TEXAS AGRICULTURAL EXPERIMENT STATION
THE TEXAS A&M UNIVERSITY SYSTEM

Project Summary Report 4928-S
Project 7-4928: Chinese Tallow Control Research and Habitat Enhancement

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PROJECT SUMMARY REPORT

Chinese Tallow Control: An Integrated Approach

Chinese tallow is a tropical, deciduous species native to China and Japan. In the early 1900s the U.S Department of Agriculture, Bureau of Plant Industries introduced Chinese tallow into Texas. By 1949 Chinese tallow had spread throughout riparian portions of southeast Texas. The

Chinese tallow tree is rapidly replacing many natural habitats in the southeastern U.S. It is a major problem in parts of East Texas. Chinese tallow trees have several life history features that allow them to invade and dominate both coastal prairie and flooded woodland habitats. The tree's floating seed can be carried great distances by floodwater. Birds and other animals also disperse seed. After arrival, the seeds dominate floodplain forests through a unique combination of shade tolerance, adaptation to seasonally flooded soils, and low palatability to browsing animals. They tolerate moderate levels of root competition.

Most Chinese tallow tree control information is focused on coastal prairies, where broadcast applications are legal and effective. However, broadcast herbicide applications are neither desirable nor legal in the cypress-tupelo forested swamps of East Texas. This research developed a series of individual plant control options for Chinese tallow that provide managers with several management options. They can select the most effective and economical control method for their particular situation. Or they may elect to use a less economical method that is more appropriate for their unique combination of plants and management situation. For example, chemical-free options may be desirable for certain situations, even though they are not the most cost-effective.

What We Did . . .

We evaluated eight different control techniques for effectiveness and cost efficiency at two Orange County, Texas, locations (Blue Elbow Swamp). For trees with 1/5 inch diameter stems or larger we compared frill cut and spray ARSENAL (imazapyr) or ROUNDUP PRO (glyphosate), EZJect injections using glyphosate, and basal sprays of GARLON 4 (triclopyr). We evaluated seedling control methods by comparing foliar leaf sprays containing a combination of glyphosate and imazapyr, with hand pulling and burning with a backpack propane torch. Herbicide costs per acre and labor costs per acre were recorded for all treatments and related to the number of plants treated.

Potential long-term Chinese tallow management strategies were tested for their ability to

Figure 1. Frill cut and spray

Figure 2. EZJect injector

control the spread of Chinese tallow trees into recently opened areas. Three different native tree species (bald cypress, cherry bark oak, and water oak) were transplanted into recently thinned plots at both study locations. One native grass, switchgrass, was seeded into similar plots. We recorded percent survival and growth rate for these species.

What We Found . . .

Treatments using the EZJect capsule injection system, frill cut and spray (Roundup or Arsenal) and basal stem sprays with triclopyr all killed at least 92 percent of the Chinese tallow trees. Seedlings treated with the propane burner, foliar sprays, or hand pulling reduced seedling densities by 90 percent during the first year. However, by 22 months post-treatment seedling densities had returned to pretreatment levels. This indicates that there is either a large seed bank and/or that seeds have been transported into the area by flood waters.

Athough the frill cut and spray with Arsenal had a higher percent kill than Roundup Pro (100 percent and 92 percent respectively), the greater herbicide cost of Arsenal would not justify its use over Roundup Pro. In general, the frill cut and spray is the simplest and most cost-effective method. A sharp machete and a hand held plastic bottle are all that is needed.

Basal spray with Garlon 4 resulted in a 94 percent root kill to both mature trees and saplings. However, due to wetland regulations, it is restricted to areas without standing or flowing water. The basal stem spray application for treating tallow saplings is best used in low-density populations.

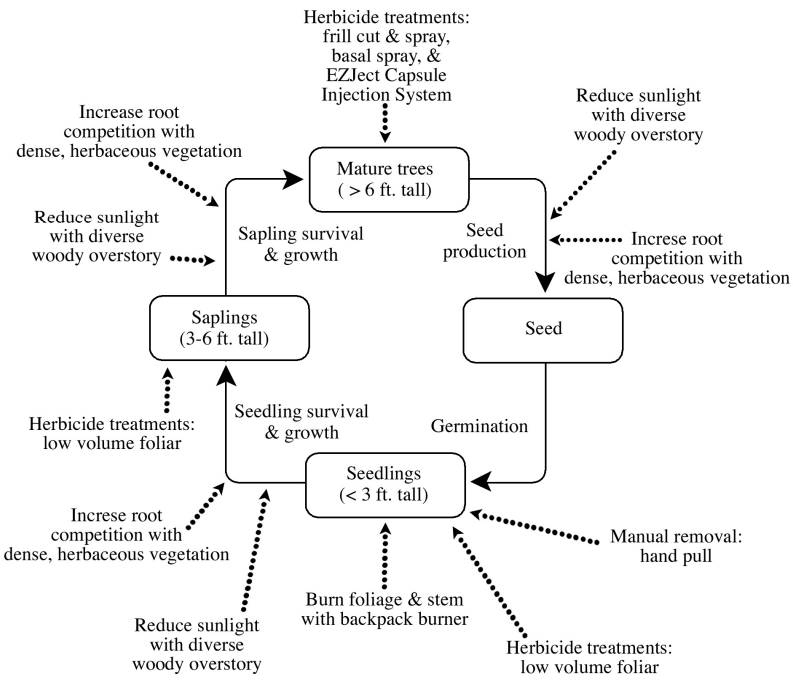

Figure 3. Life history diagram of Chinese tallow illustrating several control strategies used in this study

The EZJect injection capsule system resulted in the least amount of labor compared to the other methods, but it had the highest herbicide cost. This method is ineffective on plants with less than 1 1/2 inch stem diameters due to flexibility of the plants when trying to inject the capsule. The injection system can be used on sites with or without standing or flowing water. Although the cost of the EZJect system is high, it can be a useful tool for individuals who do not desire to work with herbicides, since workers never come in contact with the chemicals.

Low-volume foliar spray with a mixture of Roundup Pro and Arsenal can be used to treat saplings and seedlings in areas where there is no standing or flowing water. In areas with flowing water Roundup Pro should be replaced with Rodeo in the spray mixture.

The propane burner and the hand pulling treatments required the most labor; however, these two methods might be used where herbicides are not an option. The propane burner was particularly tiring due to the weight of the propane bottle backpack and the heat generated by the propane flame. Hand pulling resulted in the greatest amount of labor with an average of over 12 work-hours per acre. However, this option might be useful for small areas or when a large number of volunteer workers are available.

The Researchers Recommend . . .

Mature Chinese tallow trees are most efficiently controlled with frill cut applications of glyphosate or imazapyr. Basal applications of triclopyr in diesel are also effective where no standing water is present (Figure 4). Felling trees is possible,

but provides a very short-term improvement, because it stimulates vigorous resprouting from the root system. Seedlings are very effectively treated with backpack sprayers using glyphosate and imazapyr.

Non-chemical options for seedling control include hand pulling and burning the leaves with a propane burner. Although these methods provide effective control of the seedlings, that control does not last. In virtually every instance studied, existing seed bank or seed immigration replaced the lost seedlings during the second year after treatment.

Saplings that are 6 feet tall or more and have a stem diameter of about 1/4 inch are difficult to treat. They are too tall to leaf spray easily and the stem is too thin for frill cut or EZJect treatments. While they can be basal treated with triclopyr, that becomes very tedious in high-density stands and is not an option where standing or flowing water is present. The most practical solution for these stands is to wait a few years before treating. Self-thinning will greatly reduce the density of trees, and the remaining trees can be treated with frill cut and spray treatments.

While Chinese tallow trees and seedlings can be killed with several methods, that control is both expensive and short-lived. This suggests the value of forest management practices that maintain dense canopies of native tree species. Although Chinese tallow will still occur in these forests, they will not form the dense stands that exclude other species.

The individual plant treatments identified in this study should be reserved for high-profile or high-priority locations, where those expenditures can be justified.

In riparian wetlands, like the Blue Elbow swamp, it seems appropriate to assume Chinese tallow seed will always be available. Seed immigration and seed storage are sufficient to ensure a continuing supply of seed. Consequently, we must focus on management strategies that inhibit the growth of Chinese tallow seedlings. Healthy native forests provide the best inhibitor of Chinese tallow seedlings. Natural openings from the death of individual trees will create a small Chinese tallow dominated area, but the effect is small and not permanent.

Large-scale damages to the forest canopy occur through natural (hurricane blowdowns) or man-made causes (construction). When they do occur, the methods outlined in this study provide effective techniques for reducing the impact of Chinese tallow trees.

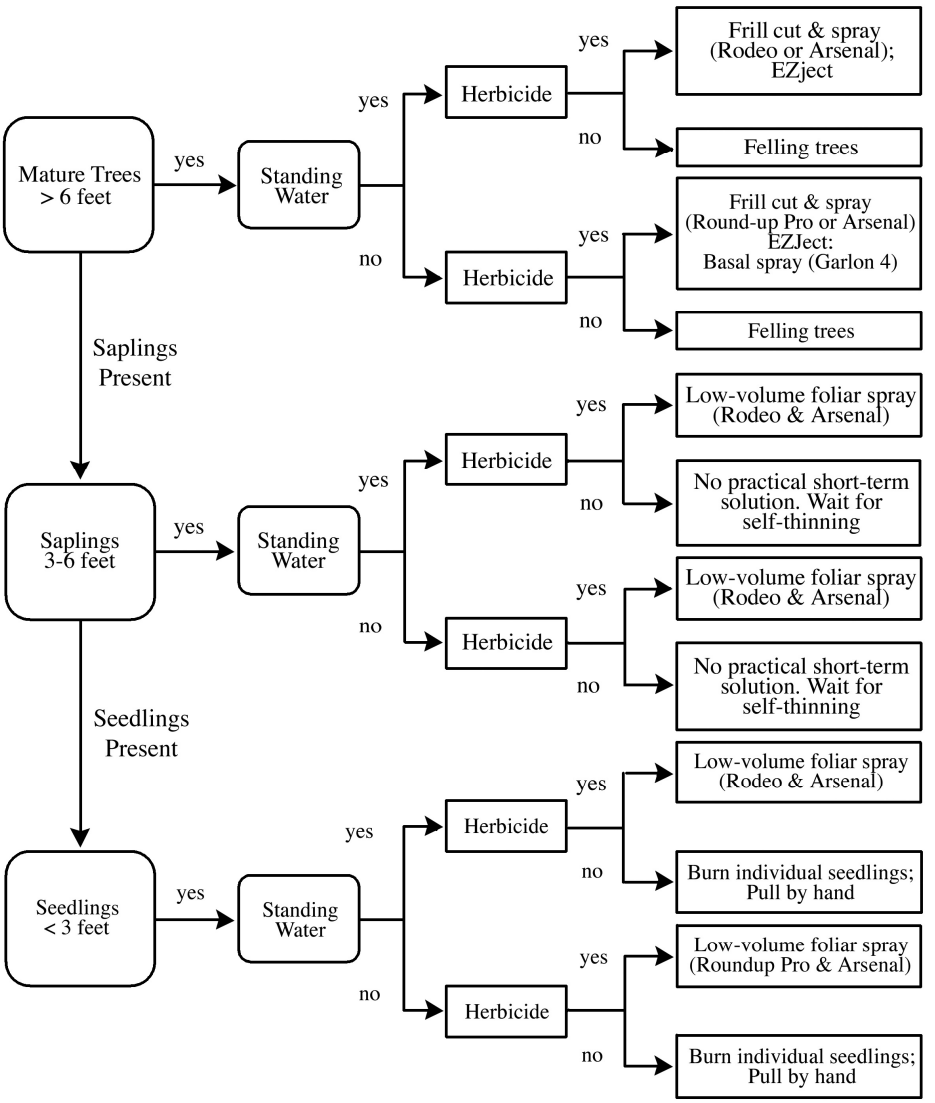

Figure 4. Decision tree for selecting the most appropriate Chinese tallow treatments

For More Details . . .

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The research established methods for environmentally safe, cost-effective control of Chinese tallow trees including long term management. The results are being utilized by TxDOT for Chinese tallow tree control. The report results have been shared with the Texas Parks and Wildlife and the Army Corps of Engineers to assist their efforts in Chinese tallow tree control.

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