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ORGANISATION EUROPEENNE ET MEDITERRANEENNE
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Report of a Pest Risk Analysis

This summary presents the main features of a Pest Risk Analysis which has been conducted on *Pueraria montana* var. *lobata*, according to the EPPO Decision Support Scheme.

Pest:	<i>Pueraria montana</i> var. <i>lobata</i> (Willd.) Sanjappa & Pradeep
PRA area:	EPPO region
Assessors:	Gritta Schrader (DE), EPPO Secretariat
Date:	First PRA 2002-08, revised 2006-05
Reviewed:	Panel on IAS 2006-05-16/19 (editorial modifications by EPPO Secretariat 2007-01) Species name revision 2015-06-08
Reason for doing PRA:	This plant has been intentionally introduced in Italy and Switzerland. A request for the intentional introduction of the plant from the USA. for research purposes was made by Germany. Most EPPO Countries are still free from the pest.
Taxonomic position of pest:	<i>Plantae, Fabaceae</i>
<u>Entry</u>	
<u>Geographical distribution:</u>	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), Korea Democratic People's Republic, the Republic of Korea, Malaysia (Peninsular Malaysia, Sarawak), Pakistan, the Philippines, Taiwan, Thailand, Vietnam. Africa: Sierra Leone, South Africa. North-America: Bermuda, the 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, Texas, Tennessee, 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, Vanuatu, Tonga.
<u>Major host plants or habitats:</u>	Main habitats are pastures, woodland edges, or woodlands without dense canopy, riverbanks / canalsides (dry river beds), road and rail networks and associated land, banks of continental water, gardens, wastelands, abandoned farm land where sunlight is abundant.

Which pathway(s) is the pest likely to be introduced on: Intentional introduction:
- for horticulture,
- for agriculture (for livestock fodder, erosion control, nitrogen fixing),
Unintentional introduction with garden waste has not been considered in the assessment.

Establishment

Plants or habitats at risk in the PRA area: All suitable habitats mentioned in the entry section are present in the PRA area

Climatic similarity of present distribution with PRA area (or parts thereof): The climatic conditions are slightly similar. It is already established in Italy and in Switzerland.

The plant would probably survive under various climatic conditions, nevertheless, invasiveness is most likely where there are mild winters together with hot and wet summers with abundant sunlight. *P. montana var. lobata* can survive very cold winters but this reduces growth and spread.

Aspects of the pest's biology that would favour establishment: The plant succeeded in establishing in the USA mostly by vegetative reproduction.

Characteristics (other than climatic) of the PRA area that would favour establishment: *P. montana var. lobata* grows well under a wide range of conditions and in most soil types.

Which part of the PRA area is the endangered area: The endangered part of the PRA area corresponds to areas with high temperatures and high rainfalls. Such suitable conditions may be found at low altitudes in valleys and lowlands of the Pyrenees and the Alps for instance. Southern parts of the EPPO region seem to be at greatest risk (see maps in Annexe 1).

How much economic impact does the pest have in its current area of distribution: Very high. In the USA., about 2.8 million hectares are so massively overgrown by *P. montana var. lobata*, that the decrease of productivity in the forestry sector is estimated at 340 million US-Dollars per year. Costs for chemical control are incurred. Monospecific stands of *P. montana var. lobata* can cover shrubs and trees, shading, smothering and completely replacing native vegetation. Few plants can survive once smothered by *P. montana var. lobata* and small ecosystems could be radically altered. The plant can develop rapidly covering the soil, affecting indigenous plants and completely modifying the structure of the ecosystem. Enrichment of nitrogen may permanently alter the chemical balance in the ecosystem. In some areas, biodiversity is greatly reduced by the monospecific stands of *P. montana var. lobata*, the fauna becomes also impoverished. Recreational facilities are overgrown; the weight of the *P. montana var. lobata* vines on power and phone lines can cause serious problems for these utilities due to short circuiting of power.

Describe damage to potential hosts/ habitats in the PRA area: Under favourable growing conditions the plant could cause similar damage as those in the current area of distribution.

How much economic impact would the pest have in the PRA area: Similar impacts are expected to those in the current area of distribution. Under favourable conditions, the environmental impact in the endangered area is expected to be massive.

Estimate the probability of entry:	The species is already established in Switzerland and Italy. The plant is also recorded as traded in Europe.
Estimate the probability of establishment:	The plant is already naturalized in Italy. The probability of establishment in suitable areas of the EPPO region is high (see endangered area).
Estimate the potential economic impact:	<i>P. montana var. lobata</i> could significantly reduce biodiversity. Important impacts are: reduction of endangered species, significant reduction displacement or elimination of other species; indirect effects on plant communities (species richness, biodiversity); significant effects on designated environmentally sensitive areas Cost of control in man-made sites are high.
Degree of uncertainty	The endangered part of the PRA area should be defined more precisely. Capacity of seeds to germinate.
OVERALL CONCLUSIONS	The plant has already entered the EPPO region and is invasive under favourable conditions. This justifies that management options should be identified to prevent further introduction or spread of the plant in the EPPO region.

STAGE 3: PEST RISK MANAGEMENT

IDENTIFICATION OF THE PATHWAYS

Pathways studied in the pest risk management

Pathway:

Intentional introduction as an ornamental plant

IDENTIFICATION OF POSSIBLE MEASURES

Pathway1 : Intentional introduction as an ornamental plant

No essential interest is served by continuing trade of *P. montana var. lobata*. Its overall value is minor, and comparable non-invasive plants are available. Further trade, introduction and movement could have negative economic and environmental impacts, which may be irreversible. Without a strict preventive approach, more invasions are foreseeable. Therefore, the following measures/requirements are proposed:

- publicity
- introduction into and spread within EPPO member countries should be prohibited (by prohibition of import, sale, holding, planting, and movement)
- obligation to report findings
- monitoring/surveillance
- emergency plan
 - establishment of an action plan and eradication, when the plant is found
- proposal of alternative species for planting

Garden waste and soil movement have not been considered as there is uncertainty on their importance as pathways.

EVALUATION OF THE MEASURES IDENTIFIED IN RELATION TO THE RISKS PRESENTED BY THE PATHWAYS

Degree of uncertainty The degree of uncertainty is low

CONCLUSION:

Recommendation for possible measures for the endangered area:

Plants of <i>Pueraria montana var. lobata</i>	<u>Prohibited</u> (see also recommendations for internal measures)
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Annexe 1

Potential Geographical Distribution of *Pueraria montana var. lobata*

The CLIMEX model is a computer programme aiming at predicting the potential geographical distribution of an organism considering its climatic requirements. It is based on the hypothesis that climate is an essential factor for the establishment of a species in a country.

This documents aims at predicting the potential geographical distribution of *P. montana var. lobata* in the EPPO region if no measure is taken to limit its spread.

The CLIMEX “match climate” function: knowing where the species is present, CLIMEX compare a location where the species is known to be present and extrapolate it to the area of study. This method was used in the present document.

The “match climates” function in CLIMEX, a computer programme that compares climate in different locations and predicts potential distribution based on current distribution and climate, was used to provide a basic comparison of the climates at these locations with those in the rest of the world and in the Euro-Med area. Climate is represented by the 1961-90 30 minute latitude/longitude resolution world climatology (New *et al.*, 1999). Outputs from CLIMEX were imported into a geographical information system (ArcView) and mapped.

It is important to stress that the CLIMEX Match Index maps should be used with great care in predicting the potential distribution of *P. montana var. lobata* because:

- Distribution depends on many other factors apart from climate,
- The composite Match Index algorithm used by CLIMEX is based on differences in maximum, minimum and mean temperatures, annual rainfall, rainfall pattern, relative humidity and soil moisture. These factors, the relationship between them and the algorithm employed by CLIMEX may not necessarily be relevant for *P. montana var. lobata*.

Figure 1: Euro-Med map of the CLIMEX Match Index based on Croglia, Switzerland (45.9°N, 8.8°W)

Figure 2: Euro-Med map of the CLIMEX Match Index based on Trieste, Italy (45.6°N, 13.8°W)

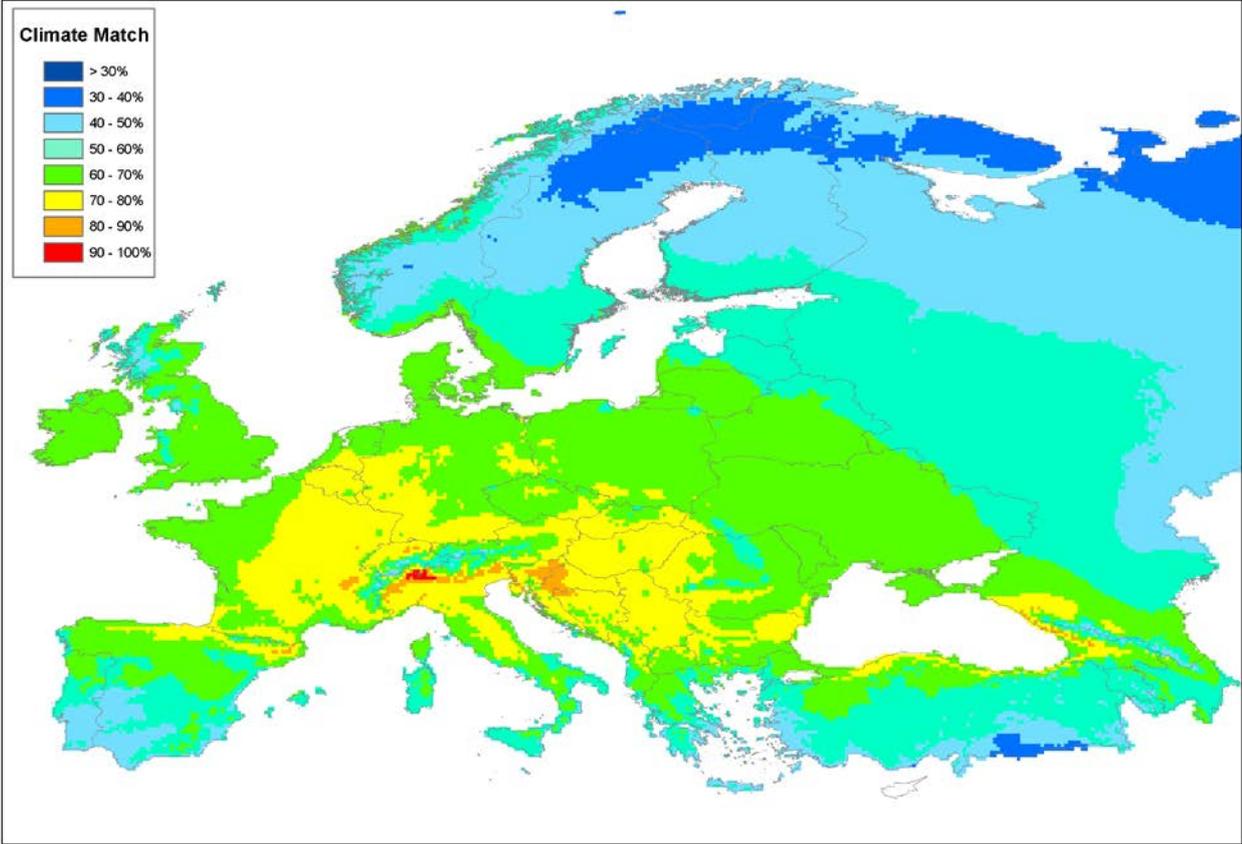
References

CLIMEX (2004) Version 2.0 <http://www.hearne.co.uk/climex/>

New M, Hulme M, Jones PD (1999) Representing twentieth century space-time climate variability. Part 1: Development of a 1961-90 mean monthly terrestrial climatology. *Journal of Climate*, **12**: 829-856.

Prepared by Richard Baker, Central Science Laboratory, York UK, 31.5.2006

CLIMEX MATCH INDEX, Based on Croglio, Switzerland (45.9°N, 8.8°W)



CLIMEX MATCH INDEX, Based on Trieste, Italy (45.6°N, 13.8°W)

