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KUDZU IN APPALACHIA

Kudzu (*Pueraria lobata*) was introduced to the United States twenty-five years before the turn of the twentieth century, and is currently found naturalized throughout the southeastern states 125 years later. It is said that there is not a county in the southern US that lacks kudzu.

BIOLOGICAL DESCRIPTION & RANGE

Kudzu is a perennial, woody vine with deciduous, trifoliate leaves and indeterminate clusters of one-inch, purple, pea-like flowers that exude an aroma much like the fragrance of grapes. The lush, hairy, prolific kudzu vine is a member of the nitrogen-fixing Legume family with other economically valuable plants such as soybeans, peas, and locust. Kudzu thrives in the moist, long growing season found in the southeast US, and is not nearly as abundant in the cooler northeastern states. Kudzu rarely produces viable seed in the US, and has historically been propagated via crowns and cuttings in North America. Kudzu will survive in rugged terrain and in depleted, nutrient poor soils as long as the soil is well-drained. The deep tap root of the kudzu vine can help hold the soil in place and allows the plant to prosper during dry spells.

HISTORY

The public sentiment concerning kudzu over the past 125 years in the United States has been fickle and varied, and can be viewed in four distinct categories. Kudzu was initially introduced and distributed in the US as an exotic ornamental with sweet smelling flowers and lush foliage. Kudzu was then promoted as a nutritious fodder and cover crop in the southeast US. A third category evolved as the Soil Conservation Service (SCS)

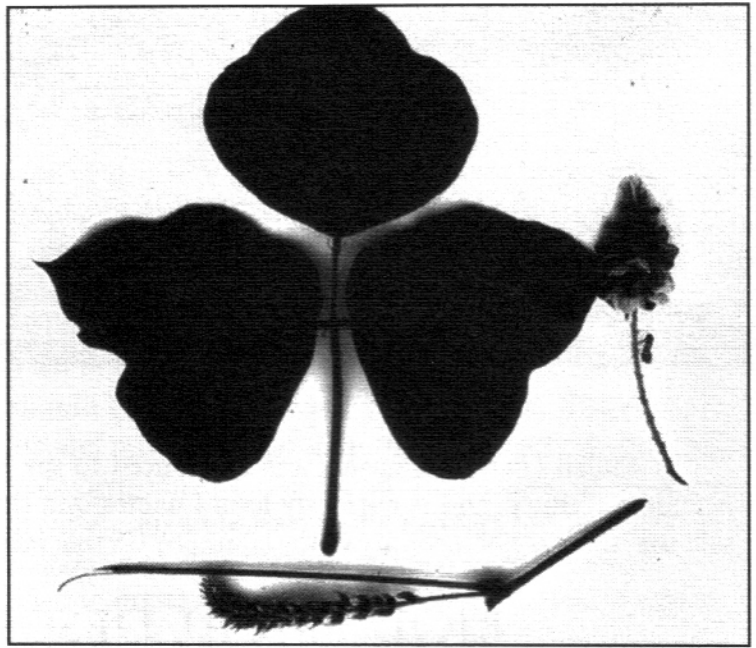
advocated the use of kudzu as an erosion control agent along the steep cuts created in the construction of highways and railroads. The economically valuable kudzu vine gradually fell from favor as kudzu vegetation grew beyond desired areas, extending into farmland and forest, usurping buildings and large trees. In the years that followed, kudzu's popularity and promotion declined until becoming the focus of a widescale eradication program (Shurtleff & Aoyagi 1985).



Pueraria lobata, better known as kudzu

Kudzu was introduced to the United States from Japan in 1876 as an ornamental in the Philadelphia Centennial Exposition. The vine was appreciated for its fragrant flowers,

lush vegetation and tropical effect. Kudzu seeds and crowns were sold through mail order catalogs and planted throughout the south as an ornamental in front yards. In 1902 a United States Department of Agriculture (USDA) plant explorer, David Fairchild, experimented with kudzu, planting it around his home after he had seen kudzu in Japan planted as a forage crop. The kudzu soon took over his yard, growing into the tall pines and suffocating pre-existing vegetation. Fairchild wrote against the propagation and planting of the exotic kudzu plant in the US, but his work was not published until 1938, well after the initial distribution of kudzu in the south (Shurtleff & Aoyagi 1985).



In the early decades of the twentieth century (1910-1930), kudzu was used as a fodder crop throughout the southeast US. Though never fully adopted or promoted by the USDA, a few land grant universities in the south conducted agricultural research to investigate the fodder value of kudzu in the 1920's. A farmer from Florida, C.E. Pleas, became the first advocate of kudzu cultivation. A kudzu cutting he had purchased for ornamental purposes was tossed near a garbage pile in disappointment of the plant's performance. Within two years the pile was covered and his goats, chickens, pigs, and horses were eating the nutritious leaves. By 1910 Pleas had 35 acres in kudzu and was selling fodder by the wagonfull. He wrote a pamphlet in 1925 called Kudzu: The Coming Forage of the South. He promoted kudzu propaganda and sold root cuttings through mail order catalogs until he died in 1954 (Shurtleff & Aoyagi 1985).

From 1935 to 1955, kudzu was viewed by some as a hardy, nutritious, prolific plant that could be the salvation for nutrient deprived southern agriculture, and was used widely throughout the southeast US in soil conservation programs funded by Franklin D. Roosevelt's New Deal. Kudzu's ability to grow in poor soils on steeply sloped terrain in combination with its large, fast-growing tap root that can hold the soil in place made it ideal for planting in areas prone to erosion. Kudzu was used to control erosion in many of the Tennessee Valley Authority (TVA) projects in the south, and can be seen climbing 300 foot or more at the Norris Dam site in East Tennessee. The height of kudzu's popularity and promotion in the US was during the 1930's. A regional agronomist in Spartanburg, South Carolina, R.Y. "Kudzu" Baily, wrote the first comprehensive booklet about kudzu in 1939. By 1940, the Soil Conservation Service (SCS) had produced over 7 million kudzu seedlings from seeds imported from Asia and employed thousands of workers to transplant the seedlings in every slope threatened by soil loss. Russell Lord was a USDA consultant that promoted kudzu's use in agriculture during the forties. In 1943, Channing Cope, a farmer called the "father of kudzu", founded the Kudzu Club of America in Atlanta, Georgia, to promote the use of kudzu in American, primarily southern agriculture. An approximate 500,000 acres of kudzu was growing throughout the southern states in 1945, Cope aimed for 8 million southern acres in kudzu production by 1950. At the same time, the SCS was reducing the numbers of acres of kudzu planted, from 36,000 acres in 1947 to 3000 in 1953. In 1954, kudzu was removed from the list of acceptable cover crops published by the USDA (Shurtleff & Aoyagi 1985).

The growing disenchantment with kudzu in the southern states could aptly be coined in the phrase "too much of a good thing." The prolific growth habits of kudzu that had once been so desirable within the agricultural community became feared in the south as the vine's growth became difficult to control and kudzu spread into forests, smothering native vegetation, killing saplings and large trees. Farmers who experimented

with kudzu production as animal fodder or cover crop found the plant difficult to manage and harvest. Though the leaves are highly nutritious, the fibrous vines are a greater part of the plants' biomass and could not be utilized as animal fodder. The kudzu vine would clog farm equipment, mechanized sickle bar mowers and bushhogs alike. Throughout the 1960's, the agricultural production of kudzu in the southern US waned, and initial efforts were made to eradicate the vine. Large amounts of economically and ecologically costly petrochemical herbicides were applied to the vine, and managed somewhat to control the plant rather than eliminate the fast growing creeper. Kudzu has since been viewed as a public nuisance and a threat to the overall environmental health of the region, more specifically, the Eastern Mixed Mesophytic Forest.

WHY IS KUDZU A THREAT?

The introduction of exotic species to a natural area is the greatest threat to the biodiversity of native ecosystems according to many ecologists. As an exotic species in the US, kudzu is not only inherently capable of thriving in various topographies in even the poorest soils except those that are poorly drained, but it has not coevolved with any insect species in this country that would maintain an ecological balance as is the case in Japan and China. The prolific vine is therefore able to out compete native vegetation without confronting debilitating insect attacks, invading and overcoming the habitat of native vegetation that fill an essential and often not fully understood role in the ecosystem and that frequently can not be found in any other ecosystem in the world. Human disturbance derived from development and the consequences of road construction is the leading mechanism for the spread of exotic species into native ecosystems both globally and regionally.

NATIVE VINES

Listed below are some native vines that are good substitutes for kudzu as a climbing ornamental, and as a source of nectar and insect habitat:

<u>Common name</u>	<u>Latin name</u>
trumpet creeper	<i>Campsis radicans</i>
pipevine	<i>Aristolochia macrophylla</i>
passionflower	<i>Passiflora lutea</i>
trumpet honeysuckle	<i>Lonicera sempervirens</i>
bittersweet	<i>Celastrus scandens</i>

WHAT TO DO ABOUT KUDZU

Two schools of thought have developed in response to the ubiquitous presence of kudzu in the south. One school of thought chooses to eradicate the plant at any cost or opportunity, applying an abundance of herbicides along highways, railways, and in fields, or mowing intensively to be rid of the kudzu in arable farmland (or at least keep it in check). Another school of thought has evolved in the south which strives to learn how to use the prolific plant to an economic and environmentally sound advantage. The kudzu vine has been economically and medicinally important in China for over 2000 years, and the latter school of thought chooses to benefit from the voice of experience.

CONTROLS

Repeated mowing in areas where kudzu was growing was a practice commonly used in the south to rid an area or field of kudzu prior to the promotion of petrochemical herbicides. Toxic herbicides have been used for decades in the south to control kudzu. Consistent reapplication of herbicides is required to keep kudzu growth in check. The ecological impact of using herbicides to control kudzu is not adequately justified. Herbicide application, as a management technique for kudzu control, is a poor ecological and economic choice because of the cost of the herbicides as well as the resulting detrimental effect on the environment.

Recent entomological research has identified 60 types of insects that eat kudzu in Georgia alone. Even more have been identified in Japan, including insects that appear to subsist solely on kudzu. Future research standards to developing biological controls will determine whether or not an exotic insect species can be used to control kudzu in the southeast US. There are no guarantees that an Asian insect which feeds on kudzu in Japan would not prefer to eat economically valuable agricultural crops such as soybeans or peas in the US (Blumenstyk 1997).

KUDZU BENEFITS SOIL

Kudzu has the potential to be used in bioremediation efforts to generate the fertility of nutrient-deprived soils. As a legume, kudzu has a symbiotic relationship with nitrogen-fixing bacteria in the soil. The bacteria have the capacity to harvest nitrogen from the air and offer it to the kudzu plant in exchange for sugars and starches that the kudzu vine makes. Kudzu's relationship with the *Rhizobium* result in increased fertility of the land due to nitrogen fixation in the soil. Kudzu can be managed as a green manure in which the kudzu crop is grown in order to turn it's vegetation back into the soil to increase nutrient content and organic matter in the soil. Kudzu can be used to reclaim poor agricultural land where fertility has diminished and weeds are abundant. Kudzu will out compete weeds as well as return nutrients and biomass to the soil. Kudzu vegetation makes a fine mulch and a nutritious compost ingredient. As an animal fodder crop, kudzu compares nutritionally to clover and alfalfa. The leaves are rich in vitamins A, D, calcium and protein. The vines, which make up the other 50% of kudzu's biomass, are a good source of carbohydrates.

EDIBLE & MEDICINAL KUDZU

Every part of the kudzu plant can be utilized. The nutritious leaves are high in vitamins C and A, make an excellent animal fodder and can be eaten by humans steamed, boiled, deep-fried, pickled, or raw when harvested in areas that have not been sprayed with herbicides. Kudzu leaves are also used as green manure crops or to generate biomass for compost piles to improve agricultural land. The flowers of the kudzu vine are an excellent honey source and can be infused to concoct a subtly flavorful tea. Kudzu vines can be woven into baskets and furniture. Fibers derived from the vine can be used to make both paper and cloth. The most economically valued structure of kudzu is the root which is renowned in Asia for its culinary, nutritional, and medicinal properties. The root is rich in a valuable starch that can be eaten steamed or boiled, or turned into a powder or cream for medicinal purposes. Kudzu powder or kudzu root tea is used to treat a wide array of ailments such as inflammation, hangovers, sexual apathy, indigestion, respiratory disorders, headaches, sinus troubles, muscle stiffness, kidney trouble, breast-feeding complications, and skin rashes.

KUDZU BLOSSOM JELLY

4 cups kudzu blossoms
4 cups water
1 tablespoon lemon juice
1 pectin package
5 cups of sugar

Make kudzu blossom tea and allow it to sit overnight. Strain flowers. Bring the tea to a boil. Add sugar and pectin (while stirring constantly) and bring to a full rolling boil for one minute. Remove mixture from heat and skim off the foam. Place hot jelly into clean jars and process in a hot water bath for 5 minutes.



KUDZU POWDER

Kudzu powder is derived from the root starch and is used as a thickening agent similar to cornstarch, arrowroot, agar, potato starch and gelatin. The chemical consistency of kudzu powder gives it a uniquely alkaline disposition (all of the other jelling agents listed above are acidic). Characteristics of kudzu powder that distinguish it from other starches and cause culinary connoisseurs to seek out kudzu starch include the following: the mild flavor of kudzu starch does not conflict with delicate or subtle flavors; kudzu starch creates a smooth, creamy consistency and a clear shine in jelled foods and a crispy texture when the powder is dusted over foods prior to deep frying; and its alkalinity allows the kudzu starch to harmonize well with sugars, which are acidic. Kudzu powder is used commonly in Japan in soups, jelled foods, deep fried foods, grains and confections.

The kudzu starch can be extracted from wild root and turned into a powder commonly used in culinary ventures and medicinal preparations in the home or on a small or large commercial scale. There are several grades of kudzu starch that it is important to be aware of when preparing the powder with an intent to market the product. A pure, white starch with consistently fine granules is preferable and will fetch a higher price than less pure, grayish starch with inconsistently sized granules. The amount of time and effort required to extract kudzu starch is directly correlated with the quality of the end product, more tedious and more frequent straining techniques will produce a more valuable starch. As high-grade kudzu starch is prized in Japan and China, there is economic opportunity in the southeast US to harvest the root, prepare a marketable kudzu powder, and sell it to culinary experts in cultural hubs domestically and overseas. See the references and resources section (Shurtleff and Aoyagi) for information on how to set up a large scale kudzu starch extracting operation.

MAKING KUDZU POWDER AT HOME

Kudzu powder can be prepared on a small scale from wild kudzu with little equipment. Roots no smaller than 1 1/2" in diameter should be harvested during the winter months, December through March. Kudzu root should be washed, cut into approximate one-inch thick slices and pureed in a blender with enough cold water to blend the root well. The puree should be strained and the solid fibers squeezed to extract all the liquid to be used for further processing. The remaining fibers should then be saturated with water, stirred, and strained again, collecting the liquid into the container with the other extract. The brown kudzu liquid should be filtered through muslin or lower grade cotton fabric and left undisturbed in a cool or cold location for 24 hours. The fibers can be composted and the brown liquid should then be discarded as grey water. The clay like substance remaining in the container should be broken up and mixed well, until thoroughly dissolved with clean water once again, and allowed to rest for 24 hours in a cool environment. The liquid should again be discarded and the starch redissolved into a second batch of clean water, this time leaving the mixture for 48 hours in a cool place. The liquid should then be discarded and the layer of gray impurities removed from the starch. The starch is then ready to be used immediately or can be dried to preserve it indefinitely. To dry the kudzu starch, place kudzu chunks on a tray or on layers of paper and set it in a cool, well ventilated place for 10 to 40 days until thoroughly dry. Store dry chunks of kudzu in a sealed container. The dry chunks of kudzu, when pulverized, become kudzu powder.

KUDZU: FRIEND OR FOE?

Few residents of the southeastern US are acquainted with the economic potential that lies in the kudzu plant. Public sentiment still holds kudzu as a pest that threatens to run families out of their homes with its speedy growth. Locals tell stories of the vine growing "a foot a night," climbing trees, telephone poles and barns. For those individuals in the south who tap the medicinal and nutritional resources of the plants that grow in the vicinity, kudzu offers a world of wealth. Can the unleashed kudzu vine be converted to an economic opportunity in the south? We can only hope.

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