

# Kudzu

For other uses, see Kudzu (disambiguation).

**Kudzu** (/ˈkɜːdzuː/, also called **Japanese arrow-**



*Flowers of Pueraria montana*

**root**<sup>\*</sup>[1]<sup>\*</sup>[2] is a group of plants in the genus *Pueraria*, in the pea family Fabaceae, subfamily Faboideae. They are climbing, coiling, and trailing perennial vines native to much of eastern Asia, southeast Asia, and some Pacific Islands.<sup>\*</sup>[2] The name comes from the Japanese name for the plants, *kuzu* (クズ or 葛<sup>\*</sup>?), which was written “kudzu” in historical romanizations. Where these plants are naturalized, they can be invasive and are considered noxious weeds. The plant climbs over trees or shrubs and grows so rapidly that it kills them by heavy shading.<sup>\*</sup>[3] The plant is edible but often sprayed with herbicides.<sup>\*</sup>[3]

## 1 Taxonomy and nomenclature

The name kudzu describes one or more species in the genus *Pueraria* that are closely related, and some of them



*Kudzu seedpods*

are considered to be **varieties** rather than full species. The morphological differences between them are subtle; they can breed with each other, and it appears that introduced kudzu populations in the United States have ancestry from more than one of the species.<sup>\*</sup>[4]<sup>\*</sup>[5] They are:

- *P. montana*
- *P. lobata* (*P. montana* var. *lobata*)
- *P. edulis*
- *P. phaseoloides*
- *P. thomsonii*<sup>\*</sup>[4] (*P. montana* var. *chinensis*)<sup>\*</sup>[6]
- *P. tuberosa*

## 2 Origin in the United States

Kudzu was introduced to the United States as an ornamental bush and an effortless and efficient shade producer at the Philadelphia Continental Exposition in 1876. In the 1930s and '40s, the vine was rebranded as a way for farmers to stop soil erosion. Southern farmers were given

about eight dollars an hour to sow topsoil with the invasive vine. The cultivation covered over one million acres of kudzu.\*[7]

### 3 Propagation

Kudzu spreads by vegetative reproduction via stolons (runners) that root at the nodes to form new plants and by rhizomes. Kudzu will also spread by seeds, which are contained in pods and mature in the autumn, although this is rare. One or two viable seeds are produced per cluster of pods. The hard-coated seeds may not germinate for several years, which can result in the reappearance of the species years after it was thought eradicated at a site.

## 4 Uses

### 4.1 Soil improvement and preservation

Kudzu has been used as a form of erosion control and also to enhance the soil. As a legume, it increases the nitrogen in the soil via a symbiotic relationship with nitrogen-fixing bacteria.\*[8] Its deep taproots also transfer valuable minerals from the subsoil to the topsoil, thereby improving the topsoil. In the deforested section of the central Amazon Basin in Brazil, it has been used for improving the soil pore-space in clay latosols, thus freeing even more water for plants than in the soil prior to deforestation.\*[9]

### 4.2 Animal feed

Kudzu can be used by grazing animals, as it is high in quality as a forage and palatable to livestock. It can be grazed until frost and even slightly after. Kudzu had been used in the southern United States specifically to feed goats on land that had limited resources. Kudzu hay typically has a 15–18% crude protein content and over 60% total digestible nutrient value. The quality of the leaves decreases, however, as vine content increases relative to the leaf content. Kudzu also has low forage yields despite its rate of growth, yielding around two to four tons of dry matter per acre annually. It is also difficult to bale due to its vining growth and its slowness in shedding water. This makes it necessary to place kudzu hay under sheltered protection after being baled. Kudzu is readily consumed by all types of grazing animals, yet frequent grazing over three to four years can ruin stands. Thus, kudzu only serves well as a grazing crop on a temporary basis.\*[3]

### 4.3 Basketry

Kudzu fiber has long been used for fiber art and basketry. The long runners which propagate the kudzu fields and

the larger vines which cover trees make excellent weaving material. Some basketmakers use the material green. Others use it after splitting it in half, allowing it to dry and then re-hydrating it using hot water. Both traditional and contemporary basketry artists use kudzu.

### 4.4 Medicine



*Kudzu leaves near Canton, Georgia, USA*

Kudzu contains a number of useful isoflavones, including puerarin, approximately 60% of the total isoflavones, and also daidzein (an anti-inflammatory and antimicrobial agent) and daidzin (structurally related to genistein). It has shown value in treating migraine and cluster headaches.\*[10] It is recommended by some for allergies and diarrhea.\*[11]

In traditional Chinese medicine (TCM), where it is known as *gé gēn* (Chinese: 葛根), kudzu is considered one of the 50 fundamental herbs. It is used to treat tinnitus, vertigo, and Wei syndrome (superficial heat).\*[12]

Kudzu has been used as a remedy for alcoholism and hangover. The root was used to prevent excessive consumption, while the flower was supposed to detoxify the liver and alleviate the symptoms afterwards.\*[13] However, a 2007 study suggested that the use of the Kudzu root is inappropriate as a hangover remedy due to increased acetaldehyde accumulation through mitochondrial aldehyde dehydrogenase (ALDH2) inhibition.\*[14] Some TCM hangover remedies are marketed with kudzu as one of their active ingredients.

It has also shown potential in animal models of Alzheimer's disease.\*[15]

### 4.5 Food and beverage

The roots contain starch, which has traditionally been used as a food ingredient in East Asia. In Vietnam, the starch called *bột sắn dây* is flavoured with pomelo oil and then used as a drink in the summer. In Japan, the plant is known as *kuzu* and the starch named *kuzuko*. *Kuzuko*



Kuzumochi (葛餅), Japanese style kudzu starch cake (Katori City, Japan)

is used in dishes including *kuzumochi*, *mizu manjū*, and *kuzuyu*. It also serves as a thickener for sauces, and can substitute for cornstarch.\*[16]

The flowers are used to make a jelly that tastes similar to grape jelly.\*[17]\*[18] Roots, flowers, and leaves of kudzu show antioxidant activity that suggests food uses.\*[17] Nearby bee colonies may forage on kudzu nectar during droughts as a last resort, producing a low-viscosity red or purple honey that tastes of grape jelly or bubblegum.\*[18]

Kudzu has also been used for centuries in East Asia to make herbal teas and tinctures.\*[19] Kudzu powder is used in Japan to make an herbal tea called *kuzuyu*.

#### 4.6 Other uses

Kudzu fiber, known as ko-hemp,\*[20] is used traditionally to make clothing and paper,\*[21] and has also been investigated for industrial-scale use.\*[22]\*[23] The stems are traditionally used for basketry.\*[24]

It may become a valuable asset for the production of cellulosic ethanol.\*[25] In the Southern United States, kudzu is used to make soaps, lotions, and compost.\*[26]

## 5 Invasive species

### 5.1 Ecological damage and roles

Kudzu's environmental and ecological damage results from acting through “interference competition,” meaning it out-competes other species for a resource. Kudzu competes with native flora for light, and acts to block their access to this vital resource by growing over them and shading them with its leaves. Native plants may then die as a result.\*[27]

A study published in 2014 found that changes in leaf litter associated with kudzu infestation resulted in changes to



Kudzu growing on trees in Georgia, United States



Kudzu plants near Canton, Georgia, USA

decomposition processes and a 28% reduction in stocks of soil carbon, with potential implications for processes involved in climate change.\*[28]

### 5.2 United States

Main article: [Kudzu in the United States](#)

Kudzu was introduced from Japan into the United States at the Japanese pavilion in the 1876 Centennial Exposition in Philadelphia.\*[19] It is now common along roadsides and other disturbed areas\* [29] throughout most of the southeastern United States. It has been spreading at the rate of 150,000 acres (610 km<sup>2</sup>) annually.\*[30]

### 5.3 Canada

Kudzu was discovered July 2009 in a patch 110 m (360 ft) wide and 30 m (98 ft) deep, on a south-facing slope on the shore of [Lake Erie](#) near [Leamington, Ontario](#), about 50 km (31 mi) southeast of [Windsor](#).\*[31] Leamington is located in the second-warmest growing region of Canada after south coastal British Columbia.

Ecologist Gerald Waldron made the Leamington find while walking along the beach. He recognized the kudzu instantly, having read about its destructive expansion in the southeastern United States.\*[32]

## 5.4 Other countries

During World War II, kudzu was introduced to Vanuatu and Fiji by United States Armed Forces to serve as camouflage for equipment and has become a major weed.\*[33]

Kudzu is also becoming a problem in northeastern Australia, and has been seen in isolated spots in Northern Italy (Lake Maggiore).

In New Zealand, kudzu was declared an “unwanted organism” and was added to the Biosecurity New Zealand register in 2002.\*[34]

## 6 Control

### 6.1 Crown removal

For successful long-term control of kudzu, it is not necessary to destroy the underground system, which can be extremely large and deep. It is only necessary to use some method to kill or remove the kudzu root crown\*[35] and all rooting runners. The root crown is a fibrous knob of tissue that sits on top of the roots. Crowns form from multiple vine nodes that root to the ground, and range from pea- to basketball-size.\*[35] The older the crowns, the deeper they tend to be found in the ground. Nodes and crowns are the source of all kudzu vines, and roots cannot produce vines. If any portion of a root crown remains after attempted removal, the kudzu plant may grow back.

Mechanical methods of control involve cutting off crowns from roots, usually just below ground level. This immediately kills the plant. Cutting off the above-ground vines is not sufficient for an immediate kill. It is necessary to destroy all removed crown material. Buried crowns can regenerate into healthy kudzu. Transporting crowns in soil removed from a kudzu infestation is one common way that kudzu unexpectedly spreads and shows up in various locations.

### 6.2 Mowing

Close mowing every week, regular heavy grazing for many successive years, or repeated cultivation may be effective, as this serves to deplete root reserves.\*[35] If done in the spring, cutting off vines must be repeated. Regrowth appears to exhaust the plant's stored carbohydrate reserves. Cut kudzu can be fed to livestock, burned, or composted.

### 6.3 Grazing

The city of Chattanooga, Tennessee, has undertaken a trial program using goats and llamas to graze on the plant.

As of 2007, the goats are grazing along the Missionary Ridge area in the east of the city.\*[36] Similar efforts to reduce widespread nuisance kudzu growth have also been undertaken in the cities of Winston-Salem, North Carolina\*[37] and Tallahassee, Florida.\*[38]

### 6.4 Fire

Prescribed burning is also used on old extensive infestations to remove vegetative cover and promote seed germination for removal or treatment. While fire is not an effective way to kill kudzu,\*[35] equipment, such as a skid loader, can later remove crowns and thereby kill kudzu with minimal disturbance of soil.\*[35]\*[39]

### 6.5 Herbicide

A systemic herbicide, for example, glyphosate,\*[40] Triclopyr,\*[40] or Tordon,\*[41] can be applied directly on cut stems, which is an effective means of transporting the herbicide into the kudzu's extensive root system.\*[42] Herbicides can be used after other methods of control, such as mowing, grazing, or burning, which can allow for an easier application of the chemical to the weakened plants.\*[43] In large-scale forestry infestations, soil-active herbicides have been shown to be highly effective.\*[42]

After initial herbicidal treatment, follow-up treatments and monitoring are usually necessary, depending on how long the kudzu has been growing in the area. It may require up to 10 years of supervision, after the initial chemical placement, to make sure the plant does not return.\*[44]

### 6.6 Fungi

Since 1998, the United States Department of Agriculture, Agricultural Research Service (ARS) has experimented with using the fungus *Myrothecium verrucaria* as a biologically based herbicide against kudzu.\*[30] A diacetylverrucarol spray based on *M. verrucaria* works under a variety of conditions (including the absence of dew), causes minimal injury to many of the other woody plants in kudzu-infested habitats, and takes effect quickly enough that kudzu treated with it in the morning starts showing evidence of damage by midafternoon.\*[30] Initial formulations of the herbicide produced toxic levels of other trichothecenes as byproducts, though the ARS discovered growing *M. verrucaria* in a fermenter on a liquid instead of a solid diet limited or eliminated the problem.\*[30]

## 7 See also

- Chinese herbology
- Daidzein
- Daidzin
- Kudzu bug
- Puerarin

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## 9 External links

- Species Profile - Kudzu (*Pueraria montana* var. *lobata*), National Invasive Species Information Center, United States National Agricultural Library. Lists general information and resources for Kudzu.

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