

<b>Taxon:</b> <i>Orchis mascula</i>	<b>Family:</b> Orchidaceae
<b>Common Name(s):</b> early purple orchid	<b>Synonym(s):</b> <i>Orchis morio</i> var. <i>mascula</i> L.

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 15 Sep 2015
<b>WRA Score:</b> 3.0	<b>Designation:</b> L	<b>Rating:</b> Low Risk

**Keywords:** Temperate, Herbaceous, Ornamental, Geophyte, Wind-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	n
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	?
301	Naturalized beyond native range		
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	y
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	y
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m <sup>2</sup> )		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	No evidence of domestication

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Intermediate
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 14 Sep 2015]	"Native: AFRICA Macaronesia: Spain - Canary Islands [La Palma] Northern Africa: Algeria; Morocco ASIA-TEMPERATE Western Asia: Iran [n. & w.]; Iraq [n.e.]; Lebanon; Turkey Caucasus: Armenia; Azerbaijan; Georgia; Russian Federation - Ciscaucasia EUROPE Northern Europe: Denmark; Finland; Ireland; Norway; Sweden; United Kingdom Middle Europe: Austria; Belgium; Czechoslovakia; Germany; Hungary; Netherlands; Poland; Switzerland East Europe: Belarus; Estonia; Latvia; Lithuania; Ukraine [incl. Krym] Southeastern Europe: Albania; Bulgaria; Former Yugoslavia; Greece; Italy [incl. Sardinia, Sicily]; Romania Southwestern Europe: France [incl. Corsica]; Portugal; Spain [incl. Balears]"

Qsn #	Question	Answer
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed ]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Broad distribution & elevation range, demonstrating environmental versatility] " <i>Orchis mascula</i> has a very wide distribution in Europe and also occurs in parts of Asia. It is found throughout most of Europe – with the exception of northern Russia, mainland Finland and a large part of Sweden – in North Africa and eastwards to Iran, the Caucasus and western Siberia" ... "The altitudinal range of <i>O. mascula</i> in the British Isles is from sea level to 880 m a.s.l. in Caenlochan, Angus (Pearman & Corner 2004). In Spain it occurs between sea level and 1750 m (Castroviejo et al . 2005). In the Alps it has been recorded at approximately 2000 m (Hegi 1975); 2200 m in Puschlav (Switzerland), 2500 m in the area around Bernina (Italy), 2000 m in Wallis (Switzerland), 1900 m in Tirol (Austria) and 1600 m in the Karawanken Mountains on the border between Austria and Slovenia (Ziegenspeck 1936). In the mountains of Albania, the species is mostly found between 1600 and 2100 m altitude (Ziegenspeck 1936)."

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 14 Sep 2015]	"Native: AFRICA Macaronesia: Spain - Canary Islands [La Palma] Northern Africa: Algeria; Morocco ASIA-TEMPERATE Western Asia: Iran [n. & w.]; Iraq [n.e.]; Lebanon; Turkey Caucasus: Armenia; Azerbaijan; Georgia; Russian Federation - Ciscaucasia EUROPE Northern Europe: Denmark; Finland; Ireland; Norway; Sweden; United Kingdom Middle Europe: Austria; Belgium; Czechoslovakia; Germany; Hungary; Netherlands; Poland; Switzerland East Europe: Belarus; Estonia; Latvia; Lithuania; Ukraine [incl. Krym] Southeastern Europe: Albania; Bulgaria; Former Yugoslavia; Greece; Italy [incl. Sardinia, Sicily]; Romania Southwestern Europe: France [incl. Corsica]; Portugal; Spain [incl. Balears]"

Qsn #	Question	Answer
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	"Preston & Hill (1997) and Grime et al . (2007) assign <i>O. mascula</i> to the European Temperate element in the British flora (i.e. mainly occurring in Europe and not extending east of 60 ° East, and associated with the cooltemperate deciduous forest zone)."

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Widespread native distribution. Unknown how widely cultivated this species is outside its native range] " <i>Orchis mascula</i> has a very wide distribution in Europe and also occurs in parts of Asia. It is found throughout most of Europe – with the exception of northern Russia, mainland Finland and a large part of Sweden – in North Africa and eastwards to Iran, the Caucasus and western Siberia (Fig. 2; Ziegenspeck 1936; Meusel et al . 1965; Sundermann 1970; Hultén & Fries 1986)"

301	Naturalized beyond native range	
	Source(s)	Notes
	La Croix, I. F. 2008. <i>The New Encyclopedia of Orchids: 1500 Species in Cultivation</i> . Timber Press, Portland, OR	"Some species, for example, <i>Orchis mascula</i> , will become naturalized if planted in temperate gardens, but others are better in an alpine house."
	Nestorović, M., & Konstantinovic, B. (2011). Overview of the weed flora in the Serbia. <i>Contemporary Agriculture</i> , 60(1-2): 215-230	"Weed flora in Serbia is characterized by high diversity, comprising a total of 741 species classified into 322 genera and 63 families." [Orchis mascula included in this list, but the designation as a "weed" does not include evidence of naturalization or impacts]
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Specialized mycorrhizal requirements may limit ability to naturalized] "Like almost all other <i>Orchis</i> species, <i>O. mascula</i> is mycorrhizal and a fungal symbiont is necessary for seed establishment under field conditions (Rasmussen 1995). In experiments set up by Borris & Voigt (1986), seeds of <i>O. mascula</i> did not germinate asymbiotically whether fresh mature seeds, after-ripened seeds or immature embryos from green capsules were used, but when a fungus strain isolated from an adult plant was introduced, seeds germinated well."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Nestorović, M., & Konstantinovic, B. (2011). Overview of the weed flora in the Serbia. <i>Contemporary Agriculture</i> , 60(1-2): 215-230	"Weed flora in Serbia is characterized by high diversity, comprising a total of 741 species classified into 322 genera and 63 families." [Orchis mascula included in this list, but the designation as a "weed" does not include evidence of naturalization or impacts]

Qsn #	Question	Answer
303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	Congeneric weed	
	Source(s)	Notes
	Turland, N., Phitos, D., Kamari, G., & Bareka, P. (2004). Weeds of the traditional agriculture of Crete. <i>Willdenowia</i> , 34: 381-406	[Several <i>Orchis</i> species are listed as weeds. Weeds in this sense refers to plants that occur as a result of agricultural practices, and do not necessarily indicate detrimental impacts] "The goal of this research project was to carry out a thorough floristic survey of weeds in the traditional agriculture of the South Aegean island of Crete, Greece" ... "Changes from traditional to modern agricultural practices on the South Aegean island of Crete, Greece, during the 20th century have adversely affected the non-invasive Mediterranean weed flora there. Many of these species were presumably originally introduced by humans (such plants are termed archaeophytes), and they often exhibit peculiar, restricted distributions reflecting the isolation under which the traditional agriculture developed"
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Several <i>Orchis</i> species listed as weeds, but description and evidence of impacts have not been described or verified

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[No evidence] "Early purple orchid. Orchidaceae, genus <i>Orchis</i> , subgenus <i>Masculae</i> , section <i>Masculae</i> . <i>Orchis mascula</i> is a polycarpic perennial herb with two ellipsoid to sub-globose tubers, 15–35 × 10–20 mm, positioned 3–10 cm underground; roots few, rather slender. Stem 20–60 cm, erect, stout, cylindrical, pale green, often purplish, and angled above, sometimes hollow at the base, with 3–5 leaves in lower half and with sheaths above. Leaves 5–20 cm long, 0.5–3 cm wide, bright or greyish-green, broadly to narrowly oblong-lanceolate to oblong, acute or obtuse at apex, keeled, usually with rounded black–purple spots, the lower leaves spreading, the upper more erect and clasping."

402	Allelopathic	
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Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	" <i>Orchis mascula</i> is a polycarpic perennial herb with two ellipsoid to sub-globose tubers, 15–35 × 1–20 mm, positioned 3–10 cm underground; roots few, rather slender." [Orchidaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	"Browsing by muntjac deer ( <i>Muntiacus reevesi</i> ) and sheep has been reported as damaging <i>O. mascula</i> (Cooke & Farrell 2001). Slugs have been observed feeding on petals of <i>O. mascula</i> . Inspection of the amount of herbivore damage to the petals of <i>O. mascula</i> in a population growing in limestone grassland in central England showed that the proportion of damage was < 1% across the whole population, but as high as 6% for individual plants (Breadmore & Kirk 1998). In recent years there have been increasingly frequent reports of damage by wildlife, especially by wild boar feeding on the tubers (Kretzschmar et al. 2007)."

405	Toxic to animals	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[No evidence] "Browsing by muntjac deer ( <i>Muntiacus reevesi</i> ) and sheep has been reported as damaging <i>O. mascula</i> (Cooke & Farrell 2001)."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Unknown] "(A) ANIMAL FEEDERS OR PARASITES: There are no data in the Phytophagous Insects Database (D. Roy, pers. comm.)." ... "(B) & (C) PLANT PARASITES AND DISEASES No data available."

Qsn #	Question	Answer
407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. Journal of Ecology, 97(2): 360-377	" <i>Orchis mascula</i> has been used for centuries in the production of salep, a drink made out of the dried and ground tubers. It was popular in Britain before the introduction of coffee and tea, and consumed in establishments devoted to the purpose (Grieve 1971)."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. Journal of Ecology, 97(2): 360-377	[No evidence. Unlikely given herbaceous habit and moist habitat] " <i>Orchis mascula</i> is a native herb occurring in moist meadows and pastures, open woods, copses, thickets or on rock-ledges, mostly on neutral or base-rich soils."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. Journal of Ecology, 97(2): 360-377	"It tolerates a sparse to moderately dense canopy, but it does not flower in deep shade." ... " <i>Orchis mascula</i> is shade tolerant, but ill-adapted to life in the deep shade of undisturbed woodland and it appears to be reliant on frequent opening of the canopy for its long-term persistence (Tamm 1972; Jacquemyn et al. 2008)."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. Journal of Ecology, 97(2): 360-377	"It is mostly found in woodland, copses, grasslands and open pastures, mostly on neutral or base rich soils." ... "It is absent from very acid or very wet sites." ... " <i>Orchis mascula</i> grows on a variety of soils in the British Isles, but is most common on basic and calcareous soils, often on moderately nutrient-rich substrates (Rackham 2003). It can also be found on clayey neutral soils or even slightly acid soils (Summerhayes 1951)."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. Journal of Ecology, 97(2): 360-377	" <i>Orchis mascula</i> is a non-bulbous geophyte with little or no capacity for vegetative spread. The main perennating organ is a tuber (strictly a rootstem tuber)."

412	Forms dense thickets	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Large populations, but no evidence of monoculture formation] " <i>Orchis mascula</i> can form vast populations. On Öland, populations of <i>O. mascula</i> can sometimes exceed a million individuals (Nilsson 1983). Within populations, it often grows in clumps of 2–5 individuals (Möller 1987)."

501	Aquatic	n
	<b>Source(s)</b>	<b>Notes</b>
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Terrestrial] " <i>Orchis mascula</i> is a native herb occurring in moist meadows and pastures, open woods, copses, thickets or on rock- ledges, mostly on neutral or base-rich soils."

502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 14 Sep 2015]	"Family: Orchidaceae subfamily: Orchidoideae tribe: Orchideae"

503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 14 Sep 2015]	"Family: Orchidaceae subfamily: Orchidoideae tribe: Orchideae"

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y
	<b>Source(s)</b>	<b>Notes</b>
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	" <i>Orchis mascula</i> is a non-bulbous geophyte with little or no capacity for vegetative spread. The main perennating organ is a tuber (strictly a rootstem tuber)."

601	Evidence of substantial reproductive failure in native habitat	n
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Habitat loss has resulted in decline, but not substantial reproductive failure] "As in most other European countries, <i>Orchis mascula</i> has declined in the British Isles, although it is not at threat of extinction at a national level. Most sites from which it has been lost are in central England and Scotland. Most losses have been caused by woodland clearance and coniferization, intensification of grassland management and ploughing." ... "Although <i>O. mascula</i> is not much at threat except from habitat destruction and is currently not endangered in the UK, its range has declined here as in most western European countries during the 20th century (Jacquemyn et al. 2005; Kull & Hutchings 2006)."

602	Produces viable seed	y
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	"Seeds very numerous and tiny (length: 0.39 (± 0.13) mm, width: 0.18 (± 0.03) mm), mean volume 6.43 (± 3.98) × 10 <sup>-3</sup> mm <sup>3</sup> ; testa transparent." ... "Under natural conditions, seeds germinate in autumn and emerge above-ground in the following May (Ziegenspeck 1936; Möller 1987)."

603	Hybridizes naturally	y
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	"Despite these strong post-mating barriers, several hybrids involving <i>O. mascula</i> have been described. For example, although they appear to be very rare, hybrids between <i>Orchis</i> ( <i>Anacamptis</i> ) <i>morio</i> and <i>O. mascula</i> ( <i>O. × morioides</i> Brand) have been recorded in the British Isles in open pasture and cliff-top habitats where both parent species occur (Godfery 1918, 1933; Summerhayes 1951; Foley 1986; Graham 1988; Sell & Murrell 1996).

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Self-compatible, but lower seed set than when cross pollinated] " <i>Orchis mascula</i> is not autogamous and pollinators are necessary for successful pollination and fruit set." ... "Nilsson (1983) reported that in hot and dry years when anthesis was faster, flowers quickly dried up and the viscidia were sometimes extracted by the collapsing lip. In a very few cases this caused the pollinia to contact the stigma, resulting in self-pollination. Experimental hand-pollinations have also shown that a lower percentage of embryos is formed when flowers are self-pollinated (59.8 ± 18.8%) than when they are cross-pollinated (75.1 ± 18.9%) and that the mean size of the embryos is also smaller (Nilsson 1983)."

Qsn #	Question	Answer
605	Requires specialist pollinators	y
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	"Flowers are nectarless, and pollinated by deceit, mainly by bumblebees and solitary bees."

606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Possible limited spread] " <i>Orchis mascula</i> is a non-bulbous geophyte with little or no capacity for vegetative spread." ... "Occasionally, clusters of <i>O. mascula</i> may arise as a result of vegetative propagation, although the capacity for this seems to be limited (Jacquemyn et al. 2009a; see also VI C)."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	"The species is long-lived: it takes at least 4 years from first appearance above-ground to achieve flowering for the first time. The maximum recorded lifetime after first appearance is 13 years."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Unknown. Occurs in heavily trafficked areas. Small seeds could be dispersed in soil adhering to vehicles, equipment or footwear] "It is mostly found in woodland, copses, grasslands and open pastures, mostly on neutral or base-rich soils. It can also occur in hedgerows, scrub, on roadsides and railway banks, in grikes on limestone pavement and on moist cliff ledges."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	La Croix, I. F. 2008. <i>The New Encyclopedia of Orchids: 1500 Species in Cultivation</i> . Timber Press, Portland, OR	[Cultivated intentionally] "Cultivation: Some species, for example, <i>Orchis mascula</i> , will become naturalized if planted in temperate gardens, but others are better in an alpine house."
	Laneside Hardy Orchids. 2015. <i>Orchis mascula</i> . <a href="http://lanesidehardyorchids.com/">http://lanesidehardyorchids.com/</a> . [Accessed 15 Sep 2015]	<i>Orchis mascula</i> sold on this and other commercial websites

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes

Qsn #	Question	Answer
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	"Because of their tiny size (length: $0.39 \pm 0.13$ mm, width: $0.18 \pm 0.03$ mm), small volume ( $6.43 \pm 3.98 \times 10^{-3}$ mm <sup>3</sup> ) and 71% free air space in the testa (Arditti & Ghani 2000), seeds of <i>O. mascula</i> appear to be well-adapted for long-distance seed dispersal by wind. Despite this, parentage analyses conducted in two populations of <i>O. mascula</i> indicated that most seeds fall in the direct neighbourhood of the mother plant (Jacquemyn et al. 2009a), with seed dispersal distances varying between 0.01 and 7.21 m (median: 1.57 m)"

705	Propagules water dispersed	
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Adapted for wind dispersal, but small size may allow for dispersal by water] "Because of their tiny size (length: $0.39 \pm 0.13$ mm, width: $0.18 \pm 0.03$ mm), small volume ( $6.43 \pm 3.98 \times 10^{-3}$ mm <sup>3</sup> ) and 71% free air space in the testa (Arditti & Ghani 2000), seeds of <i>O. mascula</i> appear to be well-adapted for long-distance seed dispersal by wind."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Wind-dispersed] "Because of their tiny size (length: $0.39 \pm 0.13$ mm, width: $0.18 \pm 0.03$ mm), small volume ( $6.43 \pm 3.98 \times 10^{-3}$ mm <sup>3</sup> ) and 71% free air space in the testa (Arditti & Ghani 2000), seeds of <i>O. mascula</i> appear to be well-adapted for long-distance seed dispersal by wind."

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Unknown. No means of external attachment, but small size could allow for dispersal in soil adhering to hooves, feet, or fur] "Because of their tiny size (length: $0.39 \pm 0.13$ mm, width: $0.18 \pm 0.03$ mm), small volume ( $6.43 \pm 3.98 \times 10^{-3}$ mm <sup>3</sup> ) and 71% free air space in the testa (Arditti & Ghani 2000), seeds of <i>O. mascula</i> appear to be well-adapted for long-distance seed dispersal by wind."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> , 25(2): 56-74	"Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut."
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Adapted for wind dispersal] "...seeds of <i>O. mascula</i> appear to be well-adapted for long-distance seed dispersal by wind."

801	Prolific seed production (>1000/m2)	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Possibly Yes. Densities unknown] "Seeds very numerous and tiny (length: 0.39 (± 0.13) mm, width: 0.18 (± 0.03) mm), mean volume 6.43 (± 3.98) × 10 <sup>-3</sup> mm <sup>3</sup> ; testa transparent."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	<b>Source(s)</b>	<b>Notes</b>
	Bakker, J. P., Bakker, E. S., Rosén, E., Verweij, G. L., & Bekker, R. M. (1996). Soil seed bank composition along a gradient from dry alvar grassland to <i>Juniperus</i> shrubland. <i>Journal of Vegetation Science</i> , 7: 165-176	"App. 1. Occurrence of plant species in the established vegetation and in the seed bank" [ <i>Orchis mascula</i> identified as having a transient seed bank]

803	Well controlled by herbicides	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2015. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	<b>Source(s)</b>	<b>Notes</b>
	Jacquemyn, H., Brys, R., Honnay, O., & Hutchings, M. J. (2009). Biological Flora of the British Isles: <i>Orchis mascula</i> (L.) L. <i>Journal of Ecology</i> , 97(2): 360-377	[Unknown, but limited ability to spread vegetatively. This suggests that plant may not recover from fire or other physical damage " <i>Orchis mascula</i> is a non-bulbous geophyte showing limited or no vegetative spread."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2015. Personal Communication	Unknown

**Summary of Risk Traits:**

## High Risk / Undesirable Traits

- Broad distribution, & elevation range that exceeds 1000 m, demonstrating environmental versatility
- Unconfirmed reports of naturalization & weediness
- Other *Orchis* species may be weedy
- Shade tolerant
- Tolerates many soil types
- Geophytic growth habit
- Reproduces by seeds
- Hybridizes with other *Orchis* species
- Self-compatible (but with limited seed set)
- Wind-dispersed seeds
- Prolific seed production (densities unknown)

## Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Palatable to animals
- Non-toxic
- Ornamental
- Specialized pollination requirements
- Limited ability to spread vegetatively
- Reaches maturity in 4+ years
- Mycorrhizal requirements may limit ability to establish

## Second Screening Results for Herbs

(A) Reported as a weed of cultivated lands?> No  
Outcome = Accept (Low Risk)