

Assessing cultural practices to enhance the establishment and survival of sugar maple seedlings

Efforts to establish sugar maple seedlings through plantings are important to create new sugar bush areas either on land without sugar maple or following catastrophic disturbances such as the January 1998 ice storm that affected New York, New England, Ontario and Quebec. Several factors are important for the successful establishment of sugar maple seedlings. These factors include cultural practices such as the tree protection devices described here and proper site selection.

Factors that typically reduce the success of seedling establishment and survival include predation by deer and competition with weeds. Ongoing research in the Cornell Sugar Maple Program includes an experiment that is testing a variety of devices that help reduce predation and competition, thereby improving early survival of sugar maple seedlings.

Cultural practices that were hypothesized to aid seedlings included tree tubes that protect from deer and against weeds with some designs, weed mats that control weeds around the seedling, and fertilizer to help the seedlings "out-grow" the weeds.

In the spring of 1997, with funding from the North American Maple Syrup Council, sugar maple seedlings were used to establish a plantation where specific cultural practices could be rigorously investigated. The first plantation was established at the Uihlein Sugar Maple Research Field Station near Lake Placid, New York. The plantation was mapped and heights of seedlings were recorded at the time of planting. Investigators involved in the research include Marianne Krasny, Todd Dawson, Lewis Staats, Peter Smallidge, and Colin Campbell, all from the College of Agriculture and Life Science at Cornell University.

Sugar maple seedlings were grown in the Uihlein greenhouse from seed of known parental origin. The seedlings were grown in containers to minimize the planting shock generally associated with planting of bare-rooted seedlings. Two year old seedlings were used in the study. By using seedlings from known parents, the study is able to assess if genetic factors influence the effectiveness of the cultural practices.

The study site selected at the Uihlein was an abandoned agricultural field that had been prepared for planting during 1996. Site preparation involved mowing the open field grasses and a few scattered shrubs during the late summer. The soils are a sandy loam in the Berkshire series. Sugar maple is commonly found on this soil type and usually grows well. To provide a rigorous and efficient use of space and resources, the seedlings were planted in a pattern that allowed for testing 9 different experimental treatments through single and combined cultural practices. The seedling planting pattern resulted in 6-tree row plots that were replicated 4 times. By using combinations of factors, all nine treatments could be applied and tested within each row of 6 seedlings. Statisticians refer to this type of combination of treatments as a factorial design.

The experimental treatments

1. Control - seedling protected by a 4 ft. tall open mesh, hardware cloth cylinder/tube
2. Standard tree tube shelter, 4 ft. tall
3. Hybrid tree tube shelter, lower half of solid material and upper half of plastic mesh, 4 ft. tall
4. Weed guard mat plus the open mesh hardware cloth cylinder
5. Fertilizer 10-10-10 at the dose rate of 4 oz within a 16 inch diameter circle around the seedling plus the open mesh hardware cloth cylinder
6. A combination of #2 and #4 from above
7. A combination of #3 and #4 from above
8. A combination of #2 and #4 and #5 (fertilizer only) from above

9. A combination of #3 and #4 and #5 (fertilizer only) from above

The plantation was mapped and heights of seedlings were recorded at the time of planting. As of late August 1997, survival of seedlings was nearly 100 percent. Data, including seedling height (growth) and survival, will be collected at the end of the growing season for each of 5 years or until the efficiencies of the specific treatments are clearly illustrated.

This research is currently in progress and thus no interpretations or management recommendations are available. As preliminary results and final analyses are completed, the results will be posted here and distributed through the North American Maple Digest and other appropriate outlets.



Tree tube shelter

In a related effort that may be of interest to producers, the Cornell Sugar Maple Program also manages the sugar maple tree improvement program, a project that was developed to locate sugar maples with above average sap sugar concentration. Growing stock from the program is currently available for outplanting.

Note: Treatment materials were provided by Treesentials Company, St. Paul, MN. No endorsement of product by Cornell University is intended or implied.