

*Pueraria montana* var. *lobata*   简体中文

**System:** Terrestrial

正體中文

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Fabales	Fabaceae

**Common name** gan ge teng (Chinese), Kudzu-Kletterwein (German), vine-that-ate-the-South (English), kudzu vine (English), kuzu (Japanese), kudzu (English), vigne japonaise (French), aka (Tongan), aka (English, Wallis and Futuna), wa yaka (English), wa yaka (Fijian), foot-a-night vine (English), fen ge (Chinese), Ko-hemp (German), aka fala (Niuean), Kopoubohne (German), shan ge teng (Chinese), nepalem (French), gan ge (Chinese), Japanese arrowroot (English), acha (English), fen ke (Chinese), aka (Niuean), akataha (Tongan), kudzu común (Spanish)

**Synonym** *Pueraria montana* , (Lour.) Merr. var. *lobata* (Willd.)  
*Pueraria lobata* , (Willd.) Ohwi  
*Dolichos lobatus* , Willd.  
*Pueraria hirsuta* , (Thunb.) C. Schneider  
*Pueraria thunbergiana* , (Sieb. & Zucc.) Benth.  
*Pueraria lobata* , var. *thomsonii* (Benth.) Maesen  
*Dolichos hirsutus* , Thunberg  
*Pachyrrhizus thunbergianus* , Siebold & Zuccarini

## Similar species

**Summary** Kudzu (*Pueraria montana* var. *lobata*) roots can eventually comprise over 50% of the plant's biomass, serving as an organ for carbohydrate storage for recovery after disturbance and making it difficult to control with herbicides. Only in the eastern United States is kudzu considered a serious pest, although it is also established in Oregon in the northwestern USA, in Italy and Switzerland, and one infestation on the northern shore of Lake Erie in Canada. Kudzu is considered naturalized in the Ukraine, Caucasus, central Asia, southern Africa, Hawaii, Hispaniola, and Panama. Impacts of kudzu in the southeastern USA include loss of productivity of forestry plantations (estimated at about 120 USD per hectare per year), smothering and killing of native plants and denying access to lands for hunting, hiking, and bird watching.



[view this species on IUCN Red List](https://www.iucn.org/redlist)

## Species Description

Kudzu is a leguminous, aggressive, stoloniferous and climbing semi-woody perennial vine with deciduous foliage. Semiwoody tuberous roots and vines originate in older plants from a knot- or ball-like root crown on top of the soil surface. Vegetative growth can be very rapid (up to 26 centimeters per day or 15 meters per growing season) with frequent unswollen nodes that root when on the ground to form new plants. Connective vines die within about 3 years. Stems are herbaceous becoming woody, 10 to 30 meters long, up to 30 centimeters thick; young vines are covered with tan to bronze hairs. Leaves are alternate with three leaflets (brown hairy above and silver hairy below) eight to 20 centimeters long and five to 19 centimeters wide, usually slightly lobed (unless in shade). Margins are thin membranous and fine golden hairy. Leafstalks are 15 to 30 centimeters long with long hairs, swollen bases, and deciduous stipules. Leaves have the ability to reorient rapidly in relation to the sun to optimize photosynthesis and decrease temperature and water loss (Forseth & Teramura, 1986). Flowers are pea-like, pink to purple with yellow centres, borne in compactly-flowered hanging or erect racemes (10 to 25 centimeters long) and have the fragrance of Concord grapes (*Vitis* sp.). Flowers commonly occur in pairs (or threes) from a given raised node (Godfrey, 1988). Flowers are produced on plants exposed to direct sunlight and pollination is by insects. Flowers and fruits are produced only on vertically twining and hanging vines. The four to seven centimeter long seed pods are relatively flat and bulging above the seeds, hairy and mature in early fall becoming dry and tan to split on one or both sides to release three to 10 seeds or detach intact. The pods produce only a few viable seeds in each pod cluster. The compressed kidney-shaped seeds are nearly round and about three to four millimeters long (Frankel, 1989; USDA, 1976; Uva *et al.*, 1997; Virginia Native Plant Society, 1999 in Mitich, 2000). Seeds are dispersed by wind, animals, and water. Kudzu also possesses large root tubers up to two meters long and 18 to 45 centimeters wide that can weigh as much as 180 kilograms on old plants and can reach a depth of one to five meters with high starch and water contents (EPPO, 2007). Roots can comprise over 50% of the plant's biomass (Wechsler, 1977 in Newton *et al.* 2007), serving as a storage organ for carbon and water (Forseth & Innis, 2004) and nodules contain nitrogen fixing cyanobacteria. This description was taken from Mitich (2000), Miller (2003), and EPPO (2007) except where stated.

## Notes

**Climate Change:** Jarnevich and Stohlgren (2009) examined how the potential distribution of kudzu will be affected by changing climate and created habitat suitability models that indicate that *P. montana* may increase its distribution particularly in the Northeast United States with climate change and may decrease in other areas. Predictions of global warming include increases of 3°C to 5°C in mean global temperatures (IPCC 2001, in Forseth and Innis 2004). These trends should favor the spread of *P. montana* (Forseth and Innis 2004). Kudzu has recently showed northward and westward migration patterns in the United States that correlate with warmer winters and higher CO<sub>2</sub> levels (Ziska *et al.* 2009).

**Related Species:** *P. montana* var. *lobata* is the variety that has been introduced into the United States and South America. The range of this variety overlaps with that of *P. montana* var. *montana* in China south of the Yangtze River to Hong Kong. The distribution of *P. montana* var. *montana* also includes Vietnam, Burma, Laos and Thailand. In these countries, and in southern China, *P. montana* var. *montana* shares its distribution with *P. montana* var. *thomsoni* and *P. montana* var. *chinensis*. Specimens from northeast India were identified as *P. montana* var. *thomsoni* (van der Maesen 1985, in Britton *et al.* 2002).

This profile pertains to *Pueraria montana* var. *lobata*. Characteristics that had been used previously to differentiate *P. montana* from *P. lobata* and *Pueraria thomsoni* (Benth.) are lobed leaflets, and the size of wing and keel petals, all of which can be quite variable. For information on the taxonomy of *P. montana* please see Ward (1998).

## Lifecycle Stages

Seedlings develop a woody root crown, with multiple runners and extensive tuberous roots (Britton *et al.* 2002).

## Uses

Kudzu's greatest potential today may be the powdery extract derived from the plant's roots used as cooking starch. Kudzu leaves, shoots, and flowers are used in salads, soups, sauteed dishes and casseroles. Kudzu has medicinal properties and has been used for millennia in China and Japan to cure a wide range of common ailments (Shurtleff and Aoyagi 1977). In Japan, young kudzu vines are harvested to provide supple waterproof fibers for weaving sturdy wicker baskets or trunks. The cellulose fiber from large vines and roots is used as the basic raw material for making fine traditional paper. The fiber is also used to stuff cushions, beds, and chairs. When burned, it acts as a mosquito repellent (Shurtleff and Aoyagi 1977, in Mitich 2000). Kudzu has been used to produce an unusually fragrant, flavorful honey. Its leguminous roots host nitrogen-fixing bacteria that enrich the soil (Shurtleff and Aoyagi 1977). Kudzu has also been successfully used in the experimental production of methane and gasohol (Hippis 1994, in Mitich 2000). The main uses of kudzu in the United States have been for erosion control and as a forage crop; while kudzu is still valued as a soil-conserving plant for erosion control on steep slopes and embankments, less invasive species are now available for stabilization purposes (Birdsall and Hough-Goldstein 2004).

## Habitat Description

The typical natural habitats of kudzu are open lands or shrub lands adjacent to broad-leaved or mixed forests, but it readily invades managed habitats such as road and rail embankments, abandoned pastures, and banks of inland water bodies (EPPO 2007). It colonises a wide variety of natural and semi-natural habitats (EPPO 2007), for example forest edges, disturbed areas or scrub vegetation (van der Maesen 1985 1994 2002; Halim 1992, in Heider *et al.* 2007). While tropical kudzu (*P. phaseoloides*) thrives in humid and low altitude habitats, kudzu prefers warm to temperate zones or higher altitudes (van der Maesen 1985 1994 2002; Halim 1992, in Heider *et al.* 2007). Kudzu thrives in full sun habitats; growth rates and survival are reduced in shaded stands of trees (Abramovitz 1983; Forseth and Teramura 1987, in Forseth and Innis 2004; Carter and Teramura 1988). Kudzu grows well with annual precipitation of 1000 to 1500 millimeters on sand or clay soil (Sunet *al.* 2006). Because of its large roots which act as water reservoirs, kudzu can also withstand fairly dry climates (Shurtleff and Aoyagi 1977, in Mitich 2000; Zhang and Ye 1990, in Sun *et al.* 2006). It prefers high summer temperatures (over 27°C) and deep, well-drained loamy soils. However the plant is able to survive in frosted and shallow soils even though its roots cannot develop fully (Pron 2006, in EPPO 2007). It is relatively indifferent to soil pH; according to soil analyses the plant can grow in soils with a soil pH from 3 to 8 (EPPO 2007). In Japan kudzu ranges in latitude from 44°N to 30°N. It grows abundantly in mountainous areas up to an elevation of 1000 m; it is also found in lowland areas and on many of the small islands. In Korea it grows in areas where the temperature drops to -30°C (Shurtleff and Aoyagi 1977, in Mitich 2000).

## Reproduction

The mating system of *P. lobata* includes both sexual reproduction through bee pollination and asexual reproduction through rhizome spread (Sun *et al.* 2005).

**Sexual:** The large purple flowers of *Pueraria* are produced in relative abundance with a sweet aroma; its corolla (petals) is papilionaceous (shaped like a butterfly) and 14 to 20 mm long (Sun *et al.* 2005). Kudzu is insect-pollinated, and the extremely low viability of seeds in its introduced range is assumed to be due to a lack of suitable pollinators (EPPO 2007). Thornton (2001, in Forseth and Innis 2004) reported visitation by several native and naturalized pollinators, the most prominent being native Hymenoptera. Insect predation of seeds has been reported to average over 80% for populations in North Carolina, and reports of successful seedling establishment remain rare (Kidd 2002, in Forseth and Innis 2004).

**Asexual:** Kudzu roots easily from nodes and has a large tuberous root system, producing extensive clonal spread (Pappert Hamrick and & Donovan 2000). Little biomass is allocated for structural support, allowing kudzu to invest its resources into vine expansion and increased photosynthetic area (Sasek and Strain, 1988, in Pappert Hamrick and Donovan 2000).

## Nutrition

Kudzu can be found growing in a wide range of soil types with little to no special nutrient requirements.

## General Impacts

For a detailed account of the environmental impacts of *P. montana* var *lobata* please read: [Pueraria montana \(Kudzu\) Impacts Information](#). The information in this document is summarised below.

Kudzu is widely believed to drastically reduce biodiversity because of its ability to smother other vegetation and develop large-scale monocultures (Alderman 1998; Forseth and Innis 2004, in Sun *et al.* 2006). It can climb overtop and subsequently kill new seedlings or mature trees (Berisford, Bush and Taylor 2006). Forestry problems associated with aggressive vines such as kudzu include mortality of edge trees, exclusion of native plant species, and potential to increase fire hazard during winter (Putz 1991, in Harrington Rader-Dixon & Taylor 2003).

Kudzu constrains urban, suburban, and rural development in highly infested areas (Blaustein 2001). Eradication and clearing must occur to safeguard open space, parks, structures, and buildings.

**Ecosystem Change:** Few plants can survive once smothered by kudzu and small ecosystems can be radically altered. Infestations quickly spread in open habitats, rapidly covering the soil and low growing vegetation, and only slowed by adjoining forests. Kudzu can affect indigenous plants and completely modify the structure of the ecosystem (Clabassi *et al.* 2003, in EPPO 2007). Kudzu may have a disproportionate effect on animals with specific mutualisms or feeding relationships with trees or shrubs suppressed by its growth (Forseth and Innis 2004).

**Reduction in Native Biodiversity:** Kudzu is invading National Parks in the USA and when it does encroach on natural areas it kills trees and plants by growing over them (EPPO 2007). Pron (2006, in EPPO 2007) found that there was a reduction in the number of species in invaded places: while 20 to 25 species grew in 4 m<sup>2</sup> of non-invaded meadow or forest, only 6 to 9 species grew in 4 m<sup>2</sup> invaded by kudzu.

**Competition:** Key traits of kudzu that contribute to its ability to spread rapidly and dominate natural communities are its high allocation to extension growth and leaf area instead of support structures; frequent rooting of stems at nodes in contact with the soil, rapid leaf movements, high leaf level photosynthetic rates accompanied by high leaf area indices, large hydraulic capacitance in roots and rhizomes, and the ability to fix atmospheric N<sub>2</sub> (Forseth and Innis 2004). This unique combination of traits makes *P. montana* an extremely aggressive competitor in the eastern deciduous and southeastern USA mixed pine forest biomes (Forseth and Innis 2004). Kudzu vines can tie trees together and the twining of vines on vines exert tension to pull trees down (Miller and True 1986).

**Disease Transmission:** Kudzu is a reservoir for soybean rust and *Phytophthora* species (EPPO 2007).

**Modification of Nutrient Regime:** *Pueraria montana* forms an initial interconnected ground cover of stolons and annually produces a thick leaf litter layer with high leaf nitrogen due to its nitrogen-fixing properties (Forseth and Innis, 2004). Kudzu has a symbiotic relationship with nitrogen-fixing bacteria (*Rhizobium* spp.) in root nodules and can almost double the concentration of nitrogen compounds in the topsoil (1 to 6 cm deep) (Pron 2006, in EPPO 2007).

**Economic/Livelihoods:** As a rapidly growing vine, kudzu can cover and smother orchard and plantation crops, including young forest plantations. Where productive forest land has been overtaken, lost productivity is estimated at about 120 USD per hectare per year (EPPO 2007). Lost productivity in forests has been estimated at anywhere between \$100 to 500 million per year (Blaustein 2001, Quimby *et al.* 2003, in Forseth and Innis 2004).

## Management Info

Please follow this link for detailed information on [Pueraria montana](#) var. *lobata* Management Information. The information in this document is summarised below.

**Preventative Measures:** Collaborative strategies and programs for spread prevention should be enacted through: (1) improved laws, policies, and public education; (2) promotion of new corporate and personal ethics to not sell, buy, and plant invasive plants; (3) sanitization of personnel, equipment, and animals that move from or among infested sites; and (4) prohibitions against the sale and transport of contaminated products such as extracted native plants, potted plants, hay, pine straw, fill dirt and rock, and mulch.

A [Risk assessment of Pueraria montana](#) var. *lobata* for Australia and the Pacific was prepared by Pacific Island Ecosystems at Risk (PIER); the result is a score of 9 and the plant is considered likely to be a pest in the Pacific.

**Physical Control:** Burning and grazing may be effective in some cases but are impractical in most heavily infested areas such as urban areas and near highways (Everest *et al.* 1994, in Boyette Walker and Abbas 2002). Heavy grazing by cows, pigs, horses or goats (Rhoden *et al.* 1991, in EPPO 2007) can remove kudzu. However animals cannot eat vines growing over trees or in steep areas, watering holes must be provided and there must be enough livestock to ensure 80% of the plant is continuously consumed (Ball *et al.* 1979, Miller and Edwards 1983, in EPPO 2007). Bulldozing vines and roots into piles and then burning them can be used to eradicate kudzu. A variety of tools can be used to surgically remove root crowns, which effectively kills the plant.

**Chemical Control:** Clopyralid, picloram, triclopyr, metsulfuron and tebuthiuron exert various degrees of control, depending on soil type, meteorological conditions, herbicide formulation, seasonal application, characteristics of the kudzu stand, and frequency and number of herbicide applications (Kay and Yelverton 1998, Miller 1996, in Berisford Bush and Taylor 2006). When used as part of a forest regeneration program, the relative potentials of the herbicides to move into shallow groundwater were: tebuthiuron > picloram > metsulfuron > clopyralid > triclopyr (Berisford, Bush and Taylor 2006).

**Biological Control:** Biological control is potentially an important element of an integrated management system for kudzu, but is only at the experimental stage so far (EPPO 2007). A three-year survey in China of phytophagous insects of kudzu was conducted to establish basic information about their abundance, diversity of damage caused. A total of 116 phytophagous insect species in 31 families and five orders were collected in six feeding guilds: foliage, sap, stem, terminal, seed and root feeders. Several of these species have potential as biological control agents for kudzu in the USA (Sun *et al.* 2006). For a full list of phytophagous insects collected from kudzu in China between 1999 and 2001 please see Sun *et al.* (2006).

A number of pathogens may also be useful in controlling kudzu, including *Pseudomonas savastanoi* pv. *phaseolicola*.

**Integrated Pest Management (IPM):** The application of polyethylene sheeting as a thermal covering is a non-herbicidal method of controlling and eradicating kudzu (Newton *et al.* 2007). This type of thermal treatment is an effective method in an Integrated Pest Management programme used to restore these areas to their native vegetation (Newton *et al.* 2007).

For information about the potential use of kudzu as an agricultural and industrial resource see Tanner *et al.* (1979).

## Pathway

The main potential pathway for entry of the plants into new areas is the movement and sale of plants for horticulture and agriculture (EPPO 2007). After its introduction in the USA in 1876, *P. montana* was marketed as an ornamental plant and shade for porches in hot southern summers (Miles and Gross 1939, Edmisten and Perkins 1967, Blaustein 2001, in Forseth and Innis 2004). It is no longer available for sale in the USA. The main potential pathway for entry of the plants into new areas is the movement and sale of plants for horticulture and agriculture (EPPO 2007).

## Principal source:

**Compiler:** IUCN/SSC Invasive Species Specialist Group (ISSG)



**Review:** Dr. James H. Miller, USDA Forest Service, Southern Research Station, Auburn, AL 36849 USA.

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## ALIEN RANGE

[3] AMERICAN SAMOA  
[1] EUROPE  
[4] FRENCH POLYNESIA  
[1] ITALY  
[1] MEDITERRANEAN AREA  
[1] NEW ZEALAND  
[1] NORFOLK ISLAND  
[2] SAMOA  
[1] SWITZERLAND  
[1] UKRAINE

[2] AUSTRALIA  
[5] FIJI  
[1] GREATER ANTILLES  
[1] KIRIBATI  
[1] MEXICO  
[1] NIUE  
[1] PANAMA  
[1] SOUTHERN AFRICA  
[8] TONGA  
[42] UNITED STATES

**Red List assessed species 6: CR = 1; VU = 1; LR/nt = 1; LR/lc = 3;**

[Sarracenia alata](#) LR/nt  
[Sarracenia leucophylla](#) VU  
[Sarracenia oreophila](#) CR

[Sarracenia flava](#) LR/lc  
[Sarracenia minor](#) LR/lc  
[Sarracenia psittacina](#) LR/lc

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This chapter is available from: [http://www.fleppc.org/ID\\_book/pueraria%20montana.pdf](http://www.fleppc.org/ID_book/pueraria%20montana.pdf) [Accessed 3 November 2009]

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**Summary:** Kudzu, *Pueraria montana*, a native of eastern, southern and southeastern Asian species of Legumes, is also a serious invasive species in the United States. However, its scientific name is much confused in the history, both in its native area and in the rest of the world. This paper is to provide it with the correct name, along with its synonyms, and a brief introduction of its invasive history in the USA, a lesson of deliberately introducing a notoriously aggressive plant we can all learn from.

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**Summary:** Kudzu control and eradication.

Michael, J. L., Neary, D. G. and Wells, M. J. M. 1989. Picloram movement in soil solution and streamflow from a coastal plain forest. Journal of Environmental Quality 18(1): 89-95.

**Summary:** Kudzu control and eradication.

Mikhailova, E., Newton, C., Nelson, L., Post, C., Hall, K. 2008. Solarization Effects on Key Soil Fertility Indicators Under Kudzu (*Pueraria montana*) Invasion. Applied Economics and Statistics, Clemson University.

Miles, I. E. and Gross, E. E. 1939. A compilation of information on kudzu. Bulletin 326/Mississippi Agricultural Experiment Station. 14 pp.

**Summary:** Kudzu establishment and management

[Miller, H James & Ronald E True., 1986. Herbicide Tests for Kudzu Eradication. Georgia Forest Research Paper 65 July 1986 Research Division. Georgia Forest Commission](#)

**Summary:** Available from: [http://www.srs.fs.usda.gov/pubs/misc/uncaptured/rp\\_gf065.pdf](http://www.srs.fs.usda.gov/pubs/misc/uncaptured/rp_gf065.pdf) [Accessed November 2 2009]

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**Summary:** Kudzu control and eradication.

Miller, J. H. 1985. Testing herbicides for kudzu eradication on a Piedmont site. Southern Journal of Applied Forestry 9: 128-132.

**Summary:** Kudzu control and eradication.

Miller, J. H. 1986. Kudzu eradication trials testing fifteen herbicides. Proceedings of the Southern Weed Science Society 39: 276-281.

**Summary:** Kudzu control and eradication.

Miller, J. H. 1988. Guidelines for kudzu eradication treatments. In: Miller, J. H., Mitchell, R. J. (eds) A manual on Ground Applications of Forestry Herbicides U.S. Department of Agriculture, Forest Service, Southern Region, Management Bulletin R8-MB 21. Chapter 6.

**Summary:** Kudzu control and eradication.

Miller, J. H. 1988. Kudzu eradication trials with new herbicides. Proceedings of the Southern Weed Science Society 41: 220-225.

**Summary:** Kudzu control and eradication.

Miller, J. H. 1991. Control kudzu on your land. Forest Farmer 51(1): 7-11.

**Summary:** Kudzu control and eradication.

Miller, J. H. 1996. Kudzu eradication and management. In Hoots, D., Baldwin, J. (eds) Kudzu the vine to love or hate. Kodak, TN: Suntop Press: 137-149.

**Summary:** Kudzu control and eradication.

Miller, J. H. and True, R. E. 1986. Herbicide tests for kudzu eradication. Macon, GA: Georgia Forestry Commission; Georgia Forest Research Paper 65. 11 pp.

**Summary:** Kudzu control and eradication.

Miller, J.H., Manning, S.T. and Enloe, S.F. 2010 [in press]. A management guide for invasive plants of southern forests. Gen. Tech. Rep. SRS-XXX. Asheville, NC; U.S. Department of Agriculture, Forest Service, Southern Research Station.

Miller, J. H., Qiu, Z. and Sirois, D. 1985. Ground sprayer designs for forestry applications. Proc. Southern Weed Science Society 38: 271-282.

**Summary:** Kudzu control and eradication.

Nelson, L., Guertin, P.J., Denight, M., Gebhart, D. 2008. Invasive Species Biology, Control, and Research. Part 1: Kudzu (*Pueraria montana*). Engineer Research and Development Center Champaign IL. Construction Engineering Research Lab. Invasive Species Biology, Control, and Research. Part 1: Kudzu (*Pueraria montana*).

**Summary:** A 2007 Report to Congress documented a crucial factor in the loss of Army training land: uncontrolled vegetation growth. Of the 53 installations surveyed for the report, 30 reported that approximately 12 percent of their training lands were unusable for certain types of training. Uncontrolled vegetation was a source of such problems as an inability to conduct mounted and dismounted maneuver training, interference with equipment used in line-of-sight training, safety issues, and damage to equipment and structures. Of the 11 plant species (or groups) identified by installations as uncontrolled vegetation, six were invasive plants, of which the two invasive plants most commonly identified were Kudzu (*Pueraria montana*) and Multiflora Rose (*Rosa multiflora*). This work provides a snapshot of current research and scientific knowledge related to the invasive plant species Kudzu, its impact on the Army, and a concise representation of control technologies for military land managers.

Newton, Casey Harve. 2007. Controlling Kudzu (*Pueraria montana*) in Riparian Zones and High Risk Areas. Graduate School of Clemson University.

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**Summary:** Kudzu establishment and management.

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**Summary:** Kudzu uses.

O'Brien, R. E. and Skelton, D. W. 1946. The production and utilization of kudzu. Mississippi State College Agricultural Experiment Station Bulletin 438. 25 pp.

**Summary:** Kudzu uses.

[Pacific Ecosystems AT Risk \(PIER\)., 2008. Pueraria montana var. lobata \(Willd.\) Maesen & S. M. Almeida, Fabaceae](#)

**Summary:** Available from: [http://www.hear.org/Pier/species/pueraria\\_montana\\_var\\_lobata.htm](http://www.hear.org/Pier/species/pueraria_montana_var_lobata.htm) [Accessed November 2 2009]

Pappert, Rebecca A., J. L. Hamrick and Lisa A. Donovan., 2000. Genetic variation in *Pueraria lobata* (Fabaceae), an introduced, clonal, invasive plant of the southeastern United States. American Journal of Botany. 2000;87:1240-1245.)

Patel, C. C., Patel, H. R., Patel, D. J. and Thakar, N. A. 1989. Relative susceptibility of certain medicinal and aromatic plants to root-knot nematodes. Pak. J. Nematol 7(2): 81-82.

**Summary:** Kudzu biocontrol.



Piper, C. V. 1920. Kudzu. Department Circular 89. United States Department of Agriculture. 7 pp.

**Summary:** Kudzu establishment and management

Polk, H. D. and Gieger, M. 1945. Kudzu in the ration of growing chicks. Bulletin 414 /Mississippi Agricultural Experiment Station. 14 pp.

**Summary:** Kudzu establishment and management.

Putz, F.E. 1991. Silvicultural effects of lianas. Pages 493-501 in F. E. Putz and H. A. Mooney, eds. The Biology of Vines. Cambridge, Great Britain: Cambridge University Press.

**Summary:** Control and eradication.

Quicheng, F. 1980. Some current study and research approaches relating to the use of plants in the traditional Chinese medicine. Journal of Ethnopharmacology 2(2): 57-63.

**Summary:** Kudzu uses

Quimby, Jr., P.C., DeLoach, C.J., Wineriter, S.A., Goolsby, J.A., Sobhian, R., Boyette, C.D., & Abbas, H.K. 2003. Biological control of weeds: research by the United States Department of Agriculture-Agricultural Research Service: selected case studies. Pest Manage. Sci. 59: 671-680.

**Summary:** Biocontrol.

Rader, L. T. and Harrington, T. B. 1999. An integrated pest management research program for kudzu (*Pueraria lobata*) at the Savannah River Site, South Carolina. Proceedings of the Southern Weed Science Society 52: 118.

**Summary:** Kudzu control and eradication

Sasakawa, M. 1981. Descriptions of three new leaf-mining pests (Diptera: Agromyzidae). Applied Entomology and Zoology 16(2): 149-155.

**Summary:** Kudzu biocontrol.

Sasek, Thomas W. and Boyd R. Strain., 1988. Effects of Carbon Dioxide Enrichment on the Growth and Morphology of Kudzu (*Pueraria lobata*) Weed Science, Vol. 36, No. 1 (Jan., 1988), pp. 28-36

Sasek, Thomas W. and Boyd R. Strain., 1990. Implications of atmospheric CO<sub>2</sub> enrichment and climatic change for the geographical distribution of two introduced vines in the U.S.A. Climatic Change Volume 16, Number 1 / February, 1990

**Summary:** The vine growth habit increases competitive potential for light capture. More biomass is allocated to height and leaf area because support structures are minimized. This study considered the effects of the continuing increase in atmospheric carbon dioxide concentration on the growth and morphology of vines. Vines were hypothesized to allocate CO<sub>2</sub>-induced increases in production to height and leaf area more efficiently than erect growth forms. Kudzu (*Pueraria lobata* Ohwi) and Japanese honeysuckle (*Lonicera japonica* Thunb.) are perennial woody vines, introduced into the United States from Japan. Both have become naturalized in the eastern US and are pernicious weeds in the Southeast capable of suppressing the native flora.

Shurtleff, W. and Aoyagi, A. 1985. The book of kudzu: a culinary and healing guide. Avery Pub. Group, Wayne, NJ. 102 pp.

**Summary:** Kudzu uses.

Smith A. E. 1992. Kudzu control in nonforested areas with herbicides. Research Report 591. Georgia Cooperative Extension. 8 pp.

**Summary:** Kudzu control and eradication.

Sturkie, D. G. and Grimes, J. C. 1939. Kudzu its value and use in Alabama. Circular 83. Agricultural Experiment Station of the Alabama Polytechnic Institute. 20 pp.

**Summary:** Kudzu establishment and management.

Sun, Jiang-Hua; Liu, Zhu-Dong; Britton, Kerry O. ; Cai, Ping; Orr, David; Hough-Goldstein, Judith., 2006. Survey of phytophagous insects and foliar pathogens in China for a biocontrol perspective on kudzu, *Pueraria montana* var. *lobata* (Willd.) Maesen and S. Almeida (Fabaceae). Biological Control. 36(1). JAN 2006. 22-31.

Tanner, R. D., Hussain S., Shahid, H., Lindsey, A. [and others]. 1980. Kudzu (*Pueraria lobata*): Potential Agricultural Industrial Resource. Economic Botany 33(4): 400-412.

**Summary:** Kudzu uses.

Thomas, L. K., Jr., 2000. Chemical grubbing for control of exotic kudzu-vine. Bartonia.(60). Jan. 10, 2000. 71-74.

**Summary:** A stump treatment was applied to the cut stubs of kudzu-vine (*Pueraria montana* (Lour.) Merr.). Three herbicides, applied full strength, and a cut treatment were selected for trial and each treatment was replicated 10 times: AMS (ammonium sulfamate) 95% soluble crystal (Ammate), isopropylamine salt of glyphosate (N-(phosphonomethyl) glycine) 480 g/L (Roundup), and fosamine ammonium (ammonium ethyl carbamoylphosphonate) 480 g/L (Krenite). AMS has long been used in stump treatments and the other treatments were compared to it. Evaluation was made eight months after treatment. All three herbicides were equally effective. An evaluation about one year after treatment showed no significant differences in rates of disintegration of chemically treated stubs. /p

Thornton, Melissa Rose. 2004. Arthropod Fauna Associated with Kudzu (*Pueraria montana* var. *lobata* Willd) in North Carolina. Department of Entomology, North Carolina State University.

Tsugawa, H. 1986. Cultivation and utilization of kudzu-vine (*Pueraria lobata* Ohwi): adaptability, cultivation method, cutting frequency, yield, grazing and feeding value. Journal of Japanese Society of Grassland Science 32(2): 173-183.

**Summary:** Kudzu establishment and management.

Waldner, Leora Susan. 2008. The kudzu connection: Exploring the link between land use and invasive species. Land Use Policy 25 (2008) 399-409.

Weaver, Mark A.; Lyn, Margaret E., 2007. Compatibility of a biological control agent with herbicides for control of invasive plant species. Natural Areas Journal. 27(3). JUL 2007. 264-268.

**Summary:** Kudzu, *Pueraria montana* var. *lobata*, is an exotic invasive weed that is difficult to control with available products and management practices. The fungal pathogen, *Myrothecium verrucaria*, is being developed as a bioherbicide for kudzu and other invasive vines. This biological control agent might be applied with conventional herbicides to improve the efficacy or spectrum of weed control. The survival of *M. verrucaria* was measured over time in simulated tank-mixes of commercial formulations of the herbicides: amniopyralid (Milestone\*), metsulfuron (Escort XP), and fluroxypyr (Vista). The fungus was also grown in vitro in the presence of these herbicides to evaluate any growth inhibition. *M. verrucaria* was highly tolerant to all concentrations of amniopyralid and metsulfuron for up to two days in simulated tank-mixes, while mixtures with fluroxypyr resulted in a gradual loss of spore viability. The fungus grew on media supplemented with amniopyralid and metsulfuron with only small effects on the growth rate, but fluroxypyr caused growth inhibition. These studies provide insight for developing effective, integrated control strategies for kudzu.

Zidack, N.K. & Backman, P.A. 1996. Biological control of kudzu (*Pueraria lobata*) with the plant pathogen *Pseudomonas syringae* pv. *phaseoliicola*. Weed Science. 44 (3): 645-649.

**Summary:** Biocontrol.

Ziska, Lewis H., 2009. Invasive Weeds and Climate Change: Threats and Consequences, In Proceedings of the Weeds Across Borders 2008 Conference May 27-30, 2008 Banff, Alberta, Canada The view from the North (Ed.) Stephen J. Darbyshire and Raj Prasad. Alberta Invasive Plants Council

## General information

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**Summary:** Kudzu biology.

Anonymous. 1971. Common weeds of the United States. USDA Agricultural Research Service. Dover Publications, New York. 463 p.

**Summary:** Kudzu range.

Anonymous. 1971. Common weeds of the United States. USDA Agricultural Research Service. Dover Publications, New York. 463 pp.

**Summary:** Kudzu range

Birdsall, J. & Hough-Goldstein, J. 2004. Proposed Host Specificity Plant List for Testing Potential Biological Control Agents of Kudzu. Submitted to USDA APHIS-PPQ Technical Advisory Group for Biological Control Agents of Weeds (TAG Petition No. 04-05).

**Summary:** Kudzu biology.

Carter, G. A. and Teramura, A. H. 1988. Vine photosynthesis and relationships to climbing mechanics in a forest understory. American Journal of Botany 75(1): 1011-1018.

**Summary:** Kudzu biology and ecology.

Carter, G.A. & Teramura, A. H. 1988. Vine photosynthesis and relationships to climbing mechanics in a forest understory. American Journal of Botany 75(1): 1011-1018.

**Summary:** Kudzu biology.

Clabassi, I., Tom, A. & Giuseppe, O.S.Z. 2003. Detection of a new potential invasive plant: *Puararia montana* Informatore Fitopatologico 9, 30-33 (in Italian).

**Summary:** Kudzu biology.

CONABIO. 2008. Sistema de información sobre especies invasoras en México. Especies invasoras - Plantas. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.

**Summary:** English:

The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (<http://www.conabio.gob.mx/invasoras/index.php/Portada>), under the section Novedades for information on updates.

Invasive species - Plants is available from: [http://www.conabio.gob.mx/invasoras/index.php/Especies\\_invasoras\\_-\\_Plantas](http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Plantas) [Accessed 30 July 2008]

**Spanish:**

La lista de especies del Sistema de información sobre especies invasoras de México cuenta actualmente con información acerca de nombre científico, familia, grupo y nombre común, así como como hábitat, estado de la invasión en México, rutas de introducción y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la página de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualización, por favor consulte la portada (<http://www.conabio.gob.mx/invasoras/index.php/Portada>), en la sección novedades, para conocer los cambios.

Especies invasoras - Plantas is available from: [http://www.conabio.gob.mx/invasoras/index.php/Especies\\_invasoras\\_-\\_Plantas](http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Plantas) [Accessed 30 July 2008]

Corley, R. N., Woldeghebriel, A. and Murphy M. R. 1997. Evaluation of the nutritive value of kudzu (*Pueraria lobata*) as a feed for ruminants. Animal Feed Sci. Tech. 68: 183-188.

**Summary:** Kudzu range.

Corley, R.N., Woldeghebriel, A. & Murphy, M.R. 1997. Evaluation of the nutritive value of kudzu (*Pueraria lobata*) as a feed for ruminants. Animal Feed Sci. Tech. 68:183-188.

**Summary:** Kudzu range.

Edmisten, J.A. & Perkins, H.F. 1967. The role and status of Kudzu in the southeast. Assoc. Southeastern Biologists Bull. 14: 27.

**Summary:** Kudzu biology.

Erdman, L.W. 1967. Legume inoculation: what it is; what it does. USDA Farmers Bulletin, #2003. 20 p.

**Summary:** Kudzu biology.

European and Mediterranean Plant Protection Organization (EPPO). 2007. Data sheets on quarantine pests: *Pueraria lobata*. Bulletin 37:230-235.

Everest, J. W., Miller, J. H., Ball, D. M. and Patterson, M. G. 2000. Kudzu in Alabama: history, uses, and control. Alabama Cooperative Extension Service, Circular ANR-65, 6 pp.

**Summary:** Kudzu general information.

Everest, J.W., Miller, J.H., Ball, D.M. & Patterson, M.G. 2000. Kudzu in Alabama: history, uses, and control. Alabama Cooperative Extension Service, Circular ANR-65, 6 p.

**Summary:** General information on kudzu.

Fankel, E. 1989. Distribution of *Pueraria lobata* in and around New York City. The Bulletin of the Torrey Botanical Club. 116(4): 390-394.

**Summary:** Kudzu range.

Fankel, E. 1989. Distribution of *Pueraria lobata* in and around New York City. The Bulletin of the Torrey Botanical Club 116(4): 390-394.

**Summary:** Kudzu range.

Forseth, I. N. and A. H. Teramura., 1987. Field photosynthesis, microclimate and water relations of an exotic temperate liana, *Pueraria lobata*, kudzu. *Oecologia* Volume 71, Number 2 / January, 1987  
 Forseth, I. N. and Teramura, A. H. 1986. Kudzu leaf energy budget and calculated transpiration: the influence of leaflet orientation. *Ecology* 67(2): 564-571.

**Summary:** Kudzu biology and ecology.

Forseth, I. N. and Teramura, A. H. 1987. Field photosynthesis, microclimate and water relations of an exotic temperate liana, *Pueraria lobata*, kudzu. *Oecologia* (Berlin) 71: 262-267.

**Summary:** Kudzu biology and ecology.

Forseth, I.N. Jr. and Innis, A.F. 2004. Kudzu (*Pueraria montana*): History, Physiology, and Ecology Combine to Make a Major Ecosystem Threat. *Critical Reviews in Plant Sciences*, 23(5):401-413 (2004)

Forseth, I.N. & Teramura, A.H. 1986. Kudzu leaf energy budget and calculated transpiration: the influence of leaflet orientation. *Ecology*. 67(2): 564-571.

**Summary:** Kudzu biology.

Forseth, I.N. & Teramura, A.H. 1987. Field photosynthesis, microclimate and water relations of an exotic temperate liana, *Pueraria lobata*, kudzu. *Oecologia* (Berlin). 71: 262-267.

**Summary:** Kudzu biology.

[Forseth, Jr., Irwin N.; Innis, Anne F. 2008. Kudzu \(\*Pueraria montana\*\): history, physiology, and ecology combine to make a major ecosystem threat. \*Critical Reviews in Plant Science\* 23\(5\): 401-413](#)

**Summary:** General information on kudzu. Available from: <http://dx.doi.org/10.1080/07352680490505150>. [Accessed 22 March, 2010]

Frankel, Edward., 1989. Distribution of *Pueraria lobata* in and Around New York City Bulletin of the Torrey Botanical Club, Vol. 116, No. 4 (Oct. - Dec., 1989), pp. 390-394 Torrey Botanical Society

Fujita, K., Matsumoto, K., Ofosu-Budu, G. K. and Ogata, S. 1993. Effect of shading on growth and dinitrogen fixation of kudzu and tropical pasture legumes. *Soil Science and Plant Nutrition* 39: 43-54.

**Summary:** Kudzu biology and ecology.

Fujita, K., Matsumoto, K. & Ofosu-Budu, G.K.; Ogata, S. 1993. Effect of shading on growth and dinitrogen fixation of kudzu and tropical pasture legumes. *Soil Science and Plant Nutrition*. 39:43-54.

**Summary:** Kudzu biology.

[Global Biodiversity Information Facility \(GBIF\), 2009. Species: \*Pueraria montana\* \(Lour.\)Merr. Kudzu Vine](#)

**Summary:** Available from: <http://www.gbif.net/species/13631777/> [Accessed 15 June 2010]

[Global Compendium of Weeds \(GCW\), 2007. \*Pueraria montana\* \(Fabaceae\)](#)

**Summary:** Available from: [http://www.hear.org/gcw/species/pueraria\\_montana/](http://www.hear.org/gcw/species/pueraria_montana/) [Accessed November 2 2009]

Halim R.A. 1992. *Pueraria phaseoloides* (Roxb.) Benth. In: [Mannetje L. and Jones R.M. \(Eds\), Plant Resources of South-East Asia No. 4](#) Forages. Pudoc Scientific Publishers, Wageningen, The Netherlands, pp. 192-195.

**Summary:** Kudzu range.

Heider, Bettina; Fischer, Elke; Berndt, Tanja; Schultze-Kraft, Rainer. 2006. Analysis of genetic variation among accessions of *Pueraria montana* (Lour.) Merr. Var. *lobata* and *Pueraria phaseoloides* (Roxb.) Benth. based on RAPD markers. *Genetic Resources & Crop Evolution*. 54(3). MAY 2007. 529-542.

Hickman, Jonathan E. 2007. COS 52-2: Changes in nitrogen cycling and greenhouse gas emissions following invasion by kudzu (*Pueraria montana*). State University of New York at Stony Brook and Manuel Lerda, University of Virginia.

**Summary:** Kudzu (*Pueraria montana*), a leguminous vine native to Asia, covers more than 3 million ha in the southeastern United States and is expanding its range northward. With its high rates of nitrogen fixation in its native range and high degree of nodulation and nitrogenase activity in the United States, it seems likely that kudzu invasion presents a substantial new source of nitrogen to these ecosystems and nitrogen oxide emissions to the atmosphere. To date, however, the impacts of kudzu invasion on nitrogen cycling and trace gas fluxes in the eastern United States have not been investigated. We examine kudzu's effect on nitrogen inputs to soil and nitrogen cycling at 3 pairs of invaded and uninvaded sites in Maryland. Newly senesced litter from kudzu contains significantly higher concentrations of nitrogen than that of co-occurring tree species, suggesting that kudzu represents a new source of organic nitrogen in these sites. Inorganic nitrogen in soils bears out this suggestion: nitrate levels were 4 times higher in sites invaded by kudzu in April, 2006, and remained higher throughout the growing season. We also found increases and trends toward increases in rates of nitrification, nitrogen mineralization, and denitrification enzyme activity. In spring, 2007, we started measurements of NO and N<sub>2</sub>O fluxes from invaded and uninvaded soils. Our data strongly suggest that kudzu is having significant impacts on the nitrogen cycling of invaded ecosystems, and potentially on regional air quality as well.

Hoots, D. and Baldwin, J. 1996. Kudzu: the vine to love or hate. Suntop Press, Kodak, TN, and Virginia Beach, VA. 154 pp.

**Summary:** Kudzu general information.

Hoots, D. & Baldwin, J. 1996. Kudzu: the vine to love or hate. Suntop Press, Kodak, TN, and Virginia Beach, VA.

**Summary:** General information on kudzu.

Inoue, T. and Fujita, M. 1977. Biosynthesis of puerarin in *Pueraria lobata* root. *Chem. Pharm. Bulletin* 25(12): 3226-3231.

**Summary:** Kudzu biology and ecology.

Inoue, T. & Fujita, M. 1977. Biosynthesis of puerarin in *Pueraria lobata* root. *Chem. Pharm. Bulletin*. 25(12): 3226-3231.

**Summary:** Kudzu biology.

[ITIS \(Integrated Taxonomic Information System\), 2005. Online Database \*Pueraria montana\* var. \*lobata\*](#)

**Summary:** An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.

Available from:

[http://www.cbif.gc.ca/pls/itiscat/taxastep?king=every&p\\_action=containing&taxa=Pueraria+montana+var.+lobata&p\\_format=&p\\_ifx=plgt&p\\_lang=](http://www.cbif.gc.ca/pls/itiscat/taxastep?king=every&p_action=containing&taxa=Pueraria+montana+var.+lobata&p_format=&p_ifx=plgt&p_lang=) [Accessed March 2005]

[ITIS \(Integrated Taxonomy Information System\), 2009. \*Pueraria montana\* \(Lour.\) Merr.](#)

**Summary:** An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals. Available from:

[http://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=504683](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=504683) [Accessed 3 November 2009]

[ITIS \(Integrated Taxonomy Information System\), 2009. \*Pueraria montana\* var. \*lobata\* \(Willd.\) Maesen & S. Almeida](#)

**Summary:** An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals. Available from:

[http://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=529930](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=529930) [Accessed 3 November 2009]

Jarnevich, C.S. & Stohlgren, T.J. 2009. Near term climate projections for invasive species distributions. *Biological Invasions* 11:1373-1379.

**Summary:** Kudzu biology.

Jewett, D.K., Jiang, C.J., Britton, K.O., Sun, J.H. & Tang, J. 2003. Characterizing specimens of kudzu and related taxa with RAPD markers. *Pueraria montana* (Lour.) Merr. var. *lobata* (Willd.) Maesen and Almeida. *Castanea* 68:254-260.

**Summary:** Kudzu biology.

[Langeland, K.A. and Burks, K. C \(Eds\) 1998. Identification and Biology of Non-Native Plants in Florida's Natural Areas, University of Florida. \*Pueraria montana\*](#)

**Summary:** Information on plants that pose threats to natural resource areas in Florida.

Available from: [http://www.fleppc.org/ID\\_book/pueraria%20montana.pdf](http://www.fleppc.org/ID_book/pueraria%20montana.pdf) [Accessed 30 December 2004]

Liu, C.J. 1985. Kudzu-a collection of literature. Tech. Report No. 8501, Dept. of Forestry. Univ. of Kentucky.

**Summary:** General information on kudzu.

Liu, C. J. 1985. Kudzu - a collection of literature. Tech. Report No. 8501, Dept. of Forestry. Univ. of Kentucky. 46 pp.

**Summary:** Kudzu general information.

McClain, W. 2000. The green plague moves north. *Outdoor Illinois* Feb: 8-10.

**Summary:** Kudzu range.

McClain, W. 2000. The green plague moves north. *Outdoor Illinois* Feb: 8-10.

**Summary:** Kudzu range.

Miller, J. H. and Edwards, B. 1983. Kudzu: where did it come from? And how can we stop it? *Southern Journal of Applied Forestry* 7: 165-169.

**Summary:** Kudzu general information.

Miller, J.H. & Edwards, B. 1983. Kudzu: where did it come from? And how can we stop it? *Southern Journal of Applied Forestry* 7:165-169.

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