

Seed Harvesting and Processing: Techniques That Work[©]

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TIMING

One of the most fundamental things about collecting seed is determining when is the best time. Since so many plants vary from one another there is no set rule, but rather a series of questions that must be answered to determine when the time is right.

Many woody plants have set patterns for seed dispersal and this occurs on their schedule not ours so we have to look for signs that indicate whether we are on the right track. Members of the genus *Pinus* often set seed every other year. This is because during the opposite year the plants literally switch sexes so those that flowered as female trees in year one will flower as male trees in Year 2. Since not all of the pines in a given group are on the same wavelength this method insures a cross-pollination sequence. Some plants like oaks and beech vary considerably from good seed years to long periods of little or no seed. *Fagus grandiflora* is known to have good seed every 7 to 11 years. Again not all the trees are following the same timetable so there is usually some within a population having a "good year". Members of the genus *Diospyros* generally set good seed crops every other year. Many oaks do this as well.

There are other plants that give ample evidence of their intentions towards having good seed. *Carpinus caroliniana* is but one example. *Carpinus caroliniana* plants will often throw off defective or aborted seed well ahead of the normal seed dispersal schedule. If one should encounter *C. caroliniana* trees with copious quantities of seed that is brown and falling in the early part of fall there is good reason to believe that the seed those trees are carrying is hollow. *Carpinus caroliniana* trees often show fall color and go dormant early as well when seed crops are inferior. *Acer griseum* and *A. saccharum* follow similar patterns. *Acer griseum* is notorious for not setting good seed and should exuberance over take the seed collector early on there might be a sobering discovery that all that pretty seed laying on the ground is hollow. Many species of *Rhus* also do this. A good rule of thumb is to carefully select out a sample of seed and do quick cut test on 25 to 50 seeds. Experience will show that seed that falls too quick in late summer or early fall is almost always hollow and have no use whatsoever.

Another clue to poor seed set is the answer to the question. Are these plants stoloniferous? If they are there is a good chance that the seed set is mere window dressing. Many stoloniferous plants have bad records for maintaining good seed crops. *Fagus grandiflora* is one such plant. *Rhus chinensis*, *R. typhina*, and *R. glabra* var. *cismontana* are other species that do this as well. There is a host of others that follow the same pattern. So rule of thumb number two is to be observant about being stoloniferous as this normally spells trouble for good seed collecting.

SPECIAL CASES AND TROUBLE MAKERS

Some plants have seed that seems to last an eternity or at the very least generations. Many of our native grasses do this. *Schizachyrium scoparium* and the weedy foxtail grass (*Setaria glauca*) are but two examples of longevity in seeds. Some sources have

said that foxtail grass seed can have a life expectancy of near 40 years and still germinate. We as propagators can capitalize upon this by collecting desirable species in years when supply is plentiful and properly storing this seed. *Schizachyrium scoparium* will keep excellent viability when held completely dry with or without refrigeration. Of course its close cousins, the *Andropogon* also follow a similar pattern. Other grasses with long-lived seed are members of the genus *Saccharum* (formerly known as *Erianthus*) and pennisetums. An East Coast native grass, *Tripsacum dactyloides*, Eastern gama grass is also very long lived in dry storage conditions.

There are however woody plants that have very short life expectancies. *Franklinia alatamaha* is one of these. Usually healthy plants can be counted on to have really good seed set, even if they are isolated. However, this seed is extremely vulnerable to drying out and once removed from the hard fruit the seed will deteriorate rapidly. Storage is not an option and the seed is generally best treated by planting as soon as it is harvested. If this proves to be impractical, the next best option is to store the seed for short periods of time moist and cool. Another plant that follows this pattern and has very little tolerance for drying out is *Nandina domestica*. Fruit of it should be cleaned right away and the seed packed in moist perlite to prevent desiccation. Other plant species that have these so-called recalcitrant seeds can be found in the genres of *Quercus*, *Fagus*, *Clematis*, *Citrus*, and *Poncirus*. The general rule here is to plant quickly or store in the refrigerator in a sealed moist environment for short periods of time. Obviously the list is a lot longer but the principals remain the same.

Members of the *Magnolia* family offer special circumstances as well. *Magnolia* seed is oily and as a rule seeds that are oily, including *Carya*, *Juglans*, and *Quercus* must be handled carefully and not allowed to dry out. Oily seeds have problems in that the oils within the seeds will quickly oxidize and go rancid thereby destroying the viability of the seed. *Magnolia* seed should not be depulped until it is ready to be sown as the presence of the pulp seems to impart a degree of protection from the problems with oxidation.

COLLECTING TOOLS

Collecting seeds is not all that difficult. Collecting seeds in a productive and profit orientated manner is a different story. As with all jobs having the right tools is a fundamental part of the process. Any seed collector needs several things; tags and markers for labeling, a good notebook for keeping track of where good seed sources are. A global positioning device is often helpful for finding a seed source in a large forest or field that is not frequently visited. Numerous bags of several types from plastic bags with quick closing features to clothe sacks and paper bags are indispensable. Several telescoping painters' poles are handy. They are treaded on one end and will accept a screw-on type of paint roller attachment. The roller attachment can be bent in to all kinds of shapes and hooks so those high branches can be brought down to the ground with ease. Poles of several lengths are especially useful.

Tarps of all shapes and sizes are an essential part of the battle plan. Canvas tarps work best because they do not blow in the wind. Big floppy blue tarps are also handy but they can be easily thrown by erratic and sudden winds thereby causing the loss of valuable seeds with a powerful gust. Some people like to carry fishing rods of various sorts to "tickle" seeds out of tall branches. It does work. Good stout sticks covered with a soft material like pipe insulation allow the collector to beat up a bush without really damaging it. Since no one really has ownership of all the possible seed-bearing plants they need, it is best not to damage someone else's plant in the

quest for a good harvest. Sticks covered with foam pipe insulation are real assets in this situation.

It is unfortunate that the seed collecting industry for most of our ornamental plants is so small. Equipment manufacturers cannot afford to devote much time or effort to the design or production of seed harvesting and cleaning equipment. As a result much of what can be used is usually home designed and built with varying degrees of success. This is further exacerbated by the fact that much of what is collected comes from native or wild environments so there is no real way to get a running start without hammering into something that is not needed or worse something that is not wanted. Seed contaminated with weedy species is not actively sought. Some less than scrupulous seed dealers combine grasses for the seed, but a lot of trash and weed seeds can get caught up in the process.

One tool of homemade design is a gasoline-powered vacuum cleaner. It was made from a leaf blower and a discarded shop vac. The shop vac's motor was removed and the leaf blower was attached so that the suction of the blower would pull through the vacuum assembly. When in action it behaves much like a Shop Vac but is fully portable. It is used to collect seed with fluffy seed heads such as *Clematis*, *Anemone*, and *Geum triflorum*. The seed is literally vacuumed off of the plant and is deposited into the vacuum's hopper.

TOOLS AND EQUIPMENT FOR CLEANING

Most seed needs to be cleaned and there are a variety of techniques used to accomplish this. While there are a few commercial seed cleaning machines around a great deal can be done with simple machines with a little bit of ingenuity and perseverance. Small lots of fruit can be rubbed on heavy wire screens stretched across a wooden frame. Alternatively a wringer from an old fashioned washing machine can be put to good use in macerating small fruits, such as *Viburnum opulus* and *V. carlesii*. For larger fruits such as *Cornus kousa* a small cement mixer is a good choice. Fruit is collected and allowed to sit for a day or two to soften up. Then an equal volume of fruit and water, usually about 5 gal, is put into a cement mixer and an assortment of baseballs, old golf balls, pipe insulation on small blocks of wood, or similar round somewhat soft objects are put into the mixer with the fruit and the water. The unit is turned on and allowed to run for several hours. Afterwards the pulp is now suspended in the water and the seed is on the bottom of the drum. The whole slurry is drained off and seed is flushed clean with water.

Dry seed requires all kinds of sifting. It is good to have screens of numerous sizes from ½-inch hardware cloth down to standardized engineering sieves that have to be purchased from scientific supply stores. Wire screens are very useful for removing pulp on fruits as well. They are very effective at removing trash from seed. Sometimes several are put together so that heavy trash is removed by one screen, seed is captured by another and small trash is allowed to fall away, the desired seed being caught in the middle. A frame built to provide a shaking screen much like what archeologists use is quite helpful. Boards or a inclined table with a wire screen attached is good for separating seed that rolls readily away from pebbles and the like that do not roll so readily. With a little bit of practice quite a bit of seed can be separated by the combined action of gravity, and the tendency of gravel to get stuck in the wire with the seed simply falling away. This is particularly effective for seeds from the *Styrax* genus.

Other types of seed-cleaning machines include a hopper built with a pronged rotating shaft near the bottom. It can be powered by a fixed electric motor or an electric drill. The idea being that the shaft with the prongs rotates quickly and bangs against seed heads and the like inside the hopper. Seed is dislodged and falls to the bottom. This is very useful for separating seed from dehiscent seed pods and from flower heads such as *Rudbeckia* and *Echinacea*. It is also a very useful tool for dewinging maples and removing the fluff from *Clematis* and *Anemone* seeds.

Air is a fundamental element when it comes to cleaning seed and a variety of air-movement devices are indispensable. As mentioned before vacuums are essential, but they can be equipped with baffles and used as blowers as well, other things include box window fans, and hair dryers. The whole idea here is that seed density is much greater than seed head parts or other types of chaff and can be winnowed away, much as our early ancestors did with grain harvests.

Sometimes seed needs to be dried to a certain point and this gets to be difficult especially in rainy and cloudy weather. One machine that works well to accomplish this is a home laundry dryer without heat. Moist seed is placed in cloth bags, usually old pillowcases, tied shut, and then allowed to tumble dry in the bin. After a few hours the seed will be dry and can be processed further.

Large quantities of seed can be placed upon pipes with holes drilled in them and an air supply pumped into the pipes. The continual movement of the air will dry the large pile of seed. This is used for many herbs and flaxseed production.

SEEDS THAT CLEAN THEMSELVES

Yes, Virginia, it is true. Some seeds are self cleaning. Members of the *Hamamelis* family are the most frequently encountered especially *Corylopsis* and *Hamamelis* species. Others can be found as well and *Buxus* does this. Incidentally, taxonomists (Takhtajam, 1986) suggest that *Buxus* is closely related to the *Hamamelis* family by being in the order Buxales which is a part of the superorder Hamamelidaceae. The fruit and seed look and act very similar to the *Corylopsis*. This illustrates an important concept. When a nurseryman or researcher is confronted with an unknown species or genus but an alliance can be found to a known one, then a plausible inference can be made as to how to treat the unknown subject. In this case the *Buxus* fruit was treated exactly like that of *Hamamelis* and it behaved in an almost identical manner. Stratification and germination requirements should be very similar as well although Dirr (1998) suggests that only a cold stratification treatment is necessary for germination.

Such self-cleaning seed usually comes in a hard bony-type fruit that is picked while still green but maturing. The fruit is then placed in paper bags or heavy cloth bags and hung from the rafters in the barn or shed by wire. Don't place on solid surfaces as rodents can get to them too quickly. After a month or so the fruit will dry to the point where it suddenly springs open and expels the seed, being trapped in the bag it won't get away. After it is all popped the seed is easily removed by screening.

CONCLUSION

This is but a small treatise on cleaning and handling seeds. Since many plants offer so many different choices of seed and seed types we are only scratching the surface here but it is enough to get you started. With practice skills develop and pretty soon you too will be in the shop building the next generation of gasoline-powered vacuum cleaners.

LITERATURE CITED

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Plants Found in My Backyard...And Yours®

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All the great plants aren't in China. What follows are plants found on weekend trips to arborea, nurseries, and hobbyists...plants I found in my own backyard...and in yours.

Any sampling of local plants has to pay tribute to the plantsmen who came before us. We stand on the shoulders of people like Buddy Hubbuch, the former horticulturist at Bernheim Arboretum, nurseryman Theodore Klein, and nurseryman Bob Simpson.

Buddy and Theodore were particularly great influences on me. When I met them about 15 years ago, I didn't know the difference between an oak and a maple, even though I had both in my front yard. Both were kind and generous mentors.

Buddy did not breed or select, but he did collect and display plants at Bernheim like the large exhibit of bottlebrush buckeyes which both Michael Dirr and J.C. Raulston have called the best in the world.

He saved the *Euonymus alatus* 'Rudy Haag', a true dwarf, found by Jefferson town, Kentucky nurseryman, Rudy Haag. A 40-year old group of six plants at Bernheim is 6 ft tall. In 20 years a 'Rudy Haag' will be about 4 ft tall and 5 ft wide. It is nearly fruitless and non-invasive.

Bob Simpson, in Vincennes, Indiana, had a strong bias for plants that produced winter berries.

He selected deciduous holly clones decades before anyone else was interested. His *Ilex verticillata* 'Winter Red' holly is still the standard by which newer clones are judged.

Bob, Theodore Klein, and nurseryman Bon Hartline from Anna, Illinois, sent their best clones to Bernheim giving it one of the best holly collections in the nation.

Simpson introduced many good crabapples and selected *Crataegus viridis* 'Winter King', a 100-year-old wild tree growing in a fence row.

Bon Hartline found other ornamental plants including a dwarf *Ginkgo biloba* with the inflated name of 'Chase Manhattan', also sold as 'Bon's Dwarf'.

Theodore Klein displayed unusual plants at his private arboretum, Yew-Dell, in Crestwood, Kentucky. He found a weeping katsura, *Cercidiphyllum japonicum*, in the nursery of Jess Elliott in southern Indiana. Jess gave the tree to Theodore who propagated it and passed it on to Bernheim and to Cave Hill Cemetery. The tree was planted at Cave Hill in 1976. It appears to be a full-sized katsura, only weeping. Bob Hill from Hidden Hill Nursery and a columnist at the *Louisville Courier-Journal* gave this tree the name 'Amazing Grace' about a year before Theodore's death. Theodore called me out to Yew-Dell every spring when his native crabapples, *Malus coronaria* 'Fimbriata' and *M. coronaria* var. *dasycalyx* 'Charlotte' bloomed. He found the pendulous serviceberry *Amelanchier arborea* 'Silver Fountain' in a fence row