

Data sheets on quarantine pests
Fiches informatives sur les organismes de quarantaine

Pueraria lobata

Identity

Scientific name: *Pueraria lobata* (Willdenow) Ohwi

Synonyms:

Dolichos lobatus Willdenow, *Dolichos hirsutus* Thunberg, *Pueraria hirsuta* (Thunberg) C. Schneider, *Pachyrrhizus thunbergianus* Siebold & Zuccarini, *Pueraria thunbergiana* (Siebold & Zuccarini) Benth

Taxonomic position: *Fabaceae*

Common names: kudzu, kudzu vine (English), kudzu, kudzu común (Spanish), kudzu, vigne japonaise (French), Kopoubohne (German)

Notes on taxonomy and nomenclature: three varieties have been described (var. *thomsonii* (Benth) Maesen, var. *chinensis* (Benth) Ohwi and var. *montana* (Loureiro) Maesen (Missouri Botanical Garden, 2006)

EPPO code: PUELO

Phytosanitary categorization: EPPO A2 List no. 341.

Geographical distribution

EPPO region: Italy, Switzerland

Asia: China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hong Kong, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang), Indonesia (Irian Jaya, Java, Nusa Tenggara), Japan (Hokkaido, Honshu, Kyushu, Ryukyu Archipelago), Democratic People's Republic of Korea, Republic of Korea, Malaysia (Peninsular Malaysia, Sarawak), Pakistan, Philippines, Taiwan, Thailand, Vietnam

Africa: Sierra Leone, South Africa

North America: Bermuda, USA (Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kansas, Louisiana, Maryland, Massachusetts, Mississippi, Missouri, Nebraska, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia)

Central America & Caribbean: Dominican Republic, Jamaica, Panama

South America: Brazil, Paraguay

Oceania: American Samoa, Australia (New South Wales,

Queensland), Fiji, Micronesia, New Caledonia, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu.

History of introduction and spread

P. lobata is native to eastern Asia (China, Japan, Korea). It was first imported into the USA in 1876 as an ornamental plant for gardens, and later promoted as nutritious forage for livestock. However, the yield is only 4–6 tons per ha per year and it is difficult to cut and bale (Everest *et al.*, 1991). In the 1930s and 1940s, *P. lobata* was actively planted in USA for erosion control, until it was recognized to be an invasive weed in the 1950s (Britton *et al.*, 2002). Over the same period, *P. lobata* was imported into various other countries (South America, Oceania, most recently Africa), where its invasive potential is now feared as a result of the experience of extensive planting in America. In the EPPO region, *P. lobata* has only recently been imported as a horticultural curiosity and has generally not escaped from cultivation. Very recently limited invasive outbreaks were found in Italy and Switzerland.

Morphology

Plant type

P. lobata is a climbing, semiwoody, deciduous, mat-forming, perennial vine.

Description

P. lobata has hairy dark brown stems up to 15 m long (Fig. 1). It forms large root tubers up to 2 m long and 18–45 cm wide that can weigh as much as 180 kg on old plants and can reach a depth of 1–5 m. Leaves are alternate with 3 leaflets (hairy on both surfaces) 8–20 cm long and 5–19 cm wide, usually slightly lobed (unless in shade) (Fig. 2). Flowers are pea-like, pink to purple with yellow centres, highly fragrant and borne in long hanging panicles (10–25 cm long) (Fig. 2). Fruit are brown hairy pods 2–3 cm long and 8–12 mm wide, splitting on one or both sides to release 3–10 seeds.



Fig. 1 *P. lobata* stems in Tronzano (Italy) in August 2006. With kind permission of Sebastiano Pron.



Fig. 2 Leaves and flowers of *P. lobata*. With kind permission of Sebastiano Pron.

Biology and ecology

General

Flowering occurs from June to September and is soon followed by the production of fruits from September to January. There is one seed crop per year. Vegetative growth can be very rapid (up to 26 cm per day or 15 m per growing season) and plants produce new roots where nodes contact soil. Most of the spread of *P. lobata* in the USA is due to vegetative growth because its seed production is poor.

Relatively little is known about the genetics of *P. lobata*. Research results support the hypothesis of multiple introductions into the USA from different sources in Japan or China, followed by subsequent gene exchange and recombination (Sun *et al.*, 2005). It is possible that the species has evolved further under human influence (anecophytic).



Fig. 3 *P. lobata* growing near Locarno (Switzerland) in June 2006. With kind permission of Sebastiano Pron.



Fig. 4 *P. lobata* growing near Magliaso (Switzerland) in August 2006. With kind permission of Sebastiano Pron.

Habitat

The plant is native to eastern Asia. Its typical natural habitat is broad-leaved or mixed forests, but it readily invades managed habitats such as road and rail embankments, pastures, conifer plantations, banks of inland water bodies. In its introduced range, it colonizes a wide variety of natural and seminatural habitats (Figs 3 & 4).

Environmental requirements

P. lobata is most favoured by conditions of at least 1000 mm precipitation per year, as well as high summer temperatures (over 27°C). It prefers deep, well-drained loamy soils but is able to establish under less favourable conditions. The plant is able to survive in frosted and shallow soils even though its roots cannot develop fully (Pron, 2006). It is relatively indifferent to soil pH. According to soil analyses in six locations in Switzerland, the plant can grow in soils with a soil pH from 3 to 8.

It requires full light, and will not grow in the shade. Though it requires moist soil, it can tolerate drought. Like most legumes, *P. lobata* 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 (1–6 cm deep) (Pron, 2006). It 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.

In Switzerland, all 29 infested sites are located in the warmer region of southern Switzerland, with an average annual temperature close to 11°C (Pron, 2006).

Climatic and vegetational categorization

The plant is recorded in the following climates in Koeppen's classification:

- hot and wet year round
- hot wet summer, hot dry winter (low sun period)
- warm to hot wet summer, cool dry winter
- hot wet summer, cool to cold wet winter (introduced range)
- warm wet summer, cold wet winter (introduced range)
- hot year round, unreliable precipitation (introduced range).

The plant is hardy to zone 7 (–18 to –12°C).

It is associated with the following vegetation zones:

- tropical rainforests
- tropical mountains and subtropical rainforests
- temperate steppes
- temperate zone deciduous forests.

Uses and benefits

In China and Japan, *P. lobata* is widespread in disturbed habitats, and is harvested for the starch which can be extracted from its roots. In 1977, Japanese production was approximately 338 tons annually (van der Maesen, 1985). However, the roots are laborious to collect and extract and a small starch factory in Anhui Province (China) failed in 1997 after only a few years' production. *P. lobata* is also grown in private gardens, where its leaves, shoots and flowers are harvested as a vegetable or for medicinal use (van der Maesen, 1985). However, these positive uses of the plant are not known in its introduced range. *P. lobata* was at one time planted as a forage crop (see *History of introduction and spread*), and for land improvement through nitrogen fixation and prevention of erosion. However, it is impossible to integrate *P. lobata* into rotational agriculture because it is persistent and difficult to remove (Britton *et al.*, 2002). In its introduced range, the only benefit of *P. lobata* is a very minor use as an ornamental.

Pathways of movement

Natural dispersal

In its native range, *P. lobata* spreads locally by runners, and over moderate distances by dispersal of seeds by mammals and birds. In its introduced range, little seed is set, so natural spread is limited. In Switzerland, plant waste has been found in many

infested sites, therefore garden waste is thought to be a pathway (Pron, 2006).

The main potential pathway for entry of the plants into new areas is the movement and sale of plants for horticulture and agriculture.

Impact

Effects on plants

As a rapidly growing vine, *P. lobata* can cover and smother orchard and plantation crops, including young forest plantations. Estimates of financial losses in the USA have been made by Dr C. Dangerfield (University of Georgia, forest economist): 'losses vary with the potential use of the land in an uninfested state. Where productive forest land has been overtaken, lost productivity is estimated at about 120 USD per ha per year. The present net value of an average stand of pines grown on cut-over land for 25 years in the south-east is approximately 1500 USD per ha. *P. lobata* control costs exceed 450 USD per ha per year for five years' (Britton *et al.*, 2002). Soybean rust (*Phakopsora pachyrhizi*) is common on *P. lobata* in areas close to soybean fields in Brazil and Paraguay (Poolpol & Pupipat, 1985; Morel, 2003). A *Phytophthora* species was also isolated from infected root and foliar parts of *P. lobata* in the Republic of Korea (YW Lee, Seoul National University, Suwon, Republic of Korea, pers. comm., 2003). The pest could therefore be a reservoir for soybean rust and *Phytophthora* species.

Environmental and social impact

P. lobata is typically a pest of managed or disturbed habitats, where it smothers planted trees and forms monospecific stands. This behaviour is seen both in its native range and in its introduced range. Potential for damage is high because monospecific stands of *P. lobata* can cover shrubs and trees, shading, smothering and completely replacing native vegetation. Few plants can survive once smothered by *P. lobata* and small ecosystems could be radically altered. The plant quickly develops, rapidly covering the soil, affecting indigenous plants and completely modifying the structure of the ecosystem (Clabassi *et al.*, 2003).

P. lobata is invading National Parks in the USA and when it does encroach on natural areas it kills trees and plants by growing over them.

According to a study based on phytosociological surveys, Pron (2006) found that there was a reduction in the number of species in invaded places: while 20–25 species grew in 4 m² of non-invaded meadow or forest, only 6–9 species grew in 4 m² invaded by *P. lobata*. Moreover, light indicators were lower under the cover of *P. lobata*, while temperature indicator values were higher.

A reduction of the number and diversity of arthropods has also been identified in invaded sites. Near Magliaso, while a total of 262 arthropods (corresponding to 17 taxa) were found

in uninvaded forests, only 187 arthropods (corresponding to 12 taxa) were found in invaded sites. The number of mites, beetles, ants and springtails decreased in invaded sites, while the number of *Glomerida* and *Myriapoda* feeding on litter augmented.

Summary of invasiveness

P. lobata has negative effects on crop production, forestry production and the natural environment, as it smothers existing flora. It has been highly invasive in the south-eastern USA, where it was extensively planted in the 1930s and 1940s for erosion control. Although its natural spread is not very rapid, it is readily spread by man. Once introduced into an area, it is difficult to control or eradicate. Though favoured by rather hotter and wetter climates than those of Europe, the plant is established in Switzerland and it seems likely that it can establish in the EPPO region and cause local harm to natural and seminatural habitats.

Control

Cultural control

Repetition of cultural methods can be effective in certain situations. Monthly close mowing for two growing seasons can be successful in flat open areas (Ball *et al.*, 1979). Equally, heavy grazing by cows, pigs, horses or goats (Rhoden *et al.*, 1991) can remove *P. lobata*. However, there are associated problems since the 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 & Edwards, 1983). Although *P. lobata* is nutritious for livestock, cattle do not favour it when it is trampled and horses need to become adapted to it (Hintz, 1993).

Combinations of cultural methods can be effective. In 1967, the St Regis Paper Co. converted land in Stewart County (Georgia, US) which was partially overrun with *P. lobata*, to a pine plantation by burning the weed after it was killed by autumn frost. Merchantable timber was removed and unmarketable trees were knocked down so *P. lobata* could not grow over them. The land was stocked with cattle for two years until no *P. lobata* remained on the flat areas. Plants growing in gullies where the cows could not reach them were treated with herbicide. *Pinus taeda* seedlings were planted in pasture areas. As a result, yield from areas formerly covered by *P. lobata* exceeded yield from adjacent areas where it had not been present. Soil samples from the two areas showed that the *P. lobata* soil was richer in organic matter and had higher levels of all elements tested for except phosphorus.

Chemical control

Effective control of *P. lobata* with herbicides is possible but may require repeated application over a period of 4–10 years (Nelson, 1997). Many herbicides have been tested. Selection

of an appropriate treatment depends on several factors including: age and vigour of *P. lobata*, roughness of the terrain, proximity to streams or ponds and the value of other crops or trees present on the site. As with cultural control, *P. lobata* will regrow if even a single root crown is left untreated. Several procedures can improve the effectiveness of herbicide treatment. Prescribed burning early in the spring will kill small plants and sever stems draped over trees. The size of root crowns indicates the age of the patch of *P. lobata*. Typically, patches more than 10 years old require twice as much herbicide as younger patches (Miller, 1991). If possible, trees should be logged prior to treatment and draping stems should be severed.

Biological control

Biological control is potentially an important element of an integrated management system for *P. lobata*, but is only at the experimental stage so far.

Approximately 25 species of insect have been observed feeding on *P. lobata* (Pemberton, 1988; Britton *et al.*, 2002). Of these, seven coleoptera are not specific to *P. lobata* (*Deporaus* sp., *Alcidodes trifidus*, *Sagra femorata*, *Aristobia hispida*, *Paraleprodera diopthalma*, *Anomala corpulenta* and *Epicauta chinensis*); the others are still under investigation and include symphytans, chrysomelids, curculionids, cerambycids, scarabaeids and buprestids (Britton *et al.*, 2002). In Japan, at least three hemipterans, a parasitoid wasp and two mites develop on or are associated with *P. lobata* (Takasu & Hirose, 1986; Tayutivutikul & Yano, 1990; Shimoda *et al.*, 1997). There are several reports on the Internet of arthropods that can live on *P. lobata* but are not considered potential control agents, including the lepidopterans *Pseudoplusia includens* (Kidd & Orr, 2001), *Epargyreus clarus* in the USA (Lind *et al.*, 2001) and *Anticarsia gemmatalis* (Fescemyer & Erlandson, 1993). In the USA, native hemipterans feed on the pods and the seeds are eaten by a naturalized Asian bruchid *Borowiecius ademptus* (Thornton, 2001).

A number of pathogens of this plant in North America may have potential for use as biological control agents in the USA (Jiang *et al.*, 2000). *Pseudomonas savastanoi* pv. *phaseolicola* is a widespread pathogen of legumes, particularly *Phaseolus* spp. Zidak & Backman (1996) found that it was capable of causing mortality of *P. lobata* seedlings, but that it had a very limited potential to cause secondary leaf or pod infections under dry conditions in the field. Boyette *et al.* (2001, 2002) tested the widespread *Myrothecium verrucaria*, isolated in 1997 from infected *Senna obtusifolia*. This showed potential for biological control of various weed species when formulated, even in the absence of environmental dew (Walker & Tilley, 1997). In the USA, various *Alternaria* and *Fusarium* spp. are being developed as potential biocontrol agents against a variety of weeds and have been tested against *P. lobata*. In glasshouse and field experiments, seedling mortality was achieved with preparations of *A. helianthi*, *F. solani* and *F. polyphialidicum* (Abbas *et al.*, 1995a, b, 1996a, b; Abbas & Boyette, 1996).

Pathogens from the native range of *P. lobata* could be considered, but most attack other legumes including cultivated species. Six fungal pathogens have been isolated from *P. lobata* in Anhui Province (China). A common disease called ‘imitation rust’ is caused by the fungus *Synchytrium puerariae*. This pathogen can infect all plant tissues including leaves, stems, flowers and seed pods. Other pathogens included *Pseudocercospora puerariicola*, the cause of angular leafspot; *Cercospora puerario-thomsona*, the cause of brown spot; and *Phomopsis* sp., *Colletotrichum lindemuthianum* and another *Colletotrichum* sp., causal agents of anthracnose. Virus diseases such as leaf mottling and mosaic disease are found in some parts of China (Jiang *et al.*, 2000).

Possibilities for eradication

A few small infestations have been eradicated in Oregon (Colquhoun, 2000).

Regulatory status

Pueraria lobata is declared as a ‘Noxious Weed’ in the USA, in the states of Florida, Illinois, Kansas, Mississippi, Missouri, Pennsylvania, Texas and West Virginia. It is stated as being harmful in Connecticut, Oregon and Washington. It is also of concern in South Africa. In 2006, *P. lobata* was recommended for regulation in the EPPO region as an A2 pest. Suggested measures are contained in EPPO Standard PM 3/67 (OEPP/EPPO, 2006) with a particular emphasis on: the obligation to report findings, publicity, surveillance, establishment of an action plan for eradication when the plant is found.

References

- Abbas HK & Boyette CD (1996) Control of morning glory species using *Fusarium solani* and its extracts. *International Journal of Pest Management* **42**, 235–239.
- Abbas HK, Duke SO, Shier WT, Badria FA, Ocamb OC, Woodward RP, Xie W & Mirocha CJ (1996a) Comparison of ceramide synthase inhibitors with other phytotoxins produced by *Fusarium* species. *Journal of Natural Toxins* **6**, 163–181.
- Abbas HK, Egley GH & Paul RN (1995a) Effect of conidia production temperature on germination and infectivity of *Alternaria helianthi*. *Phytopathology* **85**, 677–682.
- Abbas HK, Tanaka T & Duke SO (1995b) Pathogenicity of *Alternaria alternata* and *Fusarium moniliforme* and phytotoxicity of AAL-toxin and fumonisin B1 on tomato cultivars. *Journal of Phytopathology* **143**, 329–334.
- Abbas HK, Johnson BJ & Egley GH (1996b) Biological control of common cocklebur by *Alternaria helianthi*. *Proceedings of the Second International Weed Control Congress*, pp. 1129–1134. Copenhagen (DK).
- Abbas HK, Johnson BB, Shier WT, Tak H, Jarvis BB & Boyette CD (2002) Phytotoxicity and mammalian cytotoxicity of macrocyclic trichothecene mycotoxins from *Myrothecium verrucaria*. *Phytochemistry* **59**, 309–313.
- Ball DM, Walker RH & Dickens R (1979) *Kudzu in Alabama – Uses and Control*. Forage Production Fact Sheet. Alabama Cooperative Extension Service, Auburn University, Auburn (US).
- Boyette CD, Abbas HK & Walker HL (2001) *Control of Kudzu with a Fungal Pathogen Derived from Myrothecium verrucaria*. U.S. Patent. 6 274 534 B1, August 14, 2001, 1–6.
- Britton KO, Orr D & Sun J (2002) Kudzu. In *Biological Control of Invasive Plants and Weeds in the Eastern United States* (ed. van Driesche, R, Blossy, B, Hoddle, M, Lyon, S & Reardon, R). USDA Forest Service Publication FHTET-2002–04 (US). <http://www.invasive.org/eastern/biocontrol/25Kudzu.html> [accessed on 13 November 2006]
- Clabassi I, Tomé A & Otto Stefan Zanin Giuseppe (2003) [Detection of a new potential invasive plant: *Puararia montana*.] *Informatore Fitopatologico* **9**, 30–33 (in Italian).
- Colquhoun J (2000) Another newcomer: kudzu (*Pueraria lobata*) invades Oregon. *Crop and Soil News/Notes* **14**, 3. Oregon State University Extension Service, Oregon (US).
- Everest JW, Miller JH, Ball DM & Patterson MG (1991) *Kudzu in Alabama: History, Uses and Control*. Alabama Cooperative Extension Service, Auburn (US). <http://www.aces.edu/departments/ipm/kudzu.htm> [accessed in February 2006]
- Fescemyer HW & Erlandson CM (1993) Influence of diet on the density-dependent phase polymorphism of velvetbean caterpillars (Lepidoptera: Noctuidae). *Environmental Entomology* **22**, 933–941.
- Hintz HF (1993) Kudzu. *Equine Practice* **15**, 5–6.
- Jiang Z, Xi P, Sun J & Britton KO (2000) Diseases of kudzu in China. *Phytopathology* **90**, S39.
- Kidd KA & Orr DB (2001) Comparative feeding and development of *Pseudoplusia includens* (Lepidoptera: Noctuidae) on kudzu and soybean foliage. *Annals of the Entomological Society of America* **94**, 219–225.
- Lind EM, Jones MT, Long JD & Weiss MR (2001) Ontogenetic changes in leaf shelter construction by larvae of *Epargyreus clarus* (Hesperiidae). *Journal of the Lepidopterists' Society* **54**, 77–82.
- Miller JH (1991) Control kudzu on your land. *Forest Farmer* **51**, 7–11.
- Miller JH & Edwards B (1983) KUDZU: where did it come from? And how can we stop it? *Southern Journal of Applied Forestry* **7**, 165–169.
- Missouri Botanical Garden (2006) W³TROPICOS program, release 1.5. Missouri (US). <http://mobot.mobot.org/W3T/Search/vast.html> [accessed on 19 April 2007]
- Morel W (2003) *Soybean rust characteristics on kudzu*. USDA APHIS PPQ, USA. http://www.aphis.usda.gov/ppq/ep/soybean_rust/detection4.html [accessed on 13 November 2006]
- Nelson LR (1997) *Kudzu Eradication Guidelines*. Department of Forest Resources, Clemson University, South Carolina (US). <http://www.clemson.edu/extfor/publications/ec656> [accessed on 13 November 2006]
- Pemberton RW (1988) Northeast Asia as a source for biological control agents for North American weeds. In *Proceedings of the VII International Symposium on Biology Control of Weeds* (ed. Delfosse E), pp. 651–657. Istituto Sperimentale per la Patologia Vegetale, Rome (IT).
- Poolpol U & Pupipat U (1985) Morphology, development, induced teliospore formation and host range of *Phakopsora pachyrhizi*. *Soybean Rust Newsletter* **7**, 26–27.
- Pron S (2006) *Ecology, distribution and evaluation of the exotic liana Pueraria lobata (Willd.) Ohwi (Fabaceae) in southern Switzerland*. Thesis. Department of Environmental Sciences. Swiss Federal Institute of Technology, Zurich (CH).
- Rhoden EG, Woldegebriel A & Small T (1991) Kudzu as a feed for Angora goats. *Tuskegee Horizons* **2**, 23.
- Shimoda T, Shinkaji N & Amano H (1997) Prey stage preference and feeding behaviour of *Oligota kashmirica benefica* (Coleoptera: Staphylinidae), an insect predator of the spider mite *Tetranychus urticae* (Acari: Tetranychidae). *Experimental and Applied Acarology* **21**, 665–675.
- Shores M (2006) *The Amazing Story of Kudzu*. Centre for Public Television and Radio. University of Alabama (US). <http://www.alabamatv.org/kudzu/> [accessed on 13 November 2006]
- Sun JH, Li ZC, Jewett DK, Britton KO, YeWH & Ge XJ (2005) Genetic diversity of *Pueraria lobata* (kudzu) and closely related taxa as revealed by inter-simple sequence repeat analysis. *Weed Research* **45**, 255.

- Takasu K & Hirose Y (1986) Kudzu-vine community as a breeding site of *Ooencyrtus nezarae* Ishi (Hymenoptera: Encyrtidae), an egg parasitoid of bugs attacking soybean. *Japanese Journal of Applied Entomology and Zoology* **30**, 302–304.
- Tayutivutikul J & Yano K (1990) Biology of insects associated with the kudzu plant, *Pueraria lobata* L. *Megacopta punctissimum* (Hemiptera, Plataspidae). *Japanese Journal of Entomology* **58**, 533–539.
- Thornton MR (2001) *Arthropod fauna associated with kudzu (Pueraria lobata) in North Carolina*. MSc Thesis. North Carolina State University, Raleigh (US).
- van der Maesen LGJ (1985) *Revision of the Genus Pueraria DC with Some Notes on Teyleria Backer*. Papers no 85. Agricultural University Wageningen. Wageningen, (NL).
- Walker HL & Tilley AM (1997) Evaluation of an isolate of *Myrothecium verrucaria* from sicklepod (*Senna obtusifolia*) as a potential mycoherbicide agent. *Biology Control* **10**, 104–112.
- Zidak NK & Backman PA (1996) Biological control of Kudzu (*Pueraria lobata*) with the plant pathogen. *Pseudomonas Syringae* Pv *Phaseolicola*. *Weed Science* **44**, 645–649.

Appendix

References for geographical distribution

Australia

Australia's Virtual Herbarium (2001 onwards) <http://www.rbg.vic.gov.au/cgi-bin/avhpublic/avh.cgi> [accessed in November 2006].

Italy

Clabassi I, Tomé A, Otto S & Zanin G (2003) [Detection of a new potential invasive plant: *Puararia montana*.] *Informatore fitopatologico* **9**, 30–33 (in Italian).

Switzerland

Buholzer S, pers. comm. (2006).

USA

USDA-Plants Database (2006) Plants profile: *Pueraria montana* (Lour.) Merr. – kudzu. <http://plants.usda.gov/java/profile?symbol=PUMO> [accessed in February 2006]