

Chinese Tallow: Invading the Southeastern Coastal Plain

Chinese tallow is an ornamental tree with colorful autumn foliage that can survive full sunlight and shade, flooding, drought, and in some cases fire. To horticulturists this kind of tree sounds like a dream, but to ecologists, land managers, and land owners this kind of tree can be a nightmare, especially when it invades an area and takes over native vegetation. Chinese tallow (*Triadica sebifera*), a nonnative tree from China, is currently transforming the southeastern Coastal Plain.

Over the last 30 years, Chinese tallow has become a common tree in old fields and bottomland swamps of coastal Louisiana. Several studies at the U.S. Geological Survey's National Wetlands Research Center (NWRC), Lafayette, Louisiana, are aimed at understanding the factors that contribute to Chinese tallow growth, spread, and management.

When tallow invades, it eventually monopolizes an area, creating a forest without native animal or plant species.

This tree exhibits classic traits of most nonnative invaders: it is attractive so people want to distribute it, it has incredible resiliency, it grows quickly and in a variety of soils, and it is resistant to pests.

In the coastal prairie of Louisiana and Texas, Chinese tallow can grow up to 30 feet and shade out native sun-loving prairie species. The disappearing of prairie species is troublesome because less than 1% of original coastal prairie remains, and in Louisiana, less than 500 of the original 2.2 million acres still exist.

Tallow reproduces and grows quickly and can cause large-scale ecosystem modification (fig. 1). For example, when it completely replaces native vegetation, it has a negative effect on birds by degrading the habitat. Besides shading out grasses that cattle like to eat, it can also be potentially harmful to humans and animals because of its berries (fig. 2) and plant sap that contain toxins. There is some concern its leaves may shed toxins that change the

soil chemistry and make it difficult for other plants to grow.

How did Chinese tallow come to America?

Chinese tallow was reportedly introduced to the United States by Benjamin Franklin in 1772. It was also introduced to South Carolina in the late 1700's. Because of the large amount of vegetable tallow found in the seed, the U.S. Department of Agriculture introduced it to the Gulf of Mexico Coast region in the 1900's to help establish local soap industries.

What other products can be created with Chinese tallow?

Tallow has been cultivated as a seed-oil crop in China for at least 14 centuries. Candles, soap, cloth dressing, and fuel are made from the tallow. Chinese vegetable tallow is a solid fat that is in the outer covering of the seeds. The kernels produce an oil called stillingia oil that is used in machine oils, as a crude lamp oil, and in making varnishes and paints. It can also be converted to charcoal, ethanol, and methanol. Potentially, oil from the seeds can be a substitute for petroleum.



Figure 1. Chinese tallow, also called chicken tree and popcorn tree, is an aggressive, nonnative invader that reproduces quickly, creating a forest without native plant or animal species.



Figure 2. The fruit of Chinese tallow can be carried by birds and water runoff to invade areas.

How far has Chinese tallow spread in the United States?

It has spread from South Carolina all the way down to Florida, west into Texas, and has now been located in California.

How do Chinese tallow's characteristics make it such an aggressive invader?

Chinese tallow has the ability to reach reproductive age in as little as 3 years and to remain productive for at least 60 years. It does not seem to have a preference for disturbed areas over undisturbed areas and can grow in a variety of places. It can also grow in both full sunlight and shade. It is more tolerant of salinity and flooding than quite a few other native species. It grows in subtropical to warm climates but is hardy and able to withstand a few degrees of frost. It is able to thrive in the United States and is resistant to native insects. In addition, it is somewhat resistant to fire.

Once Chinese tallow is established, is it hard to get rid of?

Chinese tallow is very hard to get rid of. Trees are chopped down, roots are dug up and removed, and herbicides are used, but the aggressive seedlings continue to return, sometimes for years. Fire can hold the tallow at bay when the tree density is low, but since tallow can suppress fuel species, fire can go up to a stand and then go out from lack of fuel, leaving the tallow relatively unharmed. Tallow can resprout if topkilled as well as root at some distance from the original stem.

How can I control tallow on my property?

Tallow is susceptible to herbicides. Effective control of tallow can be achieved through the intensive use of chemical herbicides, mowing, or cutting; however, these methods are expensive for large-scale control.

How is Chinese tallow spread?

Chinese tallow has been cultivated in nurseries and sold as an ornamental tree used for landscaping; however, it is now classified as a nuisance species in some locations and can no longer be sold. It has separate pollen and seed-bearing flowers, and seeds can be spread by birds and by moving water.

How is the USGS National Wetlands Research Center studying Chinese tallow?

In the Jean Lafitte National and Historical Park and Preserve, Louisiana, NWRC researchers use models that simulate tallow

invasion in bottomland hardwood areas of the Mississippi River delta to better understand how Chinese tallow spreads. They also monitor the rate and extent of its invasion as well as assess the fate of native trees once tallow has invaded.

In the coastal prairie of Louisiana and Texas, researchers are also trying to determine the distribution of Chinese tallow and conditions that contribute to its growth. Because fire is an important natural process that maintains prairie, they are also evaluating the effectiveness of prescribed burning, specifically for the control of Chinese tallow.

Researchers have found that tallow is not restricted to moist conditions and established trees can tolerate severe drought, though growth can be reduced by arid conditions. Also, they have found that tallow can be damaged by fire and under certain circumstances, may be controlled by prescribed burning (fig. 3). On the other hand, tallow inhibits the spread of fire, which suggests that it could possibly escape from fire control if left untreated for several years.

Identifying how Chinese tallow is dispersed is crucial to controlling it. NWRC researchers are studying how tallow is distributed by migrating versus resident birds in South Carolina and Louisiana. In order to do this, they are studying which bird species eat tallow seeds. In addition, they are studying to see if some bird species may actually benefit from the presence of tallow, whereas others may suffer because of the change to their habitat.

Additionally, researchers at NWRC use aerial photography and satellite images to monitor landscape changes to detect and



Figure 3. The USGS National Wetlands Research Center, Lafayette, is currently researching the role of fire in controlling Chinese tallow.

track Chinese tallow invasion (fig. 4). These remote-sensing techniques can also be used to assess the impact of fire on tallow. A collaborative study with NASA is mapping Chinese tallow occurrences.

For more information, contact:

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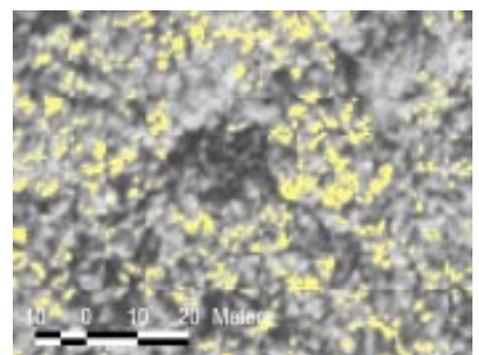
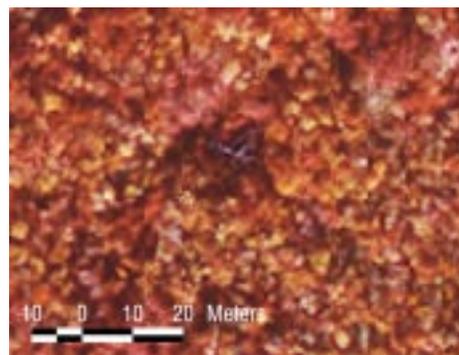


Figure 4. USGS National Wetlands Research Center researchers are exploring the uses of color-infrared photography to map Chinese tallow occurrences. One of the challenges of this research is being able to discern not only different types of vegetation but also leaf color changes of Chinese tallow. Chinese tallow mapping was carried out when the leaves were turning red (shown here in yellow) and provided a high contrast with the native forest, prairie, and marsh vegetation.