STARTING SMALL

Sometime this spring, depending on location, maple producers may see little maples popping out of the ground. They are small and grass-like, unrecognizable to many as trees, as they emerge not only from the forest floor but from lawns and gardens and wherever maple seed landed last fall (Figure 1). It will be a long process, but a few of these odd little plants will one day replace the sugar maples from which you gather sap.

Like many northeastern trees, e.g. beech, yellow birch, white ash and black cherry, sugar maple does not produce a good seed crop every year. Two or three times a decade, something (undoubtedly weather related) triggers trees over a wide area to flower, and in these years a yellow haze covers the crowns at the end of the sugaring season (Figure 2). Flowering in 2008 was light in Vermont, which could make new sugar maple seedlings quite scarce, while 1992 and 2000 were both extraordinary maple flowering years and the resulting seed crops were enormous. Flowering is related to tree age—sugar maples younger than about 20 years do not flower, and really dense flowering generally occurs in mature trees 100+ years old. The pollinated flowers soon develop seeds incased in a winged structure called a samara, which hang in pairs from the branches like little horseshoes. In a good year, over 1 million seeds per acre may be produced. The samaras stay on the trees all summer, ripen about 16 weeks after flowering, and usually fall in October. They will not begin to grow in the fall, no matter what kind of Indian summer occurs, because they are to programmed to require at least 35 days of temperatures of around 34 degrees. They lie amongst the leaf litter, under the snow, until the warm days of spring.

With a seed crop of a million per acre, it would seem logical there is always an abundant, perhaps over-abundant, supply of new sugar maples to replace the mature trees—but the journey from seed to tree is fraught with danger. The new seedling is fragile. Before any green appears, a root is sent down through the leaf litter, seeking a source of moisture. The root system of a young seedling is quite shallow and spring or early summer drought can decimate the year's crop. What surfaces from the leaf litter and gives the new seedling a strange appearance, are the "seed leaves," or cotyledons. Not true leaves, these cotyledons are characteristic of an emerging plant, and provide a head start for the plant before the leaves develop. Soon the first real leaves emerge (figure 3). They are subject to predation by everything from pear thrips and mites, to diseases such as anthracnose, to browsing by deer and other animals. Competition for light, water, and nutrients will further reduce their numbers. At the end of the first year, the surviving seedling may have a single pair of leaves, or a few pairs—but it will still be a very small plant.

Sugar maple is a species that can survive in very low light levels, and what may look like very young seedlings growing in the shade could be many years old and still only knee high. Seedlings germinating in an open field usually lose out to competition from faster growing grasses, bushes and trees, and for this reason sugar maple is not a pioneer species of clearings; however, the deep shade of a mature forest is where maples can bide their time, while other species die from lack of light. As an example of this strategy—I once aged a mature tree, using an increment borer, that was 22" in diameter. The tree, now 213 years old, was only 4" in diameter at age 115 years, then grew from 4" to 22" in the following 98 years. For many decades it was suppressed in the shade of the canopy—then, somehow, the trees overtopping it died or were thrown down in a storm, an opening was created, and the new light accelerated its growth.

In recent years there have been reports from some areas that sugar maple regeneration is failing. In Vermont, where soil pH and soil calcium are quite variable, the best growth of sugar maple trees usually occurs on higher pH soils, and the absence of good maple regeneration under a mature maple canopy often seems to be linked to very acidic soils. This could be caused by changes that are relatively recent, such as the effects of acid precipitation. In some cases it could also be the result of silvicultural treatment from long ago—removal of all non-sugar maples from a mixed stand to create a sugarbush in soils that really were never favorable for a maple stand. Or, poor regeneration could result from factors unrelated to soil quality, such as an overabundance of deer, or years of grazing by cows. In some experiments, the addition of calcium in the form of powered limestone has increased both the survival and growth of young seedlings. While the improper application of lime could be counterproductive, through mechanical damage and soil compaction, if done carefully it might be a solution for some marginal sites that helps ensure future generations of sugar maples. For more information about sugarbush fertilization, see the brochure on the Proctor Maple Research Center website at:
http://www.uvm.edu/~pmrc/fertilization_brochure.pdf

Figure 1. Sugar maples emerging in the spring. The “leaves” are actually cotyledons, which contain stored food and will photosynthesize until the true leaves develop.

Figure 2. 2000 was a year of heavy flowering in sugar maple. A good crop of young seedlings will develop in the following year.

Figure 3. A sugar maple seedling in the summer of its first year; keys included for scale. The seedling will not develop the classic shaped maple leaves until its second year.