

The History and Use of Kudzu in the Southeastern United States

Kudzu is an aggressive vine familiar to most people across the southeastern United States. It is a classic example of a plant that was introduced with good intentions, but that has resulted in many bad outcomes. Landowners know all too well that kudzu can stifle agricultural production as well as timber growth. It often becomes a weed in noncropland areas such as right-of-ways, old fields, vacant lots, or yards of abandoned or little-used buildings.

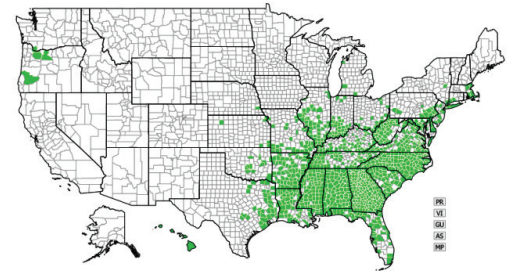
Kudzu is also a serious weed of urban forests, and homeowners often struggle to effectively control its aggressive growth. Kudzu can quickly overtake any type of vegetation and suppress or kill it by heavy shading. Given the problems it causes, many people often question how such an invasive plant could have been purposefully introduced. This publication provides a short history of kudzu in the Southeast and explains the reasons behind the problem it has become.



Figure 1. Kudzu has trifoliate leaves. Each of the three leaflets is usually slightly lobed and has a pointed tip.

Description

Kudzu (*Pueraria montana* var. *lobata* [Willd] Maesen & S. Almeida) is a large, trifoliate-leaved, semi-woody, trailing or climbing perennial vine in the Fabaceae (legume or pea) family. Up close, kudzu might at first be confused with a vigorous poison ivy plant. But kudzu stems are distinctly hairy, and the vines twine rather than use hairy rootlets to climb as poison ivy does. The



EDDMaps. 2014. Early Detection & Distribution Mapping System. The University of Georgia—Center for Invasive Species and Ecosystem Health. Available online at <http://www.eddmaps.org/>. Last accessed September 18, 2014.

vines may grow up to 60 feet in a single season and as much as 1 foot during a single day in the early summer. This amount of vine growth is supported by starchy, tuberous roots that can reach a depth of 12 feet in older patches and weigh as much as 200 to 300 pounds.

Kudzu is well-adapted to Alabama and is found throughout the state. It will grow on a wide range of soil types, but does better on deep, loamy soils compared to very light sands or poorly drained, heavy clay soils or those with high pH. Kudzu exhibits a symbiotic relationship with nitrogen-fixing bacteria, which may help explain its successful growth on heavily eroded sites.

Vines grow outward in all directions, and roots grow down from a root crown located on the soil surface. Vines growing along the ground can root every foot or so at the nodes and form new root crowns that can become independent plants. Mature stands may contain tens of thousands of plants per acre and can create mats up to 8 feet

thick. Vines climb by twining, but cannot twine around smooth objects with diameters greater than approximately 8 inches. Trailing, prostrate vines generally die back to the root crown after the first heavy frost. Vigorous, climbing vines greater than one-quarter inch in diameter can overwinter, but the leaves will be killed by the first frost. Climbing vines can reach 10 inches and greater in diameter, putting on what appear to be annual growth rings and developing rough, dark brown bark.

Kudzu blooms from July through September. The fragrant, pealike purple flowers are typically produced on plants that are climbing or draped over vegetation or other objects, as vines rarely flower when trailing on the ground. Flowers are followed by flat, hairy seed pods; however, seed production and viability are highly variable. Seeds mature on the vines in October and November. Longevity of seeds in the soil is not known. Because the seeds have very hard coats, it is thought that those that don't succumb to predation may lie dormant in the soil for several years before they germinate.



Figure 2. Young kudzu vines are covered with erect golden hairs and climb by twining.

History

Approximately 15 species of kudzu (*Pueraria* spp.) are known throughout the world, all native to China, Taiwan, Japan, and India. For more than 2,000 years, Asian cultures have found great value in kudzu. Chinese records tell of kudzu roots being dried and diced for medicinal purposes as early as 1578. Kudzu fiber from vines and stems was used to make “grass” cloth and paper by 1665. During the 1700s, kudzu was imported into Japan where the roots were ground into flour. Kudzu flour is still imported to the United States and sold in many Asian grocery and health food stores.

Kudzu first arrived in the United States in 1876 as a display at the Japanese Exhibition of the Philadelphia Centennial Exposition. However, all the plants were destroyed by law after the exhibition. Kudzu was also later displayed in the United States in 1883 at the New Orleans Exposition. In the late nineteenth century, kudzu seeds were imported and sold for use as an ornamental vine to shade porches and courtyards of southern homes. It was also appreciated for the grape-like fragrance of its flowers and for its vigorous growth.

By the turn of the century, kudzu was available through mail-order catalogs. By 1905, through the efforts of C. E. Pleas of Chipley, Florida, kudzu was promoted as inexpensive forage for livestock.

In the 1930s, kudzu reached the height of its prominence. The Soil Erosion Service (later renamed the Soil Conservation Service and now the Natural Resource Conservation Service), established by Congress in 1933, was charged to reduce soil erosion caused by poor farming practices in the South. About 85 million kudzu plants were given to southern landowners by the Soil Erosion Service for land revitalization and to reduce soil erosion and add nitrogen to the soil. The Civilian Conservation Corps also planted kudzu throughout the South. The government offered up to \$8 per acre as an incentive for farmers to plant their land in kudzu. About 3 million acres of kudzu had been planted on farms by 1946. Ironically, due to difficulties in establishment, many of these initial plantings did not survive.

In the 1940s, numerous kudzu clubs were formed throughout the South. Kudzu festivals were held, and kudzu queens were crowned. In 1943, Channing Cope, a journalist and radio show host in Covington, Georgia, founded the Kudzu Club of America, which eventually had a membership of about 20,000 individuals. He became known as the “Father of Kudzu.”

By the early 1950s, kudzu had largely become a nuisance. It



Figure 3. Kudzu roots grow down from a root crown located on the soil surface.

had spread rapidly throughout the South because of the long growing season, warm climate, plentiful rainfall, and lack of disease and insect enemies. Abandonment of farmland during this time contributed to the uncontrolled spread of kudzu. In 1953, the United States Department of Agriculture removed kudzu from the list of cover plants permissible under the Agricultural Conservation Program.



Figure 4. Kudzu flowers are typically produced on plants that are climbing or draped over vegetation or other objects. Note the kudzu bugs at the base of the flower.

In 1962, the Soil Conservation Service limited its recommendation of kudzu to areas far removed from developed areas. Finally in 1970, the USDA listed kudzu as a common weed in the South. Congress voted in 1997 to place kudzu on the Federal Noxious Weed list, where it remained for a few years. While no longer on the Federal Noxious Weed list, kudzu is currently listed as a noxious weed in 13 states.

It is estimated that kudzu may cover more than one-quarter million acres in Alabama. Kudzu has spread north into Pennsylvania and Illinois and west into Texas, Oklahoma, Iowa, and Nebraska. There are also scattered reports of kudzu as far north as Michigan and New York, with populations in Ontario, Oregon, and Washington.

Forage Uses

Kudzu produces high-quality forage that, when young, is quite palatable to livestock and poultry. The forage quality varies with management and season, but it is not unusual for kudzu hay to have a crude protein content of 15 to 18 percent and a total digestible nutrient value (TDN) of more than 60 percent (on a dry-matter basis). The overall quality decreases as the amount of large vines increases relative to leaves. Kudzu also retains its forage value until frost and can even be of some value for grazing for a short time after frost.

Unfortunately, the use of kudzu as a forage plant has definite limitations. Although kudzu appears to make a great deal of growth, it produces low to moderate forage yields, usually around 2 to 4 tons of dry matter per acre per year. In addition, kudzu

is difficult to harvest and bale because of its vining growth habit. It is possible to remove two cuttings of hay per year without damaging the kudzu stand. The first cutting should be made in late June or early July and the second in the fall, just before frost. Because it will not shed water well, kudzu hay should be placed under shelter for protection after it is baled. Kudzu can also be harvested for silage, but the silage is light and difficult to pack.

Some Alabama farmers still harvest kudzu from fields managed for this purpose by annual or biennial harvesting. It is most frequently used in this manner during dry periods, since its deep root system allows it to obtain moisture for growth when other forage species cannot.

All types of grazing animals will readily eat kudzu, but frequent defoliation over 3 to 4 years can destroy stands. Therefore, kudzu has limited value as a grazing crop except on a very temporary basis. The negative impacts of livestock on kudzu tend to relegate it to forests, roadsides, right-of-ways, and non-crop areas where livestock do not have access. Goats and sheep have been used in vegetation management programs for kudzu control. Deer are known to browse kudzu but do not have any meaningful negative impacts. The interactions of kudzu with other herbivores are largely unknown.

Impacts



Figure 5. Kudzu fruits are flattened seed pod legumes.

Although kudzu is widely assumed to have significant negative ecological impacts, the influence of kudzu on biodiversity and ecological processes are surprisingly poorly studied. Anecdotal reports and general observations suggest that the dense shading created by kudzu significantly reduces native plant biodiversity. Kudzu growing in forest plantations can weigh down and smother seedlings and saplings. Larger

trees blanketed by kudzu may be more prone to wind throw. Utility and railroad companies spend significant amounts of time and money controlling kudzu growing over utility poles and railroad tracks. Considerable time and money are also spent at national and state parks as well as other federal and state lands to control kudzu, especially when threatening national monuments, historical sites, or other sensitive areas.

Kudzu is a nitrogen-fixing species, and dense infestations have the potential to significantly affect nitrogen cycling. Alteration of the nitrogen cycle can affect soil fertility, water quality, and biodiversity. Kudzu also has the potential to affect air quality, as it is an intermediate to high emitter of isoprene. Isoprene is a photochemically reactive hydrocarbon that can contribute to ozone and smog production. All plants produce isoprene, but not all produce as much as kudzu. Depending on what species a kudzu infestation has replaced, isoprene levels may be higher in the vicinity. This is especially the case during hot and dry periods of the year.

Kudzu also serves as a host for significant agricultural diseases and insect pests including

Asian soybean rust and the kudzu bug (*Megacopta cribraria*). Kudzu bugs are of special importance as they were first detected in 2009, but within a few years, these strong fliers have spread throughout much of the southeast. A true stink bug, kudzu bugs suck sap from kudzu and many other plants, including soybeans. On average, kudzu bugs have reduced soybean yields by 18 percent, but losses as high as 47 percent have been reported. Kudzu bugs are also an urban pest as they congregate around homes and other buildings and emit a foul smelling chemical. Kudzu bugs do damage kudzu and appear to reduce its vigor and climbing ability. However, to date, their impact has not yet been enough to control kudzu.

Conclusions

The history of kudzu in the United States is a compelling story, but also a cautionary tale of how good plants can go bad. Although scientists now use risk assessment tools to evaluate the potential for invasiveness in new plant introductions, it is still an imperfect process, and there is much yet to be learned. Without a doubt, kudzu is here to stay. Although landowners can get effective kudzu control, eradication from the United States is not currently feasible. It is clear that kudzu is continuing to expand its range in the United States and has yet to reach its ecological potential. Future research will help clarify the full impacts of kudzu and what can be done about it.



Figure 6. During the 1900s, kudzu was promoted as an inexpensive forage and for erosion control. (Photo credit: USDA NRCS Archive, USDA, NRCS, Bugwood.org.)



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