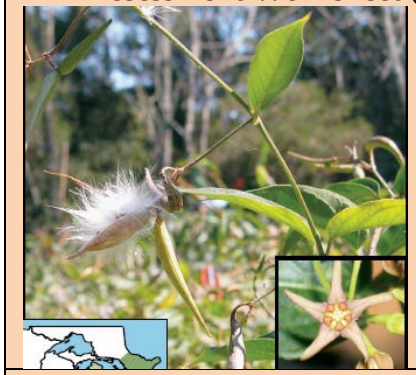
MN NWAC Risk Assessment Worksheet (04-2011) 	Common Name	*Latin Name*
	Pale Swallow-wort (European Swallow-wort)	***Cynanchum rossicum;*** *syn. Vincetoxicum rossicum*
Reviewer	**Affiliation/Organization**	**Date (mm/dd/yyyy)**
Laura Van Riper	**Minnesota Department of Natural Resources**	**DRAFT 09/13/2012**

Box	Question	Answer	Outcome
1	Is the plant species or genotype non-native?	Yes. Native to eastern regions of the Ukraine and southwestern portions of Russia north of the Black Sea and Caucasus (Di Tommasso et al 2005). First found in the US in 1891 in New York state (Douglass 2009). "The most likely source of introduction of both species was importation as specimens for botanical or estate gardens, though this remains uncertain (DiTommaso et al. 2005b; Sheeley 1992). For many years the two swallow-wort species were cultivated and sold as ornamental plants, though this is no longer common (DiTommaso et al. 2005b; Monachino 1957)." Douglass et al. 2009	Go to box 3

Box	Question	Answer	Outcome
3	Is the plant species, or a related species, documented as being a problem elsewhere?	Yes. Listed as invasive or prohibited in Connecticut, Massachusetts, and New Hampshire (USDA Plants). "PSW invasion in North America is centralized in upstate New York, specifically Central New York, the Finger Lakes Region, and the region surrounding Lake Ontario in both the USA and southern Canada. There are additional extensive populations throughout Long Island, NY and other states in the Northeast, and there have been isolated reports of plant sightings in Indiana, Michigan, Missouri, and Wisconsin (DiTommaso et al. 2005b; Weston et al. 2005)." Douglass et al. 2009	Go to box 6
6	Does the plant species have the capacity to establish and survive in Minnesota?	May have limited range in Minnesota.	
	A. Is the plant, or a close relative, currently established in Minnesota?	No populations are currently known in Minnesota (www.EDDMaps.org)	Go to Box 6B
	B. Has the plant become established in areas having a climate and growing conditions similar to those found in Minnesota?	Yes, although projections are not clear. Found in Canada, Michigan, northeast, Midwest (USDA Plants) "Both swallow-wort species are typically found in habitats with temperature ranges in the winter of −11 to 0.7°C (12 – 33 deg F) and in the summer of 20.7–26.4°C (68 – 79 deg F), while mean annual precipitation levels in these areas range from 776–1,206 mm (DiTommaso et al. 2005b)." Douglass et al. 2009 An unpublished study of projected range expansion, conservatively estimates that pale swallowwort range could include portions of southeastern Minnesota (Little et al. 2009)	Go to Box 7 (If you say no, then the "species is not a risk").
7	Does the plant species have the potential to reproduce and spread in Minnesota?		
	A. Does the plant reproduce by asexual/vegetative means?	Yes. "PSW has a stout and often large root crown that produces perennating buds and extensive, fleshly, fibrous roots (DiTommaso et al. 2005b). Many plants also possess a horizontal, woody rhizome, though this structure does not appear to substantially facilitate dispersion of the plants (Cappuccino 2004; Weston et al. 2005)." Douglass et al. 2009	Go to Box 7B

Box	Question	Answer	Outcome
	B. Are the asexual propagules effectively dispersed to new areas?	No. Asexual reproduction seems to be a way that the species increases at a site, but not a primary method of dispersing to new sites.	Go to Box 7C.
	C. Does the plant produce large amounts of viable, cold-hardy seeds?	Yes. "At a heavily infested site in northern New York State, Smith (2006) reported a potential seedling output of 62,439 seedlings/m_2 when polyembryonic offsprings were taken into account." Douglass et al. 2009 Seeds generally require a cold treatment to germinate (Douglass et al. 2009).	Go to Box 7F
	D. If this species produces low numbers of viable seeds, does it have a high level of seed/seedling vigor or do the seeds remain viable for an extended period?		
	E. Is this species self-fertile?	Yes. It is self-compatible and also pollinated by fly, ant, bee, wasp, and beetle species (Douglass et al. 2009).	
	F. Are sexual propagules – viable seeds – effectively dispersed to new areas?	Yes. "Maximum dispersal of seeds found to be up to 60 m from the parent plant (Ladd and Cappuccino 2005). First-year PSW seedlings also have unusually high survivorship (71–100%) when compared with many other herbaceous plant species." Douglass et al. 2009 Like other members of the milkweed family, seeds are wind dispersed (Czarpata 2005).	Go to Box 7I
	G. Can the species hybridize with native species (or other introduced species) and produce viable seed and fertile offspring in the absence of human intervention?	Potential to hybridize with other European species (DiTommaso et al 2005).	
	H. If the species is a woody (trees, shrubs, and woody vines) is the juvenile period less than or equal to 5 years for tree species or 3 years for shrubs and vines?		

Box	Question	Answer	Outcome
	I. Do natural controls exist, species native to Minnesota, that are documented to effectively prevent the spread of the plant in question?	There are no native controls that have been documented.	Go to Box 8.
8	Does the plant species pose significant human or livestock concerns or has the potential to significantly harm agricultural production, native ecosystems, or managed landscapes?		
	A. Does the plant have toxic qualities, or other detrimental qualities, that pose a significant risk to livestock, wildlife, or people?	Yes. "There have been numerous reports of landowners abandoning horse pastures due to unmanageable infestations of PSW, possibly due to the physical obstruction posed by dense swallow-wort stands or the suspected toxicity to mammals of plant tissues (Lawlor 2003; Weston et al. 2005). A feeding trial with fresh PSW plant material resulted in the death of a goat from suspected cardiac arrest 4 days after the last tissue treatment, which seems to support evidence from Scandinavia that sheep avoid grazing on PSW plants (DiTommaso et al 2005b; Haeggstrom 1990)." Douglass et al. 2009 "The potential for both swallow-wort species to serve as fatal hosts for Monarch butterflies (*Danaus plexippus* L.), a condition in which adults lay eggs on the plants but the larvae do not survive, has been well reported (Casagrande and Dacey 2001; DiTommaso and Losey 2003). Casagrande and Dacey (2007) found that in fields with little or no common milkweed (*Asclepias syriaca* L. – the butterflies' normal host species), the density of eggs found on BSW stems was five times greater than that found in a more diverse old-field site with abundant common milkweed. Although there have been studies that questioned whether swallow-worts play a significant role as fatal hosts for Monarch butterflies (Mattila and Otis 2003), it is likely that through the competitive displacement of common milkweed populations, the two swallow-wort species could ultimately pose a serious threat to Monarch butterfly populations in infested areas (DiTommaso et al. 2005b; Tewksbury et al. 2002)." Douglass et al. 2009	Go to Box 9.

Box	Question	Answer	Outcome
	B. Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?	Yes. "The detection of PSW plants in no-till corn and soybean fields is problematic given the relative difficulty of controlling either of the swallow-wort species effectively with commonly used herbicides in crop systems (DiTommaso et al. 2005b; Lawlor 2003; Weston et al. 2005)." Douglass et al. 2009 "The New York State Forest Owner's Association and many foresters have claimed that swallow-wort infestations in understories are also compromising forest regeneration (Lawlor 2003). Horticultural nursery owners and Christmas tree producers affected by swallow-wort infestations reported that due to lack of effective control methods and regeneration impacts, land abandonment was often the only reasonable option. Indeed, several orchard owners east of Rochester, NY cited PSW as their most problematic weed species (A. Fowler, personal communication; Lawlor 2003)." Douglass et al. 2009	

Box	Question	Answer	Outcome
	C. Can the plant aggressively displace native species through competition (including allelopathic effects)?	Yes. PSW in particular has invaded sensitive and rare alvar communities both in eastern Ontario, Canada, and in Jefferson County, NY, and has displaced endemic flora and fauna (DiTommaso et al. 2005b). A survey in the affected areas revealed a significant negative correlation between PSW cover and the number and diversity of previously common grassland bird species (DiTommaso et al. 2005b). Ernst and Cappuccino (2005) found fewer arthropods both dwelling on PSW plants and ground-dwelling insects adjacent to sampled plants. The authors concluded that the decline in old-field arthropod populations because of the invasion of swallowworts could negatively impact bird and small mammals that also depend on insects for food. Allelopathy: Both swallow-wort species have been found to have high concentrations of cytotoxic secondary products in their roots, stems, and leaves (Capo and Saa 1989; Lee et al. 2003; Nowak and Kiesel 2000; Staerk et al. 2000, 2002). A comparison of inhibitory effects with common milkweed (generally not considered to be invasive) found that the swallowworts did not exhibit significantly greater negative allelopathic abilities than the related nonnative species.	
	D. Can the plant hybridize with native species resulting in a modified gene pool and potentially negative impacts on native populations?	Potential to hybridize with other European species (DiTommaso et al 2005).	

Box	Question	Answer	Outcome
	E. Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?	Soils at sites invaded by PSW have been found to have greater AMF inoculums potentials than adjacent, uninvaded sites (DiTommaso et al. 2005b; Greipsson and DiTommaso 2006; Smith 2006; Smith et al. 2008). Swallow-wort plants also showed significantly greater growth in the presence of locally associated microbial communities than nonlocal communities. The authors proposed that by altering the species of mycorrhizal fungi at sites, swallow-wort could facilitate its establishment and expansion by displacing resident flora dependent on native fungal species. Once established, both swallow-wort species grow profusely and aggressively. PSW and BSW can rapidly alter the abiotic and biotic features of their understory and surrounding areas: decreasing sunlight penetration, increasing nutrient acquisition through large root biomasses, and altering rhizosphere dynamics both through shifts in the AMF community and the exudation of allelopathic chemicals (Douglass 2008; Greipsson and DiTommaso 2006; Lawlor 2002; Sheeley and Raynal 1996; Weston et al. 2005).	
	F. Does the plant have the potential to introduce or harbor another pest or serve as an alternate host?		
9	Does the plant species have clearly defined benefits that outweigh associated negative impacts?		
	A. Is the plant currently being used or produced and/or sold in Minnesota or native to Minnesota?	No. (personal communication with Debbie Lonnee and Tim Power, Minnesota Nursery and Landscape Association)	Go to Box 10
10	Should the plant species be enforced as a noxious weed to prevent introduction &/or dispersal; designate as prohibited or restricted?		
	A. Is the plant currently established in Minnesota?	No.	LIST THE PLANT AS A PROHIBITED/ERADICATE NOXIOUS WEED

Box	Question	Answer	Outcome
	B. Does the plant pose a serious human health threat?		
	C. Can the plant be reliably eradicated (entire plant) or controlled (top growth only to prevent pollen dispersal and seed production as appropriate) on a statewide basis using existing practices and available resources?	Both PSWs and BSWs can rapidly regrow from buds on the root crown, rendering mowing, tillage, clipping, and other frequently used control strategies less effective against these perennials (Averill et al. 2008; Lawlor 2002; Lawlor and Raynal 2002; Weston et al. 2005). The most effective chemical treatments were glyphosate (10.4 kg ai ha^{-1}) applied at an early stage of flowering and triclopyr (2.6 kg ai ha^{-1}) applied at early fruit formation, both of which resulted in a 73% reduction in cover, decreased densities, and a loss of apical dominance (Lawlor and Raynal 2002). Biocontrol research was initiated in 2006. There are potential insect biocontrol candidates, but nothing is approved for release at this time. Dick Cassagrande (University of Rhode Island) submitted a petition to USDA for release for the insect Hypena opulent. No recommendation from the Technical Advisory Group (TAG) has been received at this time (5-1-12). Research on other insects is ongoing. (personal communication with Lindsay Milbreth – USDA-ARS and Hariet Hinz - CABI)	
11	Should the plant species be allowed in Minnesota via a species-specific management plan; designate as specially regulated?		

Box	Question	Answer	Outcome
Final Results of Risk Assessment			
	Review Entity	**Comments**	**Outcome**
	NWAC Listing Subcommittee	May 2012 meeting: The biggest question is whether or not pale swallowwort could survive in Minnesota. Need to gather additional data. If only one swallowwort species is listed, it makes more sense to have black swallowwort listed than pale swallowwort. September 2012 meeting: The Little et al. (2009) paper of projected range for pale swallowwort showed that pale swallowwort was not likely to survive in most of Minnesota. The subcommittee thought that listing of Pale swallowwort was not necessary at this time. If there are reports of pale swallowwort persisting in Minnesota, then the risk assessment could be revisited.	**Suggest no regulation at this time.** **Risk assessment will be revisited upon positive finds of this species in MN.**
	NWAC Full-group		**No regulation at this time.** **Risk assessment will be revisited upon positive finds of this species in MN.**
	MDA Commissioner		
File #	**MDARA00022PALSW_1_18_2013**		

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