

<b>Taxon:</b> <i>Vigna radiata</i> (L.) R. Wilczek	<b>Family:</b> Fabaceae
<b>Common Name(s):</b> golden gram green gram mung bean	<b>Synonym(s):</b> <i>Azukia radiata</i> (L.) Ohwi <i>Cadelium radiatum</i> (L.) S.Y.Hu <i>Phaseolus abysissinicus</i> Savi <i>Phaseolus aureus</i> Roxburgh <i>Rudua aurea</i> (Roxb.) Maekawa <i>Vigna aureus</i> Piper

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 10 May 2022
<b>WRA Score:</b> 1.0	<b>Designation:</b> L	<b>Rating:</b> Low Risk

**Keywords:** Domesticated, Annual Herb, Naturalized, Fodder, Self-Fertile

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	y
102	Has the species become naturalized where grown?	y=1, n=-1	y
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)	High
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	n
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	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
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	n=0, y = 1*multiplier (see Appendix 2)	y
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		

Qsn #	Question	Answer Option	Answer
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
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		
604	Self-compatible or apomictic	y=1, n=-1	y
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	n
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	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
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	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	y
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"India is regarded to be the centre of domestication of mungbean and supported by archaeological remains (Jain and Mehra 1980) . However wild forms of mungbean, <i>Vigna radiata</i> var. <i>sublobata</i> show a wide area of distribution, extending from Central and East Africa, Madagascar, through Asia, New Guinea, to North and East Australia (Tateishi 1996) ."
	Lambrides, C. J., & Godwin, I. D. (2007). Mungbean. In Pulses, sugar and tuber crops (pp. 69-90). Springer, Berlin, Heidelberg	"Mungbean was most likely domesticated in the Indian subcontinent (Smartt 1984), with archaeological evidence suggesting use in these regions for over 3500 years (Vishnu-Mittre 1974). Early in the domestication process mungbean cultivation spread to other parts of Asia and into north Africa. Cultivated mungbean developed through domestication and selection from <i>V. radiata</i> ssp. <i>radiata</i> , which is widely distributed throughout southern and eastern Asia, Africa and Austronesia."

102	Has the species become naturalized where grown?	y
	Source(s)	Notes
	PlantNET. (2022). New South Wales Flora Online - <i>Vigna radiata</i> (L.) Wilczek. National Herbarium of NSW, Royal Botanic Garden, Sydney. <a href="http://plantnet.rbgsyd.nsw.gov.au">http://plantnet.rbgsyd.nsw.gov.au</a> . [Accessed 9 May 2022]	"Distribution and occurrence: Cultivated, occasionally naturalized in coastal districts. Native of Asia"
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 9 May 2022]	"Naturalized REGION: Asia-Temperate CHINA: China (s.) Australasia AUSTRALIA: Australia (n. (natzd.?))"

103	Does the species have weedy races?	
	Source(s)	Notes
	Maxted, N. (2001). African <i>Vigna</i> : an Interactive Key. <a href="https://keys.lucidcentral.org/keys/African_Vigna/">https://keys.lucidcentral.org/keys/African_Vigna/</a> . [Accessed 9 May 2022]	[Possibly] "Plant wild or weedy; stems twining or prostrate, less robust; pods dehiscent; leaflets frequently lobed; pods and seeds usually smaller" [Referring to <i>Vigna radiata</i> var. <i>sublobata</i> . No negative impacts described]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Possibly. Cited as a weed of unspecified impacts

Qsn #	Question	Answer
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Open wastelands, roadsides, thicket margins, also cultivated; ca. 500 m. Taiwan; cultivated throughout China [Cambodia, India, Indonesia, Laos, Sri Lanka, Thailand, Vietnam; Africa; widely cultivated in tropical and subtropical regions]"

202	Quality of climate match data	High
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Taiwan; cultivated throughout China [Cambodia, India, Indonesia, Laos, Sri Lanka, Thailand, Vietnam; Africa; widely cultivated in tropical and subtropical regions]."

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Mung bean is a warm-season crop and grows mainly within a mean temperature range of 20–40°C, the optimum being 28–30°C. It can therefore be grown in summer and autumn in warm temperate and subtropical regions and at altitudes below 2000 m in the tropics. It is sensitive to frost. Mung bean is mostly grown in regions with an average annual rainfall of 600–1000 mm, but it can do with less. It withstands drought well, by curtailing the period of flowering and maturation, but it is susceptible to waterlogging. High humidity at maturity causes damage to seeds leading to seed discoloration or sprouting while still in the field. Mung bean cultivars differ markedly in photoperiod sensitivity, but most genotypes show quantitative short-day responses, flower initiation being delayed by photoperiods longer than 12–13 hours."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Open wastelands, roadsides, thicket margins, also cultivated; ca. 500 m. Taiwan; cultivated throughout China [Cambodia, India, Indonesia, Laos, Sri Lanka, Thailand, Vietnam; Africa; widely cultivated in tropical and subtropical regions]."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes

Qsn #	Question	Answer
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"Mung beans are mainly cultivated in China, Thailand, Philippines, Vietnam, Indonesia, Burma, Bangladesh and India, but also in hot and dry regions of southern Europe and the southern USA."
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"widely cultivated in tropical and subtropical regions"

301	Naturalized beyond native range	y
	Source(s)	Notes
	PlantNET. (2022). New South Wales Flora Online - <i>Vigna radiata</i> (L.) Wilczek. National Herbarium of NSW, Royal Botanic Garden, Sydney. <a href="http://plantnet.rbgsyd.nsw.gov.au">http://plantnet.rbgsyd.nsw.gov.au</a> . [Accessed 9 May 2022]	"Distribution and occurrence: Cultivated, occasionally naturalized in coastal districts. Native of Asia."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 9 May 2022]	"Naturalized REGION: Asia-Temperate CHINA: China (s.) Australasia AUSTRALIA: Australia (n. (natzd.?))"
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Plants for a Future. (2022). <i>Vigna radiata</i> . <a href="https://pfaf.org">https://pfaf.org</a> . [Accessed 10 May 2022]	"Not known in a truly wild situation[300]. Naturalized in open wastelands, roadsides, thicket margins, at elevations up to 500 metres in southern China[266]." ... "Weed Potential - No"
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Open wastelands, roadsides, thicket margins, also cultivated"
	Maxted, N. (2001). African Vigna: an Interactive Key. <a href="https://keys.lucidcentral.org/keys/African_Vigna/">https://keys.lucidcentral.org/keys/African_Vigna/</a> . [Accessed 9 May 2022]	"Plant wild or weedy; stems twining or prostrate, less robust; pods dehiscent; leaflets frequently lobed; pods and seeds usually smaller" [Referring to <i>Vigna radiata</i> var. <i>sublobata</i> . No negative impacts described]
	HerbiGuide. (2022). <i>Vigna radiata</i> (L.) Wilczek and <i>Vigna mungo</i> (L.) Pepper. <a href="http://www.herbiguide.com.au/Descriptions/hg_Mung_Bean.htm">http://www.herbiguide.com.au/Descriptions/hg_Mung_Bean.htm</a> . [Accessed 9 May 2022]	"Weed of disturbed areas." [No impacts described. May just be referring to this plant's ability to persist in disturbed sites]
	WRA Specialist. (2022). Personal Communication	A possible weed of disturbed sites, but details on impacts are lacking. Generally regarded as a desirable cultivated crop in most situations

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No confirmed evidence
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence

305	Congeneric weed	y
	Source(s)	Notes
	Rawal, K. M. (1975). Natural hybridization among wild, weedy and cultivated <i>Vigna unguiculata</i> (L.) Walp. <i>Euphytica</i> , 24(3), 699-707	"As is the case with many cultivated species, <i>Vigna unguiculata</i> (L.) Walp. has a wild form growing in secondary forests and derived savannahs and a companion weed form adapted to disturbed habitats such as roadside ditches and fields. Evidence of introgressive hybridization between weedy and cultivated forms has been presented. The zone of extensive natural hybridization corresponds to the cultivation area in northern Nigeria and Niger and may well extend to Upper Volta and Senegal. The pattern of distribution of wild and weedy forms, the extent of introgression and ethnobotanical evidence strongly suggest West Africa as the center of domestication for <i>V. unguiculata</i> ."
	Murphy, T. R., & Gossett, B. J. (1984). Control of cowpea ( <i>Vigna unguiculata</i> ) in soybean ( <i>Glycine max</i> ) with acifluorfen. <i>Weed Science</i> , 32(4), 427-431	"Due to similarities in size, their seed are often a contaminant in soybean seed, which has assisted in their spread. In a recent South Carolina survey, cowpea ranked as the ninth most troublesome weed in soybean production"

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). <i>Flora of China</i> . Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Annual herbs, erect, twining, or creeping, 20-60 cm tall. Stems hispid with brown spreading hairs. Stipules peltate, ovate, 0.8-1.2 cm, ciliate; petiole 5-21 cm; leaflets ovate, 5-16 × 3-12 cm, lateral ones ± oblique, ± sparsely pilose on both surfaces, sometimes 3-veined from base, base broadly cuneate or rounded, apex acuminate or acute. Racemes axillary, 4- to several flowered (up to 25). Bracteoles linear-lanceolate or oblong, striate. Calyx tube 3-4 mm, glabrous; lobes narrowly deltoid, 1.5-4 mm, upper 2 connate into a 2-fid lip. Standard yellow-green outside, sometimes pink inside, suboblate, ca. 1.2 × 1.6 cm, apex emarginate; wings yellow, ovate; keel falcate and in-curved through 180°, green tinged with pink. Legumes linear-terete, 4-9 × ca. 0.6 cm, shortly hispid with pale brown hairs. Seeds 8-14, greenish or yellow-brown, shortly cylindrical, 2.5-4 × 2.5-3 mm; hilum white."

402	Allelopathic	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	[Grown with other crops] "Mung bean can be grown mixed with other crops such as sugar cane, maize, sorghum or tree crops in agroforestry systems. Short-duration mung bean is often relay-cropped to make use of a short cropping period. In Kenya mung bean is usually intercropped with maize, sorghum or millet; it is occasionally grown in pure stands or intercropped with other pulses. The usual practice here is to place 1–2 rows of mung bean between rows of a cereal, or to plant mung bean in the cereal row. "
	Lertmongkol, S., Sarobol, E., & Premasthira, C. U. (2011). Allelopathic effects of mungbean ( <i>Vigna radiata</i> ) on subsequent crops. <i>Agriculture and Natural Resources</i> , 45 (5), 773-779	[Possibly. Extracts exhibit allelopathic effects] "Mungbean has allelochemicals that inhibited the germination and growth of adjacent and subsequent crops. In the laboratory experiment, mungbean allelochemicals inhibited germination and reduced the root length and dry matter of lettuce, but seemed to stimulate the seed germination and shoot growth of <i>Echinochloa crus-galli</i> . Compounds from the mungbean root had a retention time equal to that of thioglycerol while compounds from the mungbean stem had a retention time identical to that of aglycone. The pot experiment indicated that the germination and plant height of the subsequent crops were inhibited. Lettuce and soybean were highly sensitive to allelochemicals in the mungbean residual soil."

403	Parasitic	n
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). <i>Flora of China</i> . Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Annual herbs, erect, twining, or creeping, 20-60 cm tall." [Fabaceae. No evidence]

404	Unpalatable to grazing animals	n
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Immature pods and young leaves are eaten as a vegetable. Plant residues and cracked or weathered seeds are fed to livestock. Mung bean is sometimes grown for fodder, green manure or as a cover crop."

Qsn #	Question	Answer
405	<b>Toxic to animals</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Immature pods and young leaves are eaten as a vegetable. Plant residues and cracked or weathered seeds are fed to livestock. Mung bean is sometimes grown for fodder, green manure or as a cover crop." [No evidence]
	HerbiGuide. (2022). <i>Vigna radiata</i> (L.) Wilczek and <i>Vigna mungo</i> (L.) Pepper. <a href="http://www.herbiguide.com.au/Descriptions/hg_Mung_Bean.htm">http://www.herbiguide.com.au/Descriptions/hg_Mung_Bean.htm</a> . [Accessed 10 May 2022]	"Toxicity: Not recorded as toxic."
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	[A cultivated crop more likely to be impacted by common pests and pathogens on weeds growing in the region] "The most important and widespread fungal diseases of mung bean are Cercospora leaf spot ( <i>Cercospora canescens</i> ) and powdery mildew ( <i>Erysiphe polygoni</i> ). Less serious are scab ( <i>Elsinoë iwatae</i> ), anthracnose ( <i>Colletotrichum lindemuthianum</i> ) and rust ( <i>Uromyces</i> spp.). Important bacterial diseases are blights caused by <i>Xanthomonas</i> and <i>Pseudomonas</i> spp. Mung bean suffers from several virus diseases but they are not well described, except for mung bean yellow mosaic virus (MYMV), which is widespread in South Asia. The main insect pests are aphids ( <i>Aphis fabae</i> , <i>Aphis craccivora</i> ), bean fly ( <i>Ophiomyia phaseoli</i> ), thrips ( <i>Megalurothrips sjostedii</i> ), pod borers ( <i>Heliothis</i> spp., <i>Etiella zinckenella</i> , <i>Maruca testulalis</i> ) and pod-suckers such as the green stink bug ( <i>Nezara viridula</i> ). In the drier areas of Kenya the apion weevil ( <i>Apion soleatum</i> ) may cause heavy losses. Stored mung bean seed is attacked by bruchids ( <i>Callosobruchus</i> spp.). In Africa it is common to use ash made from neem ( <i>Azadirachta indica</i> A.Juss.) leaves or cow dung to protect seeds against storage pests. Insecticides are seldom used on mung bean in tropical Africa. "

407	Causes allergies or is otherwise toxic to humans	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"immature pods and young leaves as a vegetable, dried beans eaten, fodder" [No evidence]
	HerbiGuide. (2022). <i>Vigna radiata</i> (L.) Wilczek and <i>Vigna mungo</i> (L.) Pepper. <a href="http://www.herbiguide.com.au/Descriptions/hg_Mung_Bean.htm">http://www.herbiguide.com.au/Descriptions/hg_Mung_Bean.htm</a> . [Accessed 9 May 2022]	"Not recorded as toxic."



Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Mung bean is a warm-season crop and grows mainly within a mean temperature range of 20–40°C, the optimum being 28–30°C. It can therefore be grown in summer and autumn in warm temperate and subtropical regions and at altitudes below 2000 m in the tropics. It is sensitive to frost. Mung bean is mostly grown in regions with an average annual rainfall of 600–1000 mm, but it can do with less. It withstands drought well, by curtailing the period of flowering and maturation, but it is susceptible to waterlogging. High humidity at maturity causes damage to seeds leading to seed discoloration or sprouting while still in the field." [Unlikely. Primarily a cultivated crop with no evidence of increase fire risk documented]
409	Is a shade tolerant plant at some stage of its life cycle	
	<b>Source(s)</b>	<b>Notes</b>
	Plants for a Future. (2022). <i>Vigna radiata</i> . <a href="https://pfaf.org">https://pfaf.org</a> . [Accessed 10 May 2022]	"It can grow in semi-shade (light woodland) or no shade." ... "Prefers a sunny position, tolerating light shade"
	Flora Fauna Web. (2022). <i>Vigna radiata</i> . <a href="https://www.nparks.gov.sg/florafaunaweb/flora/5/8/5888">https://www.nparks.gov.sg/florafaunaweb/flora/5/8/5888</a> . [Accessed 10 May 2022]	"Light Preference Full Sun"
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Mung bean grows in a wide range of soil types, but prefers well-drained loams or sandy loams with pH (5–)5.5–7(–8). Some cultivars are tolerant to moderate alkaline and saline soils."
411	Climbing or smothering growth habit	n
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Perennial non-climbing herb, erect or semi-erect, sometimes twining, many-branched, well-developed taproot, greenish to bright yellow flowers borne in clusters on axillary racemes, linear-cylindrical pods spreading and pendent"
412	Forms dense thickets	
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"In pure stands, 1–2 weedings are necessary during the early stages of growth." [Cultivated in pure stands. Unknown from wild, but no evidence found]
501	Aquatic	n

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Open wastelands, roadsides, thicket margins, also cultivated"
<b>502</b>	<b>Grass</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 9 May 2022]	"Genus: Vigna Subgenus: Ceratotropis Family: Fabaceae (alt. Leguminosae) Subfamily: Faboideae Tribe: Phaseoleae Subtribe: Phaseolinae"
<b>503</b>	<b>Nitrogen fixing woody plant</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Lambrides, C. J., & Godwin, I. D. (2007). Mungbean. In Pulses, sugar and tuber crops (pp. 69-90). Springer, Berlin, Heidelberg	[Non-woody] "Leaves are trifoliate and roots bear nodules that fix atmospheric nitrogen via a symbiotic relationship with the bacterium Rhizobium."
<b>504</b>	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Annual herbs, erect, twining, or creeping, 20-60 cm tall."
<b>601</b>	<b>Evidence of substantial reproductive failure in native habitat</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"India is regarded to be the centre of domestication of mungbean and supported by archaeological remains (Jain and Mehra 1980) . However wild forms of mungbean, <i>Vigna radiata</i> var. <i>sublobata</i> show a wide area of distribution, extending from Central and East Africa, Madagascar, through Asia, New Guinea, to North and East Australia (Tateishi 1996) ."
<b>602</b>	<b>Produces viable seed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Legumes linear-terete, 4-9 × ca. 0.6 cm, shortly hispid with pale brown hairs. Seeds 8-14, greenish or yellow-brown, shortly cylindrical, 2.5-4 × 2.5-3 mm; hilum white."

Qsn #	Question	Answer
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Mung bean is propagated by seed. The 1000-seed weight is 15–40 g. There is no seed dormancy, but germination can be affected by a hard seedcoat. Mung bean is broadcast or dibbled in hills or in rows. Recommended sowing rates are 5–30 kg/ha for sole cropped mung bean, and 3–4 kg/ha under intercropping. Recommended spacings are 25–100 cm × 5–30 cm. For the more modern cultivars ripening in 60–75 days, maximum yields are obtained at plant densities of 300,000–400,000 plants/ha. The later-maturing traditional cultivars generally need wider spacing. Recommended spacings for sole-cropped mung bean in Kenya are 45 cm between rows and 15 cm within the row, with a seed rate of 6–10 kg/ha and a sowing depth of 4–5 cm."

603	Hybridizes naturally	
	Source(s)	Notes
	Tomooka, N., Isemura, T., Naito, K., Kaga, A. & Vaughan, D. (2014). <i>Vigna</i> Species. Pp. 175-208 in Singh, M. et al. (eds.). Springer, New Delhi	"Cross compatibility studies have been reviewed by Tomooka et al. ( 2002a ). Generally, there is no barrier to gene flow between domesticated forms and their closest relatives. Species in the same section of the subgenus <i>Ceratotropis</i> can usually cross with little difficulty. Natural interspecific hybrids have been found between <i>V. hirtella</i> and <i>V. minima</i> in northern Thailand (author's unpublished observations). Recently, Pandiyan et al. ( 2010 ) reported a number of cross-sectional and cross subgenus hybrids. Among these hybrids, the cross between <i>V. radiata</i> and <i>V. umbellata</i> is particularly significant as <i>V. umbellata</i> possesses a high level of resistance to bruchid beetles, one of the most serious pests of <i>Vigna</i> ."
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	" <i>Vigna</i> comprises about 80 species and occurs throughout the tropics. <i>Vigna radiata</i> belongs to the subgenus <i>Ceratotropis</i> , a relatively homogenous and morphologically and taxonomically distinct group, primarily of Asian distribution. Other cultivated Asiatic <i>Vigna</i> species in this subgenus include <i>Vigna aconitifolia</i> (Jacq.) Maréchal (moth bean), <i>Vigna angularis</i> (Willd.) Ohwi & Ohashi (adzuki bean), <i>Vigna mungo</i> (L.) Hepper (black gram or urd bean), <i>Vigna trilobata</i> (L.) Verdc. (pillipesara) and <i>Vigna umbellata</i> (Thunb.) Ohwi & Ohashi (rice bean). Hybrids have been obtained between many of these species. The species have often been confounded, especially <i>Vigna radiata</i> and <i>Vigna mungo</i> ."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Self-pollination is the rule, but up to 5% outcrossing may occur. Flowers are usually pollinated during the night, before they open early in the morning."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Self-pollination is the rule, but up to 5% outcrossing may occur. Flowers are usually pollinated during the night, before they open early in the morning."

Qsn #	Question	Answer
	Irshad, M., & Stephen, E. (2013). Value of insect pollinators to agriculture of Pakistan. International Journal of Agronomy and Agricultural Research, 3 (5): 14-21	"Table 2. Non pollinator dependent crops of Pakistan beneficial for human beings." [Includes <i>Vigna radiata</i> ]
<b>606</b>	<b>Reproduction by vegetative fragmentation</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Annual, erect to semi-erect, slightly pubescent herb up to 1.3 m tall" ... "Mung bean is propagated by seed."
<b>607</b>	<b>Minimum generative time (years)</b>	<b>1</b>
	<b>Source(s)</b>	<b>Notes</b>
	Brink, M. & Belay, G. (Editors). (2006). Plant Resources of Tropical Africa. Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Annual, erect to semi-erect, slightly pubescent herb up to 1.3 m tall; root system consisting of a well-developed taproot with deeply placed lateral roots; stem much branched, with a tendency to twine at the tips, angular, covered with long spreading hairs."
<b>701</b>	<b>Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Legumes linear-terete, 4-9 × ca. 0.6 cm, shortly hispid with pale brown hairs. Seeds 8-14, greenish or yellow-brown, shortly cylindrical, 2.5-4 × 2.5-3 mm; hilum white." [No means of external attachment]
<b>702</b>	<b>Propagules dispersed intentionally by people</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"Mungbean is now widely grown in tropical and subtropical areas throughout the world. Mung beans are mainly cultivated in China, Thailand, Philippines, Vietnam, Indonesia, Burma, Bangladesh and India, but also in hot and dry regions of southern Europe and the southern USA."
<b>703</b>	<b>Propagules likely to disperse as a produce contaminant</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[An agricultural crop and potential crop contaminant, although direct evidence of this pathway has not been found] "Major Pathway/s: Contaminant, Crop, Herbal, Ornamental, Pasture Dispersed by: Humans, Escapee"
<b>704</b>	<b>Propagules adapted to wind dispersal</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Legumes linear-terete, 4-9 × ca. 0.6 cm, shortly hispid with pale brown hairs. Seeds 8-14, greenish or yellow-brown, shortly cylindrical, 2.5-4 × 2.5-3 mm; hilum white."

Qsn #	Question	Answer
	Parker, T. A., Lo, S., & Gepts, P. (2021). Pod shattering in grain legumes: emerging genetic and environment-related patterns. <i>The Plant Cell</i> , 33(2), 179-199	[Reduced shattering reported for <i>V. radiata</i> . No adaptations for wind dispersal] "A primary unifying feature of the legume family, or Fabaceae, is a unilocular fruit (legumen in Latin or pods), which produces seeds along a single ventral suture (Esau, 1977). Seeds are typically dispersed by the explosive dehiscence of the pod at fruit maturity, a process known as pod shattering (Simpson, 2019). This form of dispersal has been highly successful for wild species. The legume family is the third largest family of flowering plants in terms of species number, with at least 19,300 species (LPWG, 2017; Figure 1). Pod dehiscence in legumes can lead to devastating yield losses in agricultural environments. Humans have, therefore, selected strongly against pod shattering in domesticated legumes (Ogutcen et al., 2018; Di Vittori et al., 2019). A reduction in seed dispersal and the loss of seed dormancy are two fundamental domestication traits among seed-propagated crops, including grain legumes (Koinange et al., 1996)."

705	Propagules water dispersed	n
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Escapee"
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). <i>Flora of China</i> . Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Legumes linear-terete, 4-9 × ca. 0.6 cm, shortly hispid with pale brown hairs. Seeds 8-14, greenish or yellow-brown, shortly cylindrical, 2.5-4 × 2.5-3 mm; hilum white." [A domesticated crop with no evolutionary adaptations for water dispersal]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). <i>Flora of China</i> . Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Legumes linear-terete, 4-9 × ca. 0.6 cm, shortly hispid with pale brown hairs. Seeds 8-14, greenish or yellow-brown, shortly cylindrical, 2.5-4 × 2.5-3 mm; hilum white." [No means of external attachment]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Brink, M. & Belay, G. (Editors). (2006). <i>Plant Resources of Tropical Africa</i> . Volume 1. Cereals and pulses. PROTA Foundation. Wageningen, Netherlands	"Fruit a linear-cylindrical pod (2.5-)4-9(-15) cm × 4-9 mm, usually straight, black or tawny brown, with brown short spreading pubescence, (7-)10-15(-20)-seeded, somewhat constricted between the seeds. Seeds 2.5-4 mm × 2.5-3 mm × 2.5-3 mm, globose to ellipsoid or cube-like, commonly green but sometimes yellow, olive, brown, purplish brown or black, marbled or mottled with black patches, glossy or dull; hilum white, conspicuously flat, c. 1.5 mm × 0.5 mm; seed coat often with ridges, making the seed rough to the touch." [No means of external attachment]

708	Propagules survive passage through the gut	n
	Source(s)	Notes

Qsn #	Question	Answer
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Escapee"
	Parker, T. A., Lo, S., & Gepts, P. (2021). Pod shattering in grain legumes: emerging genetic and environment-related patterns. <i>The Plant Cell</i> , 33(2), 179-199	[No evidence. Pods of <i>Vigna radiata</i> reported to have reduced shattering] "A primary unifying feature of the legume family, or Fabaceae, is a unilocular fruit (legumen in Latin or pods), which produces seeds along a single ventral suture (Esau, 1977). Seeds are typically dispersed by the explosive dehiscence of the pod at fruit maturity, a process known as pod shattering (Simpson, 2019)."

801	Prolific seed production (>1000/m <sup>2</sup> )	
	Source(s)	Notes
	Brink, M. & Belay, G. (Editors). (2006). <i>Plant Resources of Tropical Africa. Volume 1. Cereals and pulses.</i> PROTA Foundation. Wageningen, Netherlands	"Average mung bean yields are low: 300–700 kg/ha. Under irrigation in Kenya yields are obtained of 1.25 t/ha. Yields over 3 t/ha have been obtained in trials." [High seed yields under cultivation. Seed production under unmanaged, or wild conditions, unlikely to achieve such high numbers]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	HerbiGuide. (2022). <i>Vigna radiata</i> (L.) Wilczek and <i>Vigna mungo</i> (L.) Pepper. <a href="http://www.herbiguide.com.au/Descriptions/hg_Mung_Bean.htm">http://www.herbiguide.com.au/Descriptions/hg_Mung_Bean.htm</a> . [Accessed 9 May 2022]	"Seeds germinate rapidly but seedlings are weak if planted more than 50 mm deep."
	Brink, M. & Belay, G. (Editors). (2006). <i>Plant Resources of Tropical Africa. Volume 1. Cereals and pulses.</i> PROTA Foundation. Wageningen, Netherlands	[Possibly yes, depending on environmental conditions] "There is no seed dormancy, but germination can be affected by a hard seedcoat." ... "Properly dried mung bean seeds maintain high viability over a long period."

803	Well controlled by herbicides	
	Source(s)	Notes
	Cook, B.G., et al. (2022). <i>Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8.</i> <a href="https://www.tropicalforages.info/text/intro/index.html">https://www.tropicalforages.info/text/intro/index.html</a> . [Accessed 10 May 2022]	[Probably. Related species, <i>Vigna hosei</i> , susceptible to herbicides] "Trifluralin can be used for pre-emergent, and bentazone (at 2-4 leaf stage), the imidazolinones (imazethapyr, imazaquin), and flumetsulam for postemergent broadleaf weed control, but there is the risk of some stunting of <i>V. parkeri</i> seedlings. Fluazifop and sethoxydim can be used for selective grass control in seed crops. Seedlings are susceptible to acifluorfen, 2,4-D and 2,4-DB."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Williams, P.R. (2002). <i>The effect of fire regime on tropical savannas of north-eastern Australia: interpreting floristic patterns through critical life events.</i> PhD Dissertation. James Cook University, Townsville	"Appendix 2. Post-fire regeneration observations from eucalypt savanna at Cape Cleveland, Castle Hill, Many Peaks Range and Mt Elliot." [ <i>Vigna radiata</i> classified as "sprouting from base of plant" and s, post-fire seed germination]

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. No evidence

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**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Grows, and could spread in regions with tropical climates
- Naturalized in China, Australia and possible elsewhere (but no evidence in the Hawaiian Islands to date)
- A potential weed of disturbed sites
- Other *Vigna* species are invasive
- Tolerates many soil types
- Reproduces by seeds
- Self-fertile
- An annual, reaching maturity in <1 year
- Seeds dispersed by dehiscent pods and through intentional cultivation
- Hard-coated seeds might form a persistent seed bank
- Resprouts after fire

Low Risk Traits

- A domesticated and intentionally cultivated crop with no reports of detrimental impacts
- Unarmed (no spines, thorns, or burrs)
- Provides fodder for livestock
- Non-toxic
- Not reported to spread vegetatively

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? No. Questionable weed of disturbed sites.

(B) Unpalatable to grazers or known to form dense stands? No

Outcome = Accept (Low Risk)