Attachment C

Christmas Tree Promotion Board

Final Research Report

CTPB Project Number: 19-06-TAMU

Project Title: **Breeding to produce the next generation of Virginia pine for the Texas/Oklahoma Christmas tree markets**

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Institution: Texas A&M Forest Service (TFS)

Final Report

Introduction

This project was undertaken to secure tested sources of Virginia Pine (*Pinus virginiana* Mill.) developed by the Texas A&M Forest Service (TFS) Western Gulf Forest Tree Improvement Program (WGFTIP) for seed orchard inclusion in the Magnolia Springs seed orchard (MSSO) complex near Kirbyville, TX. The goal was to centralize the land-race population as a source for MSSO orchard expansion and future breeding. Testing was done collaboratively with the states of Oklahoma and Louisiana. A seed orchard was also established by Oklahoma Forestry Services; however, serious mortality has occurred at this location, thus jeopardizing the genetic diversity available for future seed orchards and breeding.

The TFS maintains its Virginia pine seed orchard at MSSO to provide seed to meet the annual reforestation requirements of the Texas Christmas Tree Growers Association (TCTGA). This relationship has existed since the early 1980s and seed demand has been growing as the number of grower farms in Texas utilizing Virginia pine as its source of Christmas trees continues to grow. Unfortunately, as seedling demands were rising, productivity in the MSSO orchard was faltering, mainly due to continual losses of trees within the orchard, which is now 18 years old.

If the TFS is going to continue to meet its obligations to the TCTGA, it will need to expand its current orchard to meet long-term needs and secure a secondary seed source to increase the number of improved seed in the short term.

Methods

MSSO orchard expansion. In April of 2021 seed from the WGFTIP Virginia pine testing program was sown in the TFS greenhouse located behind the Forest Science Laboratory on the Texas A&M University campus in College Station. A total of 400 seeds, sufficient seed to provide enough seedlings to be used as rootstock in the expansion effort, were sown in Ray Leach super cells to allow adequate root development. Developing seedlings were maintained in a shade house during the 2021 growing season and fertilized biweekly to enhance top growth.

To ensure survival of the seedlings once established at MSSO, irrigation lines were installed to the orchard from an existing mainline and then within the orchard expansion area. Drip emitters were installed at every planting location. In all 100 new planting locations were created, doubling the size of the orchard. Once the irrigation lines were in place, herbicide was sprayed along the irrigation lines prior to planting to also enhance seedling survival.

In late March of 2022, three seedlings were transplanted at each new planting location for rootstock purposes. These seedlings were irrigated on an as-needed basis and fertilized once by hand using a balanced fertilizer. Seedlings were also sprayed with a permethrin-based pesticide using a ground-spray application monthly from April through August.

Supplemental seed sourcing. In 2021 contact was made with a TCTGA member with a failed WGFTIP Virginia pine progeny test on his property. This test, near Manvel, TX, failed after the first year due to high mortality caused by excessive rainfall. However, the grower did not remove the trees on the distant edge of his property, nor did he maintain this part of his property after the test failed. Many of the remaining trees were irregularly spaced and covered in vines and other trees species such as Chinese tallow.

During the summer of 2021 the TFS cleared much of this part of the property using a skid steer-mounted brush hog implement with the capability to cut both horizontally but also in a vertical position to clear vines and other woody shrubs. Larger trees, including some closely-spaced Virginia pines were removed using a chain saw. The goal of this clean up effort was to open up the canopies of the larger Virginia pines, increasing their exposure to sunlight to enhance cone production, which was evident on many trees.

Once cleared the landowner continued to mow and maintain this portion of his property to facilitate future access for seed collection.

Results

MSSO orchard expansion. Much of the 2022 growing season was hot and dry, but the irrigation system ran nearly continuously on the Virginia pine transplants at MSSO. The only losses were due to predation by gophers that moved into the area, most likely also looking for water. They were successfully eradicated from the expansion block.

Seedling growth has been good with most of the planting positions having at least one seedling of sufficient size for grafting during the winter of 2022 (see Figure 1.)

Figure 1. Virginia pine rootstock in foreground at TFS Magnolia Springs seed orchard. Current Virginia pine seed orchard in background.

Supplemental seed sourcing. Cleanup of the TCTGA member site near Manvel, TX, resulted in access to more than 100 large trees (see Figure 2 and Figure 3.) These trees were harvested in the fall of 2022 to supplement the harvest from the MSSO orchard.

Figure 2. Abandoned Virginia pine progeny test prior to cleanup of vines and unneeded trees.

Figure 3. Abandoned progeny test after clearing. These trees were harvested in 2022.

Discussion

Work done to increase the availability of Virginia pine seed to the Texas Christmas Tree Growers Association through work carried out by the Texas A&M Forest Service using funding provided by the Real Christmas Tree Board during the 2019 – 2022 period has been successful. Short-term seed production from the TFS seed orchard at Magnolia Springs (MSSO) in 2022 was supplemented from a harvest made possible by cleanup and resurrection of a Virginia pine progeny test on TCTGA member property. This work is timely as the 2022 flower crop observed at this and other properties, including the TFS orchard, indicates that the 2023 harvest should be a bumper crop.

The long-term availability of improved Virginia pine seed was made possible by work done to expand the TFS MSSO seed orchard. Seedlings were successfully transplanted and grow in an expansion block, that if successfully grafted, will double the size of the current orchard. Despite setbacks due to hot, dry growing conditions and animal predation, a high percentage of seedlings are ready for grafting during the winter of 2022-23.