

Australia/New Zealand Weed Risk Assessment adapted for United States.

Data used for analysis published in: Gordon, D.R. and C.A. Gantz. 2008. Potential impacts on the horticultural industry of screening new plants for invasiveness. Conservation Letters 1: 227-235. Available at: <http://www3.interscience.wiley.com/cgi-bin/fulltext/121448369/PDFSTART>

| <i>Ornithogalum kochii</i> |  |        |       |
|----------------------------|--|--------|-------|
| Question number            | Question   | Answer | Score |
| 1.01                       | Is the species highly domesticated?  | n      | 0     |
| 1.02                       | Has the species become naturalised where grown?  |        |       |
| 1.03                       | Does the species have weedy races?   |        |       |
| 2.01                       | Species suited to U.S. climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high)    | 2      |       |
| 2.02                       | Quality of climate match data (0-low; 1-intermediate; 2-high)                            | 1      |       |
| 2.03                       | Broad climate suitability (environmental versatility)                                    | n      | 0     |
| 2.04                       | Native or naturalized in regions with an average of 11-60 inches of annual precipitation | y      | 1     |
| 2.05                       | Does the species have a history of repeated introductions outside its natural range?     | ?      |       |
| 3.01                       | Naturalized beyond native range  | n      | -1    |
| 3.02                       | Garden/amenity/disturbance weed  | n      | 0     |
| 3.03                       | Weed of agriculture  | n      | 0     |
| 3.04                       | Environmental weed   | n      | 0     |
| 3.05                       | Congeneric weed  | y      | 2     |
| 4.01                       | Produces spines, thorns or burrs   | n      | 0     |
| 4.02                       | Allelopathic   |        |       |
| 4.03                       | Parasitic  | n      | 0     |
| 4.04                       | Unpalatable to grazing animals   |        |       |
| 4.05                       | Toxic to animals   | n      | 0     |
| 4.06                       | Host for recognised pests and pathogens  | ?      |       |
| 4.07                       | Causes allergies or is otherwise toxic to humans   | n      | 0     |
| 4.08                       | Creates a fire hazard in natural ecosystems  |        |       |
| 4.09                       | Is a shade tolerant plant at some stage of its life cycle                                | ?      |       |
| 4.1                        | Grows on one or more of the following soil types: alfisols, entisols, or mollisols       | y      | 1     |
| 4.11                       | Climbing or smothering growth habit  | ?      |       |
| 4.12                       | Forms dense thickets   | ?      |       |

|                    |  |   |          |
|--------------------|--|---|----------|
| 5.01               | Aquatic  | n | 0        |
| 5.02               | Grass  | n | 0        |
| 5.03               | Nitrogen fixing woody plant  | n | 0        |
| 5.04               | Geophyte   | y | 1        |
| 6.01               | Evidence of substantial reproductive failure in native habitat                                 | n | 0        |
| 6.02               | Produces viable seed   | y | 1        |
| 6.03               | Hybridizes naturally   |   |          |
| 6.04               | Self-compatible or apomictic   |   |          |
| 6.05               | Requires specialist pollinators  |   |          |
| 6.06               | Reproduction by vegetative fragmentation   | y | 1        |
| 6.07               | Minimum generative time (years)  |   |          |
| 7.01               | Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas) |   |          |
| 7.02               | Propagules dispersed intentionally by people   | n | -1       |
| 7.03               | Propagules likely to disperse as a produce contaminant   | n | -1       |
| 7.04               | Propagules adapted to wind dispersal   | n | -1       |
| 7.05               | Propagules water dispersed   |   |          |
| 7.06               | Propagules bird dispersed  |   |          |
| 7.07               | Propagules dispersed by other animals (externally)   | n | -1       |
| 7.08               | Propagules dispersed by other animals (internally)   |   |          |
| 8.01               | Prolific seed production   |   |          |
| 8.02               | Evidence that a persistent propagule bank is formed (>1 yr)                                    |   |          |
| 8.03               | Well controlled by herbicides  |   |          |
| 8.04               | Tolerates, or benefits from, mutilation or cultivation   |   |          |
| 8.05               | Effective natural enemies present in U.S.  |   |          |
| <b>Total Score</b> |  |   | <b>2</b> |

|                |                |
|----------------|----------------|
| <b>Outcome</b> | <b>Accept*</b> |
|----------------|----------------|

\*Used secondary screen from: Daehler, C. C., J.L. Denslow, S. Ansari, and H. Kuo. 2004. A risk assessment system for screening out harmful invasive pest plants from Hawaii's and other Pacific islands. *Conserv. Biol.* 18: 360-368.

| section | # questions answered | satisfy minimum? |
|---------|----------------------|------------------|
| A       | 10                   | Yes              |
| B       | 5                    | Yes              |
| C       | 11                   | Yes              |
| total   | 26                   | yes              |

Data collected 2008

| Question number | Reference   | Source data   |
|-----------------|---|---|
| 1.01            |   | used horticulturally, but no evidence of significant modification   |
| 1.02            |   |   |
| 1.03            |   |   |
| 2.01            | <p>1. PERAL NAPPFAST Global Plant Hardiness (<a href="http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lnd.tif">http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lnd.tif</a>). 2. Herrmann, N (2002) Biological Flora of Central Europe: "<i>Ornithogalum angustifolium</i>" nom. prov., Syn. p.p. <i>O. orthophyllum</i> ssp. <i>kochii</i> = <i>O. kochii</i> Parl., <i>O. gussonei</i> Ten. Flora 197: 409-428. 3. Czerepanov, SK (1995) Vascular Plants of Russia and Adjacent States (the former USSR). Cambridge University Press, Cambridge and New York. 4. Fedorov, AA (1999) Flora of Russia: The European Part and Bordering Regions. Volume IV. A.A. Balkema, Rotterdam and Brookfield, Vermont. 5. Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).</p> | <p>1. Global hardiness zones 6-7. 2. "According to Raamsdonk (1998, 2000) the diploid <i>O. kochii</i> occurs in Germany only with a single population in the south of Baden-Wurtemberg."; "According to Speta (1990a) the diploid <i>O. kochii</i> occurs in the South of Poland, in the Czech Republic, in eastern Austria, in the North of Hungaria and in the north-western and north-eastern regions of former Yugoslavia." 3. Eastern Europe (European part of former USSR), Caucasus. 4. "General distribution: Caucasus, Central Europe, Mediterranean, Asia Minor." 5. "European part: M. Dnp., Bl., U. don, L. Don; Caucasus: Cisc., Dag., E., S., and W. Transc. Gen. distr.: W. Med., Bal. - As. Min., Arm. - Kurd. Described from Sicily".</p> |
| 2.02            |   |   |
| 2.03            | <p>1. Köppen-Geiger climate map (<a href="http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf">http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf</a>). 2. Herrmann, N (2002) Biological Flora of Central Europe: "<i>Ornithogalum angustifolium</i>" nom. prov., Syn. p.p. <i>O. orthophyllum</i> ssp. <i>kochii</i> = <i>O. kochii</i> Parl., <i>O. gussonei</i> Ten. Flora 197: 409-428. 3. Czerepanov, SK (1995) Vascular Plants of Russia and Adjacent States (the former USSR).</p>  | <p>1. Only two climatic regions. 2. "According to Raamsdonk (1998, 2000) the diploid <i>O. kochii</i> occurs in Germany only with a single population in the south of Baden-Wurtemberg."; "According to Speta (1990a) the diploid <i>O. kochii</i> occurs in the South of Poland, in the Czech Republic, in</p>   |

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|      | <p>Cambridge University Press, Cambridge and New York. 4. Fedorov, AA (1999) Flora of Russia: The European Part and Bordering Regions. Volume IV. A.A. Balkema, Rotterdam and Brookfield, Vermont. 5. Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).</p>  | <p>eastern Austria, in the North of Hungaria and in the north-western and north-eastern regions of former Yugoslavia." 3. Eastern Europe (European part of former USSR), Caucasus. 4. "General distribution: Caucasus, Central Europe, Mediterranean, Asia Minor." 5. "European part: M. Dnp., Bl., U. don, L. Don; Caucasus: Cisc., Dag., E., S., and W. Transc. Gen. distr.: W. Med., Bal. - As. Min., Arm. - Kurd. Described from Sicily".</p>  |
| 2.04 | <p>1. Atlapedia Online (<a href="http://www.atlapedia.com/online/countries/germany.htm">http://www.atlapedia.com/online/countries/germany.htm</a>). 2. Atlapedia Online (<a href="http://www.atlapedia.com/online/countries/poland.htm">http://www.atlapedia.com/online/countries/poland.htm</a>). 3. Atlapedia Online (<a href="http://www.atlapedia.com/online/countries/czech.htm">http://www.atlapedia.com/online/countries/czech.htm</a>). 4. United Nations Environment Programme, Country Environmental Profile Information System (<a href="http://countryprofiles.unep.org/profiles/AT">http://countryprofiles.unep.org/profiles/AT</a>). 5. Atlapedia Online (<a href="http://www.atlapedia.com/online/countries/hungary.htm">http://www.atlapedia.com/online/countries/hungary.htm</a>). 6. Atlapedia Online (<a href="http://www.atlapedia.com/online/countries/bosnia.htm">http://www.atlapedia.com/online/countries/bosnia.htm</a>).</p> | <p>1. For Germany: "Average annual precipitation in Berlin is 592 mm (23 inches)." 2. For Poland: "The average annual precipitation varies from 500 mm (20 inches) to 1,220 mm (48 inches) depending on the region." 3. For the Czech Republic: "Average annual precipitation in Prague is about 510 mm (20 inches)." 4. For Austria: "Average annual rainfall is about 660 mm (~26 in) in Vienna and 870 mm (~34.3 in) in Innsbruck, while some interior valleys average between about 1 500 (~59.1 in) and 2 000 mm (~78.7 in)." 5. For Hungary: "Average annual precipitation is 640 mm (25 inches)." 6. For Bosnia-Herzegovina [Yugoslavia]: "Herzegovina and the southern area has a modified Mediterranean climate with an average annual precipitation of 600 to 800 mm (24 to 31.5 inches) while (2.) the central and northern area of Bosnia has a modified Pannonian or Alpine climate with an average annual precipitation of 1,500 to 2,500 mm (59 to 98 inches)."</p> |
| 2.05 |  | no evidence  |
| 3.01 |  | no evidence  |
| 3.02 |  | no evidence  |

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| 3.03 |  | no evidence   |
| 3.04 |  | no evidence   |
| 3.05 | Holm, L, JV Pancho, JP Herberger, and DL Plucknett (1979) A Geographical Atlas of World Weeds. John Wiley and Sons, New York.  | One congener is a principal weed in one country; three congeners are common weeds in 3 countries; one congener is present as a weed in 1 country.                                   |
| 4.01 | Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).                        | no description of these traits  |
| 4.02 |  |   |
| 4.03 | Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).                        | no description of parasitism  |
| 4.04 |  |   |
| 4.05 | Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).                        | no evidence   |
| 4.06 | Herrmann, N (2002) Biological Flora of Central Europe: " <i>Ornithogalum angustifolium</i> " nom. prov., Syn. p.p. <i>O. orthophyllum</i> ssp. <i>kochii</i> = <i>O. kochii</i> Parl., <i>O. gussonei</i> Ten. Flora 197: 409-428. | "According to Scheur & Poelt (1997) <i>Puccinia liliacearum</i> was noted also on plants of <i>Ornithogalum kochii</i> growing in the Leithagebirge mountain (Austria, Burgenland). |
| 4.07 | Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).                        | no evidence   |
| 4.08 |  |   |
| 4.09 | Herrmann, N (2002) Biological Flora of Central Europe: " <i>Ornithogalum angustifolium</i> " nom. prov., Syn. p.p. <i>O. orthophyllum</i> ssp. <i>kochii</i> = <i>O. kochii</i> Parl., <i>O. gussonei</i> Ten. Flora 197: 409-428. | "the taxa of the <i>O. umbellatum</i> -group in general...colonize open xerothermous sites in the Mediterranean area"   |
| 4.1  | 1. USDA, National Resources Conservation Services (NRCS), Soil Survey Division, World Soil   | 1. Much of Europe (especially Eastern Europe) has alfisols and mollisols. 2.  |

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|      | Resources<br>( <a href="http://soils.usda.gov/use/worldsoils/mapindex/order.html">http://soils.usda.gov/use/worldsoils/mapindex/order.html</a> ). 2. Fedorov, AA (1999) Flora of Russia: The European Part and Bordering Regions. Volume IV. A.A. Balkema, Rotterdam and Brookfield, Vermont.  | "On dry stony slopes".   |
| 4.11 | Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).  | "Perennial...leaves 4-6...shorter to longer than the scape, sometimes withering at flowering" [species description]; "scape leafless" [genus description]. |
| 4.12 | Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).  | "Perennial...leaves 4-6...shorter to longer than the scape, sometimes withering at flowering" [species description]; "scape leafless" [genus description]. |
| 5.01 |  | terrestrial  |
| 5.02 | Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).  | Liliaceae  |
| 5.03 | Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968).  | Liliaceae  |
| 5.04 | 1. Herrmann, N (2002) Biological Flora of Central Europe: " <i>Ornithogalum angustifolium</i> " nom. prov., Syn. p.p. <i>O. orthophyllum</i> ssp. <i>kochii</i> = <i>O. kochii</i> Parl., <i>O. gussonei</i> Ten. Flora 197: 409-428. 2. Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968). 3. Walters, SM <i>et al</i> (1984) The European Garden Flora. Volume I. Pteridophyta, Gymnospermae, Angiospermae-Monocotyledons (Part I). P.216. Cambridge University Press, Cambridge (Cambridgeshire) and New York. | 1. "All species of the genus are bulbous geophytes". 2. "Bulb ovoid, small". 3. "Plants with bulbs which are usually subterranean" [genus description].    |
| 6.01 |  | no evidence  |
| 6.02 | 1. Herrmann, N (2002) Biological Flora of Central Europe: " <i>Ornithogalum angustifolium</i> " nom. prov.,  | 1. "Germination is epigeal. This is a typical character of the whole <i>O.</i>   |

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|      | Syn. p.p. <i>O. orthophyllum</i> ssp. <i>kochii</i> = <i>O. kochii</i> Parl., <i>O. gussonei</i> Ten. Flora 197: 409-428. 2. Fedorov, AA (1999) Flora of Russia: The European Part and Bordering Regions. Volume IV. A.A. Balkema, Rotterdam and Brookfield, Vermont.  | <i>umbellatum</i> -group." 2. "Germination epigeal" [genus description]   |
| 6.03 |  |   |
| 6.04 |  |   |
| 6.05 |  |   |
| 6.06 | 1. Herrmann, N (2002) Biological Flora of Central Europe: " <i>Ornithogalum angustifolium</i> " nom. prov., Syn. p.p. <i>O. orthophyllum</i> ssp. <i>kochii</i> = <i>O. kochii</i> Parl., <i>O. gussonei</i> Ten. Flora 197: 409-428. 2. Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968). 3. Walters, SM <i>et al</i> (1984) The European Garden Flora. Volume I. Pteridophyta, Gymnospermae, Angiospermae-Monocotyledons (Part I). P.216. Cambridge University Press, Cambridge (Cambridgeshire) and New York. | 1. "All species of the genus are bulbous geophytes". 2. "Bulb ovoid, small". 3. "Plants with bulbs which are usually subterranean" [genus description].   |
| 6.07 |  |   |
| 7.01 |  |   |
| 7.02 |  | no evidence   |
| 7.03 |  | no evidence   |
| 7.04 | 1. Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968). 2. Walters, SM <i>et al</i> (1984) The European Garden Flora. Volume I. Pteridophyta, Gymnospermae, Angiospermae-Monocotyledons (Part I). P.216. Cambridge University Press, Cambridge (Cambridgeshire) and New York.   | 1. "Capsule obovoid" [species description]; "capsule with winged or wingless ribs; seeds flat, ovoid or subglobose, black" [genus description]; "mature capsules not distinctly winged" [species description in key]. 2. "Fruit a capsule with many seeds" [genus description]. [no evidence of adaptations to wind dispersal]. |
| 7.05 |  |   |
| 7.06 |  |   |
| 7.07 | 1. Komarov, VL (1935) Flora of the U.S.S.R. Volume IV. Liliiflorae and Microspermae. Pp. 292-294. Izdatel'stvo Akademii Nauk SSSR, Leningrad and Israel Program for Scientific Translations, Jerusalem (1968). 2. Walters, SM <i>et al</i> (1984) The European Garden Flora. Volume I. Pteridophyta, Gymnospermae, Angiospermae-Monocotyledons (Part I). P.216. Cambridge University Press,  | 1. "Capsule obovoid" [species description]; "capsule with winged or wingless ribs; seeds flat, ovoid or subglobose, black" [genus description]. 2. "Fruit a capsule with many seeds" [genus description]. [no evidence of adaptations to external   |

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|------|--|-------------|
|      | Cambridge (Cambridgeshire) and New York. | dispersal]. |
| 7.08 |  |             |
| 8.01 |  |             |
| 8.02 |  |             |
| 8.03 |  |             |
| 8.04 |  |             |
| 8.05 |  |             |