

SUGAR MAPLE TREE IMPROVEMENT PROGRAM

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Maple producers and rural landowners throughout the maple syrup producing regions of the Northeast have expressed interest for acquiring improved sugar maple (*Acer saccharum* Marsh.) seedlings for future sap production on abandoned agricultural land and for replacement of roadside sugar maples that have declined. The supply of sugar maple planting stock with improved sap sugar concentration for plantation establishment and replacement of roadside trees has been limited. Requests from maple producers and landowners for improved sugar maple planting stock exceed the current availability of seedlings.

A sugar maple tree improvement program for high sap sugar concentration began in the 1960's under the direction of the USDA Forest Service (USFS). The program began with phenotypic selection by field examination of over 21,000 trees in the Northeast and intensive selection of the best trees. The program continued with the establishment of clonal orchards in Grand Isle, VT and Lake Placid, NY. Highly significant differences in sap sugar concentration were found in progeny tests in New York and Pennsylvania representing 25 of the selected USFS parental sources and derived from seed collected from within clonal bank production. The

sugar maple tree improvement program continued with the construction of a greenhouse in 1994 at Cornell University's Uihlein Sugar Maple Field Station at Lake Placid, NY to facilitate propagation of sugar maple for current and future programs. After favorable results were obtained in 1994 with the rooting of cuttings collected from 15 selections, over 60 individual sources selected for possessing high sap sugar concentration have been successfully cloned by the rooting of cuttings to the present time. Additionally, high sap sugar selections found difficult to root from cuttings have been cloned by scionwood grafting. This clonal material has allowed expansion and replacement in the established clonal orchards. As a result of damage from the January 1998 ice storm, several selections were lost in the Grant Isle clonal orchard and replaced in the spring of 1999 with clonal material reserved in the field station nursery. Also, clonal material propagated in the Uihlein greenhouse was outplanted in 1996 near the field station at Lake Placid as the initial step for establishing a seed orchard of higher performing individuals for producing improved growing stock. Since that time, the seed orchard has grown in size to nearly 100 trees representing 49 high sap sugar selections from throughout the Northeast. This number will be increasing as more selections are identified, propagated, and attain suitable size for outplanting in the orchard. As the seed orchard and clonal orchards develop, seed production will become more abundant, and thus, help fulfill the demand for providing greater availability of

improved seedlings for establishing orchards for future sap production.

Flowering and seed production have occurred at intervals in the clonal orchards at Grand Isle, VT and Lake Placid, NY. In recent years, seed production collected from the clonal orchards and propagated in the greenhouse has provided an amount of improved growing stock required for field trials at the field station and for cooperators and maple producers. To examine the cultural effects of establishing sugar maple, Cornell established a controlled, replicated outplanting trial at the Uihlein Field Station in 1997 designed to test treatments such as the use of fertilizer, tree shelters, and weed control. A similar outplanting trial was established at the Cornell Arnot Research Forest in 1998. In a training program for 10

extension educators in NY and PA, less formal outplanting trials have been established with about 20 landowners in NY and neighboring states. Additionally, a growing number of improved seedlings have been made available to maple producers in NY and other states in the Northeast.

Cultural Methods for Establishing Sugar Maple in Field Plantings

A sugar maple plantation designed to investigate specific cultural practices that offer efficient plantation establishment and enhancement of survival and growth was established in May 1997 at the Uihlein Sugar Maple Research Field Station of Cornell University near Lake Placid, New York. Two-year old containerized sugar maple seedlings of known source and propagated in the field sta-



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tion's greenhouse served as the planting stock for the study. The study site, abandoned agricultural land adjacent to the field station, had been prepared for planting during the previous year. Soil at the site is classified as Berkshire sandy loam. The experimental design consisted of 6-tree row plots for 9 treatments in 4 replications. Experimental variables included treatments of standard tree shelters 4 ft in height, hybrid tree shelters 4 ft. in height (half solid texture as the standard shelters with upper portion of breathable, perforated mesh), tree mat for reduction of weed competition, fertilizer, and combinations of each¹. A control (seedlings with none of the above treatments) was included in each of the 4 replications. 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 collect-

ed at the end of the growing season for each of 5 years or until the efficiencies of the specific treatments are clearly illustrated.

To expand this study, an additional site near Ithaca, New York at the Arnot Forest of Cornell University was established during the spring of 1998. This site had not been identified or prepared to allow planting to take place during 1997. The plantation at the Ithaca site was designed in the same manner containing the same treatments as the Lake Placid site. Examination of cultural treatments for sugar maple growing in different environments will enhance this investigation.

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¹Treatment materials provided by Treesentials Company, St. Paul, MN. No endorsement of product by Cornell University is intended or implied.

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