

Seed Propagation: Stacking the Deck in Your Favor

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Plant propagators sometimes face the need or desire to propagate, by seed, plants about which little or nothing is known. In the arboretum and botanic garden world this is a common occurrence. Coupled with the need to propagate a plant is usually a dearth of seeds. Rarely will you encounter a situation where you have adequate numbers of seeds to run a controlled experiment with multiple treatments. What, then, are your options that will assure, at least, some degree of success? How do you stack the deck in your favor?

Many propagators have developed informal protocols, or processes, by which they gather information before attempting to germinate seed. Without realizing it, I informally developed my own way of obtaining information for the many plants that do not appear in reference manuals. Recently, Rob Nicholson and I published an expanded version of a seed germination protocol (Munson and Nicholson, 1994). In it we described a protocol for obtaining information and also provided an extensive listing of ecological factors that may give clues to pregermination requirements. This paper will describe the steps and some common sources of information. For a more detailed analysis of ecological factors please see the aforementioned paper.

When you first discover that your plant is not mentioned in any of the standard sources of propagation information where do you turn? Before giving up on the literature be sure to consult a specialty text dealing with specific groups of plants or specific genera. While few propagators have easy access to university libraries with extensive collections of plant propagation literature most will have access to the most commonly used references. Our own Dirr and Heuser (1987) and the classic Hartmann, et. al. (1990) are the first choice of many propagators. While extensive, they will not always have the specific information you seek. In addition, many will use Schopmeyer's (1974) seed manual or the later revision by Young and Young (1992). Further, there are several specialty references such as Emery (1988) for California seed plants, Phillips (1985) for wildflowers, and our own Richard Bir (1992) for woody native plants. Of course, it is often beneficial to consult the past Proceedings of I.P.P.S. If your search through all your references yields nothing of direct value you need to take the next step.

The next step normally involves finding propagation information for a plant in the same genus. If their nativities are similar in climate and growing season I usually feel confident in trying the same method. In a large genus such as *Acer* I also consult a reference such as Rehder (1940) to determine the section within which a particular species falls. If I am lucky a member of that section will have a known propagation strategy. Although not a guarantee, many members of a section will germinate under the same conditions. Occasionally, the only information available is for another genus in the same family. Although less likely to yield usable information there still may be some indications that certain treatments will work. The general rule-of-thumb that I follow is that the more closely related two species are the more likely they are to have the same pregermination requirements.

When the preceding two steps still provide no clues, I resort to the third step that

provides less specific, but often useful, information. If you can learn the climate in the plant's nativity it will often provide possibilities for pregermination treatments. Such information as annual rainfall, seasonal temperature extremes, and distribution of precipitation, may suggest certain seed treatments. For example, an annual climate with minor temperature fluctuations suggests that cold-moist stratification is not necessary. If, on the other hand, the local climate is highly seasonal with definite cold and warm periods then cold-moist stratification may be a likely option. At least, seeds are unlikely to be harmed by such a treatment.

Another factor that warrants consideration is when seeds ripen and are dispersed. Seeds that ripen and are dispersed early in the growing season, such as silver maple, *A. saccharinum*, often require no pregermination treatments. Seeds of plants that ripen in the autumn, e.g. sugar maple, *A. saccharum*, usually require a cold-moist period to overcome dormancy. Again, knowing the relatedness of species can give some clues on how to proceed.

Finally, some indications are often gleaned from an understanding of certain ecological factors. The manner of seed dispersal and the position of the plant within its native habitat may be significant in terms of germination requirements. The following general rules are evident from a detailed study of many woody plant genera. Wind-dispersed seeds, such as *Populus* and *Oxydendrum*, usually have either no pregermination requirements or very simple ones. Bird- and mammal-dispersed seeds, such as *Ilex* and *Asimina*, respectively, normally have much more complex or difficult germination requirements. In addition canopy species often have simpler germination requirements than do understory plants. Finally, very small seeds, such as *Rhododendron* and *Betula*, often germinate with no pretreatment. Normally, small seeds are not covered with germination medium and frequently germinate in the presence of light. Large seeds, on the other hand, are often covered with soil and seldom germinate in the presence of light. Although these rules are not fixed, they are often good guidelines when you have little else on which to proceed.

If you are blessed with a large quantity of seeds the wise choice would be to try multiple treatments. This will assure at least one of your methods will result in germination. Minimum quantities of seeds per treatment, where they are large enough to count, should be about 25. It is also possible to combine some treatments on the same seed such as acid scarification and moist chilling.

One last recommendation, based on experience, is to practice patience. Do not throw away any of your seed flats or pots the first year. Put them in a cold frame or overwintering house and allow them to go through another season. Surprisingly, many seeds will germinate if given enough time, although you may not know exactly which treatment really worked and why.

In summary, make the best use of available information by connecting species with known germination requirements with those about which nothing is known. Consider the climate and ecological clues and try multiple treatments whenever possible. Lastly, be patient and rewards will often follow.

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Mist Propagation of Perennials Using Side or Lateral Shoots

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The perennials discussed in this paper are those that typically do not develop a stem or branch with leaves and internodes. Instead, they grow from a crown at the soil surface with leaves grouping themselves around a thickened fleshy base in what are variously called: offsets, suckers, side shoots, lateral shoots, or heeled cuttings. They will be called shoots in this paper. When the stock plants are growing in the ground the preferred method of making cuttings is to cut the shoots by inserting the snippers into the ground at the base of the plant. Some of the plants have shoots that are tender and will be bruised or crushed if they are pulled off by hand.

The general rule is that these perennials root better in the spring or fall when it is cooler than in the summer. Hormondin #3 is normally used. A light mist is preferable, beginning with a short burst at 10-min intervals and after 5 days increasing the interval to 20 min. Just enough mist is needed to prevent visible wilting of the leaves.

The *Achillea* taxa are easy to root. We prefer to force field clumps or 1-gal containers in the late winter and then to pull off the shoots when they are 2 to 4 in. long. Side shoots can also be taken in the fall and stuck in a heated house.

Allium senescens var. *glaucum* roots under light mist in well drained soil.

Armeria maritima will root anytime, even in the heat of summer, if there is a brown sheath at the base of the shoot.

Heuchera, *Tiarella*, and *Heucherella* will root from cuttings taken from outside stock up until frost in the fall. Plants can be forced in the winter also. The larger top leaves are trimmed prior to sticking leaving either bare stems or some of the smaller lower leaves.

Echinacea and *Rudbeckia* need to be propagated prior to flower bud formation. This is a good method to use to catch up on production when one has forgotten to seed enough of them.

Scabiosa roots easily except that the better cultivars bloom so profusely that they