Outreach
Warnell School of Forestry & Natural Resources
UNIVERSITY OF GEORGIA

Important Tree Species --

Southern Catalpa *Catalpa bignonioides*: The Fish Bait Tree

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The Southern catalpa (Catalpa bignonioides) tree is a common fixture along roadsides and in old landscapes. The big green leaves and distinctive long dangling fruits are noticeable from hundreds of yards away. Although used in the past for a few wood-based products and pioneer medicines, today catalpa is used for shade trees and for growing a special caterpillar. This catalpa "worm" is prized by fishing enthusiast across the South.

Family Ties

The catalpa tree is a member of the Catalpa or Trumpet-Creeper family (Bignoniaceae). This family contains more than 700 species scattered around the globe, primarily in tropical and sub-tropical regions. This plant family is represented by trees, shrubs and vines in North America. The trumpet creeper (Campsis radicans), cross vine (Bignonia capreolata), and two catalpa trees (Catalpa ssp.) are the most recognized natives of this family in the Southeastern United States. The exotic Asiatic Paulownia tree is a member of this family and has been widely planted, now reproducing on its own. The catalpa genus (Catalpa) has 12 species spread across North America, the Caribbean basin, Eastern Asia and Japan.

There are two common native catalpa trees in the United States, and one exotic (Catalpa ovata - Chinese catalpa). Catalpa speciosa is the larger and more northern growing of the two native trees. Common names for this catalpa are Northern catalpa, Western catalpa, and catawba-tree. Catalpa bignonioides is the native Southern catalpa. Other common names for this species include American catalpa, bean tree, catalpa, catawba, caterpillar tree, cigar tree, Eastern catalpa, fish bait tree, fisherman tree, Indian bean, Indian cigar, katalpa, lady cigar, Shawnee wood, smoking bean, and worm tree. The name "catalpa" is a native American name for this tree.

Tree Locations

The original native range of Southern catalpa and Northern catalpa are unclear because they were moved out of their native ranges and planted all over the Eastern United States starting in the 1700's. Southern catalpa was officially listed in the plant trade by the 1720's. The original native range of Southern catalpa was thought to be Southwest Georgia, South Alabama, South-central and South-East Mississippi, and a small area of the Florida panhandle away from the coast. Figure 1. For comparison, Figure 2 provides the original native ranges of both Southern and Northern catalpa.

Southern catalpa normally produces significant amounts of fruit and seeds, and has escaped to reproduce (become naturalized) in the wild anywhere it was planted. Figure 3 provides the naturalized range of catalpa across the nation. Note how far and wide from its native range it has reproduced and grown naturally. The naturalized distribution range of Southern catalpa has increased by more than ten times in the last 300 years due to human plantings and associated natural seeding.

Which One?

Many people see catalpa trees growing along roadsides, along streets, and in parks. At one time there was a fad of pollarding catalpa. With all the catalpas growing in many places, few people are aware of which species is actually present. Figure 4 shows the general naturalized range of Northern, Southern, and Chinese catalpa across the United States. Note the wide range and great overlap of cat-

alpa species. In addition to species, there are a number of full size and dwarf cultivars and varieties available for landscape use.

Leaves

Two to three leaves grow from each node (an opposite or whorled leaf arrangement). Leaves are large, deciduous, simple, and broadly heart-shaped. Figure 5. Leaf margins are smooth, entire or slightly wavy. The leaf tip has an abruptly sharp point. The leaf base is heart-shaped and can occasionally have two small basal lobes. Leaves are connected to twigs with a long petiole (3-6 inches long).

Leaf size is 5-10 inches long and 3-8 inches wide. Figure 6. Leaves are a bright medium green color and smooth on top, and paler green and slightly hairy (i.e. with trichomes) on the underside. Undersides of leaves are especially hairy on veins, with leaf hairs turning black by Fall. Leaves produce an unpleasant aromatic odor when crushed. As leaves senescence in Fall, leaf blades turn a bright yellow color.

Flowers

Flowers of Southern catalpa are large, white, and showy, blooming just after leaves have expanded. Trees are cosexual (a tree has both sexual parts in one flower) with perfect flowers. Flowers are slightly fragrant, and 1 to 1.5 inches long and wide. Flowering occurs from May to June in large upright, pyramid-shaped flower clusters 7-11 inches tall and wide.

Flowers are predominately white with a bell or tube shape. Each flower has a variety of yellow to orange, and purple to purple-brown lines, markings, or spots on its inner surfaces. Flower tubes each have five unequal, rounded, and fringed lobes with two upper lobes larger than the three lower lobes. The lowest or bottom-most lobe is not notched. A flower has two visible ridges and presents two rows of yellow-orange spots (or stripes) as well as many purple spots on the inner side of the flower tube and lower lobe. There are two fertile stamens present.

Fruit

Southern catalpa fruit are bright green, long, slender, thin-walled, pod-like, two-celled capsules which dangle from ends of twigs. Figure 7. They look like long, thin, cylindrical pencils or cigars about 1/3 - 1/2 inch in diameter and 6-19 inches long. Figure 8. Fruit drys to a brownish color and eventually splits along two lengthwise seams. Fruits mature by October and are held on a tree until Spring. Inside each fruit are many papery, thin, flat seeds with two long-pointed wings which have tufts of fringe hairs on each end. Seeds with wings are 1-2 inches long and 1/4 - 1/3 inch wide.

Trees begin to flower by age seven and are usually producing good seed crops by age 10. Good seed crops can be expected every 2-3 years. Seeds are naturally shed in late winter as drying fruits split. Collection should only occur after the fruit has dried and turned brown. If ten pounds of air-dried fruit are collected, expect 2-3 pounds of seed, which is approximately 40,000 individual seeds. Seeds can be stored under cold, dry conditions for up to two years. Sow seeds in Spring under 1/8 inch of soil and a light, thin mulch. Once sowed, seeds germinate quickly (within 2 weeks) usually with 90% germination potential.

Twigs

Southern catalpa twigs are thick, stout, and brittle. Twigs are minutely hairy and pale orange to brownish-grey in color. Many short crooked twigs and branches support a wide-spreading, irregular crown. Lenticels are clearly present on twig surfaces, and are large, pale and numerous. The terminal bud is absent and lateral buds are small (1/16 inches long), sunken, brown, and solitary with six overlapping bud scales. Twig pith is solid and white in color.

Leaf scars on twigs are large, elliptical to circular in shape with a raised margin and a sunken center (i.e. crater). Usually 10-12 vascular bundle scars are clearly visible in a circle-shape within the leaf scar. Leaf scars occur 2-3 per node. Neighboring leaf scars on the same node are not connected by lines and there are no stipular scars. Southern catalpa stem periderm is light reddish brown to grey in color. Periderm on young trees begins smooth and thin, eventually flaking off into thin, narrow scales.

Wood / Root

Southern catalpa heartwood is extremely rot resistant and relatively low density. In the past it was use for fence posts and rails. Catalpa wood was utilized for a number of uses where its soft, straight-grained, and low shrinkage properties were valuable. Occasional wood pieces and furniture parts were fashioned from catalpa. Sapwood is pale grey in color, while the heartwood is greyish-brown with a hint of lavender color. The wood is faintly aromatic. Roots can be aggressive / invasive. Roots are poisonous and should not be handled or composted.

Tree Atributes

Southern catalpa is fast growing and moderately short-lived (~70 years), small to medium in height, and has a wide spreading crown.. It reaches 40-50 feet in height and crown spread. The largest trees found measure 70 feet tall by 70 feet wide in Texas, and 75 feet by 75 feet in Mississippi. Old trees can reach 2-3 feet in stem diameter. It is hardy in lowest winter temperature zones 6A through 9A. Catalpa requires 80-100% full sun, but can handle limited amounts of shade especially when young. Catalpa does not react well to competition from trees, shrubs, and ground covers, but does handle environmental stress well.

Catalpa does well over a range of soil pHs and soil types. It grows best on open, moist, well-drained and deep soils, but can grow across a range of moisture regimes once established. Stream banks, gravel bars, and road cuts are prime habitat. It is easily damaged by ice and wind storms, which usually destroy crown shape and break crowns out of trees over time. Catalpa is very susceptible to fire.

Peculiarities

Catalpa produces a set of allelopathic chemicals which affect soil microorganisms and other plants. A number of different plants can be stressed or damaged in the vicinity to catalpa foliage or rooting areas. The chemicals generated can also led to catalpa seed germination and growth problems, which keep catalpas seedlings separated from each other in the wild. Allelopathic problems can be a serious constraint under plantation conditions.

In summary, southern catalpa has large showy flower clusters presenting in late Spring with unique long, thin, dangling fruit in Fall. It is known for its rapid growth rate, unique smell, relatively short life span, and messy litter dropped onto surroundings. It is also know for its major pest.

Pests

Compared to most trees of North America, Southern catalpa has few pests of any consequence. The top five pest problems include catalpa sphinx moth caterpillar defoliation, leaf spot anthracnose, assorted leaf spots, powdery mildew, and verticillium wilt-caused branch die-back. In addition to these pests, drought initiated leaf scorch and leaf chlorosis in high pH soil are stress related problems common in catalpa.

Catalpa Sphinx Moth

Catalpa trees are the only host for the catalpa sphinx moth (Ceratomia catalpae – Lepidoptera, Sphingidae family.) Figure 9. This moth is found across the Eastern United States. It consumes leaves

of catalpa and often completely defoliates trees at least once per season when moth larvae populations are high. Adult moths have a heavy, spindle shaped body with narrow, long wings. They are strong flyers with a wingspan of three inches. The front wings and body are gray colored with irregular light and dark markings. The back wings are brownish gray. Adult moths are seldom seen because they fly only at dusk and during the night.

Adults usually first appear in March to April. Eggs are deposited in masses of from 100 to 1,000 on the underside of leaves. Occasionally smaller egg masses are laid on twigs. Eggs hatch in 5-7 days and young larvae feed together as leaf skeletonizers. The older, larger larvae feed alone and consume whole leaves. Full grown larvae are about three inches long.

Moth Larvae

Older larvae generally have a black head with a black stripe running down its length with a black curved horn near the end. There are two color forms of large larvae observed: 1) a dark phase with black colors dominant on top and pale yellow below; and, 2) a light phase of pale yellow color all over with irregular black markings on top. Some years, large larvae will be heavily parasitized by a hymenopteron – a small wasp (Apanteles congregatus).

Larvae molt 5 times over a 3-4 week period with the last molt generating a pupa without a cocoon. The pupa is reddish-brown in color and slightly longer than an inch. The pupal stage lasts for about two weeks in soil and then an adult emerges. The last pupa stage of a season overwinters in soil beneath catalpa trees. At any one time in a single growing season, all three life-stages of the moth can be present (pupa, larvae, and adult). In any one year, 3-4 generations may develop (approximately 6 week life-cycle length). Seek the expertise of an entomologist for identification, life history, management and production of this moth.

Tree Reactions

Different individual catalpa trees have different reactions to moth larvae feeding. Some trees are consistently not attacked. Other trees are heavily defoliated almost every year. In some trees, once the tree detects significant leaf damage, the leaf is abscised (falls) from a tree. Constantly defoliated trees can develop branch die-back, and in severe cases, decline and die. The year to year fluctuations in moth larvae populations are associated with selected bird predation and with parasite infestations.

Plantations For Caterpillars

A few catalpa trees along a fence row are usually enough to supply moth larvae for fish bait at a family level. Commercial production for local sales require more trees, as well as a management plan. Consult with a forester, entomologist, and state regulatory agencies for commercial production, marketing, sales and transportation requirements.

There are many ways to successfully grow catalpas and their pests. Below are a number of conservative recommendations for growing catalpas specifically for catalpa sphinx moth larvae. These are general recommendations and your specific site will require a careful examination for suitability and chance of success.

Sites: Choose moist, moderately well-drained soils with loam to sandy loam textures. Poorer drained soils and finer soil textures can be used if drainage can be assured. If soil does not drain effectively, select sites with small slopes or plant trees on raised mounds (bedded) to gain moist but well-drained soil. Loosen planting site soil ahead of planting with harrows, plows, or tillers.

The planting site should be cleared of all woody plant materials. If a whole-site treatment is not warranted, clear spots 10 feet in diameter and assure no plants shade the spot for most of the day. Herbaceous weed control should be used (chemical or mechanical weeding). Continued woody weed control is essential. Each seedling must be completely free to grow without competition. Wind protection provided by other trees or forest edges is valuable as long as catalpas are not shaded. Fully open-grown, field trees tend to have more caterpillar crop failures than forest edge or wind-sheltered trees.

Seedlings: Gather seeds from trees proven to support moth larvae over many years. Seeds can be planted in a garden area and grown until they are 1-2 years old. Sow the seeds at a wide spacing and thin seedlings to greater than a six inch spacing between stems. Protect seedlings from wild and domestic animals with a hardware cloth screen.

Transplant seedlings during Winter once they are larger than 18 inches tall and the field site has been prepared. Hand planting of immediately dug seedlings is best. For large fields, soil can be gently shaken off seedlings and then each seedling dipped in a hydro-gel slurry to retain moisture. These seedlings can then be machine planted using a standard hardwood planting process. Seedlings are also available from select nurseries, although information regarding genetic background and suitability may not be available.

Nutrition: Once planted firmly (not packed) into soil, cover the planting site to within 3-4 inches of the stem with a coarse, organic mulch 1-2 inches thick. This mulch layer, reaching out a minimum of 3-4 feet from the tree, will need to be replenished yearly and enlarged with expanding tree crown size. A slow release nitrogen, phosphorus, and potassium containing fertilizer can be added in small amounts over the top of mulch in late Spring each year.

Addition of calcium and magnesium through applications of dolomitic limestone can also be beneficial in highly acid soils (pH below 5.4). Soil pH should be adjusted to 6.4. A soil essential element test should be completed and recommendations followed to maintain good nutrition on a site. Be careful of insecticides or any treatment which might adversely affect moth pupas in soil and caterpillars on leaves.

Spacing: Because of tree allelopathy concerns and predation on moth larvae, as well as parasite problems, large solid blocks of plantings should be avoided. Many small clusters, or small linear plantings with large edges (linear, forest or field-edges, wavy-edged, highly convoluted, and/or irregular-sided plantings) should be designed.

Final spacing when the trees are 10 years old should be approximately 35 feet between stems in an open, full-sun area protected from wind as much as possible. Seedlings should be trained into a single stemmed tree-form with new stem and basal sprouts removed as soon as noticed. Branches should be encouraged to grow laterally but not touch (recline on) the ground when wet with rain.

Tree Forms: Strive for 25 feet tall trees with 35 feet wide crown spreads. Use proper crown reduction pruning and primary stem subordination techniques to control height. Raise the crown (prune-up lower branches) 3-5 feet to help with operations around and under trees.

As trees age and grow more massive, installation of small metal cables in the upper 2/3s of the crowns to support weak branch connections (crotches) may be needed. Ground props of metal or ground-contact, pressure-treated wood can also be used to hold weak branches. Branch breakage is a serious problem in older trees. Attempt to have wide-spreading but short trees.

Problems & Risks

Success in growing trees and caterpillars together means little if a marketing plan is not developed. Caterpillars are a fresh, easily damaged, living product which do not store or ship well. Spot markets and distributors are difficult to support over time. Gathering larvae from many trees at many times during the growing season is labor intensive. Climatic and pests problems on trees or caterpillar populations can cause seasonal crop failures. Capital may not be available to support your business plan because of significant risks.

This publication is not intended to suggest a viable business is possible. This publication is an educational product to better inform interested people about the catalpa tree and its use. It is critical to seek expert advise regarding any venture. An essential recommendation is to visit a successful producer.

Conclusions

Many people dream of selling catalpa moth larvae to fishing enthusiasts. Unfortunately, the risks associated with tree culture and moth culture can be immense. Most people settle for a few trees which dependably serve a single family. Catalpas make fine and unique yard trees. Flowers are beautiful and wood can be used outdoors or indoors. Catalpas represent a Southern tradition at many levels. Plant a piece of cultural history -- the Southern catalpa.

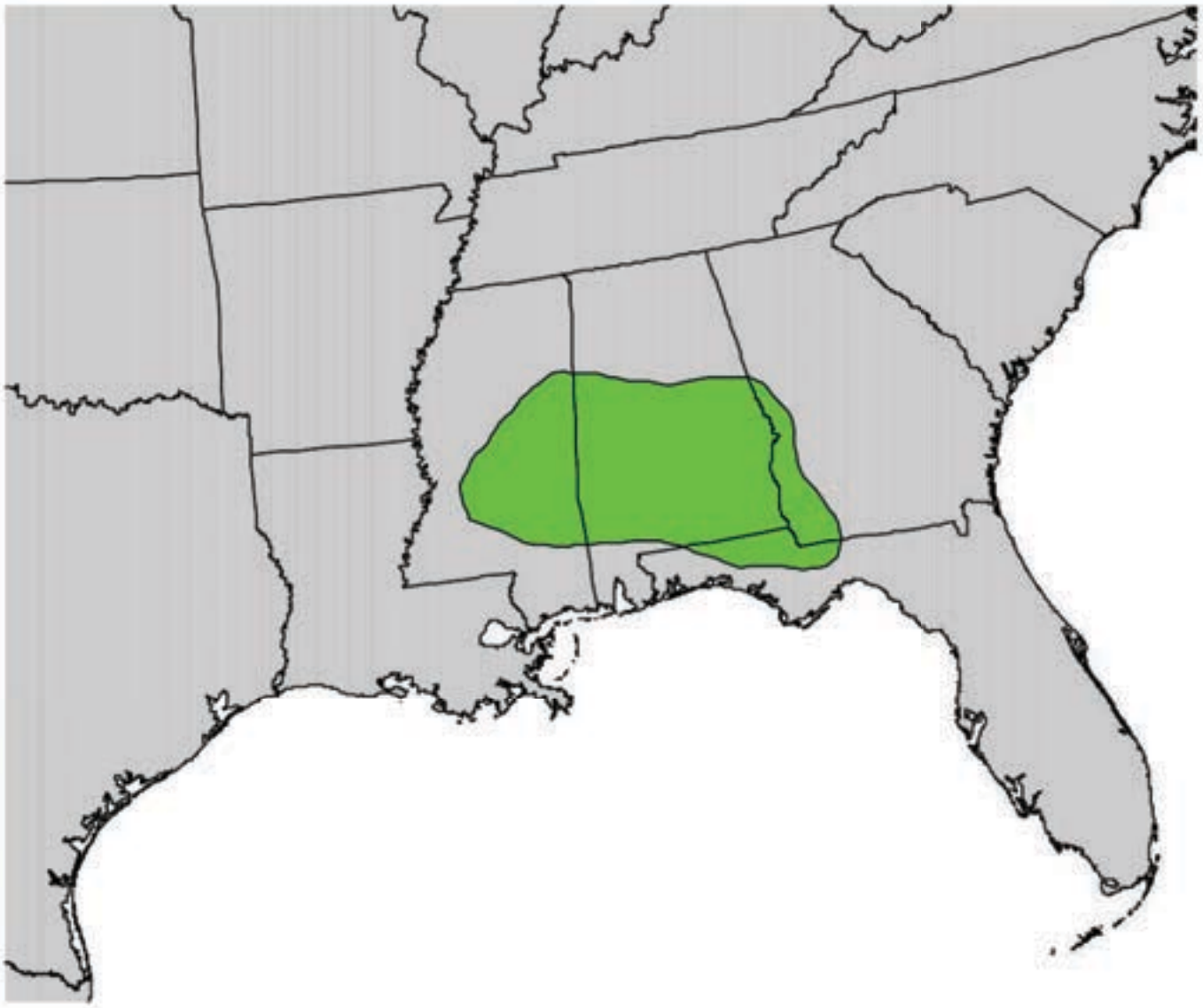

Figure 1: Original native range of Southern catalpa (Catalpa bignonioides). (USGS-Tree Range Maps)

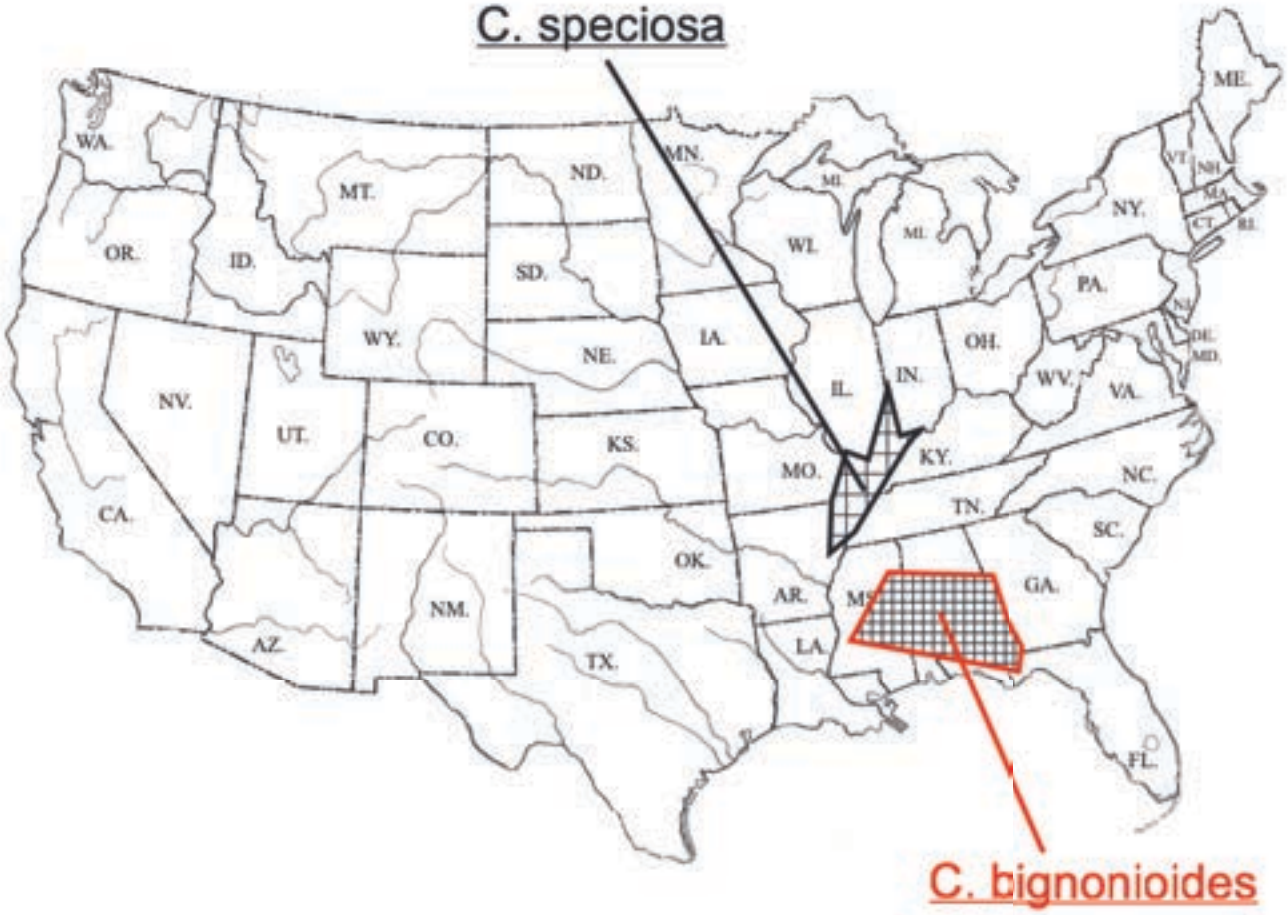

Figure 2: Generalized native ranges of Southern catalpa (Catalpa bignonioides) and Northern catalpa (Catalpa speciosa). (USGS-Tree Range Maps)

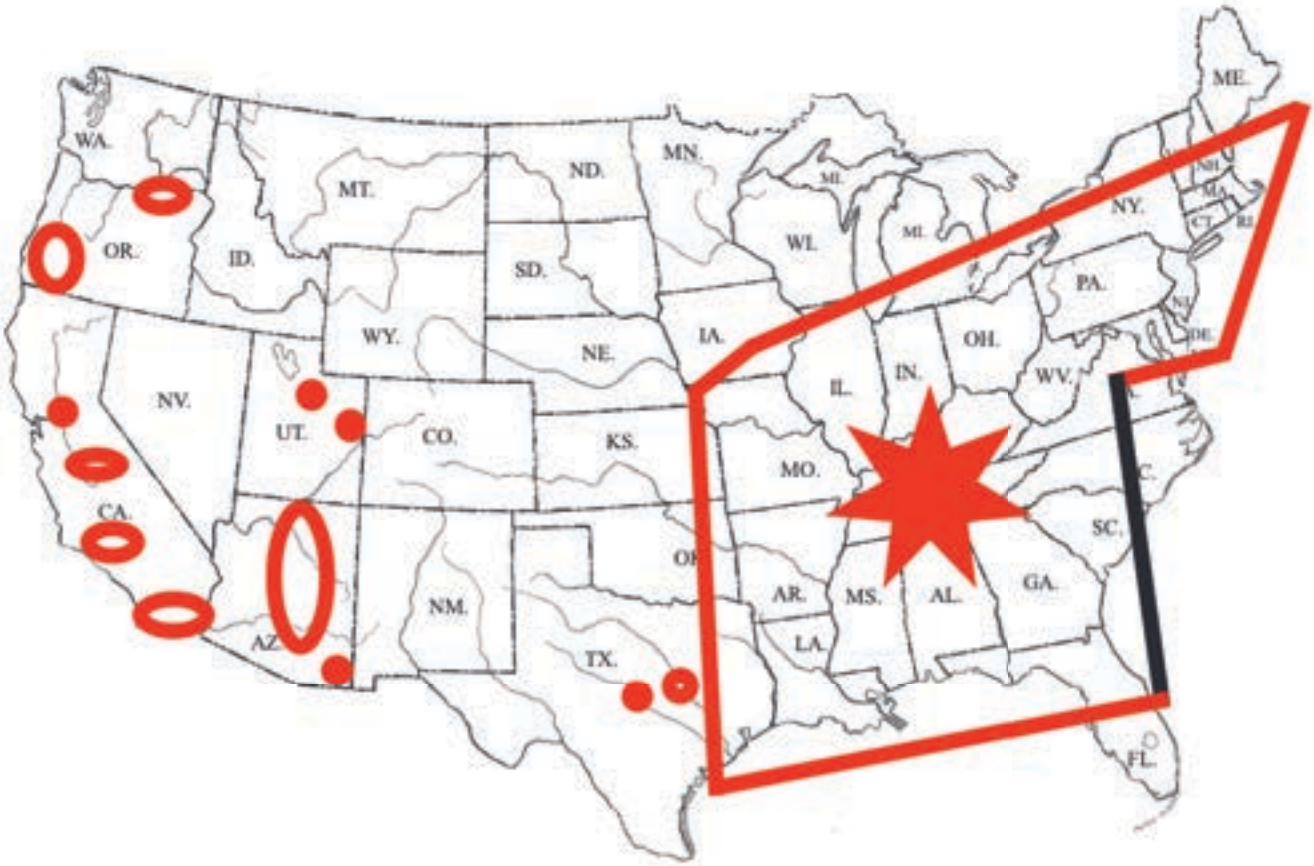

Figure 3: General naturalized range of Southern catalpa (Catalpa bignonioides) with outliers.
(USDA-NRCS PLANTS database)

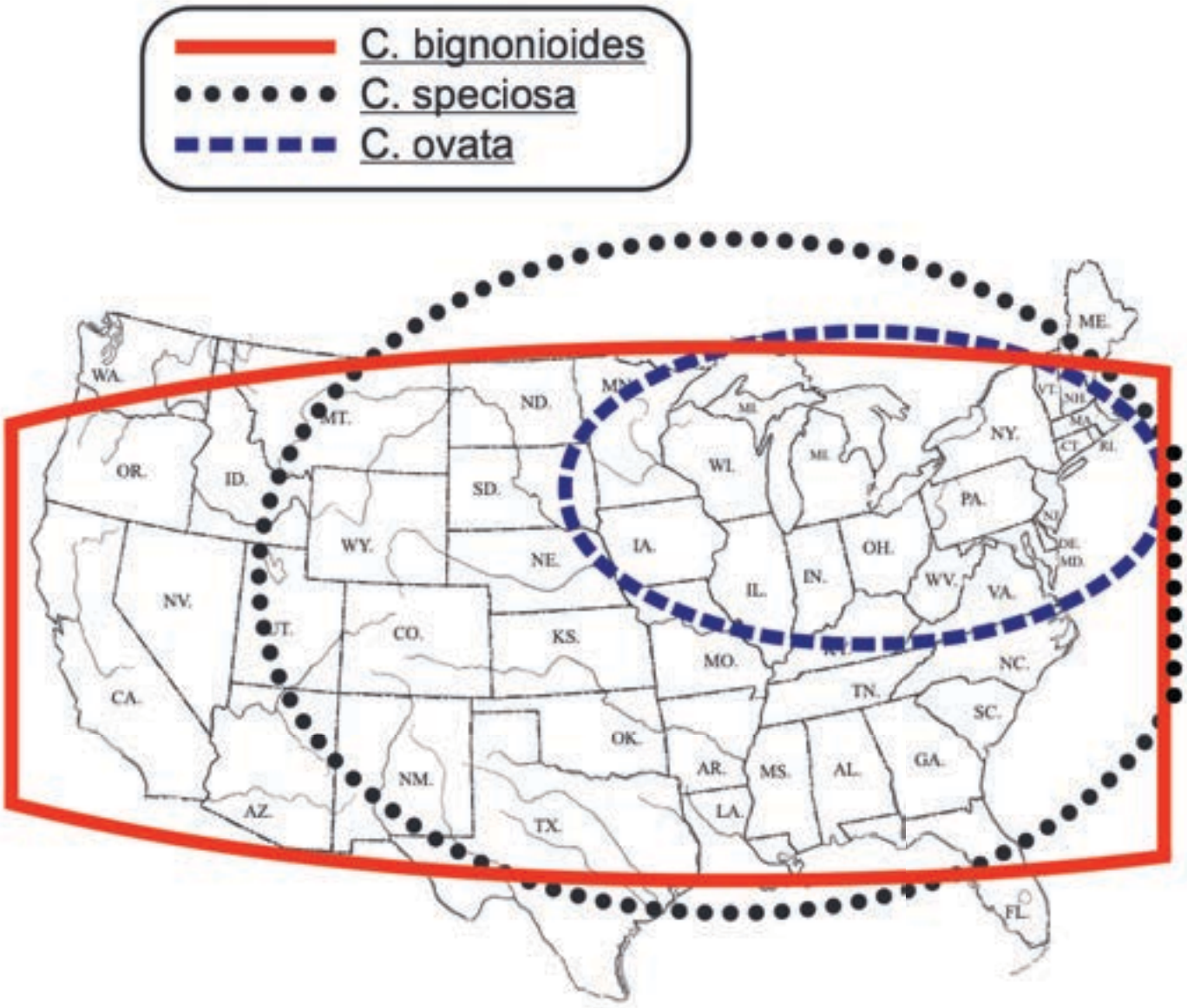

Figure 4: Combined general naturalized range of native Southern catalpa (Catalpa bignonioides), native Northern catalpa (Catalpa speciosa), and exotic / introduced Chinese catalpa (Catalpa ovata).
(USDA-NRCS PLANTS database)

Figure 5: Southern catalpa leaf.
(photo credit Dr. Kim D. Coder)

Figure 6: Southern catalpa leaf over a 1x1 inch grid.
(photo credit Dr. Kim D. Coder)

Figure 7: Southern catalpa leaves and fruit.
(photo credit Dr. Kim D. Coder)

Figure 8: Southern catalpa green fruit.
(photo credit Dr. Kim D. Coder)

Figure 9: A fishbait "worm" on Southern catalpa.
(photo credit Dr. Kim D. Coder)

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