurs, it is usually best to clean the seed right away.

Some species such as Osage orange (*Maclura pomifera*) and sweet crab (*Malus coronaria*) require a winter season of freezing and thawing cycles to soften the fruit and enable it to be cleaned. After fall collection, the usual method is to spread the fruit on tarps outdoors for the winter. In the case of the *Malus*, large tubs covered with screens are preferred to protect against rodents pilfering the seed. The tubs must have drain holes to allow moisture and winter precipitation to escape. Otherwise, the flesh of the fruit will be preserved in the frozen water and remain very hard which makes seed cleaning impossible.

CLEANING EQUIPMENT

Fruit that requires maceration to extract the clean seed is usually processed by commercial or home-made equipment. One of the more common commercial macerators that has been in use for decades is the Dybvig seed cleaner, which is effective in dry or wet applications of seed processing. For smaller lots of seed and the individual collector, a blender may be utilized which has tape or some other blunting device placed over the blades to separate the seed from the flesh without damaging the seed itself. Lastly, a set of welded screens on frames may be used to rub the fruit by hand over the screen, then flushing with water until all of the seed is clean.

When handling cones to extract conifer seed, drying racks of fine screen will allow air circulation to open the cones and release their seeds. Natural drying may take weeks or months so commercial seed houses use a kiln that heats the air to be passed over the cones to quickly remove the moisture causing them to open more quickly. This process usually takes the better part of a week. Some cones may not open properly, requiring a second soaking and drying to get them to release the seed.

Open cones must be tumbled or shaken to dislodge the seeds that do not readily fall out. Most processors have a hand or motor powered cone tumbler that will bounce the cones in their transit through the tumbler until all remaining seed is dislodged. After being released in the cone tumbler, the seed is permitted to fall through a screen and is collected beneath the tumbler. Dewinging of the seed is the next step in the conifer seed process. Hand rubbing through various sized mesh screens can accomplish this or the seeds can be carefully thrashed with tumblers or other thrashing devices that separate the seeds from their wings without damaging the seed itself.

Winnowing of the seed, wings, and other trash is the final step in obtaining clean seed.

Various types of machines are available to accomplish this task including the commercial gravity separator. This machine gently blows air from beneath a vibrating screen on an inclined plane and has cut-outs along the screen to separate the varying degrees of sound seed. The sound seeds actually climb the inclined screen to the collection point and the hollow ones travel down the plane. More common methods of winnowing seed is the use of a Clipper seed cleaner or other blower device that allows the seed to pass through a controlled stream of air to allow the more dense full seeds to fall through the air stream while the hollow ones, being lighter or less dense, are blown out with the air stream. With many conifer seeds, a point is reached where sound seed is also blown out with the trash in an effort to obtain a higher percentage of the favored lot. Most operators will stop the winnowing process when a certain acceptable level is reached in order to avoid additional waste of the sound seed.

SEED STORAGE

When seeds are processed for personal use and the seed is to be sown within a short period of time, then moisture content of the seed is not as great an issue; however, some of the seed crop often must be held in storage for subsequent year's use. High-moisture-content seeds such as *Quercus, Juglans, Carya,* and *Acer* cannot be dried like other seed and must be either planted quickly or stored in moist stratification for planting the following spring. Referred to as recalcitrant seeds, these seeds' moisture content must remain relatively high to remain viable and therefore they cannot be stored for long periods of time. Other than recalcitrant seeds, most seeds store best at a moisture content of 5%–10%. The longevity of the seed in storage is also greatly increased by storing at 34 °F in sealed containers. Usually, heavy plastic or glass containers will maintain the low moisture content of the seed and reduce respiration of the seed by air exchange. An extra refrigerator or walk-in seed cooler will work well for this purpose. Some conifer seed such as *Abies fraseri* is stored best at freezing conditions of minus 10–15 °F. Viability under these conditions has been reported as relatively unchanged after 15 years of storage.

SUMMARY

Collecting your own seed for propagation is a very satisfying and rewarding enterprise. When scouting and collecting seed, you will get a more intimate knowledge of the desired mature specimens by observing their variability within the species, their location, and the surrounding topography. If your collecting and cleaning efforts have yielded a good cache of seed without having to use your first-aid kit or cell phone, consider yourself a successful seed collector.

SUGGESTED READING

United States Department of Agriculture. Seeds of woody plants in the United States, Agricultural Handbook No. 450.

Baskin, C.C., and **J.M. Baskin.** 1998. Seeds: Ecology, biogeography and evolution of dormancy and germination. Academic Press, San Diego, California.

SEED TESTING SOURCE

National Tree Seed Laboratory
5675 Riggins Mill Rd., Dry Branch, Georgia 31020–9626
Phone: 478–751–3551
Website: <http://www.nsl.fs.fed.us>

SEED EQUIPMENT SOURCES

Dybvig Seed Cleaner
6785 S.W. Vermont St., Portland, Oregon 97223–7530
Phone: 503–244–1977

Nut Wizard
85 E. Powerline Rd., Norman, Indiana 47264
Phone: 888–321–9445
Website: <http://www.nutwizard.com/>