

Family: *Polygonaceae*

Taxon: *Persicaria tinctoria*

Synonym: *Polygonum tinctorium* Aiton (*basionym*)

Common Name: Chinese indigo
polygonum-indigo

Questionnaire : current 20090513
Status: Assessor Approved

Assessor: Patti Clifford
Data Entry Person: Patti Clifford

Designation: L

WRA Score 4

101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?	y=1, n=-1	
103	Does the species have weedy races?	y=1, n=-1	
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)	Intermediate
203	Broad climate suitability (environmental versatility)	y=1, n=0	
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	n
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
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	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	
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	
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	
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	n
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	
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
803	Well controlled by herbicides	y=-1, n=1	
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: L

WRA Score 4

Supporting Data:

101	2011. WRA Specialist. Personal Communication.	[Is the species highly domesticated? No] No evidence of domestication that reduces invasive traits.
102	2011. WRA Specialist. Personal Communication.	[Has the species become naturalized where grown? NA]
103	2011. WRA Specialist. Personal Communication.	[Does the species have weedy races? NA]
201	2009. Bechtold, R./Mussak, R.. Handbook of natural colorants. John Wiley & Sons, http://books.google.com/books?id=UTxkf9H7lvcC&pg=PA92&dq=persicaria+tinctoria&hl=en&ei=G6uwTj9NOKviQLKh9D2Dw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CCOQ6AEwAA#v=onepag	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"? Intermediate] <i>Persicaria tinctoria</i> a subtropical, annual member of the Polygonaceae family, which has been grown for centuries in Japan and China as a source of indigo. An native of Vietnam and southern China, <i>Persicaria</i> is adapted to growing in wet places, and therefore would be expected to require a warm humid tropical or subtropical climate.
201	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"? Intermediate] Native range: China - Guangdong, Guangxi, Hebei, Hubei, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan
202	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Quality of climate match data? Intermediate] Native range: China - Guangdong, Guangxi, Hebei, Hubei, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan
203	2011. WRA Specialist. Personal Communication.	[Broad climate suitability (environmental versatility)? Unknown]
204	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Native or naturalized in regions with tropical or subtropical climates? Yes] Native range: China - Guangdong, Guangxi, Hebei, Hubei, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan [marginally grows in subtropics]
205	2001. Hanelt, P. (ed.). <i>Mansfeld's encyclopedia of agricultural & horticultural crops: (except ornamentals). Algae, Fungi, Pteridophyta, Gymnospermae, Angiospermae-Dicotyledones: Magnoliaceae-Chrysobalanaceae.</i> Springer, Berlin	[Does the species have a history of repeated introductions outside its natural range? No] Cultivated in China, Japan and Korea; formerly occasionally grown in Europe (Ukraine) and the Caucasus area.
205	2011. WRA Specialist. Personal Communication.	[Does the species have a history of repeated introductions outside its natural range? No] No evidence of repeated introductions.
301	2001. Hanelt, P. (ed.). <i>Mansfeld's encyclopedia of agricultural & horticultural crops: (except ornamentals). Algae, Fungi, Pteridophyta, Gymnospermae, Angiospermae-Dicotyledones: Magnoliaceae-Chrysobalanaceae.</i> Springer, Berlin	[Naturalized beyond native range? Yes] Locally naturalized in SE Europe.
302	2007. Randall, R.. <i>Global Compendium of Weeds - Persicaria tinctoria.</i> http://www.hear.org/gcw/species/persicaria_tinctoria/	[Garden/amenity/disturbance weed? No] No evidence.
303	2007. Randall, R.. <i>Global Compendium of Weeds - Persicaria tinctoria.</i> http://www.hear.org/gcw/species/persicaria_tinctoria/	[Agricultural/forestry/horticultural weed? No] No evidence.
304	2007. Randall, R.. <i>Global Compendium of Weeds - Persicaria tinctoria.</i> http://www.hear.org/gcw/species/persicaria_tinctoria/	[Environmental weed? No] No evidence.

305	2010. Swearingen, J.B./Slattery, B./Reshetiloff, K./Zwicker, S.. <i>Persicaria tinctoria</i> In: Plant invaders of Mid-Atlantic Natural Areas, 4th ed.. National Park Service and U.S. Fish and Wildlife Service, Washington D.C. http://www.nps.gov/plants/alien/pubs	[Congeneric weed? Yes] <i>Persicaria perfoliata</i> (mile-a-minute weed) is invasive. Mile-a-minute is found in the northeast from Virginia to New York to Ohio and Oregon. It invades open and disturbed areas, such as fields, forest edges, stream banks, wetlands, roadsides and wetlands. Mile-a-minute grows rapidly, producing a thick tangle of vines over herbaceous and woody plants and even scrambling up into trees. Thick tangles block sunlight and limit photosynthesis which eventually kills covered plants.
401	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - <i>Polygonum tinctoria</i> . Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Produces spines, thorns or burrs? No] Herbs annual. Stems erect, 50-80 cm tall, usually branched.
402	2011. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - <i>Polygonum tinctoria</i> . Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Parasitic? No] Polygonaceae.
404	2011. WRA Specialist. Personal Communication.	[Unpalatable to grazing animals? Unknown]
405	2011. National Center for Biotechnology Information. PubMed. U.S. National Library of Medicine, Bethesda, Maryland http://www.ncbi.nlm.nih.gov/	[Toxic to animals? No] No evidence.
405	2011. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Toxic to animals? No] No evidence.
406	2009. Bechtold, R./Mussak, R.. Handbook of natural colorants. John Wiley & Sons, http://books.google.com/books?id=UTxkf9H7lvcC&pg=PA92&dq=persicaria+tinctoria&hl=en&ei=G6uwTpj9NOKviQLKh9D2Dw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CC0Q6AEwAA#v=o nepag	[Host for recognized pests and pathogens?] Regarding pests, diseases and other problems, <i>Persicaria tinctoria</i> is relatively problem free.
407	2009. Bechtold, R./Mussak, R.. Handbook of natural colorants. John Wiley & Sons, http://books.google.com/books?id=UTxkf9H7lvcC&pg=PA92&dq=persicaria+tinctoria&hl=en&ei=G6uwTpj9NOKviQLKh9D2Dw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CC0Q6AEwAA#v=o nepag	[Causes allergies or is otherwise toxic to humans? No] Used as a dye and a medicinal.
408	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - <i>Polygonum tinctoria</i> . Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Creates a fire hazard in natural ecosystems? No] Annual; herbaceous 50-80 cm.
409	2011. Dave's Garden. PlantFiles: Dyers' knotweed, Japaneses indigo - <i>Persicaria tinctoria</i> . Dave's Garden, http://davesgarden.com/guides/pf/go/77072/	[Is a shade tolerant plant at some stage of its life cycle?] Sun Exposure: Full Sun Sun to Partial Shade
410	2004. Angelini, L.G./Tozzi, S./Nassi, N.. Environmental factors affecting productivity, indican content, and indigo yield in <i>Polygonum tinctorium</i> Ait., a subtropical crop grown under temperate conditions. Journal of Agricultural and Food Chemistry. 52: 75	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)?]. Field experiments were undertaken in southern Italy to better understand the effect of environmental parameters on the commercial production of <i>Persicaria tinctoria</i> . "The soil was a typical Xerofluvent, representative of the lower Arno River plain, and it was characterized by a superficial water table 120 cm deep in the driest conditions."

411	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - Polygonum tinctoria. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Climbing or smothering growth habit? No] Herbaceous; 50-80 cm tall.
412	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - Polygonum tinctoria. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Forms dense thickets? No] Annual; 50-80 cm tall.
501	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - Polygonum tinctoria. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Aquatic? No] Terrestrial.
502	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - Polygonum tinctoria. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Grass? No] Polygonaceae.
503	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - Polygonum tinctoria. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Nitrogen fixing woody plant? No] Herbaceous.
504	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - Polygonum tinctoria. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Herbs, annual. [no underground storage organs]
601	2011. WRA Specialist. Personal Communication.	[Evidence of substantial reproductive failure in native habitat? No] No evidence.
602	2009. Bechtold, R./Mussak, R.. Handbook of natural colorants. John Wiley & Sons, http://books.google.com/books?id=UTxf9H7lvcC&pg=PA92&dq=persicaria+tinctoria&hl=en&ei=G6uwTpj9NOKviQLKh9D2Dw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CC0Q6AEwAA#v=onepag	[Produces viable seed? Yes] Seeds are sown into seed beds after danger of frost is over. Species is cultivated for indigo dye.
602	2011. Dave's Garden. PlantFiles: Dyers' knotweed, Japaneses indigo - Persicaria tinctoria. Dave's Garden, http://davesgarden.com/guides/pf/go/77072/	[Produces viable seed? Yes] Propagate from seed.
603	2011. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	2011. WRA Specialist. Personal Communication.	[Self-compatible or apomictic? Unknown]
605	2011. Quebbeman, A./Burnham, R.J.. Plant diversity website - Persicaria arifolia. Paleobotany web page University of Michigan, http://www-personal.umich.edu/~rburnham/SpeciesAccounts/pdfs/PersarifPOLYFINAL.pdf	[Requires specialist pollinators? No] "Pollinator: Studies of pollen shape suggest that species of Persicaria are insect pollinated."

606	2010. Swearingen, J.B./Slattery, B./Reshetiloff, K./Zwicker, S.. <i>Persicaria tinctoria</i> In: Plant invaders of Mid-Atlantic Natural Areas, 4th ed.. National Park Service and U.S. Fish and Wildlife Service, Washington D.C. http://www.nps.gov/plants/alien/pubs	[Reproduction by vegetative fragmentation? No] Annual.
607	2009. Bechtold, R./Mussak, R.. Handbook of natural colorants. John Wiley & Sons, http://books.google.com/books?id=UTxkf9H7lvcC&pg=PA92&dq=persicaria+tinctoria&hl=en&ei=G6uwTpj9NOKviQLKh9D2Dw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CC0Q6AEwAA#v=onepag	[Minimum generative time (years)? 1] Annual.
701	2011. WRA Specialist. Personal Communication.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Unknown] [grown as a commercial crop]
702	2001. Hanelt, P. (ed.). Mansfeld's encyclopedia of agricultural & horticultural crops: (except ornamentals). Algae, Fungi, Pteridophyta, Gymnospermae, Angiospermae-Dicotyledones: Magnoliaceae-Chrysobalanaceae. Springer, Berlin	[Propagules dispersed intentionally by people? Yes] Cultivated in China, Japan and Korea; formerly occasionally grown in Europe (Ukraine) and the Caucasus area.
702	2009. Bechtold, R./Mussak, R.. Handbook of natural colorants. John Wiley & Sons, http://books.google.com/books?id=UTxkf9H7lvcC&pg=PA92&dq=persicaria+tinctoria&hl=en&ei=G6uwTpj9NOKviQLKh9D2Dw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CC0Q6AEwAA#v=onepag	[Propagules dispersed intentionally by people? Yes] In Europe, <i>Persicaria tinctoria</i> has been cultivated for indigo in Central Germany and Central Italy.
703	2011. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No] No evidence.
704	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - <i>Polygonum tinctoria</i> . Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Propagules adapted to wind dispersal? No] Achene [no adaptation for wind dispersal]
705	2010. Swearingen, J.B./Slattery, B./Reshetiloff, K./Zwicker, S.. <i>Persicaria tinctoria</i> In: Plant invaders of Mid-Atlantic Natural Areas, 4th ed.. National Park Service and U.S. Fish and Wildlife Service, Washington D.C. http://www.nps.gov/plants/alien/pubs	[Propagules water dispersed? Yes] Moist valleys, stream banks.
706	2011. WRA Specialist. Personal Communication.	[Propagules bird dispersed? Unknown]
707	2011. Anjen, L./Grabovskaya-Borodina, A.E./Hong, S./McNeill, J./Ohba, H./Park, C.. Flora of China vol.5 - <i>Polygonum tinctoria</i> . Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon	[Propagules dispersed by other animals (externally)? No] Achenes included in persistent perianth, brown, shiny, broadly ovoid [no means of external attachment].
708	2011. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut? Unknown]
801	2009. Bechtold, R./Mussak, R.. Handbook of natural colorants. John Wiley & Sons, http://books.google.com/books?id=UTxkf9H7lvcC&pg=PA92&dq=persicaria+tinctoria&hl=en&ei=G6uwTpj9NOKviQLKh9D2Dw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CC0Q6AEwAA#v=onepag	[Prolific seed production (>1000/m ²)?] Seed yields under optimal conditions are about 500 kg/ha.
802	2011. WRA Specialist. Personal Communication.	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown]
803	2011. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown.]

804	2011. WRA Specialist. Personal Communication.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Unknown]
805	2011. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown.]
