

<i>Brassica rapa</i> (Annual turnip rape, Biennial turnip rape, Bird rape, Bok-choy, Broad-beak mustard, Brown sarson, Caisin, Canola, Celery cabbage, Celery mustard, Chinese cabbage, Chinese flat cabbage, etc.)		Answer	Score
1.01	Is the species highly domesticated?	y	-3
1.02	Has the species become naturalised where grown?	?	
1.03	Does the species have weedy races?		
2.01	Species suited to FL climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high)	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	y	1
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?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture		
3.04	Environmental weed		
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	?	
4.06	Host for recognised pests and pathogens	?	
4.07	Causes allergies or is otherwise toxic to humans		
4.08	Creates a fire hazard in natural ecosystems		
4.09	Is a shade tolerant plant at some stage of its life cycle		
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	y	1
4.11	Climbing or smothering growth habit	n	0
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	?	
6.01	Evidence of substantial reproductive failure in native habitat		
6.02	Produces viable seed	?	
6.03	Hybridizes naturally	?	
6.04	Self-compatible or apomictic		
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation		
6.07	Minimum generative time (years)	1	1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant		

7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	n	-1
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)	n	-1
8.03	Well controlled by herbicides		
8.04	Tolerates, or benefits from, mutilation or cultivation	?	
8.05	Effective natural enemies present in U.S.		
	Total Score		4
	Implemented Pacific Second Screening		yes
	Risk Assessment Results		Evaluate

section	# questions answered	satisfy minimum?
A		9 yes
B		4 yes
C		10 yes
total		23 yes

	Reference	Source data
1.01	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. It was described at the times of Alexander the Great (356–323 BC), whose empire included the Middle East and Persia. The wide variation in Brassica rapae evolved in different parts of the Eurasian continent.
1.02	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013). 2. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 20 November 2013.	1. Adventive in Africa (Eritrea, Ethiopia, Kenya, Mozambique, Tanzania, Uganda, Zimbabwe); Asia-Tropical (India, Pakistan); South America (Brazil); Caribbean (Barbados, Guadeloupe, Martinique). 2. Has been recorded as a weed, e.g. in Eritrea, Ethiopia, Kenya, Uganda, Tanzania, Zimbabwe and Mozambique, probably as an escape from cultivation.
1.03		Skip this question; this is not a sub-species, cultivar, or a registered variety of a domesticated species.
2.01	1. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lnd.tif). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013). 3. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	No computer analysis was performed. 1. Global hardiness zone: (1-3?) 4-11; equivalent to USDA Hardiness zones 2b-11b. 2. Probable origin Eurasia. Distributional range: naturalized in all habital continents. 3. The origin of Brassica rapa is not known; the area extending from the eastern Mediterranean to Pakistan and eastern China has been suggested.
2.02		No computer analysis was performed. Native range is well known; refer to 2.01 source data.
2.03	1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). 2. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Distribution is widespread and occurs in more than 3 climatic groups (cultivated in all inhabital continents). 2. Turnip and most cultivars of Chinese cabbage perform better in tropical highlands, above 800 m altitude. Some turnip and caisin cultivars can tolerate light frost.
2.04	1. World Climate Maps. http://www.climate-charts.com/World-Climate-Maps.html . Accessed 31 December 2013.	1. 125 mm-2474 mm (5.0"-97.4").
2.05	1.a-b. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013).	1.a. Widely cultivated world-wide. 1.b. Adventive in Africa (Eritrea, Ethiopia, Kenya, Mozambique, Tanzania, Uganda, Zimbabwe); Asia-Tropical (India, Pakistan); South America (Brazil); Caribbean (Barbados, Guadeloupe, Martinique).

3.01	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013).	1. Distributional range: naturalized in all habitat continents. Adventive in Africa (Eritrea, Ethiopia, Kenya, Mozambique, Tanzania, Uganda, Zimbabwe); Asia-Tropical (India, Pakistan); South America (Brazil); Caribbean (Barbados, Guadeloupe, Martinique).
3.02	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013). 2. USDA, NRCS. 2014. The PLANTS Database (http://plants.usda.gov , 2 January 2014). National Plant Data Team, Greensboro, NC 27401-4901 USA. 3.a-b. Toxopeus, H. & Baas, J., 2004. <i>Brassica rapa</i> L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 20 November 2013.	1. Widespread weed. 2. Listed as a noxious weed in the state of Michigan. 3.a. Has been recorded as a weed, e.g. in Eritrea, Ethiopia, Kenya, Uganda, Tanzania, Zimbabwe and Mozambique, probably as an escape from cultivation. 3.b. In East and southern Africa <i>Brassica rapa</i> occurs locally as a weed on waste places and along roads at 1500–3000 m altitude.
3.03		
3.04		
3.05	1. Holm et al. A Geographical Atlas of World Weeds. New York: John Wiley & Sons. 1979. Print.	1. Serious or principal weeds include <i>B. arvensis</i> and <i>B. campestris</i> .
4.01		These structures are not included in the description of this species.
4.02	1. Jafarihyazdi, E. & F. Javidfar. 2011. Comparison of allelopathic effects of some brassica species in two growth stages on germination and growth of sunflower. <i>Plant, Soil and Environment</i> , 57(2): 52-56.	1. The results demonstrated that sunflower seeds are sensitive to allelopathic compounds released by <i>B. rapa</i> .
4.03	1. USDA, NRCS. 2013. The PLANTS Database (http://plants.usda.gov , 31 December 2013). National Plant Data Team, Greensboro, NC 27401-4901 USA.	1. Family: Brassicaceae (not a parasitic family).
4.04	1. Ayres, L. & B. Clements. Forage brassicas - quality crops for livestock production. Agfact P2.1.13, first edition, 2002; New South Wales Agriculture. 2. Lemus, R. Forage News - Forage Brassicas for Winter Grazing Systems. Mississippi State University Extension Service. September 2009.	1. Both the turnip leaves and bulbs are utilized by grazing animals in NSW. Turnips are best grazed once they reach maturity, about 10-16 weeks. Regrowth is possible from a light first grazing if the leaf growing points attached to the bulb are not damaged. 2. Turnips, an excellent late-fall forage, can reach maximum production 80 to 90 days after establishment. Turnip's tops (stems and leaves) can be grazed 60 to 70 days after planting while roots can be utilized 12 to 14 weeks after planting. Brassicas have an off flavor and cattle may preference them less than grasses. Brassica crops can cause animal health disorders if not grazed properly, such as polioencephalomalacia, hemolytic anemia (mainly with kale), pulmonary emphysema, nitrate poisoning, bloat, and metabolic problems. Turnips contain a chemical that prevents the uptake of iodine by the thyroid gland. This results in hypothyroidism and goiter.
4.05	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013).	1. Vertebrate poisons: mammals.

4.06	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	Alternaria brassicae, Alternaria circinans, Peronospora parasitica, Colletotrichum higginsianum, Erwinia carotovora, Xanthomonas campestris pv. Campestris, Plasmodiophora brassicae, Trichoderma, Mortierella spp., Mycosphaerella brassicicola, Fusarium oxysporum, Cauliflower mosaic virus (CaMV), turnip mosaic virus (TuMV) [the cabbage aphid (Brevicoryne brassicae) is vector of mosaic viruses]. The most important pest of Brassica rapa is diamondback moth (Plutella xylostella). Other insect pests are leaf webber (Crociodolomia binotalis), web worm (Hellula undalis) particularly in southern Africa, cut worm (Spodoptera littoralis), flea beetle (Phyllotreta spp.) and cabbage butterfly (Pieris canidia).
4.07		
4.08		
4.09		
4.10	1. USDA, NRCS. 2013. The PLANTS Database (http://plants.usda.gov , 31 December 2013). National Plant Data Team, Greensboro, NC 27401-4901 USA. 2. Duke, J.A. 1983. Handbook of Energy Crops. Unpublished. Web. http://www.hort.purdue.edu/newcrop/default.html . Accessed 2 January 2013.	1. Brassica rapa has been introduced to all 50 states of the U.S. 2. Turnips do well in deep, friable, highly fertile soil with pH 5.5–6.8; sandy loams are used for early markets roots and greens.
4.11	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Erect, annual to biennial herb up to 1.5 m tall, with stout taproot, sometimes partly swollen (turnip).
4.12		
5.01	1. USDA, NRCS. 2013. The PLANTS Database (http://plants.usda.gov , 31 December 2013). National Plant Data Team, Greensboro, NC 27401-4901 USA. 2. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Family: Brassicaceae. 2. Erect, annual to biennial herb up to 1.5 m tall, with stout taproot, sometimes partly swollen (turnip).
5.02	1. USDA, NRCS. 2013. The PLANTS Database (http://plants.usda.gov , 31 December 2013). National Plant Data Team, Greensboro, NC 27401-4901 USA. 2. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Family: Brassicaceae. 2. Erect, annual to biennial herb up to 1.5 m tall, with stout taproot, sometimes partly swollen (turnip).

5.03	1. USDA, NRCS. 2013. The PLANTS Database (http://plants.usda.gov , 31 December 2013). National Plant Data Team, Greensboro, NC 27401-4901 USA. 2. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Family: Brassicaceae. 2. Erect, annual to biennial herb up to 1.5 m tall, with stout taproot, sometimes partly swollen (turnip).
5.04	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Vegetable Turnip Group: producing a swollen root (hypocotyl), varying in shape from flattened globose to ellipsoid and cylindrical, blunt or sharply pointed, leaves sometimes also used as a vegetable. Part of the root but mainly the hypocotyl will thicken as a storage organ.
6.01		
6.02	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. (Evidence for wild viable seed production is not included for this reference). For open-pollinated cultivars of Chinese cabbage, caisin and pakchoi, seed yields of 1500 kg/ha can be achieved, and hybrids can yield 600–700 kg/ha. Decapitation of newly bolted plants stimulates the development of axillary buds and increases seed yield.
6.03	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. For hybrid seed production, a male sterile or self-incompatible female parent is used.
6.04		
6.05	1. Duke, J.A. 1983. Handbook of Energy Crops. Unpublished. Web. http://www.hort.purdue.edu/newcrop/default.html . Accessed 2 January 2013.	1. Cross pollination, by various insects, is necessary for good seed production.
6.06		
6.07	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Once the seeds have been sown harvesting can be as soon as 30 days or later until 80 day depending on the cultivar. Some cultivars can also be harvested several times during a period of 30-45 days after sowing.
7.01		
7.02	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013).	1. Economic importance: human food (vegetable).
7.03		
7.04	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Not likely; seeds do not possess morphological features that facilitate propagule movement by wind. Fruit a linear silique 4–10 cm × 2–4 mm, with a tapering beak 0.5–3 cm long, dehiscent, up to 30-seeded. Seeds globose, 1–1.5 mm in diameter, finely reticulate, dark brown.

7.05	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Not likely. Healthy fully sun-dried seed (12% moisture content) should sink in water. Fruit a linear silique 4–10 cm × 2–4 mm, with a tapering beak 0.5–3 cm long, dehiscent, up to 30-seeded. Seeds globose, 1–1.5 mm in diameter, finely reticulate, dark brown.
7.06	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Fruit a linear silique 4–10 cm × 2–4 mm, with a tapering beak 0.5–3 cm long, dehiscent, up to 30-seeded. Seeds globose, 1–1.5 mm in diameter, finely reticulate, dark brown.
7.07	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. (Fruits/seeds do not possess the features that would attach externally.) Fruit a linear silique 4–10 cm × 2–4 mm, with a tapering beak 0.5–3 cm long, dehiscent, up to 30-seeded. Seeds globose, 1–1.5 mm in diameter, finely reticulate, dark brown.
7.08	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Fruit a linear silique 4–10 cm × 2–4 mm, with a tapering beak 0.5–3 cm long, dehiscent, up to 30-seeded. Seeds globose, 1–1.5 mm in diameter, finely reticulate, dark brown.
8.01		
8.02	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Brassica rapa seed has no dormancy.
8.03		
8.04	1. Toxopeus, H. & Baas, J., 2004. Brassica rapa L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://www.prota4u.org/search.asp >. Accessed 26 November 2013.	1. Some cultivars can be harvested several times during a period of 30-45 days after sowing.
8.05		