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Agence canadienne  
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**DRAFT**

**Pest Risk Management Document for *Pueraria montana* (kudzu) in Canada**



Kudzu in Ontario, Photo courtesy of Diana Mooij, Canadian Food Inspection Agency 2009.

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## EXECUTIVE SUMMARY

This risk management document (RMD) is part of a three step pest risk analysis process examining the risk associated with importation and trade of commodities, and equipment that may be contaminated with *Pueraria montana*, commonly known as kudzu. This RMD includes a summary of the findings of a pest risk assessment and identifies policy alternatives and a recommended risk management decision. *Pueraria montana* has been identified to pose an important threat to the environment, the economy, and biodiversity in Canada.

*Pueraria montana* is a perennial, deciduous, semi-woody vine with stems that can grow up to 10 to 30 metres in length and 10 centimetres in diameter. It is native to Asia as well as parts of Oceania. Its introduced range includes the Ukraine, Caucasus, central Asia, southern Africa, South America, parts of Oceania, the United States (U.S.), Hispaniola and Panama. The first incursion of *Pueraria montana* in Canada was detected in September 2009, in southwestern Ontario.

The intentional movement and planting of *Pueraria montana* is recognized as the primary potential pathway for entry into Canada. In the U.S. introductions have had direct negative economic consequences on industries reliant on the production of trees and shrubs, such as orchards, nurseries, Christmas tree plantations and regeneration sites where economic losses have been estimated at between \$100 and \$500 million annually. *Pueraria montana* germinates early and can quickly form a dense carpet of vegetation over seedlings and shrubs, causing defoliation, mechanical damage, and mortality. Potential indirect economic impacts include increased costs of control to a variety of sectors such as the transportation industry, parks and recreation, and home gardens. Potential environmental and social consequences of *Pueraria montana* include negative effects on biodiversity in infested areas, altered soil nutrient cycles, and decreased air quality. *Pueraria montana* var. *lobata* is recognized as one of the “World’s Worst 100 Invasive Alien Species”.

The Canadian Food Inspection Agency (CFIA) recommends regulating *Pueraria montana* as a quarantine pest under the *Plant Protection Act*, placing this plant on the *List of Pests Regulated by Canada*, and regulating the plant as a prohibited noxious weed under the *Weed Seeds Order of the Seeds Act*. These are cost-effective measures that will provide the CFIA with authority to prevent and respond to incursions of *Pueraria montana* in Canada. The recommendation to prohibit importation of *Pueraria montana* represents a joint decision among affected sections within the Plant Health and Biosecurity Directorate, and is supported by recommendations from the Plant and Biotechnology Risk Assessment Unit, Science Division, CFIA. Preventing introductions of *Pueraria montana* into Canada should be a priority as it is very difficult to control once established.

Stakeholder views on the recommended risk management decision are herein being solicited on the options presented for the effective management of risk.

### ***Preface***

*As described by the International Plant Protection Convention (IPPC), Pest Risk Analysis (PRA) includes three stages: initiation, pest risk assessment and pest risk management. Initiating the PRA process involves identifying pests and pathways of concern and defining the PRA area. Pest risk assessment provides the scientific basis for the overall management of risk. Pest risk management is the process of identifying and evaluating potential mitigation measures which may be applied to reduce the identified pest risk to acceptable levels and selecting appropriate measures. Pest risk communication is an additional component of PRA that is common to all stages of the PRA process.*

*This Risk Management Document (RMD) includes a summary of the findings of a pest risk assessment and records the pest risk management process for the identified issue. It is consistent with the principles, terminology and guidelines provided in the IPPC standards for pest risk analysis which may be found at [IPPC](#) website.*

## **1.0 PURPOSE**

The purpose of this document is to examine, with affected stakeholders, the options for mitigating the risks associated with the introduction of *Pueraria montana* (Lour.) Merr. (kudzu) into Canada.

## **2.0 SCOPE**

This Risk Management Document (RMD) examines the risks associated with the introduction of *Pueraria montana* (kudzu) into Canada and outlines potential risk management options. It focuses on the phytosanitary risks associated with the plant itself. Pest risk analysis of pests that may be associated with the plant is not within the scope of this document.

### **Additional points for consideration:**

1. Prior to use as human food, new plants and/or derived products that fit the definition of a novel food require approval under the authority of the *Food and Drugs Act* from Health Canada.
2. Prior to use as livestock feed, new plants and/or derived products must be assessed and approved by the Animal Feed Division, CFIA under the authority of the *Feeds Act* and Regulations. A positive list of approved ingredients can be found in Schedules IV and V of the *Feeds Regulations*.
3. Release (e.g. cultivation) of new plants into the Canadian environment may require prior approval under the authority of the *Seeds Act* and the *Seeds Regulations* from the Field Crops Division, CFIA.
4. The importation and sale of seed in Canada must meet the requirements of the *Seeds Act and Regulations* and *Weed Seeds Order*.

5. Plant species that are new to Canada and plant species that are endangered or threatened, must comply with Environment Canada regulations before applying for a Permit to Import from CFIA.

6. In addition to the mitigation measures suggested in this document, imported commodities likely to contain *Pueraria montana* must meet the phytosanitary requirement for other regulated organisms, as stated in CFIA's Plant Protection Policies and Directives (<http://www.inspection.gc.ca/english/plaveg/protect/dir/directe.shtml>).

### 3.0 DEFINITIONS

Definitions for terms used in this document can be found in the Plant Health Glossary of Terms at [www.inspection.gc.ca/english/plaveg/protect/dir/glosterme.shtml](http://www.inspection.gc.ca/english/plaveg/protect/dir/glosterme.shtml) or the IPPC Glossary of Phytosanitary Terms at [www.ippc.int](http://www.ippc.int).

### 4.0 BACKGROUND

- The CFIA has initiated a Least Wanted Invasive Plants project in order to expand on its efforts to prevent the introduction and spread of invasive plants in Canada. The goal of this project is to identify Canada's "least" wanted plants and regulate them as quarantine pests under the *Plant Protection Act* and *Regulations*. *Pueraria montana* is being considered for regulation as part of the Least Wanted Invasive Plants project.
- This project builds on past efforts to prevent the introduction of invasive plants and weeds into Canada under the *Plant Protection Act* and the *Weed Seeds Order* under the *Seeds Act*.
- Invasive plants are plant taxa that spread when introduced outside of their natural past or present distribution and cause serious and often irreversible damage to Canada's ecosystems, economy and society.
- A quarantine pest is a pest of potential economic importance, not yet present in Canada or present but not widely distributed and under official control.
- *Pueraria montana* is not native to Canada (CFIA 2008a). The first confirmed naturalized population was detected in Canada in September 2009 in southern Ontario along the shore of Lake Erie.
- The CFIA is carrying out this project as part of its commitment to limit the introduction and spread of invasive plants under *An Invasive Alien Species Strategy for Canada* (Government of Canada 2004). The Strategy aims to reduce the risk of invasive species to the environment, economy, and society, and to protect environmental values such as

biodiversity and sustainability.

Britton et al. (2002) summarized the history of *Pueraria montana* in the U.S. Kudzu (*Pueraria montana* var. *lobata*) was originally introduced into the U.S. as an ornamental vine at the Philadelphia Centennial Exposition in 1876. Through the early 1900s it was promoted as fodder and in the 1930s and 1940s as a means of holding soil on eroding gullies. Between 1935 and 1941, *Pueraria montana* seedling nurseries produced and distributed more than 73 million seedlings. By the 1950s, *Pueraria montana* was recognized as an invasive weed in the U.S. and listed as a Federal Noxious Weed in 1998 by the U.S. Congress. When the U.S. *Plant Protection Act* of 2000 was enacted, *Pueraria montana* was deregulated as it was determined it was too widely distributed in the United States.

*Pueraria montana* has been reported in Washington State about 440 kilometers from the Canadian border near White Rock, British Columbia. The [North American Plant Protection Organization Phytosanitary Alert System](#) posted the following alert in January of 2002: “Four specimens of kudzu, *Pueraria montana*, popularly coined the "plant that ate the south", were found at a privately owned site near Vancouver, Washington, in the southwestern part of the state. The plants were promptly destroyed and an initial survey of surrounding properties did not find additional infestations. The closest incidence of *Pueraria montana* to Washington State was in late 2000, when a *Pueraria montana* patch of about half an acre was found in Clackamas County, Oregon, the first occurrence of this vine west of Texas.”

Prior to the 2009 incursion detected in southern Ontario, the closest incursion of *Pueraria montana* into Canada was in the State of New York. In November 2005, *Pueraria montana* was found within the city of Albany, New York, by a forester for the New York State Department of Environmental Conservation (source: <http://clifflamere.com/Misc/Kudzu-Albany.htm>). Albany, New York, is approximately 320 kilometers from the Canadian border.

## 5.0 PEST RISK ASSESSMENT SUMMARY

The CFIA completed a weed risk assessment for *Pueraria montana* in May 2009 (Castro 2009a), and the assessment was updated later in 2009 with the detection of *Pueraria montana* in southern Ontario (Castro 2009b). Major points discussed in this weed risk assessment are summarized below.

### 5.1 Identity of Organism

NAME: *Pueraria montana* (Lour.) Merr. (USDA-ARS 2009)

SYNONYMS: There are numerous synonyms for each of the three subordinate taxa for *Pueraria montana*, which are *Pueraria montana* (Lour.) Merr. var. *lobata* (Willd.) Maesen & S. M. Almeida ex Sanjappa & Predeep, *Pueraria montana* (Lour.) Merr. var. *montana* and *Pueraria montana* (Lour.) Merr. var. *thomsonii* (Benth.) M. R. Almeida (USDA-ARS 2008).

Synonyms for *Pueraria montana* var. *lobata*: *Dolichos hirsutus* Thunb.; *Dolichos lobatus* Willd. (basionym); *Neustanthus chinensis* Benth.; *Pachyrhizus thunbergianus* Siebold & Zucc.; *Pueraria hirsuta* (Thunb.) Matsum.; *Pueraria lobata* (Willd.) Ohwi; *Pueraria lobata* var. *chinensis* (Benth.) Ohwi; *Pueraria pseudohirsuta* Tang & F. T. Wang, nom. nud.; *Pueraria thunbergiana* (Siebold & Zucc.) Benth.; *Pueraria triloba* (Houtt.) Makino (USDA-ARS 2008).

Synonyms for *Pueraria montana* var. *montana*: *Dolichos montanus* Lour. (basionym); *Glycine javanica* L.; *Pueraria lobata* var. *montana* (Lour.) Maesen; *Pueraria omeiensis* F. T. Wang & Tang, nom. nud.; *Pueraria tonkinensis* Gagnep. (USDA-ARS 2008).

Synonyms for *Pueraria montana* var. *thomsonii*: *Pueraria lobata* var. *thomsonii* (Benth.) Maesen; *Pueraria montana* var. *chinensis* auct.; *Pueraria thomsonii* Benth. (basionym) (USDA-ARS 2008).

COMMON NAMES: kudzu, wild kudzu, Taiwan kudzu (*Pueraria montana* var. *montana*); kudzu, kudzu, Japanese arrowroot (*Pueraria montana* var. *lobata*); mealy kudzu, Thomson's kudzu (*Pueraria montana* var. *thomsonii*) (Porcher 1995-2002; USDA-ARS 2008).

FRENCH COMMON NAMES: *koudzou*, *koudsou*, *kudzu*, *vigne japonaise*, *kudzu du japon* (CAB International 2007), *dolique kudzu*, *puéraire kudzu* (Porcher 1995-2002).

DESCRIPTION: *Pueraria montana* is a perennial, deciduous, semiwoody vine with stems that can grow 10 to 30 m in length (EPPO 2007; Gleason and Cronquist 1963) and reach 10 cm in diameter (H. Coiner, pers. comm., 15 May 2009). Leaves are alternate, compound, and have three leaflets. Flowers are reddish-purple, fragrant, pea-like, and clustered in long racemes (Bailey and Bailey 1976). Fruits are brown flattened pods containing 3 to 12 kidney-shaped seeds that measure 3 to 4 mm each (EPPO 2007; US Forest Service - PIER 2008; Uva et al. 1997). Vines, leaves and fruits are hairy. *Pueraria montana* produces tuberous roots, which in older plants can become massive. A key to the three varieties of *Pueraria montana* is provided by van der Maesen (van der Maesen 1985).

## 5.2 Organism Status

*Pueraria montana* (var. *lobata*) is a notorious weed in the United States, where it is referred to as the “plant that ate the south” for its ability to form dense, ropey mats over ground and trees. It has also been nominated as one of the “[World's Worst 100 Invasive Alien Species](#)” (Global Invasive Species Database 2008).

*Pueraria montana* is not native to Canada (CFIA 2008a). The first and only known wild population of *Pueraria montana* in Canada was discovered in 2009 in southwestern Ontario along the Lake Erie shoreline just west of Leamington. This population, which is approximately



120 m long and 50 m wide, appears to have been present for several years. There is also a reference in the literature to the occurrence of *Pueraria montana* in Nova Scotia (Shurtleff and Aoyagi 1977); however, this reference does not seem to be corroborated by any credible observation data or a voucher specimen.

There is a plantation of *Pueraria montana* in cultivation, on the roof of a building in downtown Toronto, which is maintained by a professor at the University of Toronto. The plantation is carefully monitored and any clippings are autoclaved (H. Coiner, pers. comm., 17 Sept 2009). There is little additional information available on the cultivation of *Pueraria montana* in Canada (CNLA 2008); however, it is possible to purchase seeds online.

Based on this information, for the PRA area, *Pueraria montana* is considered present: only in one area (specifically, one population west of Leamington, Ontario) and in protected cultivation.

### **5.3 Current Regulatory Status**

Kudzu is not currently regulated as a pest in Canada. It is not currently regulated at the federal level in the U.S. or Mexico (Britton et al. 2002). At the state level, kudzu as *Pueraria montana*, *P. lobata* or *P. thunbergiana*, is on noxious weed lists for Connecticut, Florida, Illinois, Kansas, Kentucky, Massachusetts, Mississippi, Missouri, Oregon, Pennsylvania, Texas, Washington and West Virginia.

### **5.4 Probability of Entry**

The main pathway of entry for *Pueraria montana* into Canada is intentional movement and planting by humans (Table 1). Active planting of *Pueraria montana* is the most significant factor contributing to its escape and spread in the United States. Unintentional dispersal by vehicles crossing international borders is a less likely pathway of entry, as is natural dispersal.

### **5.5 Probability of Establishment**

*Pueraria montana* is native to temperate and tropical Asia as well as parts of Oceania (USDA-ARS 2008). Its introduced range includes the Ukraine, Caucasus, central Asia, southern Africa, South America, parts of Oceania, the United States, Hispaniola and Panama (EPPO 2007; USDA-ARS 2008). In the United States, the most severe *Pueraria montana* infestations are found in the southeast (Mississippi, Alabama, and Georgia) (Britton et al. 2002) (Figure 1). It has recently been discovered in Italy and Switzerland as well (EPPO 2007).

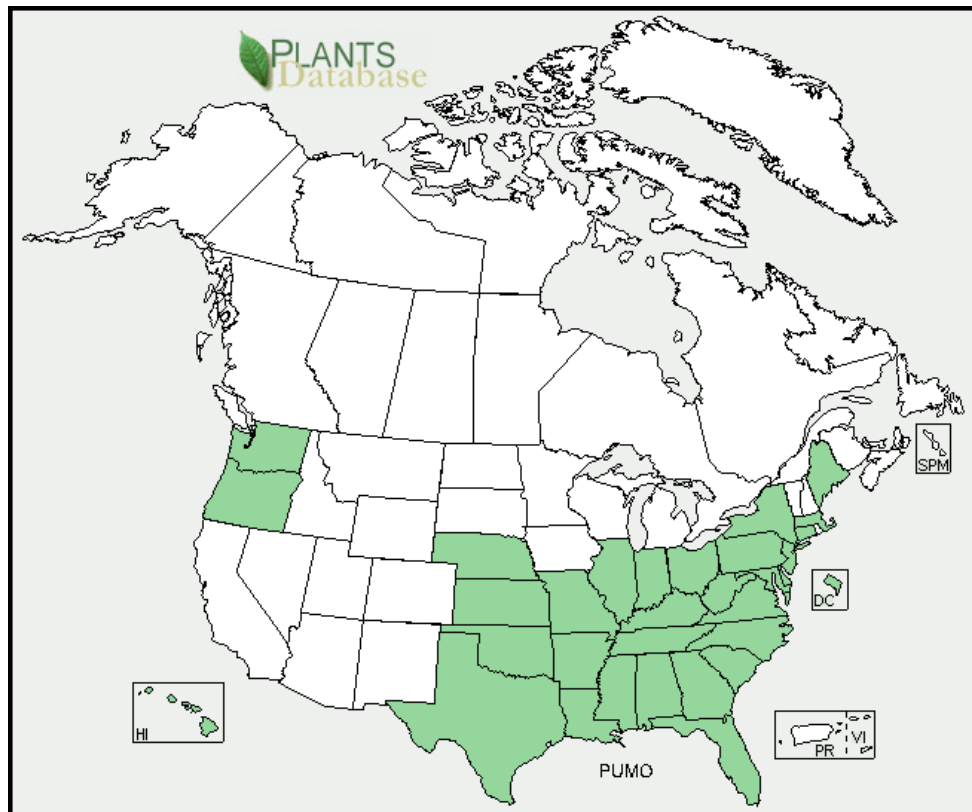
*Pueraria montana* grows best in areas with mild winters (5 to 15°C), hot summers (over 25°C), and at least 100 cm of precipitation annually (CAB International 2007). It is considered to be hardy to USDA Hardiness Zone 5. Toward the edge of its range plants may not flower and stems may be killed back to the ground in the winter (Bailey and Bailey 1976). A comparison of Canadian hardiness zones with those of the naturalized range of *Pueraria montana* within the

United States suggests that it could survive in southern and coastal British Columbia, southwestern Ontario and the Maritimes which corresponds to plant hardiness zone 5 and warmer based on the NCSU APHIS Plant Pest Forecasting System (NAPPFASST) map shown in Figure 2. The discovery of mature plants in 2009 in southwestern Ontario supports this conclusion.

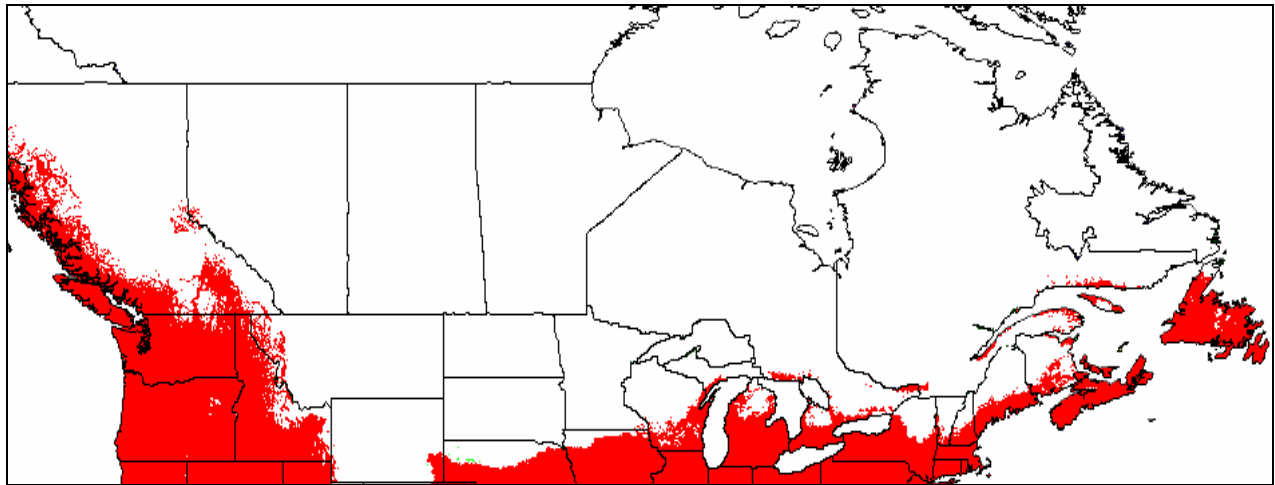
**Table 1.** Summary of potential *Pueraria montana* introduction pathways.

| Type of Introduction       | Specific Pathways  |
|----------------------------|--|
| Natural Means of Dispersal | <ul style="list-style-type: none"> <li>• Natural dispersal by birds and wildlife is reported to occur in the native range (EPPO 2007), and there is some evidence of consumption by northern bobwhites in the introduced range (McRae 1980).</li> <li>• However, in the introduced range, pods generally remain closed on the vines after maturity (in October) and do not seem to be appealing to animals (H. Coiner, pers. comm., 26 Nov 2008).</li> <li>• Water dispersal is a possibility (Maddox and Westbrooks 2009), but does not appear to be well documented.</li> <li>• Overall, the probability of entry of <i>Pueraria montana</i> into Canada by natural means of dispersal appears to be low.</li> </ul>   |
| Intentional Introduction   | <ul style="list-style-type: none"> <li>• In the United States, <i>Pueraria montana</i> was first introduced as an ornamental, then used as a fodder plant, and later promoted for erosion control.</li> <li>• <i>Pueraria montana</i> also has significant medicinal and culinary uses (Shurteff and Aoyagi 1977) that make it attractive for cultivation.</li> <li>• Active planting of <i>Pueraria montana</i> has been the most significant factor in its escape and spread in the United States.</li> <li>• Seeds are available for purchase through the internet.</li> <li>• The main pathway for entry into Canada is intentional movement and planting (live plants and seeds) by humans. There are no Canadian regulations currently in place to prevent its importation.</li> </ul> |

|                            |   |
|----------------------------|---|
| Unintentional Introduction | <ul style="list-style-type: none"><li>• Transportation of plant pieces stuck in wheels of vehicles crossing the border from the United States into Canada is an additional, potential pathway for entry into Canada. This pathway is of lesser importance compared to intentional movement.</li></ul> |
|                            | <p>This pathway is of lesser importance compared to intentional movement.</p>   |



**Figure 1.** Distribution of *Pueraria montana* in the United States and Canada (USDA-NRCS 2009). Note that the 2009 discovery of this species in southwestern Ontario is not included on the map.



**Figure 2.** Plant hardiness zones 5-9 in Canada (areas shaded red), based on the NAPPFAST map (NAPPFAST 2007).

### 5.6 Probability of Spread

The main mechanism of spread for *Pueraria montana* is its remarkably rapid vegetative growth, which has been recorded as high as 20 cm per day in Toronto, Ontario (H. Coiner, pers. comm., 26 Nov. 2008). The long stems frequently root at nodes that come in contact with soil. These and other physiological traits, such as high photosynthetic rates, high leaf area indices, large hydraulic capacitance in roots and rhizomes, and the ability to fix nitrogen, allow it to quickly overgrow, shade out, and replace existing vegetation (Forseth Jr. and Innis 2004).

Compared to some of the southeastern locations, rate of spread appears to be less in more northerly locations. In the northern United States, *Pueraria montana* populations are smaller and more infrequent, and can be measured in m<sup>2</sup> instead of ha<sup>2</sup> (H. Coiner, pers. comm., 26 Nov. 2008). One possible explanation for this observation is that the plants are constrained by the shorter growing season and are unable to maintain the high photosynthetic and growth rates typical of further south. Stem elongation stops when temperatures drop below 15°C (H. Coiner, pers. comm., 26 Nov. 2008). Even so, *Pueraria montana* is still considered invasive in these areas. In Georgia, where conditions are more favorable, growth has been recorded at 18 m per year (Britton et al. 2002; Wechsler 1977). In addition to its spread *in situ*, pieces of root crowns could conceivably be dispersed by humans in contaminated soil or with contaminated equipment, such as mowers or in wheels of vehicles (H. Coiner, pers. comm., 26 Nov. 2008).

In its native range, birds and mammals spread *Pueraria montana* seeds over moderate distances (EPPO 2007). In its introduced range, dispersal by birds and other wildlife is not a major factor because seed set is generally poor, and its effects have been swamped by intentional dispersal by humans (EPPO 2007; Mitich 2000). However, field observations in North America suggest there

may be greater seed production success at more northerly locations (H. Coiner, pers. comm., 26 Nov. 2008). Plants are known to flower annually and set seed in Long Island, NY and Beltsville, MD (H. Coiner, pers. comm., 26 Nov. 2008). Consumption by northern bobwhites has been recorded in the U.S. (McRae 1980), but this bird species is rare in Canada. Overall, the pods do not seem to be very attractive to wildlife and natural seed dispersal potential in the introduced range appears to be low, though this has yet to be tested (H. Coiner, pers. comm., 26 Nov. 2008). Dispersal by water has also been suggested (Maddox and Westbrooks 2009).

### **5.7 Potential Economic Consequences**

*Pueraria montana* currently infests approximately 3 million hectares in the United States and has been described in a report to the US Congress as one of the country's most harmful non-indigenous plants (Quimby Jr. et al. 2003). It is known to completely replace existing vegetation, and can smother orchard crops, plantation crops and young forest plantations (Britton et al. 2002).

The greatest impacts of *Pueraria montana* are felt by the forestry industry, where productivity losses in the United States have been estimated at between \$100 and \$500 million US per year (Forseth Jr. and Innis 2004). Control costs have been estimated at approximately \$500 US per hectare per year for five years, which exceeds profits for average 25 year-old pine plantations (Britton et al. 2002; Forseth Jr. and Innis 2004) and results in land being taken out of production. Mitich (2000) notes that "hundreds of thousands of dollars' worth of lumber and pulpwood are lost annually to its attack."

Other sectors are affected as well. In the southern United States, *Pueraria montana* has brought down power lines and caused periodic power interruptions (Forseth Jr. and Innis 2004). Costs of control to power companies have been estimated at \$1.5 million per year (Britton et al. 2002). Railroad companies also incur significant costs to control *Pueraria montana* growing over rails, which can cause derailments (Forseth Jr. and Innis 2004). Costs of control for national and state parks, where *Pueraria montana* is changing the native landscape, are an additional economic impact (Forseth Jr. and Innis 2004). Finally, *Pueraria montana* may be a reservoir for soybean rust (*Phakopsora pachyrhizi*) and *Phytophthora* species (CAB International 2007; EPPO 2007).

*Pueraria montana* has been used for a variety of purposes, although less invasive alternatives can usually be found (CAB International 2007). It has been grown as an ornamental, a forage plant, and for erosion control. As a forage, it is nutritious for livestock but yields are only 4 to 6 tons per hectare and harvest is difficult (CAB International 2007). *Pueraria montana* is also used as a source of starch in China and Japan, although collecting and extracting the starch is laborious. In addition, it is eaten as a vegetable (CAB International 2007). Historically, *Pueraria montana* has been used as a remedy for a variety of ailments and as a fiber for weaving (Shurtleff and Aoyagi 1977). *The Book of Kudzu: A Culinary & Healing Guide* by Shurtleff and Aoyagi (1977) describes the many uses of *Pueraria montana*. More recently, it has been considered as a potential source of biofuel (Sage et al. 2009).

## 5.8 Potential Environmental and Social Consequences

*Pueraria montana* shades and crushes its competitors, killing native vegetation and forming kudzu monocultures (Forseth Jr. and Innis 2004). It has the potential to radically alter ecosystems on a local scale (CAB International 2007). In Switzerland, surveys by Pron (2006) showed reductions in biodiversity in areas invaded by kudzu (20-25 species per 4 m<sup>2</sup> in non-invaded meadow or forest vs. 6-9 species in 4 m<sup>2</sup> where invaded by kudzu) (EPPO 2007). Arthropod numbers and diversity were also reduced in invaded sites (262 arthropods in 17 taxa in non-invaded sites and 187 arthropods in 12 taxa in invaded sites) (EPPO 2007; Pron 2006). Observations by Forseth Jr. and Innis (2004) suggest that the impact of kudzu may be greater on late successional trees and shrubs than on early spring understory plants that leaf out prior to *Pueraria montana*. Much of the damage caused by kudzu occurs in habitats that are already disturbed, but it also encroaches on natural areas and parks (CAB International 2007).

*Pueraria montana* may also interfere with forest stand recovery after storms and tree falls by dominating sites and spreading while preventing other pioneer species from establishing (Forseth Jr. and Innis 2004).

Although legumes are generally considered to improve soil nutrient status through nitrogen fixation, dense stands of nitrogen-fixing species can have detrimental impacts on biodiversity and nutrient cycles. Furthermore, once *Pueraria montana* is established in a location nothing else can grow there unless the *Pueraria montana* is removed (CAB International 2007). Planting of *Pueraria montana* on slopes for erosion control also increases the probability of nitrates leaching into streams, affecting aquatic biodiversity and eutrophication (Forseth Jr. and Innis 2004).

Expansive stands of *Pueraria montana*, as found in the southeastern United States, may also have negative impacts on regional air quality. It has been identified as an intermediate to high emitter of isoprene, which is a photochemically reactive hydrocarbon that forms ozone and smog in the presence of nitrogen oxides (Forseth Jr. and Innis 2004; Sharkey and Loreto 1993). Other temperate trees and shrubs also produce isoprene; however, the large acreage of *Pueraria montana* makes it a source comparable to trees (CAB International 2007; Sharkey and Loreto 1993). Isoprene emission from *Pueraria montana* increases with increasing temperature and water stress (Forseth Jr. and Innis 2004). Soils infested with *Pueraria montana* also emit nitrogen-containing compounds that have been linked to ozone formation (Hickman et al. 2008).

## 5.9 Uncertainty

The North American distribution of *Pueraria montana* follows an extreme winter temperature isocline of approximately -20°C (Sasek and Strain 1990). Increasing winter temperatures over the past three to four decades have allowed the northward expansion of this species, and further expansion of its potential range is expected, but will depend on the nature of climate change in the future.

## 5.10 Conclusion

Based on the outcome of this pest risk assessment, *Pueraria montana* is likely to become weedy or invasive in parts of Canada, including southern and coastal British Columbia, southwestern Ontario and the Maritimes. This plant should be considered for regulation under the *Plant Protection Act*. Regulation under the *Seeds Act* as a prohibited noxious weed would prohibit both the importation and sale of *Pueraria montana* seed, and the presence of the species as a seed contaminant. It is recommended that the pest risk analysis process continue for this plant with the completion of a Risk Management Document.

## 5.11 Technical Issues for Consideration

- Regulation of this species will address the main pathway of entry of *Pueraria montana* into Canada, which is intentional human movement as both a live plant and as seed.
- If *Pueraria montana* is regulated in the future, exemptions to allow the import of live or dried kudzu plant parts should be considered for special purposes (e.g. research, medicine).
- Prevention of *Pueraria montana* should be stressed, as it is very difficult to control once established. Well-established stands of *Pueraria montana* can take up to ten years to eliminate, and require persistent elimination of all root material (Mitich 2000).

# 6.0 RISK MANAGEMENT CONSIDERATIONS

## 6.1 Introduction

This RMD provides a means of communicating and recording information. Potential risk mitigation measures are provided for each pathway. The effectiveness and feasibility of those mitigation measures are discussed, including impacts on the CFIA, practicality of implementation, impacts on Canadian stakeholders, impacts on trading relationships, and short-term and long-term sustainability.

This RMD documents the rationale in determining the regulatory status of the plant. It outlines the possible phytosanitary requirements for traded commodities. The commodities may be the plant under consideration for regulation itself (intentional introduction) or a product contaminated with the plant (unintentional introduction).

## 6.2 International Responsibilities, Government of Canada Priorities and CFIA Objectives

The CFIA plays an important role in protecting Canada's plant resource base from pests and diseases. The objectives of the Plant Protection Program within the CFIA are: (1) to prevent the introduction and spread within Canada of plant pests of quarantine significance, including invasive plants; (2) to detect and control or eradicate designated plant pests in Canada; and (3) to

certify plant and plant products for domestic and export trade.

Canada is a contracting party to the International Plant Protection Convention (IPPC). Canada is a member of the World Trade Organization (WTO), and the IPPC is formally identified in the WTO Sanitary and Phytosanitary (SPS) Agreement as the international standard setting organization for phytosanitary measures. The IPPC is an international treaty to secure action to prevent the spread and introduction of pests of plants and plant products (including plants as pests), and to promote appropriate measures for their control. As the administrator of the *Plant Protection Act*, the CFIA is Canada's official National Plant Protection Organization responsible for implementing the standards of the IPPC in Canada.

The *Plant Protection Act* provides authority to prevent the importation, exportation and spread of pests injurious to plants, provides for control and eradication methods, and for the issuance of certificates.

In 1996, as a party to the United Nations Convention on Biological Diversity (CBD), Canada developed its own Canadian Biodiversity Strategy, which recognized the need to conserve biological diversity and promote the sustainable use of biological resources through increased understanding, legislation, incentives and other means. As party to these international and national instruments, Canada has a strong commitment to addressing the deleterious impacts of invasive plants.

### **6.3 Pest Management**

In the event of an incursion, risk management needs to consider control or eradication options. Miller (2008) reviewed *Pueraria montana* eradication and management options. *Pueraria montana* patches can be eradicated with persistent treatments followed by establishment of fast growing trees or grasses that can out-compete the surviving *Pueraria montana* plants or by manually removing surviving plants. Herbicides, prescribed burning, disk harrowing, plastic sheeting, and hand and mechanical removal of plants can be used alone or in combination as eradication or containment treatments. For eradication, every *Pueraria montana* plant in and around a patch must be killed or removed to prevent reoccupation that would otherwise make all prior efforts and investments useless. Biological control is also being investigated (Britton et al. 2002, Sun et al. 2006).

### **6.4 Pest Risk Assessments from Other Countries**

The European and Mediterranean Plant Protection Organization (EPPO) publishes [EPPO datasheets on quarantine pests](#). EPPO completed one for *Pueraria lobata* in 2007 reporting that it has negative effects on crop production, forestry production and the natural environment, as it smothers existing flora (EPPO 2007). In the EPPO region, *Pueraria lobata* has recently been imported as a horticultural plant and has escaped cultivation in Italy and Switzerland, while most other EPPO countries remain free from the pest (EPPO 2007). The pathway of introduction into



the EPPO region is recognized to be intentional introduction as an ornamental plant (Baker 2006).

In 2007, EPPO completed a [pest risk analysis](#) for *Pueraria lobata* concluding that it presents a risk to the EPPO region and that the import and trade of the plant in the EPPO countries should be prohibited. As a result, *Pueraria lobata* has been added to the [EPPO A1/A2 List](#) of pests recommended for regulation as quarantine pests (as approved by EPPO Council in September 2007). The purpose of the EPPO A1/A2 Lists is to recommend that organisms of serious phytosanitary concern be regulated as quarantine pests by EPPO member countries (e.g., A1 pests are absent from the EPPO region and A2 pests are locally present in the EPPO region).

The Pacific Island Ecosystems at Risk project (PIER) has completed a [risk assessment](#) on *Pueraria montana* var. *lobata*. The purpose of the [Pacific Island Ecosystems at Risk project \(PIER\)](#) is to compile and disseminate reference information on exotic plant species of known or potential threat to Pacific island ecosystems. The risk assessment recommended that the plant be rejected for import.

Biosecurity Queensland, Australia, completed a [kudzu plant risk assessment](#) in 2008 (Csurhes 2008). It concluded that kudzu has the potential to become a major pest in coastal areas of Queensland where annual rainfall exceeds 1000 mm.

*Pueraria montana* var. *lobata* is on the invasive plant species list maintained by the National Commission for the Knowledge and Use of Biodiversity ([CONABIO](#) is an agency of the Mexican Government with the mission of creating a national inventory of biodiversity). Kudzu has become established in Mexico and the primary pathways of invasion are identified as humans, transportation, commerce and natural spread.

## **6.5 Existing Domestic, Provincial or other Programs**

There are no existing programs directly related to *Pueraria montana* management or control in Canada. Provinces and territories should consider revising their noxious weed regulations to include invasive plants not yet present in Canada such as *Pueraria montana*. While not found in British Columbia, *Pueraria montana* is on the [Weed Alert](#) list published by the British Columbia Ministry of Agriculture and Lands (BCMAL 2009).

Weed free forage programs can help prevent the spread of invasive plants. The Government of Alberta, Agriculture and Rural Development, administers the [Alberta Certified Weed Free Hay Program](#). The objectives of the program are to provide a premium product that is recognized as marketable and transportable, to prevent the spread of restricted and noxious weeds, and to protect private and public lands from non-native, invasive plant species. *Pueraria montana* could be added on their “Designated Weed List and Undesirable Plant Species List”. Currently, this is the only existing weed free forage program in Canada.

Internationally, regional regulation has been implemented in at least one province of Australia (Csurhes 2008). In Queensland *Pueraria montana* var. *lobata* is a Class 2 declared plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. In this jurisdiction a Class 2 pest is one that has already spread over substantial areas, but its impact is so serious that efforts

are required to try and control it and avoid further spread. By law, all landholders must try to keep their land free of Class 2 pests and it is an offence to keep or sell these pests without a permit. In Western Australia it is a “prohibited” weed and in New South Wales it is regulated as a regionally controlled weed.

## **6.6 Potential Mitigation Measures for Natural Means of Dispersal**

Natural dispersal is not recognized as the primary introduction pathway into Canada. However, in its native range *Pueraria montana* disperses naturally by runners, and seeds are dispersed over moderate distances by mammals and birds (EPPO 2007). In its introduced range *Pueraria montana* also spreads vegetatively; Castro (2009a) recognized vegetative growth as the main mechanism of spread for these plants. Seed production is generally poor (Britton et al. 2002; Castro 2009a). Risk management of natural dispersal events is difficult, however, regulation will require surveys that would detect any new incursions established through natural dispersal pathways. Education and outreach programs, as well as pest identification training for inspectors and those working in forestry sectors, would support the early detection of new incursions that may result from natural dispersal events.

## **6.7 Potential Mitigation Measures for Intentional Introduction Pathways**

### **6.7.1 Plants for Planting**

Intentional human movement of live plants for planting is recognized as the main pathway of entry for *Pueraria montana* into Canada (Csurhes 2008; Castro 2009) through the intentional movement and sale of plants for horticulture and agriculture (EPPO 2007). Risk management needs to consider the risk of *Pueraria montana* being intentionally imported into Canada as an ornamental plant. In some areas of the world where *Pueraria montana* has been imported as an ornamental plant, it has escaped cultivation to become a significant pest. For example, the pathway of introduction into the EPPO region is recognized to be through intentional introduction as an ornamental plant (Baker 2006). In the late 1800s, *Pueraria montana* was available in catalogs as “porch vine” (Reichard and White 2001). *Pueraria montana* has also been imported into South America, Oceania, and Africa where its invasive potential is now feared (EPPO 2007).

#### **6.7.1.1 Previous imports**

A search of the CFIA’s Import Permit System indicated no import permits have been issued for imports of live plants into Canada of *Pueraria montana* or *Pueraria montana* var. *lobata* in the last five years.

#### **6.7.1.2 Potential risk mitigation measures**

##### **a. Regulatory measures**

It is recommended that Canada regulate *Pueraria montana* as a quarantine pest under the *Plant Protection Act* (1990, c.22)<sup>1</sup>, thus adding this species to the *List of Pests Regulated by Canada* (CFIA 2009). This would prevent the intentional importation, movement, or cultivation of this species in Canada. Any plants of *Pueraria montana* established either outside of cultivation or in cultivation would need to be placed under official control. If regulated as a quarantine pest, the CFIA would not approve import permit applications for *Pueraria montana*.

To support regulation, importers would be required to provide full scientific name on all applications for Import Permits (as well as on any Phytosanitary Certificates) as there are many species in the *Pueraria* genus.

Regulatory exemptions for the import of live or dried *Pueraria montana* plant parts for special purposes such as research, food or medicine would be considered on a case by case basis by the CFIA.

Regulation of *Pueraria montana* under the *Plant Protection Act* would enable inspectors to take appropriate action for the purposes of preventing its spread, including:

- quarantine of commodities suspected of being infested with the pest (see Section 11 *Plant Protection Act*);
- request for appropriate treatment to remove the pest (see Section 17 *Plant Protection Act*);
- prohibit or restrict items coming from an infested area (see Section 22 *Plant Protection Act*);
- or request that items suspected of being infested with the pest are disposed of by the party in possession of the items (see Section 27 *Plant Protection Act*).

#### **b. Non-regulatory measures**

Education and awareness programs that foster awareness of *Pueraria montana* are recommended to support regulatory mitigation measures. Non-regulatory measures might include industry initiatives such as voluntary prohibitions or establishing codes of conduct that would prevent the sale of *Pueraria montana* in Canada. Industry can also promote the use of native, non-invasive ornamental species as alternative plantings.

#### **6.7.1.3 Trade Implications**

The regulation of *Pueraria montana* under the *Plant Protection Act* is not expected to have a major trade impact as international trade for the species is limited; most countries recognize *Pueraria montana* as an invasive plant.

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<sup>1</sup> The purpose of the *Plant Protection Act* is to protect plant life and the agricultural and forestry sectors of the Canadian economy by preventing the importation, exportation and spread of pests and by controlling or eradicating pests in Canada.

#### **6.7.1.4 Cost-effectiveness and Feasibility**

The impact on CFIA resources is expected to be minimal as there has been little motivation to import live plants of *Pueraria montana* into Canada. If regulated, resources would be required to expand CFIA survey efforts. Minor costs will be incurred for pest identification training for inspectors and survey staff.

#### **6.7.2 Seed**

It is unlikely that importers would import pure lots of *Pueraria montana* seed. However, persons wishing to intentionally import the species may choose the seed pathway.

##### **6.7.2.1 Previous imports**

In June 2008, a permit to import *Pueraria lobata* (a synonym of *Pueraria montana* var. *lobata*) seed was issued by the CFIA under Section 43 of the *Plant Protection Regulations* (SOR/95-212). The seed was intended to be used in a weed management course. However, the importer has since indicated that seeds of this species were not imported.

##### **6.7.2.2 Potential risk mitigation measures**

###### **a. Regulatory measures**

Regulate *Pueraria montana* as a Class 1 Prohibited Noxious weed under the *Weeds Seeds Order* (SOR/2005-220) of the *Seeds Act* (R.S., 1985, c. S-8)<sup>2</sup>. This species meets the definition for Class 1<sup>3</sup> species under the *Weeds Seeds Order*. All imported and domestic seed lots must be free of prohibited noxious weed seeds. Imported seed lots would require a certificate of analysis stating *Pueraria montana* is absent from the seed lot before it can be imported.

The *Weed Seeds Order* allows the Minister of Agriculture and Agri-Food to regulate the seeds of the species of plants set out in the schedule that are deemed to be weed seeds for the purpose of establishing grades under the *Seeds Act*. *Pueraria montana* would be regulated as a Class 1 Prohibited Noxious weed seed. The *Weed Seeds Order* is a Ministerial Order made under the *Seeds Act*.

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<sup>2</sup> The *Seeds Act* provides authority for the testing, inspection, quality and sale of seeds in Canada. The Canadian Food Inspection Agency is responsible for the administration of the *Seeds Act* and *Regulations* to help to ensure that seeds sold in, imported into and exported from Canada meet established standards for quality and are labelled so that they are properly represented in the marketplace, and are registered prior to sale in Canada (most agricultural crop varieties).

<sup>3</sup> A Prohibited Noxious Class 1 species is not yet present in Canada, or is under official control as it has not yet reached its full ecological range. Official control is used to prevent further spread of the species and with the goal of eradicating the species. The species must be a weed whose presence in seed could affect the value and/or intended use of the seed; and/or could have potential impact on the economy, human and/or animal health.

**b. Non-regulatory measures**

Education and awareness programs that foster awareness of *Pueraria montana* are recommended to support regulatory mitigation measures. Non-regulatory measures might include industry initiatives such as voluntary prohibitions or establishing codes of conduct that would prevent the sale of *Pueraria montana* in Canada. Industry can use voluntary prohibitions to end the sale and distribution of seed of invasive plants such as *Pueraria montana* through mail order catalogs or through internet sales.

**6.7.2.3 Trade Implications**

The regulation of *Pueraria montana* under the *Seeds Act* is not expected to have a major trade impact as international trade of seed of this species is limited.

**6.7.2.4 Cost-effectiveness and Feasibility**

No trade implications are anticipated as seed of *Pueraria montana* is not known to have been intentionally imported into Canada.

**6.8 Potential Mitigation Measures for Unintentional Introduction Pathways**

This pathway is of lesser importance as compared to the intentional introduction pathway. Transportation of plant pieces stuck in wheels of vehicles crossing the border from the U.S. into Canada is a potential pathway for entry into Canada.

**6.8.1 Seed**

*Pueraria montana* is not known to be a seed or grain contaminant.

**6.8.1.1 Previous Imports**

The Seed Science and Technology Section of the CFIA Saskatoon laboratory maintains a record of contaminants found through marketplace monitoring of domestic and imported seed. *Pueraria montana* has not previously been detected as a seed contaminant.

**6.8.1.2 Potential risk mitigation measures**

Regulate *Pueraria montana* as a Class 1 Prohibited Noxious weed under the *Weed Seeds Order* of the *Seeds Act*. This species meets the definitions for Class 1 species under the *Weed Seeds Order*. All imported and domestic seed lots must be free of prohibited noxious weed seeds. Imported seed lots would require a certificate of analysis stating *Pueraria montana* is absent from the seed lot before it can be imported.

**6.8.1.3 Trade Implications**

The regulation of *Pueraria montana* under the *Seeds Act* is not expected to have a major

trade impact. There may be a low level of risk associated with trade of seed or grain commodities being imported into Canada from countries where the pest is established such as China and the U.S., two of Canada's major trading partners. If *Pueraria montana* is added to the *List of Regulated Pests by Canada* (CFIA 2009), regulated commodities imported into Canada would require a Phytosanitary Certificate indicating freedom from *Pueraria montana*.

#### **6.8.1.4 Cost-effectiveness and Feasibility**

The CFIA currently requires import declarations and certificates of analysis for seed imported into Canada<sup>4</sup>. Additional resources required to regulate *Pueraria montana* via the seed pathway would be minimal. Resources would be required to expand CFIA seed sampling efforts and minor costs would be incurred for seed identification training for inspectors. *Pueraria montana* seeds are bean-like, approximately 2 mm wide and 3-4 mm long, reddish in colour and with or without colour patterns. Inspectors should be able to detect the seeds in any imported commodities.

### **6.8.2 Vehicles and Equipment**

#### **6.8.2.1 Previous imports**

*Pueraria montana* may be introduced unintentionally into Canada as residual material on vehicles or equipment. Information is not available on the volume of these types of imports and mitigating the risk would be difficult.

#### **6.8.2.2 Potential risk mitigation measures**

##### **a. Regulatory**

In 2003, the Canada Border Services Agency (CBSA) assumed responsibility for the initial import inspection services in respect of the Acts and Regulations administered by the CFIA to the extent that they are applicable at Canadian border points. The inspections of goods that may be contaminated with soil are among the responsibilities that were transferred to the CBSA in 2003. The Food, Plant and Animals Programs Section of the CBSA is currently finalizing its Standard Operating Procedures (SOP) concerning the "Inspection of Imported Goods Potentially Contaminated with Soil." This SOP provides the CBSA's Border Services Officers with formal procedures for the inspection and disposition of goods that may be contaminated with soil, including used agricultural machinery and vehicles.

Regulatory measures would include enforcement of CFIA's [Policy Directive 95-26](#) (CFIA 2008b) that specifies phytosanitary requirements for the import and domestic movement

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<sup>4</sup> Exemptions to this requirement exist.

of soil and related matter. It includes requirements for soil and related matter individually or in association with plants, plant material, and other things such as vehicles, equipment, seed, hay, and containers. This directive also specifies the standards by which the Canadian Food Inspection Agency or the Canada Border Services Agency may inspect, certify or release these articles. If *Pueraria montana* is added to the *List of Pests Regulated by Canada* (2009), things such as vehicles, equipment, and containers may be refused entry into Canada if found to be contaminated with regulated plant pests.

#### **b. Non-regulatory measures**

Non-regulatory measures may include an education and outreach program that would encourage importers to ensure vehicles and other equipment are appropriately cleaned of all residual plant material and contaminants before reaching the border.

#### **6.8.2.3 Trade implications**

No trade implications are anticipated.

#### **6.8.2.4 Cost-effectiveness and Feasibility**

Resources would be needed to train CBSA staff on how to identify *Pueraria montana* plant material on vehicles and any equipment entering Canada.

## **7.0 PEST RISK MANAGEMENT OPTIONS**

### **7.1 Risk Management Options**

Four risk management options are presented and summarized in Table 2:

#### **Option 1 – Regulate under the *Plant Protection Act* and the *Weed Seeds Order***

Regulate *Pueraria montana* as a quarantine pest under the authority of the *Plant Protection Act* (1990, c.22) prohibiting the importation of live plants, plant parts and seeds of *Pueraria montana* from all sources, add to the *List of Pests Regulated by Canada* (2009), and Regulate *Pueraria montana* as a Class 1 Prohibited Noxious weed under the *Weed Seeds Order* (SOR/2005-220) of the *Seeds Act* (R.S., 1985, c. S-8).

Regulatory exemptions for the import of live or dried *Pueraria montana* plant parts for special purposes such as research, food or medicine would be considered on a case by case basis by the CFIA.

#### **Option 2 – Regulate under the *Plant Protection Act***

Regulate *Pueraria montana* as a quarantine pest under the authority of the *Plant*

*Protection Act* (1990, c.22) prohibiting the importation of live plants, plant parts and seeds of *Pueraria montana* from all sources and add to the *List of Pests Regulated by Canada* (2009).

This option would prevent the importation, movement, and cultivation of this species in Canada. Regulatory exemptions for the import of live or dried *Pueraria montana* plant parts for special purposes such as research, food or medicine would be considered on a case by case basis by the CFIA.

**Option 3 – Regulate under the *Weed Seeds Order***

Regulate *Pueraria montana* as a Class 1 Prohibited Noxious weed under the *Weed Seeds Order* (SOR/2005-220) of the *Seeds Act* (R.S., 1985, c. S-8).

**Option 4 - Do not regulate *Pueraria montana*.**

**Table 2.** Summary of advantages and disadvantages of the pest risk management options

| Options  | Advantages  | Disadvantages  |
|--|---|--|
| <p><b>Option 1 – Regulate under the <i>Plant Protection Act</i> and the <i>Weed Seeds Order</i></b></p> <ul style="list-style-type: none"> <li>▪ Regulate <i>Pueraria montana</i> as a quarantine pest under the authority of the <i>Plant Protection Act</i>;</li> <li>▪ Add to the <i>List of Pests Regulated by Canada</i>; and</li> <li>▪ Regulate <i>Pueraria montana</i> as a Class 1 Prohibited noxious weed under the <i>Weed Seeds Order</i> of the <i>Seeds Act</i></li> <li>▪ The CFIA would implement an Official Control program for an existing population in southwestern Ontario and any populations in</li> </ul> | <ul style="list-style-type: none"> <li>▪ Authority over all of the pathways of introduction.</li> <li>▪ See advantages under options 2 and 3 in table below.</li> </ul> | <ul style="list-style-type: none"> <li>▪ See disadvantages under options 2 and 3 in table below</li> </ul> |



|  |  |  |
|--|--|--|
| <p>protected cultivation.</p>  |  |  |
| <p><b>Option 2 – Regulate under the <i>Plant Protection Act</i></b></p> <ul style="list-style-type: none"> <li>▪ Regulate <i>Pueraria montana</i> as a quarantine pest under the authority of the <i>Plant Protection Act</i>; and</li> <li>▪ Add to the <i>List of Pests Regulated by Canada</i>.</li> <li>▪ The CFIA would implement an Official Control program for an existing population in southwestern Ontario and any populations in protected cultivation.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Authority to respond to incursions by applying official control measures.</li> <li>▪ Prevent introduction of a species known to cause devastating economic and environmental impacts elsewhere.</li> <li>▪ The CFIA would impose equivalent measures domestically and establish, authorize and perform an education and outreach program the objective of prevention.</li> <li>▪ This decision would require development of a new import policy for <i>Pueraria montana</i>, communication of the policy nationally and internationally, and provisions of instructions to the Canada Border Services Agency and CFIA Import Service Centre.</li> <li>▪ The CFIA would add <i>Pueraria montana</i> to its annual invasive plants survey efforts.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Potential costs to the owner of the non-compliant good in the exporting country.</li> <li>▪ Potential costs and impacts to trading partners and trading relationships.</li> <li>▪ Additional resources needed by CFIA for import inspections, inspector training, communication material, sampling and surveys.</li> <li>▪ Additional resources required by CFIA to enforce the regulation if non-compliance found.</li> <li>▪ Resources needed by CFIA to administer and enforce Official Control (eradication or containment measures).</li> <li>▪ Potential costs to businesses and citizens affected by the trade impacts of regulation and official measures to control any infestations, as specified in the <i>Regulations of the Plant Protection Act</i>.</li> <li>▪ The CFIA would be required to trace-back any outstanding import permits issued as these would need to be rescinded.</li> <li>▪ There would be trade implications for imports from countries where <i>Pueraria montana</i> is established, for example Phytosanitary Certificates indicating “freedom</li> </ul> |

|   |   |   |
|---|---|---|
|   |   | <p>from” <i>Pueraria montana</i> may be required.</p>   |
| <p><b>Option 3 – Regulate under the Weed Seeds Order</b></p> <ul style="list-style-type: none"> <li>▪ Regulate <i>Pueraria montana</i> as a Class 1 Prohibited Noxious weed under the <i>Weed Seeds Order</i> of the <i>Seeds Act</i>.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Authority over seed pathway of introduction.</li> <li>▪ Protect agricultural and forestry sectors and trade markets.</li> <li>▪ Ensure that seeds sold in, imported into and exported from Canada meet established standards for quality.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Increased inspection costs.</li> </ul>   |
| <p><b>Option 4 - Status Quo – Do not regulate.</b></p>  | <ul style="list-style-type: none"> <li>▪ No additional costs for the CFIA.</li> <li>▪ No additional requirements for importers.</li> </ul>  | <ul style="list-style-type: none"> <li>▪ No authority to request phytosanitary or mitigation measures for commodities contaminated with <i>Pueraria montana</i>.</li> <li>▪ No authority to apply official control measures to introduced or established populations.</li> <li>▪ Potential for significant losses in agriculture and forestry production and biological diversity if <i>Pueraria montana</i> becomes established in Canada.</li> <li>▪ Risk that <i>Pueraria montana</i> may establish and become an invasive pest in Canada, resulting in negative economic and environmental impacts.</li> <li>▪ Risk to agricultural and forestry productivity and trade markets.</li> </ul> |

## 7.2 Preferred Option

The CFIA recommends Option 1.

- As a signatory party under the International Plant Protection Convention (IPPC), the Government of Canada has a right to prevent the entry into Canada of invasive plants that can cause serious damage or threaten biodiversity, and to officially control them if they are present. As a signatory party to the Convention on Biological Diversity, the Government of Canada shall, as far as possible and as appropriate, prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or native species.
- *Pueraria montana* presents a serious risk to the Canadian environment and economy, and to the biodiversity of native ecosystems
- Effective mitigation measures currently do not exist to prevent the entry of *Pueraria montana* into Canada.
- The proposed risk management option is cost-effective and the advantages clearly outweigh the disadvantages.

## 8.0 RISK MANAGEMENT DECISION

### 8.1 Risk Decision

The CFIA will make a decision after consulting with stakeholders and reviewing their comments. The CFIA will engage its federal, provincial and territorial partners, affected Canadian stakeholders, the scientific community and the general public in the consultation process.

### 8.2 Next Steps

Implementing regulation of *Pueraria montana* would require the following steps:

- World Trade Organization (WTO) notification;
- Canada Border Services Agency (CBSA) notification;
- Official pest report forwarded to the North American Plant Protection Organization Phytosanitary Alert System;
- Addition to CFIA's *List of Pests Regulated by Canada*;

- amendments to existing CFIA import directives; and
- amendments to CFIA's Automated Import Reference System (AIRS).

### **8.3 Re-evaluation of the Risk Management Decision**

The CFIA will review the risk management decision at least every five years to ensure that the action being taken is still appropriate. Potential triggers for a review of the risk management decision are: (1) new information becomes available about the invasiveness of the species, (2) new incursions in Canada occur, (3) the species' world distribution changes, and (4) Canadian international trade patterns change. The extent of the review and potential amendments will be determined by the nature of the new information. In some instances, additional consultation with stakeholders will be required. Amendments are recorded in Appendix 1.

## **9.0 COMMUNICATION PLAN**

If the CFIA, after consultation, decides to add *Pueraria montana* to the *List of Pests Regulated by Canada*, it will implement the following actions:

- publish the Risk Management Decision document on the CFIA website;
- amend and post all relevant directives on the CFIA website;
- send a notification to the World Trade Organization 60 days before implementation of the regulation; and
- amend the Automated Import Reference System (AIRS) to inform importers and the Canada Border Services Agency (CBSA) of the prohibition of entry for *Pueraria montana*.

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## 11.0 ENDORSEMENT

Approved by:

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Chief Plant Health Officer

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Date



**APPENDIX 1: AMENDMENT RECORD**

| <b>Amendment Number / Document Version</b> | <b>Amended by:</b> | <b>Date Amended:</b> | <b>Purpose of Amendment</b> |
|--|--------------------|----------------------|-----------------------------|
| <b>1</b>                                   |                    |                      |                             |
| <b>2</b>                                   |                    |                      |                             |
| <b>3</b>                                   |                    |                      |                             |