Trillium Seed Propagation

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Trilliums are slow-growing woodland herbs that reproduce naturally by seed. Seed ripens roughly 10-14 weeks after flowering, which for us in southern New England is late July to mid-August. The seeds mature inside a fleshy capsule that is either green or more commonly red or maroon. The bigger the plant, the bigger the capsule: large specimens can produce sizable ones containing 60 or more large seeds (capsules of some of the western species such as *Trillium chloropetalum* contain as many as 200 seeds). The seeds are a rich medium brown to dark tan when ripe, and each sports a large elaiosome (a lipid-rich structure designed to entice ants, which gather the seed and feed the elaiosome to their young). Ants move the seed from 3 to 30 feet from the parent, which is not extremely far but does get it out from the shade of the parental foliage.

Nearly mature *Trillium cernuum* capsule. Seed is tan, eliaosomes not fully developed. This seed will germinate if collected now even though it is about 2 weeks from maturity.

Even though the capsule of this *Trillium foetidissimum* is mostly green, the seeds inside are fully mature and elaiosomes well developed. Very soon this capsule would have detached at the base and fallen to the ground or would have been eaten by rodents. This small individual produced an equally small capsule this year containing 10 seeds. Notice the small tan specks in the bed of elaiosome tissue below the two seeds in the capsule. These are aborted seeds that were not pollinated. To ensure the best seed set, I will hand pollinate flowers using a small paint brush. Trilliums need to be cross-pollinated by another genetically different individual of the same or a closely related species. Pollen is usually ripe and stigmas receptive 2-5 days after the flowers open. Trillium seed is intolerant of desiccation once harvested. If you cannot get to it right away, leave the seed in the capsules under refrigeration. They can remain like this for several weeks. Ideally, you should sow the seeds immediately once they are removed from the capsule. However, if you are saving seeds for others or cannot sow them immediately, place the cleaned seeds in a sealed plastic bag and refrigerate. If you intent to keep the seeds this way for more than 2 weeks, place a few pieces of sphagnum moss in the bag to absorb

excess moisture. In a garden situation, you can just squeeze the seeds out of the capsule and directly into the soil about 1 inch below the surface.

For larger scale production, sow the seeds in flats or in prepared beds. I use a good commercial seed-starting mix like Metromix 360 or Fafard superfine germinating mix, covering the seeds with ½ inch of mix and a 1/8 inch layer of fine gravel to hold everything in place. Trillium seed sown in August will not come up until the second spring. I sow the seed and place it outdoors in a coldframe. To protect against rodents and weeds, I cover the flats with a piece of spun-bonded row-cover and then a cover made of ½ mesh hardware cloth. After the first winter, healthy seeds will sprout a root and rhizome but not show up above ground until they have gone through a second winter

These are *Trillium grandiflorum* seedlings 12 months after sowing. The one in the top and center has formed a small round rhizome (white) the cotyledon or seed leaf is beginning to emerge from the seed (yellow green) but will not expand and emerge out of the soil until it has gone through a second winter. An emerging root coming from another seed is evident at the bottom left.

Trillium grandiflorum seedlings emerging in the second spring (20 months after sowing). The row cover is removed at this time and the wire cover replaced. I leave the seedlings alone, just making sure they stay moist and fertilizing them every 10 days with a dilute (200ppm N or about a teaspoon/gallon) liquid fertilizer like Miracle Gro until about late June, when they go dormant. At the New England Wild Flower Society nursery, we bring 12 month old flats into a greenhouse in the fall and raise the temperature to 50-65 degrees F in late February. The seeds sprout a month earlier than they would outdoors and grow well in the cool weather and short days of late winter and early spring. They continue to grow until June, which is when the outdoor seedlings naturally go dormant. Thus we get an extra 4 weeks of growth on the greenhouse seedlings when compared to the ones left outdoors. Greenhouse seedling rhizomes are twice as large because of the extra time afforded them.

This flat of trillium seedlings has been partially uncovered to show the rhizomes after one season of growth. It has been 24 months now from the time they were sown and most have formed rhizomes about $3/16^{th}$ s of an inch long. A few seeds continue to sprout and will for several years to come. This flat will now go through another winter and then the seedlings will be transplanted in late winter (greenhouse) or early spring (outdoors).

This *Trillium cuneatum* (above, left) seedling is ready for transplanting in next spring (31 months after sowing). We either transplant them before the leaf expands or just after, though this is trickier as you have to set the rhizomes at exactly the same depth so the blanched part of the leaf petiole is buried and the pigmented section is not. If you transplant them before the leaf expands, you can set them in more quickly as the depth is not so critical. Either way, the rhizome should be 1 inch or so below the surface. (above, right) At the nursery, we usually clump a few seedlings together to avoid damaging too many roots. These are being placed in a Dutch bulb crate (you can usually get them from nurseries that carry bulbs in the fall after the bulbs come in).

The crates are filled with a perennial growers pine-bark mix (a variation of Fafard's # 52 with 60 % bark, 25 % perlite, and 15% peat adjusted to a pH of 5.8). The crates give excellent drainage and the coarse mix does not fall through the slats. We can fit about 200 thirty month old seedlings in one crate. The crates are fertilized like the seed flats and kept under 40% shade cloth in greenhouse or outdoors. They can be stacked in the greenhouse during the winter to save space, and this also discourages rodents.

Trillium grandiflorum (left) after 3 months in a crate (34 months from seed sowing) notice new roots emerging from lead end of rhizome. (right) *Trillium flexipes* rhizomes at 36 months: note the very long roots that develop in the bulb crates. *Trilliums* do not produce many roots, so the longer these few can grow, the better. This has been one of the real advantages of the crates, along with more even moisture levels and more moderate and consistent soil temperatures when compared to individual pots. In the more challenging environment of a woodland garden soil, it would likely take these rhizomes an additional year to get to this size (about the size of a large pea). However, similar results can be achieved in prepared raised beds. These beds have even better temperature and moisture consistency than the crates and work very well if you have the place for them.

(left) *Trillium sulcatum* seedlings 43 months after sowing. These are large enough to be potted individually, planted into the garden or could be grown on an additional year to blooming size in the crate. If you wish to transplant them, do so before the leaf emerges so you can set the rhizome deeper into the soil without damage to the petiole.

(below) The same crate of Trillium cuneatum pictured on page 6 after an additional growing season (43 months from sowing),

This *Trillium cuneatum* rhizome (right) remained in the crate an additional year and is now fully blooming sized. Through natural attrition, about ½ of the original seedlings died off so there where approximately 100 left in this crate. Notice the large, excellent root system. At 60 months from sowing, it has reached maturity 1-3 years faster than it would in the wild or under less than ideal culture.