

Key Words: High Risk, Naturalized, Agricultural Weed, Potentially Toxic, Self-compatible

**Family:** *Fabaceae*

**Taxon:** *Senna obtusifolia*

**Synonym:** *Cassia obtusifolia* L. (basionym)

**Common Name:** American sicklepod  
coffee weed  
Java bean

Questionnaire Status:	Assessor:	Data Entry Person:	Designation:	WRA Score
current 20090513 Assessor Approved	Chuck Chimera	Chuck Chimera	H(HPWRA)	20
101	Is the species highly domesticated?	y=-3, n=0	n	
102	Has the species become naturalized where grown?	y=1, n=-1		
103	Does the species have weedy races?	y=1, n=-1		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	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)	n	
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y	
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n	
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y	
401	Produces spines, thorns or burrs	y=1, n=0	n	
402	Allelopathic	y=1, n=0		
403	Parasitic	y=1, n=0	n	
404	Unpalatable to grazing animals	y=1, n=-1	n	
405	Toxic to animals	y=1, n=0	y	
406	Host for recognized pests and pathogens	y=1, n=0	y	
407	Causes allergies or is otherwise toxic to humans	y=1, n=0		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n	
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n	
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	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	n
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	y
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	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
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)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 20

## Supporting Data:

101	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Is the species highly domesticated? No, but potential exists for selection of desirable traits] "While the wider genetic variation of <i>Senna obtusifolia</i> is found in the New World, there is obvious scope for selection for vegetable use even within the African populations. Farmers already select plants that taste less bitter, are less fibrous and have easy -to-pick leaves. Australia may start a breeding programme based on seed stock collected from all over the area of distribution in the near future. Breeding would aim at high seed and gum yield, good gum quality and adaptation to mechanized cultivation."
102	2013. WRA Specialist. Personal Communication.	NA
103	2013. WRA Specialist. Personal Communication.	NA
201	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Species suited to tropical or subtropical climate(s) 2-High] "Probably native to the Neotropics..."
202	2013. WRA Specialist. Personal Communication.	[Quality of climate match data 2-High] Native range poorly known, but widely established in areas with tropical and subtropical climates
203	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[ <i>Senna obtusifolia</i> is found along rivers and on lake shores, as well as on cultivated land, up to 1700 m altitude.? Yes] " <i>Senna obtusifolia</i> is found along rivers and on lake shores, as well as on cultivated land, up to 1700 m altitude." [Elevation range exceeds 1000 m]
204	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Native or naturalized in regions with tropical or subtropical climates? Yes] " <i>Senna obtusifolia</i> is found throughout tropical Africa with the exception of Madagascar. It is considered an early introduction into Africa from America, where it shows far more variation. In Africa the fruits are broad as specimens from the Caribbean and southern United States, which suggests a Caribbean origin of the African plants."
205	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Does the species have a history of repeated introductions outside its natural range? Yes] "Probably native to the Neotropics, now widely cultivated for medicinal uses and naturalized..."
205	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Does the species have a history of repeated introductions outside its natural range? Yes] " <i>Senna obtusifolia</i> is considered a weed worldwide and an estimated 600,000 ha are infested in Queensland (Australia)."
301	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Naturalized beyond native range? Yes] "cultivated and naturalized on the Greenwell Ranch, Hawai'i" ... "Material examined. Lāna'i: keomuku rd, nahoko, 5 m. locally common yellow flowered herbs, growing in sandy soil at edge of unpaved road and dense <i>Prosopis</i> thickets, 20 Jan 2009, Oppenheimer H10919."
301	2003. Staples, G.W./Imada, C.T./Herbst, D.R.. New Hawaiian plant records for 2001. Bishop Museum Occasional Papers. 74: 7-21.	[Naturalized beyond native range? Yes] "Previously documented as naturalized since at least 1960 only on the Greenwell Ranch, Hawai'i (Wagner et al., 1999: 700), this is the first such record of this species on O'ahu, and it pushes back the year of naturalization by 20 years. Called habucha, the seeds were roasted for tea by Japanese. Material examined. O'AHU: Ko'olaupoko Distr., Kailua, west margin of Ka'elepulu Pond, 11 Jun 1940, M.C. Neal & C. Hartt s. n. (BISH 614694)."
301	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Naturalized beyond native range? Yes] " <i>Senna obtusifolia</i> is considered a weed worldwide and an estimated 600,000 ha are infested in Queensland (Australia)."
301	2011. Oppenheimer, H.. New Hawaiian plant records for 2009. Bishop Museum Occasional Papers. 110: 5-10.	[Naturalized beyond native range? Yes] "Used medicinally and the roasted seeds are used by Japanese for tea, habucha is naturalized on the Big island (Wagner et al. 1999: 700) and O'ahu (staples et al. 2003: 12). On Lāna'i it was found growing in sandy soil near sea level. there were hundreds of plants scattered in dense patches along several hundred meters of roadside."
302	2013. WRA Specialist. Personal Communication.	[Garden/amenity/disturbance weed? No] A weed of agriculture
303	1989. Bozsa, R.C./Oliver, L.R./Driver, T.L.. Intraspecific and Interspecific Sicklepod ( <i>Cassia obtusifolia</i> ) Interference. Weed Science. 37(5): 670-673.	[Agricultural/forestry/horticultural weed? Yes] "Sicklepod is one of the most serious weed problems of the warm, humid southeastern United States and is particularly difficult to control in cotton ( <i>Gossypium hirsutum</i> L.), peanuts ( <i>Arachis hypogaea</i> L.), and soybeans (14, 15). Several researchers have reported the competitive effects of sicklepod on crop growth and yield (1, 2, 3, 13)."

303	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Agricultural/forestry/horticultural weed? Yes] "Sicklepod is a weed of pastures and of sugar cane. It has the potential to become a major weed of several other crops. In pasture, it is an aggressive invader and can completely dominate grass species, eradicating pasture growth and excluding stock. Carrying capacities can be reduced by as much as 85%. It is conceivable that properties could become completely unproductive."
303	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Agricultural/forestry/horticultural weed? Yes] "It is a major weed of the south-eastern United States, affecting cotton, soybean and peanut yields significantly." ... "In Australia, sicklepod is mainly a weed of neglected rangelands but occasionally extends into sown pastures, a few row crops and old sugarcane fields."
303	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Agricultural/forestry/horticultural weed? Yes] "Grassland, forest edges, riparian habitats, floodplains, disturbed sites. This plant is a significant agricultural weed that also invades natural plant communities. It grows in dense thickets, competing for light, water and nutrients and displacing native vegetation."
303	2008. Walker, E.R./Oliver, L.R.. Translocation and Absorption of Glyphosate in Flowering Sicklepod ( <i>Senna obtusifolia</i> ). <i>Weed Science</i> . 56(3): 338-343.	[Agricultural/forestry/horticultural weed? Yes] " In addition to troublesome weed characteristics, its competitive ability makes sicklepod a problem weed in crops. In rows spaced 107 cm apart, soybean [ <i>Glycine max</i> (L.) Merr] yield was reduced by 1 sicklepod plant per 2 m of soybean row, and soybean yield has been reduced by 19 to 35% by allowing sicklepod interference with soybean during the first 4 wk after soybean emergence (Thurlow and Buchanan 1972). In rows spaced 97 cm apart, cotton ( <i>Gossypium hirsutum</i> L.) yields were reduced by 20% when 8 sicklepod plants per 7.3 m of row were present (Buchanan and Burns 1971).
304	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Environmental weed? Potentially, but primarily an agricultural weed] "In areas favourable for its growth, sicklepod is capable of excluding all native vegetation and of forming dense monospecific stands, but in Queensland at least, it predominantly inhabits disturbed areas, grazing and crop lands. As such, sickle pod may be able to invade open native plant communities, and as mentioned above, it is threatening small remnant areas of native grassland in the Wet Tropics. In Dryander National Park, the open forest community is heavily impacted, and sicklepod also grows along old snigging tracks in vine forest on ridges (8. Nolan, pers. comm. 1997). Hardwood State Forests which have been disturbed by logging may also be susceptible to invasion. Feral cattle, feral pigs and the occurrence of natural events such as cyclone, which open up the forest canopy, are likely to enhance the possibility of invasion into pristine areas. Whilst there is no compelling evidence to suggest that sicklepod is an aggressive environmental weed in Queensland, the information available suggests that this aspect of its impact may just not be evident at this stage of the invasion process. The environmental costs of sicklepod are therefore minimal at present but may well increase in the future."
305	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Congeneric weed? Yes] <i>Senna alata</i> , <i>S. bicapsularis</i> , <i>S. didymobotrya</i> , <i>S. pendula</i> [listed as significant weeds of natural areas]
401	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Produces spines, thorns or burrs? No] "Annual or perennial herbs (1-)-3-12(-20) dm tall, sometimes somewhat woody toward base, foliage malodorous, roots black with yellow tips. Leaflets 3 pairs, the distal ones larger, broadly obovate to cuneate-obovate, 1.7-6.5 cm long, 1-4 cm wide, glabrous or pubescent, margins ciliate, apex subtruncate to broadly rounded, apiculate, base with 1 side rounded to cordate, the other cuneate, petiolar nectaries between the lower and occasionally the second pair of leaflets, 1-3 mm long, stipules linear, 3.5-17 mm long, caducous."
402	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Allelopathic? Potentially Yes] "Water extracts from sicklepod have some allelopathic effects, reducing germination of oat seed by 61% but increasing the persistence of crimson clover, <i>Trifolium incarnatum</i> L., and sericea, <i>Lespedeza cuneata</i> (Dum. & Cours.) G.Don, by virtually eliminating 'damping-off' caused by <i>Rhizoctonia</i> spp."
403	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Parasitic? No] Fabaceae
404	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Unpalatable to grazing animals? No] "Cattle, sheep, goats and ostriches browse the plants, but the growth stage of the plants may influence acceptability. In both Africa and the United States, mycotoxicosis is an often fatal disease of cattle grazing <i>Senna obtusifolia</i> and other <i>Senna</i> species."
404	2011. Oppenheimer, H.. New Hawaiian plant records for 2009. Bishop Museum Occasional Papers. 110: 5-10.	[Unpalatable to grazing animals? Possibly not a preferred browse species] "It did not appear that Axis deer were browsing the plants, nor were plants observed in shady habitat directly adjacent."

405	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Toxic to animals? Yes] "Although it is generally unpalatable to stock, if eaten, sicklepod is toxic to cattle."
405	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Toxic to animals? Yes. Cattle] "Cattle, sheep, goats and ostriches browse the plants, but the growth stage of the plants may influence acceptability. In both Africa and the United States, mycotoxicosis is an often fatal disease of cattle grazing <i>Senna obtusifolia</i> and other <i>Senna</i> species."
406	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Host for recognized pests and pathogens? Yes] "Several fungi affect <i>Senna obtusifolia</i> and it is an alternative host of <i>Alternaria cassiae</i> , which affects e.g. cowpea ( <i>Vigna unguiculata</i> (L.) Walp.) and several <i>Solanum</i> species."
407	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Causes allergies or is otherwise toxic to humans? Parts of plants may be poisonous if consumed] "The young, tender leaves of <i>Senna obtusifolia</i> are occasionally used as a vegetable throughout Africa and elsewhere and the plant is cultivated in home gardens for this purpose in several countries including Senegal, Ghana, Cameroon and Ethiopia. Older leaves, if eaten frequently or in large quantities, will cause diarrhoea." ... "The leaves are used as a laxative and as a poultice to treat skin infections, sores, ulcers and insect bites. The leaves are further used as an anthelmintic and against vomiting and stomach-ache. A decoction of the leaves is used to treat eye complaints in Senegal and Zanzibar." ... "Roasted seeds have been used as a substitute for coffee, leaves for a tea like infusion. The seeds, the macerated leaves and the roots provide black, blue, yellow and orange dyes. In Sudan the powdered and fermented leaves are used as a condiment. The stems are used to make mats and fences." ... "As the seeds are reputedly poisonous, cooking or roasting is deemed necessary to make them safe to eat."
408	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Creates a fire hazard in natural ecosystems? No evidence] "Fire does not seem to have been evaluated as a control for sicklepod and foetid senna in grazing systems. However, as noted previously, fire scarifies the seed and in Australia has caused mass emergences of seedlings following good rain (Anning et al. 1989). In natural areas which are strategically burnt as part of a management plan, fire may be a useful tool to control sicklepod invasion: In Dryander National Park, the open forest areas are heavily infested by sicklepod. Strategic burns over these areas were initially carried out every 2 years, but are now burnt on a 3 5 year cycle, and are considered to be a valuable tool for controlling sicklepod invasion by killing seedlings (B. Nolan, pers. comm. 1997). No information is available on the effects of pre-harvest cane burning on sicklepod infestations in cane areas."
409	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Is a shade tolerant plant at some stage of its life cycle? No] "Attempts to control sicklepod along the waterways involves the propagation and planting of rainforest tree species around the perimeter of infestations in an effort to prevent the spread of sicklepod and to eventually shade out the weed."
409	2001. Nice, G.R.W./Buehring, N.W./Shaw, D.R.. Sicklepod ( <i>Senna obtusifolia</i> ) Response to Shading, Soybean ( <i>Glycine max</i> ) Row Spacing, and Population in Three Management Systems. Weed Technology. 15(1): 155-162.	[Is a shade tolerant plant at some stage of its life cycle? No] "Therefore, shading induced physiological and morphological changes in sicklepod. Lower levels of shading induced an increase in sicklepod height. However, severe shading of 80 to 95% inhibited growth. This implies that the shade provided by the soybean canopy can be used as a sicklepod control method."
409	2011. Oppenheimer, H.. New Hawaiian plant records for 2009. Bishop Museum Occasional Papers. 110: 5-10.	[Is a shade tolerant plant at some stage of its life cycle? No] "It did not appear that Axis deer were browsing the plants, nor were plants observed in shady habitat directly adjacent."
410	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] "The plant grows on a variety of soil types and is usually an annual, although it can perennialize."
410	2008. Walker, E.R./Oliver, L.R.. Translocation and Absorption of Glyphosate in Flowering Sicklepod ( <i>Senna obtusifolia</i> ). Weed Science. 56(3): 338-343.	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] "...it grows well in soils ranging from pH 3.2 to 7.9, with pH 5.5 to 6.0 considered optimum, close to the optimum pH range of many crops (Creel et al. 1968)."
411	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Climbing or smothering growth habit? No] "Annual or perennial herb or shrub up to 2(-2.5) m tall."
412	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Forms dense thickets? Yes] "Sicklepod tends to grow in thickets, reducing the available grazing area in infested pastures and competing with other plants for light, water and nutrients."
412	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Forms dense thickets? Yes] "It grows in dense thickets, competing for light, water and nutrients and displacing native vegetation."

412	2011. Oppenheimer, H.. New Hawaiian plant records for 2009. Bishop Museum Occasional Papers. 110: 5-10.	[Forms dense thickets? Yes] "There were hundreds of plants scattered in dense patches along several hundred meters of roadside."
501	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Aquatic? No] "Sicklepod is dispersed by water (stream flow and floods),..." [Terrestrial weed that can be spread by water]
502	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Grass? No] Fabaceae
503	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Nitrogen fixing woody plant? No] "The species is not nitrogen-fixing due to a lack of nodulation"
504	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Annual or perennial herb or shrub up to 2(-2.5) m tall. Leaves alternate, imparinnate with 3 pairs of leaflets; stipules linear or filiform; petiole without gland, rachis with prominent gland between 1-2 lower pairs of leaflets; leaflets obovate, (1-)-1.5-5(-6) cm long, apex rounded or abruptly acuminate, mucronate. Inflorescence 1-2-flowered, with usually very short peduncle."
601	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Evidence of substantial reproductive failure in native habitat? No evidence, and unlikely given status as a worldwide weed] " <i>Senna obtusifolia</i> is considered a weed worldwide and an estimated 600,000 ha are infested in Queensland (Australia)."
602	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Produces viable seed? Yes] "The plant is a prolific seed producer, and seeds may remain viable in the soil for several years."
603	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Hybridizes naturally? No] "It is self-pollinating and interspecific crosses have not yielded viable seed."
604	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Self-compatible or apomictic? Yes] "It is self-pollinating and interspecific crosses have not yielded viable seed."
605	1988. Gottsberger, G./Silberbauer-Gottsberger, I.. Evolution of Flower Structures and Pollination in Neotropical Cassiinae (Caesalpinaceae) Species*). Phytion (Austria). 28: 293-320.	[Requires specialist pollinators? No evidence] "Poricidal anther dehiscence occurs in the majority of the species of the subtribe Cassiinae (Caesalpinaceae); it implies a constraint for pollination through pollen collecting female bees able to vibrate flowers." ... "In <i>Senna obtusifolia</i> (L.) IRWIN & BARNEBY (Syn. <i>Cassia obtusifolia</i> L.), a pantropical herb with small flowers, the stamens appear undifferentiated and are almost all of the same size. In this species the gynoeceum is strongly recurved, so that the stigma and the anther openings nearly contact each other (DELGADO SALINAS & SOUSA SANCHEZ 1977; Fig. 2)."
605	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Requires specialist pollinators? No. Self-pollinating] "Indeed, self-fertilisation is probably normal in <i>S. obtusifolia</i> as the flower is commonly fertilised in late bud, before the flower is open, when the style is curved inward to present the stigmatic cavity directly to the face of the precociously dehiscent anthers (Irwin and Barneby 1982)."
606	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Reproduction by vegetative fragmentation? No] "Spread of sicklepod is wholly by seeds."
607	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Minimum generative time (years)? 1+] "Annual or perennial herbs (1-)-3-12(-20) dm tall, sometimes somewhat woody toward base, foliage malodorous, roots black with yellow tips." [Potentially reaches maturity in 1 year]
607	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Minimum generative time (years) 1+] "Flowering begins in late summer and continues into early winter. If undisturbed, these plants act as annuals and die after seeds mature."
701	2002. Smith, N.M.. Weeds of the wet/dry tropics of Australia -a field guide. Environment Centre NT, Inc.,	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas) Yes] "Seed is dispersed in mud adhering to vehicles, machinery, animal hooves and fur or as a contaminant of hay, fodder and pasture seed."
702	2004. Grubben, G.J.H. (ed.). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Propagules dispersed intentionally by people? Yes] "The flowers are decorative and the plant is commonly planted as an ornamental near towns. In India the seeds are collected from the wild for the industrial extraction of gums (galactomannans) for the food industry."



703	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Propagules likely to disperse as a produce contaminant? Yes] "In cane areas it is also transported by cane bins on tramways and harvesters."
703	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Propagules likely to disperse as a produce contaminant? Yes] "A few seeds, eaten by livestock, may be voided undamaged away from the source and some may be spread as contaminants in agricultural produce."
703	2002. Smith, N.M.. Weeds of the wet/dry tropics of Australia -a field guide. Environment Centre NT, Inc.,	[Propagules likely to disperse as a produce contaminant? Yes] "Seed is dispersed in mud adhering to vehicles, machinery, animal hooves and fur or as a contaminant of hay, fodder and pasture seed."
704	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Propagules adapted to wind dispersal? No] "Sicklepod and foetid cassia have a dehiscent pod which can disperse seed up to 5 m from the plant. Some seed does remain in the pod after dehiscence and this drops close to the base of the plant. Long distance seed dispersal in nature is mostly by stream flow, water movements over the soil surface or in mud attached to the feet and fur of animals."
704	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Propagules adapted to wind dispersal? No] "Pods ascending, chartaceous, linear, compressed, 4-angled, usually outwardly curved or sometimes almost straight, attenuate at both ends, 6-18 cm long, 0.2-0.6 cm wide, tardily dehiscent by both sutures, the cavity with well-developed interseminal septa. Seeds brown and glossy, obliquely descending, compressed-rhomboid or irregular, sometimes subcylindrical in narrow fruit, 3.2-6 mm long, crackled with age, the areole 2.5-4.2 mm long"
705	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Propagules water dispersed? Yes] "Sicklepod is dispersed by water (stream flow and floods), in mud on machinery and stock, in mulch and by stock which ingest the pods."
705	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Propagules water dispersed? Yes] "They have no specific dispersal mechanism, so that movement away from the parent plant is mainly in waterflow over the soil surface, in mud sticking to animal hooves and fur, and to footwear, farm machinery and other vehicles."
706	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Propagules bird dispersed? No] "Pods ascending, chartaceous, linear, compressed, 4-angled, usually outwardly curved or sometimes almost straight, attenuate at both ends, 6-18 cm long, 0.2-0.6 cm wide, tardily dehiscent by both sutures, the cavity with well-developed interseminal septa. Seeds brown and glossy, obliquely descending, compressed-rhomboid or irregular, sometimes subcylindrical in narrow fruit, 3.2-6 mm long, crackled with age, the areole 2.5-4.2 mm long" [Not fleshy-fruited or arillate]
707	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Propagules dispersed by other animals (externally)? Yes] "They have no specific dispersal mechanism, so that movement away from the parent plant is mainly in waterflow over the soil surface, in mud sticking to animal hooves and fur, and to footwear, farm machinery and other vehicles."
708	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Propagules survive passage through the gut? Yes] "Cattle, horses (Anning et al. 1989) and goats (Lock 1996 pers. comm.) will nibble the pods of sicklepod and ingest the seed, some of which survive passage through the gut and are spread in the dung (Anning et al. 1989, Anon. 1989)."
708	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Propagules survive passage through the gut? Yes] "A few seeds, eaten by livestock, may be voided undamaged away from the source and some may be spread as contaminants in agricultural produce."
708	2002. Smith, N.M.. Weeds of the wet/dry tropics of Australia -a field guide. Environment Centre NT, Inc.,	[Propagules survive passage through the gut? Yes] "Seeds may be eaten by stock with mature seed germinating in the dung."
708	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules survive passage through the gut? Yes] "Seeds can remain viable for several years under field conditions, and some survive ingestion by livestock."
801	1989. Bozsa, R.C./Oliver, L.R./Driver, T.L.. Intraspecific and Interspecific Sicklepod ( <i>Cassia obtusifolia</i> ) Interference. Weed Science. 37(5): 670-673.	[Prolific seed production (>1000/m <sup>2</sup> )? Yes] "An important aspect of sicklepod interference is its ability to produce vast numbers of seeds even when growth is restricted. Sicklepod produced more than 1000 seeds per plant when spaced 30 cm apart and nearly 14 000 seeds per plant when spaced 90 cm apart"

801	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Prolific seed production (>1000/m <sup>2</sup> )? Yes] "A single sicklepod plant can produce up to 8000 seeds (Retzinger 1984, Hall and Vandiver 1996). Studies in the USA have shown that the number of seeds per pod depends on ecotype and the climate (year) and varied from 24-28 seeds per pod. The number of pods per plant also varies greatly, between 63 and 342. The average number of seed per plant varies from 5280-8520 for the highest yielding ecotypes with an average of 1500-1600 overall (Retzinger 1984). Such high production leads to high seed yields: up to 3000 kg/ha are recorded (Anning et al. 1989, Anon. 1989) and to large soil seed banks (300 kg ha <sup>-1</sup> ). The number of seeds per pod is less in foetid cassia than sicklepod (Singh 1968). Seeds are scattered from the pods as the pods dry and open (Anning et al. 1989)."
802	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "Sicklepod produces an abundance of seeds, many of which remain dormant for several years, building up large reserves in the soil."
802	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "The plant is a prolific seed producer, and seeds may remain viable in the soil for several years."
803	2003. Motooka, P./Castro, L./Nelson, D./Nagai, G./Ching, L.. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI <a href="http://www.ctahr.hawaii.edu/invweed/weedsHi.html">http://www.ctahr.hawaii.edu/invweed/weedsHi.html</a>	[Well controlled by herbicides? Yes] "Senna obtusifolia, another weedy senna, was sensitive to dicamba and triclopyr but not to MCPA."
803	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Well controlled by herbicides? Yes] "Effective herbicides include 2,4-D plus picloram, glyphosate, or dichloroprop. Seedlings are best sprayed before they set flowers."
804	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Slashing delays seeding, but does not kill the plant (unless blunt blades are used to shatter the stem) and may cause it to perenniate. Ploughing often leads to an increase in plant numbers as the seeds are scarified during ploughing."
804	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Plants which have been slashed or have survived herbicide treatment, often reshoot below the point of injury, flower, and perennate for another season."
805	1997. Mackey, AP./Miller, E.N./Palmer, W.A.. Sicklepod in Queensland ( <i>Senna obtusifolia</i> ). Pest Status Review Series. Land Protection, Department of Natural Resources and Mines, Qld	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Probably No in Hawaiian islands as well] "Biological control is not available, although field work to identify possible agents has been carried out."



## **Summary of Risk Traits**

### **High Risk / Undesirable Traits**

- Widely naturalized worldwide
- Thrives in tropical climates
- Serious weed of agriculture
- Weedy genus
- Potentially allelopathic
- Toxic to cattle
- Potentially toxic to people
- Host for pathogens
- Tolerates many soil conditions (and potentially able to exploit many different habitat types)
- Forms dense thickets & crowds out other vegetation
- Self-pollinating
- Can reach reproductive maturity in 1 year
- Prolific seed production
- Forms a persistent seed bank
- Seeds dispersed by water & inadvertently on equipment, animals and as a produce contaminant
- Tolerates and resprouts after cutting

### **Low Risk / Desirable Traits**

- Shade intolerant
- Used medicinally, and as a source of food (leaves) or as a coffee-substitute (roasted seeds)
- Not known to hybridize with other Senna species
- Will not spread vegetatively
- Herbicides may provide effective control