

Taxon: <i>Vigna unguiculata</i> (L.) Walp.	Family: Fabaceae
Common Name(s): black-eye bean black-eye pea China pea cowpea marble pea Reeve's pea snake bean	Synonym(s): <i>Vigna sinensis</i> (L.) Hassk.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 13 May 2022
WRA Score: 6.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Domesticated, Weedy Forms, Fodder, Self-Fertile, Annual

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?	y=1, n=-1	y
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	y
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	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed		
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

Qsn #	Question	Answer Option	Answer
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	y
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		
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	y=1, n=-1	y
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		
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	n
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
	KewScience. (2022). Plants of the World Online - <i>Vigna radiata</i> . http://powo.science.kew.org . [Accessed 11 May 2022]	" <i>Vigna unguiculata</i> is a leguminous crop plant belonging to the same genus as bambara groundnut. It was first domesticated in West Africa 5,000-6,000 years ago and today is grown commercially in over 33 countries."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Vigna unguiculata</i> originated in Africa, where a large genetic diversity of wild types occurs throughout the continent, southern Africa being richest. It has been introduced in Madagascar and other Indian Ocean islands, where it is sometimes found as an escape from cultivation. The greatest genetic diversity of cultivated cowpea is found in West Africa, in the savanna region of Burkina Faso, Ghana, Togo, Benin, Niger, Nigeria and Cameroon. Cowpea was probably brought to Europe around 300 BC and to India 200 BC. As a result of human selection in China, India and South-East Asia, cowpea underwent further diversification to produce two cultivar-groups, Sesquipedalis Group with long pods used as a vegetable, and Biflora Group grown for the pods, dry seeds and for fodder."

102	Has the species become naturalized where grown?	y
	Source(s)	Notes
	Gann GD, Stocking CG and Collaborators. (2001-2022). Floristic Inventory of South Florida Database Online. The Institute for Regional Conservation. Delray Beach, Florida. https://regionalconservation.org/ircs/database/database.asp . [Accessed 11 May 2022]	"South Florida Native Status: Not Native, Naturalized"
	Andersson, M, S. & de Vicente, M. C. (2010). Gene Flow Between Crops and Their Wild Relatives. The Johns Hopkins University Press, Baltimore, MD	"Table 10.1 Domesticated cowpea (<i>Vigna unguiculata</i> (L.) Walp.) and its closest wild relatives" ... "wild populations native to Africa, but naturalized in Asia (Thailand and Japan)"

Qsn #	Question	Answer
103	Does the species have weedy races?	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"

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
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables.</i> PROTA, Wageningen, Netherlands	" <i>Vigna unguiculata</i> originated in Africa, where a large genetic diversity of wild types occurs throughout the continent, southern Africa being richest. It has been introduced in Madagascar and other Indian Ocean islands, where it is sometimes found as an escape from cultivation. The greatest genetic diversity of cultivated cowpea is found in West Africa, in the savanna region of Burkina Faso, Ghana, Togo, Benin, Niger, Nigeria and Cameroon. Cowpea was probably brought to Europe around 300 BC and to India 200 BC. As a result of human selection in China, India and South-East Asia, cowpea underwent further diversification to produce two cultivar-groups, <i>Sesquipedalis</i> Group with long pods used as a vegetable, and <i>Biflora</i> Group grown for the pods, dry seeds and for fodder. Cowpea was probably introduced to tropical America in the 17th century by the Spanish and is widely grown in the United States, the Caribbean region and Brazil"

202	Quality of climate match data	High
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables.</i> PROTA, Wageningen, Netherlands	" <i>Vigna unguiculata</i> originated in Africa, where a large genetic diversity of wild types occurs throughout the continent, southern Africa being richest. It has been introduced in Madagascar and other Indian Ocean islands, where it is sometimes found as an escape from cultivation."

203	Broad climate suitability (environmental versatility)	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Wild types of <i>Vigna unguiculata</i> grow in savanna vegetation, often in disturbed localities or as a weed, up to 1500 m altitude, but some can be found in grassland subject to regular burning, sandy localities close to the coast, woodland, forest edges or swampy areas, occasionally up to 2500 m altitude."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Vigna unguiculata</i> originated in Africa, where a large genetic diversity of wild types occurs throughout the continent, southern Africa being richest. It has been introduced in Madagascar and other Indian Ocean islands, where it is sometimes found as an escape from cultivation."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"Today, cowpea is cultivated throughout the tropics and subtropics between 35 N and 30 S, across Asia and the Pacific, the Middle East, southern Europe, Africa, southern United States, and Central and South America."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Gann GD, Stocking CG and Collaborators. (2001-2022). Floristic Inventory of South Florida Database Online. The Institute for Regional Conservation. Delray Beach, Florida. https://regionalconservation.org/ircs/database/database.asp . [Accessed 11 May 2022]	"Not Native, Naturalized"
	Andersson, M, S. & de Vicente, M. C. (2010). Gene Flow Between Crops and Their Wild Relatives. The Johns Hopkins University Press, Baltimore, MD	"Table 10.1 Domesticated cowpea (<i>Vigna unguiculata</i> (L.) Walp.) and its closest wild relatives" ... "wild populations native to Africa, but naturalized in Asia (Thailand and Japan)"

Qsn #	Question	Answer
	<p>Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall</p>	<p>[Naturalized (N) and/or weedy in a number of locations] "References: Guyana-N-32, Puerto Rico-UW-261, Brazil-W-255, Brazil-W-361, Brazil-W-407, Australia-N-368, Brazil-A-603, United States of America-N-101, United States of America-W-161, United States of America-W-179, Australia-N-945, Global-W-344, United States of America-A-543, Australia-Z-611, Mexico-N-791, Belize-N-850, Mexico-I-878, United States of America-N-904, Mozambique-nC-943, Australia-N-354, Europe-N-819, Egypt-A-19, Chad-nC-640, Galapagos Islands-CN-1157, Italy-U-251, Italy-N-1265, Singapore-N-1290, Georgia-A-1313, Madagascar-N-1000, French Guiana-N-1346, Global-W-1349, Spain-U-1454, Sri Lanka-ZD-1020, Brazil-N-1597, Global-CD-1611, Eastern Caribbean-N-1742, Australia-Z-1768, Singapore-N-1839, Mexico-N-1881, Italy-U-1887, Venezuela-N-1976, Tanzania-A-2076, Australia-W-1977, Chad-W-1977, Croatia-W-1977, Equatorial Guinea-W-1977, Guyana-W-1977, India-W-1977, Italy-W-1977, Mexico-W-1977, Singapore-W-1977, Suriname-W-1977, Yemen-W-1977."</p>
	<p>Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI</p>	<p>No evidence</p>

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Wild types of <i>Vigna unguiculata</i> grow in savanna vegetation, often in disturbed localities or as a weed, up to 1500 m altitude"
	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	[Equivocal evidence as a crop weed] "Cowpea plants are semiviney, summer annuals (16) that can effectively compete with soybean. 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." ... "We believe that cowpea has the potential to become a serious weed problem in soybean. Of the presently registered herbicides for soybean, only acifluorfen shows promise for control of cowpea."
	Rawal, K. M. (1975). Natural hybridization among wild, weedy and cultivated <i>Vigna unguiculata</i> (L.) Walp. <i>Euphytica</i> , 24(3), 699-707	[Weedy form persists and grows in disturbed habitats] "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> ."
	WRA Specialist. (2022). Personal Communication	For this assessment, <i>Vigna unguiculata</i> is classified as a weed with potential negative impacts to agriculture. Because it is intentionally cultivated, evidence of negative impacts is generally lacking or equivocal. Further evidence may result in its reclassification as a detrimental agricultural weed

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Vegetables"
	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	[Equivocal evidence as a crop weed] "Cowpea plants are semiviney, summer annuals (16) that can effectively compete with soybean. 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." ... "We believe that cowpea has the potential to become a serious weed problem in soybean. Of the presently registered herbicides for soybean, only acifluorfen shows promise for control of cowpea."

304	Environmental weed	n
	Source(s)	Notes

Qsn #	Question	Answer
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Persists as a weed, but not reported to have any significant environmental impacts] "Wild types of <i>Vigna unguiculata</i> grow in savanna vegetation, often in disturbed localities or as a weed, up to 1500 m altitude, but some can be found in grassland subject to regular burning, sandy localities close to the coast, woodland, forest edges or swampy areas, occasionally up to 2500 m altitude."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence

305	Congeneric weed	y
	Source(s)	Notes
	Liogier, A.H. & Martorell, L.F. (2000). Flora of Puerto Rico and adjacent islands: a systematic synopsis. Second Edition Revised. La Editorial, UPR, San Juan, Puerto Rico	[<i>Vigna hosei</i> . Impacts unspecified] "A weed at lower to middle elevations, in wet and moist districts, eastern and central Puerto Rico; a native to Borneo and Java, sometimes planted as a soil improver."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[<i>Vigna hosei</i>] "Weed of: Bananas, Orchards & Plantations" [Impacts generally unspecified. Often cultivated as a cover crop under trees]
	Bosch, C.H. (2004). <i>Vigna luteola</i> (Jacq.) Benth. [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 12 May 2022]	[<i>Vigna luteola</i>] "It is considered a weed of rice in South America, and in South Africa it figures on the national weed list."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands</p>	<p>[No evidence] "Climbing, trailing or more or less erect annual or perennial herb, cultivated as an annual; taproot well developed, with many lateral and adventitious roots; stem up to 4 m long, angular or nearly cylindrical, slightly ribbed. Leaves alternate, 3-foliolate; stipules ovate, 0.5–2 cm long, spurred at base; petiole up to 15(–25) cm long, grooved above, swollen at base, rachis (0.5–)2.5–4.5(–6.5) cm long; stipels small; leaflets ovate or rhombic to lanceolate, (1.5–)7–14(–20) cm × (1–)4–10(–17) cm, basal ones asymmetrical, apical one symmetrical, entire, sometimes lobed, glabrous or slightly pubescent, 3-veined from the base. Inflorescence an axillary or terminal false raceme up to 35 cm long, with flowers clustered near the top; rachis tuberculate. Flowers bisexual, papilionaceous; pedicel 1–3 mm long, with spatulate, deciduous bracteoles; calyx campanulate, tube c. 5 mm long, lobes narrowly triangular, c. 5 mm long; corolla pink to purple, sometimes white or yellowish, standard very broadly obovate, hood-shaped, c. 2.5 cm long, wings obovate, c. 2 cm long, keel boat-shaped, c. 2 cm long; stamens 10, 9 fused and 1 free; ovary superior, c. 1.5 cm long, laterally compressed, style upturned, with fine hairs in upper part, stigma obliquely globular. Fruit a linear-cylindrical pod 8–30(–120) cm long, straight or slightly curved, with a short beak, glabrous or slightly pubescent, pale brown when ripe, 8–30-seeded. Seeds oblong to almost globose, often laterally compressed, 0.5–1 cm long, black, brown, pink or white; hilum oblong, covered with a white tissue, with a blackish rim-like aril."</p>

402	Allelopathic	
	Source(s)	Notes
	<p>Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ</p>	<p>"Allelopathic compounds in the plant may help to suppress weeds (Clark, 2007)."</p>
	<p>Hill, E. C., Ngouajio, M., & Nair, M. G. (2007). Allelopathic potential of hairy vetch (<i>Vicia villosa</i>) and cowpea (<i>Vigna unguiculata</i>) methanol and ethyl acetate extracts on weeds and vegetables. <i>Weed Technology</i>, 21(2), 437-444</p>	<p>[Extracts demonstrate allelopathic properties] "Hairy vetch and cowpea are two leguminous cover crops that have been observed in the field and in the laboratory to reduce weed populations and to affect some vegetable crops (Hill et al. 2006; Hoffman et al. 1993; Hutchinson and McGiffen 2000; Ngouajio et al. 2003; Ngouajio and Mennan 2005; Schroeder et al. 1998; Teasdale and Daughtry 1993; Wang et al. 2003; White et al. 1989)." ... "Results of this study suggest that methanol and ethyl acetate extracts of hairy vetch and cowpea contain allelochemicals. The effects of the extracts varied with their concentrations and plant species. Previous studies by Hill et al. (2006) have also shown the susceptibility of several crop and weed species to aqueous extracts of the two cover crops. Further studies are needed to determine the nature of the compounds responsible for the inhibitory or stimulatory effect of extracts of hairy vetch and cowpea on seed germination and radicle elongation."</p>

403	Parasitic	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Climbing, trailing or more or less erect annual or perennial herb, cultivated as an annual; taproot well developed, with many lateral and adventitious roots; stem up to 4 m long, angular or nearly cylindrical, slightly ribbed." [Fabaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Cowpea is used as fodder in West Africa, Asia (especially India) and Australia; it is used for grazing or cut and mixed with dry cereals for animal feed."
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"Wildlife: Cowpea is eaten by deer as forage, and is commonly used in food plots for deer. A variety of birds, including wild turkey, eat the seeds and the plant can be used by quail as cover. Some varieties of cowpea are used specifically for wildlife purposes (Ball et al., 2007)."

405	Toxic to animals	n
	Source(s)	Notes
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"leaves and seeds widely used as a food, grain used widely for human nutrition, good fodder, pods or leaves eaten, tender fruits and seeds cooked as vegetable, heat treatment reduces trypsin inhibitors, extreme variability in plant morphology"
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"Wildlife: Cowpea is eaten by deer as forage, and is commonly used in food plots for deer. A variety of birds, including wild turkey, eat the seeds and the plant can be used by quail as cover. Some varieties of cowpea are used specifically for wildlife purposes (Ball et al., 2007)."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[No evidence] "Cowpea is used as fodder in West Africa, Asia (especially India) and Australia; it is used for grazing or cut and mixed with dry cereals for animal feed. In the United States and elsewhere cowpea is grown as a green manure and cover crop."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
		"Cowpea is susceptible to a wide range of diseases and pests. Yard-long bean suffers from the same diseases and pests as cowpea but seems less susceptible than cowpea under humid conditions. Fungal diseases are more troublesome during the rainy season, whereas insect and mite pests and virus diseases cause more damage during the dry season. The major fungal diseases are anthracnose (<i>Colletotrichum lindemuthianum</i>), Ascochyta blight (<i>Phoma exigua</i>), brown blotch (<i>Colletotrichum truncatum</i>), leaf smut (<i>Protomyces phaseoli</i>), leaf spot (<i>Cercospora canescens</i> , <i>Septoria vignae</i> , <i>Mycosphaerella cruenta</i> synonym: <i>Pseudocercospora cruenta</i>), brown rust (<i>Uromyces appendiculatus</i>), scab (<i>Elsinoë phaseoli</i>), powdery mildew (<i>Erysiphe polygoni</i>), pythium soft stem rot (<i>Pythium aphanidermatum</i>), stem canker (<i>Macrophomina phaseolina</i>) and web blight (<i>Thanatephorus cucumeris</i> , synonym <i>Rhizoctonia solani</i>). Crop rotation and the use of chemicals and

Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands

resistant cultivars are necessary for integrated disease control. Bacterial diseases include bacterial blight (*Xanthomonas campestris* pv. *vignicola*), which occurs worldwide, and bacterial pustules (*Xanthomonas axonopodis* pv. *glycines* synonym: *Xanthomonas campestris* pv. *vignaeunguiculatae*) reported from Nigeria. These bacteria are seed-transmitted and secondary spread occurs by wind-driven rain. Control measures include the use of pathogen-free seeds, seed treatment with a mixture of antibiotics and fungicides such as streptomycin plus captan, and strict crop rotation. Resistance genes are available for bacterial blight and bacterial pustules. Many viruses attack *Vigna unguiculata*. Some viruses of economic importance are cowpea aphid-borne mosaic potyvirus (CABMV), cowpea mottle carmovirus (CPMoV), cowpea yellow mosaic virus (CYMV), black eye cowpea mosaic potyvirus or bean common mosaic potyvirus (BCMV), cucumber mosaic cucumovirus (CMV-CS) and cowpea golden mosaic virus (CPGMV). Some of the viruses are seedborne, while aphids, white flies and beetles perform field transmission. Control measures include use of healthy seed of resistant cultivars if available, and weeding to remove alternative hosts. In poor sandy soils, cowpea is attacked by root-knot nematodes (*Meloidogyne* spp.). It is also a host plant of, among others, reniform nematodes (*Rotylenchus* spp.), root-lesion nematodes (*Pratylenchus* spp.) and lance nematodes (*Hoplolaimus* spp.). Crop rotation and resistant cultivars are used to control nematodes. Insect pests are also a major factor limiting cowpea production and may even cause total seed loss. In tropical Africa much damage is caused by cowpea aphids (*Aphis craccivora*), flower thrips (*Megalurothrips sjostedti*), legume pod borers (*Maruca vitrata*, *Etiella zinckenella*), pod bugs and seed suckers (e.g. *Clavigralla tomentosicollis*, synonym: *Acanthomia tomentosicollis*). *Lygus* beetle (*Lygus hesperus*), cowpea curculio (*Chalcodermus aeneus*) and green leafhoppers (*Empoasca* spp.) are of less importance. Yard-long bean is especially attractive to aphids (*Myzus persicae*, *Aphis gossypii*), green stink bug (*Nezara viridula*) and red spider mite (*Tetranychus* spp.); greasy cutworms (*Agrotis ipsilon*) often cause damage just after emergence. The bean shoot fly (*Ophiomyia phaseoli*) is a common pest; the larvae tunnel in the leaves and stems, and severely attacked young plants will die, whereas older plants will suffer from hampered growth and serious yield reduction. Lodging incidence is generally high in infested fields; tolerant cultivars may produce aerial roots above the wound. Another common pest is the bean pod fly (*Melanagromyza sojae*). The larvae damage the petioles and young pods. Control of insect pests involves protecting the seed with a systemic insecticide (e.g. carbofuran) at sowing or applied as a solution to the emerging seedlings in the planting holes. Plant debris and affected plants must be burned. Cowpea seeds are extremely vulnerable to storage pests, with the cosmopolitan cowpea weevil (*Callosobruchus maculatus*) being the major storage pest. Measures to reduce pest damage include application of inoffensive vegetable oil, neem (*Azadirachta indica* A.Juss.) oil or wood ash, roasting and bagging the seeds in airtight plastic bags, and storing as whole pods. Use of chemicals, resistant cultivars, biological control and proper crop management such as intercropping and weeding are necessary for integrated pest management. Chemical control of insects is common practice on yard-long bean, but not on cowpea. Because of the risks for farmer and consumer (especially when leaves are harvested), these sprayings must be reduced to the strict minimum. Two parasitic

		weeds are a serious problem: <i>Alectra vogelii</i> Benth. prevalent in the southern savanna regions of West Africa, East Africa and southern Africa, and <i>Striga gesnerioides</i> (Willd.) Vatke prevalent in the savanna regions of West and Central Africa. Crop rotation, deep cultivation, intercropping, early planting and use of resistant cultivars reduce infestation by these parasitic weeds."
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"Cowpea may be affected by fusarium wilt (<i>Fusarium oxysporum</i>), bacterial canker, southern stem blight (<i>Sclerotium</i> spp.), cowpea mosaic virus, cercospora leaf spot, rust, and powdery mildew (<i>Podosphaera</i> spp.) (MSU, 2010). Insect damage will most often occur during the seedling stage and may be caused by Mexican bean beetles (<i>Epilachna varivestis</i>), bean leaf beetles (<i>Cerotoma trifucata</i>), cowpea curculios (<i>Chalcodermus aeneus</i>), grasshoppers, aphids, green stink bugs, lesser cornstalk borers, and weevils (when in storage)(TJAI, 2010)."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Cowpea is the preferred pulse in large parts of Africa. The mature seeds are cooked and eaten alone or together with vegetables, spices and often palm oil, to produce a thick bean soup, which accompanies the staple food (cassava, yam, plantain). In West Africa the seeds are decorticated and ground into a flour and mixed with chopped onions and spices and made into cakes which are either deep fried ('akara balls'), or steamed ('moin moin'). In Malawi the seeds are boiled with their seed coat, or the latter is removed by soaking and leaving the seeds in the soil for a few hours. Small quantities of cowpea flour are processed into crackers, composite flour and baby foods in Senegal, Ghana and Benin."
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"leaves and seeds widely used as a food, grain used widely for human nutrition, good fodder, pods or leaves eaten, tender fruits and seeds cooked as vegetable, heat treatment reduces trypsin inhibitors"

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"Natural reseeding can occur, and disking in spring can stimulate the growth of buried seed (Ball et al., 2007). The plant will not tolerate fire (FAO, 2012)."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Wild types of <i>Vigna unguiculata</i> grow in savanna vegetation, often in disturbed localities or as a weed, up to 1500 m altitude, but some can be found in grassland subject to regular burning, sandy localities close to the coast, woodland, forest edges or swampy areas, occasionally up to 2500 m altitude." [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	y
	Source(s)	Notes
	Duke, J. A. (1983). <i>Helianthus tuberosus</i> . Handbook of Energy Crops. https://hort.purdue.edu . [Accessed 12 May 2022]	" Can withstand considerable drought and a moderate amount of shade, but is less tolerant of waterlogging than soybean."

Qsn #	Question	Answer
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"Cowpea grows best in hot conditions. It can grow in moderate shade, but in agroforestry or orchard applications, shade should not be too heavy."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"It performs best under full sunlight but tolerates some shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Cowpea can be grown on a wide range of soil types with pH 5.5–6.5 (–7.5), provided they are well drained. It is moderately sensitive to salinity and exhibits greater salt tolerance during later stages of growth."
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"It is better adapted to sandy soils and droughty conditions than soybeans (TJAI, 2010)." ... "Plants require well-drained, highly acid to neutral soils, but can grow well in a range of soil types, including soils with low fertility. The plant is very drought resistant and does not survive flooded conditions (Clark, 2007)."

411	Climbing or smothering growth habit	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Climbing, trailing or more or less erect annual or perennial herb, cultivated as an annual"

412	Forms dense thickets	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Wild types of <i>Vigna unguiculata</i> grow in savanna vegetation, often in disturbed localities or as a weed, up to 1500 m altitude, but some can be found in grassland subject to regular burning, sandy localities close to the coast, woodland, forest edges or swampy areas, occasionally up to 2500 m altitude." [Densely cultivated, but not evident from wild populations]

501	Aquatic	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Terrestrial] "Wild types of <i>Vigna unguiculata</i> grow in savanna vegetation, often in disturbed localities or as a weed, up to 1500 m altitude, but some can be found in grassland subject to regular burning, sandy localities close to the coast, woodland, forest edges or swampy areas, occasionally up to 2500 m altitude"

502	Grass	n
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Qsn #	Question	Answer
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 11 May 2022]	Genus: <i>Vigna</i> Subgenus: <i>Vigna</i> Section: <i>Catiang</i> Family: Fabaceae (alt. Leguminosae) Subfamily: Faboideae Tribe: Phaseoleae Subtribe: Phaseolinae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Non-woody] "Cowpea derives a significant amount of its nitrogen requirements from the atmosphere and may leave 75–150 kg/ha in the soil for the benefit of the succeeding crop. If cowpea is grown in localities where it has not been grown recently, inoculation with nitrogen-fixing bacteria has been found to be beneficial. Cowpea requires phosphorus for nodulation and root growth."

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Cowpea derives a significant amount of its nitrogen requirements from the atmosphere and may leave 75–150 kg/ha in the soil for the benefit of the succeeding crop. If cowpea is grown in localities where it has not been grown recently, inoculation with nitrogen-fixing bacteria has been found to be beneficial. Cowpea requires phosphorus for nodulation and root growth."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[No evidence] " <i>Vigna unguiculata</i> originated in Africa, where a large genetic diversity of wild types occurs throughout the continent, southern Africa being richest. It has been introduced in Madagascar and other Indian Ocean islands, where it is sometimes found as an escape from cultivation. The greatest genetic diversity of cultivated cowpea is found in West Africa, in the savanna region of Burkina Faso, Ghana, Togo, Benin, Niger, Nigeria and Cameroon. Cowpea was probably brought to Europe around 300 BC and to India 200 BC. As a result of human selection in China, India and South-East Asia, cowpea underwent further diversification to produce two cultivar-groups, <i>Sesquipedalis</i> Group with long pods used as a vegetable, and <i>Biflora</i> Group grown for the pods, dry seeds and for fodder. Cowpea was probably introduced to tropical America in the 17th century by the Spanish and is widely grown in the United States, the Caribbean region and Brazil."

602	Produces viable seed	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Suso, M. J., Bebeli, P. J., & Palmer, R. G. (2015). Reproductive biology of grain legumes. Grain Legumes. Springer, New York	"Cowpea readily germinates and the young plants are robust. Planting dates and temperatures are roughly the same as soybean. Planting dates should be late May through mid-June."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Farmers normally use farm-saved seed for planting. The 1000-seed weight of cowpea is 150–300 g."

603	Hybridizes naturally	
	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	[Hybridizes with wild and weedy forms] "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> ."
	Smartt, J. (1979). Interspecific hybridization in the grain legumes—a review. <i>Economic Botany</i> , 33(3), 329-337	[No evidence of interspecific hybridization] "The current position regarding reports in the literature on interspecific hybridization in the pulses is confused. Two major reasons can be advanced in explanation. The first is that frequently conspecific wild and cultivated forms have received different binomials and crosses between such are frequently regarded as interspecific hybrids. The second arises from mistaken interpretation of results of attempted interspecific hybridization when progeny strongly resembling the maternal parent are produced. It is suggested that these progeny might have been produced by failures in emasculation or rare accidental apomixis. All cultigens of the genera <i>Arachis</i> , <i>Cajanus</i> , <i>Cicer</i> , <i>Phaseolus</i> and <i>Pisum</i> are able to some extent to produce viable true interspecific hybrids as are the Asiatic forms of <i>Vigna</i> . True interspecific hybrids have not been produced with <i>Vicia faba</i> nor with <i>Vigna unguiculata</i> the cowpea."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"In dry climates cowpea is almost entirely self-pollinated, but in areas with high air humidity cross-pollination by insects may amount to 40%."
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"It is a self-pollinating plant, but wild annuals can easily be crossed with cultivated crops."

605	Requires specialist pollinators	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Suso, M. J., Bebeli, P. J., & Palmer, R. G. (2015). Reproductive biology of grain legumes. Grain Legumes. Springer, New York	"Cowpea is a self-pollinated crop, however, many insects visit cowpea flowers, which have EFNs and in the process facilitate both self- and cross-pollination." ... "The insects most likely to be involved in pollen movement in cowpea are bumblebees and honeybees (Fatokun and Ng 2007)."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"In dry climates cowpea is almost entirely self-pollinated, but in areas with high air humidity cross-pollination by insects may amount to 40%."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Climbing, trailing or more or less erect annual or perennial herb, cultivated as an annual; taproot well developed, with many lateral and adventitious roots" [No evidence. Reproduces by seed]

607	Minimum generative time (years)	1
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"The length of the reproductive period is very variable, with the earliest cultivars taking 30 days from planting to flowering, and less than 60 days to mature seeds. When leaves are harvested during the early growth stages, senescence starts 1.5–2 months after sowing and the plant dies after 3–4 months, depending on crop health and intensity of harvesting. Late cultivars with indeterminate growth take 90–100 days to flower and up to 240 days for last pods to mature."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Escapee"
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Fruit a linear-cylindrical pod 8–30(–120) cm long, straight or slightly curved, with a short beak, glabrous or slightly pubescent, pale brown when ripe, 8– 30-seeded. Seeds oblong to almost globose, often laterally compressed, 0.5–1 cm long, black, brown, pink or white; hilum oblong, covered with a white tissue, with a blackish rim-like aril." [No means of external attachment]
	Lush, W. M., & Evans, L. T. (1981). The domestication and improvement of cowpeas (<i>Vigna unguiculata</i> (L.) Walp.). Euphytica, 30(3), 579-587	"Only wild cowpeas have pods that are dehiscent in the sense of opening explosively and scattering seeds. The weather conditions required for dehiscence depend on the origin of accessions; those from humid zones dehisce in quite humid atmospheres while those from seasonally arid zones dehisce only in drier atmospheres (LUSH et al., 1980)."

702	Propagules dispersed intentionally by people	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"Today, cowpea is cultivated throughout the tropics and subtropics between 35 N and 30 S, across Asia and the Pacific, the Middle East, southern Europe, Africa, southern United States, and Central and South America."

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes
	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	"Cowpea plants are semiviney, summer annuals (16) that can effectively compete with soybean. 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." ... "We believe that cowpea has the potential to become a serious weed problem in soybean. Of the presently registered herbicides for soybean, only acifluorfen shows promise for control of cowpea."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop, Herbal, Ornamental, Pasture" [Potential seed contaminant of other cultivated crops]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Lush, W. M., & Evans, L. T. (1981). The domestication and improvement of cowpeas (<i>Vigna unguiculata</i> (L.) Walp.). <i>Euphytica</i> , 30(3), 579-587	"Only wild cowpeas have pods that are dehiscent in the sense of opening explosively and scattering seeds. The weather conditions required for dehiscence depend on the origin of accessions; those from humid zones dehisce in quite humid atmospheres while those from seasonally arid zones dehisce only in drier atmospheres (LUSH et al., 1980)." [Seeds may be released by dehiscence, but are not adapted for further dispersal by wind]

705	Propagules water dispersed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Possibly some secondary dispersal by water, but not identified as a major vector] "Major Pathway/s: Contaminant, Crop, Herbal, Ornamental, Pasture Dispersed by: Humans, Animals, Escapee Weed of: Vegetables"

706	Propagules bird dispersed	n
	Source(s)	Notes
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"A variety of birds, including wild turkey, eat the seeds and the plant can be used by quail as cover" [Birds act as seed predators]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Escapee"

Qsn #	Question	Answer
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Fruit a linear-cylindrical pod 8–30(–120) cm long, straight or slightly curved, with a short beak, glabrous or slightly pubescent, pale brown when ripe, 8– 30-seeded. Seeds oblong to almost globose, often laterally compressed, 0.5–1 cm long, black, brown, pink or white; hilum oblong, covered with a white tissue, with a blackish rim-like aril." [Arillate, but no evidence that this is an adaptation for bird dispersal]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Fruit a linear-cylindrical pod 8–30(–120) cm long, straight or slightly curved, with a short beak, glabrous or slightly pubescent, pale brown when ripe, 8– 30-seeded. Seeds oblong to almost globose, often laterally compressed, 0.5–1 cm long, black, brown, pink or white; hilum oblong, covered with a white tissue, with a blackish rim-like aril." [Arillate, but no evidence of external dispersal by ants or other animals found]
	Lush, W. M., & Evans, L. T. (1981). The domestication and improvement of cowpeas (<i>Vigna unguiculata</i> (L.) Walp.). <i>Euphytica</i> , 30(3), 579-587	[Wild types with dehiscent seed pods] "Only wild cowpeas have pods that are dehiscent in the sense of opening explosively and scattering seeds. The weather conditions required for dehiscence depend on the origin of accessions; those from humid zones dehisce in quite humid atmospheres while those from seasonally arid zones dehisce only in drier atmospheres (LUSH et al., 1980)."

708	Propagules survive passage through the gut	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, Animals, Escapee"
	Samansiri, K. A. P., & Weerakoon, D. K. (2008). A study on the seed dispersal capability of Asian elephants in the northwestern region of Sri Lanka. <i>Gajah</i> , 28, 19-24	"Table 2. List of cultivated plant species whose seeds were observed in elephant dung (n=145)." [Includes seeds of <i>Vigna unguiculata</i> found in 2 dung piles]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Possibly in cultivation. Soil seed densities under natural conditions unspecified] "Farmers may harvest up to 400 kg/ha of cowpea leaves in a few rounds with no noticeable reduction of seed yields. In Nigeria climbing cultivars yielded 9–17 t/ha of fresh pods, whereas decumbent cultivars yielded 6–15 t/ha. The mean dry seed yield of the same cultivars was 1. 4–1.7 t/ha. The world average yield of dry cowpea seed is low, 240 kg/ha, and for fodder it is 500 kg/ha (air-dried leafy stems). Average yield of dry cowpea seeds under subsistence agriculture in tropical Africa is 100–500 kg/ha. The average seed yield in Niger is 120 kg/ha, in Nigeria 400 kg/ha, and in the United States 900 kg/ha. Apart from the effects of diseases and pests, the low yields are partly explained by the fact that the crop is mostly grown at low densities in intercropping systems, shaded by taller cereals. Furthermore, cowpea is often sown later in the rainy season, which results in a shorter crop duration due to photoperiod-sensitivity. A yield potential of 3 t/ha of seed and 4 t/ha of hay can be achieved in sole-cropping with good management. In the United States seed yields up to 7 t/ha have been obtained. "

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Duke, J. A. (1983). <i>Helianthus tuberosus</i> . Handbook of Energy Crops. https://hort.purdue.edu . [Accessed]	"Seeds remain viable for several years." [Unclear if seed viability is under ambient or artificial storage conditions]
	Bortey, H. M., Sadia, A. O., & Asibuo, J. Y. (2016). Influence of seed storage techniques on germinability and storability of cowpea (<i>Vigna unguiculata</i> (L) Walp). <i>Journal of Agricultural Science</i> ; 8(10): 241-248	"This study was set to investigate the germinability and storability of the newly released cowpea genotypes and secondly the influence of different storage materials under ambient storage condition on seed vigour and germination over time. The experiment was laid in a Split-split plot design with four replicates. [Under ambient conditions, seeds may lose viability rapidly] "The main plot was duration (0, 30, 60 and 90 days), while Storage material (polyethylene bag, cotton bag and glass container) was sub plot and the four cowpea genotypes were sub-sub plot. Results from the study showed that irrespective of the cowpea genotypes and storage material used, percentage vigour and germination were significantly affected with time in storage. Seeds stored in cotton bags had the least percentage vigour (57%) and germination (65%) while the highest was recorded for seeds stored in air-tight glass containers. Among all the cowpea genotypes studied, Hewale was found to have poor storage abilities. For better storage of cowpea seeds for a period exceeding 3 months, it is preferable to use glass containers or black polyethylene bags even under ambient condition to maintain seed vigour and germinability."

803	Well controlled by herbicides	Y
	Source(s)	Notes

Qsn #	Question	Answer
	Lowndes - Echols Ag News. (2019). Control of Cowpeas. https://site.extension.uga.edu/lowndesecholsag/2019/07/control-of-cowpeas/ . [Accessed 13 May 2022]	"In summary, the following herbicides could be used for the control of cowpea depending upon the planted crop: PRE = Atrazine, Balance Flex (isoxaflutole), and Tricor (metribuzin); POST = Classic (chlorimuron), Engenia (dicamba), Enlist One (2,4-D), Envoke (trifloxysulfuron), Gramoxone (paraquat), Liberty (glufosinate), Osprey (mesosulfuron), Roundup (glyphosate), Sharpen (saflufenacil), and Stinger (clopyralid)."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	Source(s)	Notes
	Sheahan, C.M. (2012). Plant guide for cowpea (<i>Vigna unguiculata</i>). USDA-Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, NJ	"Natural reseeding can occur, and disking in spring can stimulate the growth of buried seed (Ball et al., 2007). The plant will not tolerate fire (FAO, 2012)."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Several subspecies are recognized. At least two are grown in Hawai'i: subsp. <i>unguiculata</i> ... subsp. <i>sesquipedalis</i> " [Unknown. Neither are documented to be naturalized in the Hawaiian Islands, and there is no mentions of pests or pathogens in this publication]

Summary of Risk Traits:

High Risk / Undesirable Traits

- A domesticated crop with weedy and naturalized forms
- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Grows and persists in regions with tropical climates
- Reported to be naturalized in Asia (but not in the Hawaiian Islands to date)
- Weedy, or wild forms may invade disturbed habitats and could impact crops
- Other *Vigna* species are weedy or invasive
- Potentially allelopathic
- Impacted by several pests and pathogens (could serve as a host for other crops or plants)
- Can grow in moderate shade
- Climbing, and potentially smothering habit
- Tolerates many soil types
- Reproduces by seed
- Self-pollinated
- Rapidly reaches maturity (1-2+ months)
- Seeds dispersed by dehiscent pods (wild types), possibly through ingestion by livestock, as a seed contaminant, and through intentional cultivation

Low Risk Traits

- Domesticated plants with reduced dispersibility and seed longevity may reduce invasion risk
- Two subspecies cultivated in the Hawaiian Islands are not reported to be naturalized or invasive, and are likely of lower risk than wild types
- Unarmed (no spines, thorns, or burrs)
- Provides fodder for livestock
- Non-toxic
- Not reported to spread vegetatively
- Herbicides reported to provide effective control

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? Unclear. Reported as an anecdotal weed of soybeans, but impacts on yield are speculative and unquantified.

Outcome = Evaluate (Moderate Risk)

TAXON: *Vigna unguiculata* (L.)
Walp.

SCORE: 6.0

RATING: Evaluate