THE PRODUCTION OF COTTONWOOD CUTTINGS BY THE TEXAS FOREST SERVICE

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The growing of cottonwood cuttings can be both a frustrating and a rewarding experience. It can be frustrating in the sense that you do everything you can think of to control the twig and stem borer, yet the percentage of infestation is inordinately high in the entire nursery production. It is a rewarding experience when you can turn out some pretty acceptable cutting material in spite of the high degree of insect infestation.

Some five or six years ago, the Texas Forest Service started the production of cottonwood cuttings on a somewhat modest scale under a special contract arrangement with a forest industry in the State. This forest industry wanted to plant between 1,500 to 2,000 acres a year with cuttings which we would produce for them in one of our forest tree nurseries. The spacing used in their plantations ranged from 6 x 10 feet to 10 x 15 feet. This meant that they wanted from 500,000 to 1,500,000 twenty-inch cuttings a year.

The spacing now used in their field planting is 10 x 15 feet, which translated into annual requirements is 580,000 cuttings for 2,000 acres.

In selecting a source of planting stock for the nursery production, about 8 or 10 sources or provenances were field tested through two growing seasons. Initially, we used material from Missouri, Illinois, Louisiana, Alabama, and Texas, and two sources from Central Italy. The field testing was done on different sites in Texas representative of those on which the full plantations would be established. The Texas Trinity River source exhibited the most desirable qualities (external only, evaluation of internal morphological qualities will come later) as demonstrated by the field tests. Field testing on other sites or in other states may have shown entirely different characteristics. The different qualities on which the sources were evaluated included survival, early initial growth, sustained growth through two growing seasons, crown form, branching habits (number and angle), straightness of stem, and overall appearance of the aerial part of the plant.

Eight-inch cuttings were used as root stock material for the nursery production. One acre of nursery area (gross) will accommodate approximately 10,890 root stocks on a spacing of 1-foot in the row with rows 3 feet wide. Seven of such rows are planted on each side of an irrigation riser line with a 14-foot cleared alleyway running through the center for equipment operation: e.g., for insecticide applications and other cultural treatments. We figure with an 85 percent survival of root stocks in the nursery, an estimated 60 to

70 thousand 22-inch cuttings can be produced each year. Cuttings are prepared on the basis of an arbitrary grade of 1/2-inch minimum diameter and 1-1/2-inch maximum diameter. The larger size is restrictive because of difficulty in planting; however, with equipment not being a limiting factor, there would be no restriction on maximum size of cutting that could be planted.

Cultural practices that are followed at Indian Mound Nursery in the production of cottonwood cuttings include:

(a). Annual applications of a complete commercial fertilizer. The soil at Indian Mound may be classified as one of the Red Podzolic series or a red friable sandy loam. It is identified as the Amite series and is largely used as one of the better farming soils in the pine-hardwood region of the State. The amount of commercial fertilizer applied annually will vary depending upon a soil analysis made each year. The fertility level maintained for cottonwood is comparable to that maintained for pine or approximately 60-70 pounds of nitrogen per acre; 100-150 pounds of phosphorus an acre in the form of P205, 300-400 pounds of potash an acre in the form of K20, and 1,000-1,400 pounds of calcium an acre in the form of CaCO3; we try to maintain organic matter at 1.5-2.0 percent by annual applications of a mixture of broilerhouse litter and sawdust at the rate of 100 cubic yards an acre. The cottonwood rows are subsoiled each year after the compost is applied with two 20-inch subsoilers mounted on a wheeled tractor.

(b). Excellent control of insects has been accomplished this year with some new insecticides and one old one that shows much promise. To my knowledge, we have less than 1 percent infestation with either the stem or twig borers or the leaf beetle. We used both the old standby Thimet in granular form and a couple with new formulations manufactured by Chemagro. They are both the liquid and granular formulations of the systemic Di-Syston and a new one that carries the trade name Meta-Systox-R which is also a systemic and is available only as a liquid concentrate. We were well pleased with the results obtained with all of the systemics inasmuch as insect infestations have been negligible. It has been a different story on the control plots however. Two applications of the insecticide, liquid or granular, are made each year at the rate of 2 pints in 35 gallons of water, or 120 pounds an acre, respectively--one in March before the new whips develop on the root stocks and one again in June or July. The severity of the insect population buildup will govern the number of applications or treatments that will have to be made.

(c). Some damage and mortality to cottonwood in the nursery comes from some harmful root pathogens. These are soil borne Ascomycetes that have been identified as Xylaria spp. or more commonly known as black root rot. These areas, as they appear, are treated in the spring after soil temperature reaches 60 degrees Fahrenheit or more with methyl bromide and the area is then replanted. It sometimes requires treatments for 2 successive years before the pathogen is completely controlled. It may then appear in another part of the production area.

(d). Cottonwood is cultivated throughout the spring and summer with commonly used nursery equipment. After the whips become too tall, viz., in excess of 20 inches, a single row tiller is used for the control of weeds and grass and to provide conditions for improving soil aeration.

As a footnote to this, I might briefly discuss our tree improvement program involving cottonwood, P. deltoides, as mentioned earlier in the paper. Initially we used about 10 sources of cottonwood plant material in the nursery from which one source was selected for the nursery production. The basis for the selection of this superior source has been covered earlier in this paper. Selections were made from all of the nursery production 3 years ago and 100 phenotypes were vegetatively propagated for internal and external morphological evaluation. Of these 100 original selections, 50 of the best clones were selected for further testing and the basis for the selection being exclusively on external morphology, viz., straightness of stem, branching characteristics and angle degree of limbing, rate of growth, etc. From these 50 best clonal lines, 25 will be selected for final field testing. In addition, a new concept in plantation management is being tried, on the same basis as any agricultural crop, viz., cultivating, fertilizing, and irrigating as needed, and on a short term rotation of say 5 to 7 years. The additional cost for this new concept in the cultural treatment of cottonwood plantations it is hoped will pay for itself with the additional volume of wood produced per unit area and the shortened rotation. Three spacings are being tested in the project; i.e., 5 x 10 feet, 6 x 12 feet, and 7 x 14 feet. The internal morphological characteristics that will be evaluated are pulping qualities which include diameter and thickness of cell and cell wall, respectively, fiber characteristics, etc.

Consideration is being given, too, to the production of rooted cuttings for field plantings instead of unrooted cuttings. You might think the cost prohibitive but what will the years ahead reveal in new techniques in the management of our forests, as well as new techniques that will be appropriate in forest tree nursery operation?