Key Words: Evaluate, Naturalized, Shrub, Commercial Crop, Hybridizes, Self-compatible

Family: ***Malvaceae***

Taxon: ***Gossypium barbadense***

Synonym: *Gossypium acuminatum Roxb. ex G. Don*
Gossypium brasiliense Macfad.
Gossypium evertum O. F. Cook & J. Hubb.
Gossypium guyanense var. braziliense Raf.
Gossypium peruvianum Cav.
Gossypium vitifolium Lam.

Common Name: Egyptian Cotton
American Pima cotton
Sea Island cotton
kidney cotton
long-staple cotto

Questionaire : current 20090513 **Assessor:** Chuck Chimera **Designation:** EVALUATE
Status: Assessor Approved **Data Entry Person:** Chuck Chimera **WRA Score** 5

101	**Is the species highly domesticated?**	**y=-3, n=0**	
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)**	**Intermediate**
203	**Broad climate suitability (environmental versatility)**	**y=1, n=0**	
204	**Native or naturalized in regions with tropical or subtropical climates**	**y=1, n=0**	**y**
205	**Does the species have a history of repeated introductions outside its natural range?**	**y=-2, ?=-1, n=0**	**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)**	
303	**Agricultural/forestry/horticultural weed**	**n=0, y = 2*multiplier (see Appendix 2)**	**n**
304	**Environmental weed**	**n=0, y = 2*multiplier (see Appendix 2)**	
305	**Congeneric weed**	**n=0, y = 1*multiplier (see Appendix 2)**	
401	**Produces spines, thorns or burrs**	**y=1, n=0**	**n**
402	**Allelopathic**	**y=1, n=0**	**n**
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**	
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**	**n**
408	**Creates a fire hazard in natural ecosystems**	**y=1, n=0**	**n**

409	**Is a shade tolerant plant at some stage of its life cycle**	**y=1, n=0**	**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**	**n**
501	**Aquatic**	**y=5, n=0**	**n**
502	**Grass**	**y=1, n=0**	**n**
503	**Nitrogen fixing woody plant**	**y=1, n=0**	**n**
504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**y=1, n=0**	**n**
601	**Evidence of substantial reproductive failure in native habitat**	**y=1, n=0**	**n**
602	**Produces viable seed**	**y=1, n=-1**	**y**
603	**Hybridizes naturally**	**y=1, n=-1**	**y**
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**	
702	**Propagules dispersed intentionally by people**	**y=1, n=-1**	**y**
703	**Propagules likely to disperse as a produce contaminant**	**y=1, n=-1**	**n**
704	**Propagules adapted to wind dispersal**	**y=1, n=-1**	**y**
705	**Propagules water dispersed**	**y=1, n=-1**	
706	**Propagules bird dispersed**	**y=1, n=-1**	
707	**Propagules dispersed by other animals (externally)**	**y=1, n=-1**	**n**
708	**Propagules survive passage through the gut**	**y=1, n=-1**	**y**
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	**n**
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y=1, n=-1**	**n**
803	**Well controlled by herbicides**	**y=-1, n=1**	**y**
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y=1, n=-1**	
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**y=-1, n=1**	

Designation: EVALUATE **WRA Score** 5

Supporting Data:

101	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Is the species highly domesticated? Potentially for certain cultivars] "Gossypium comprises about 50 species distributed in warm temperate to tropical zones. The origin of the genus is unknown, but 3 primary centres of diversity exist: in Australia, in north eastern Africa to Arabia, and in western central to southern Mexico. The 4 cultivated cottons of the world (the Old World diploids Gossypium arboreum and Gossypium herbaceum and the New World tetraploids Gossypium barbadense and Gossypium hirsutum) have been domesticated independently in different parts of the world. The taxonomy of Gossypium is complicated, partly due to the domestication of 4 distinct species and extensive interspecific hybridization. The literature is confusing and authors disagree on the identity of many species, subspecies, sections, varieties, forms, races and cultivars that have been distinguished. Currently the taxonomic system of P.A. Fryxell, with about 50 species grouped into 4 subgenera and 8 sections, is the most generally accepted one. It is mainly based on morphological and geographical data, but is confirmed by cytogenetic and molecular evidence. Cytological research has led to the recognition of 8 basic diploid 'genomic groups', designated A through G, plus K. In general, species within a genomic group can form fertile interspecific hybrids. Gossypium barbadense and Gossypium hirsutum belong to subgenus Karpas: tetraploid New World species with AD-genome, whereas Gossypium arboreum and Gossypium herbaceum are included in subgenus Gossypium: diploid Old World species with A-genome. Within Gossypium barbadense 2 varieties are distinguished:" [Long history of cultivation, and domestication, but the wild type is able to naturalize and persist in introduced environments]
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. 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] "Native to tropical America, but cultivated and sometimes spontaneous;"
202	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Quality of climate match data 1-Intermediate] "Gossypium barbadense probably originated in Peru as a cross between Gossypium herbaceum L. and Gossypium raimondii Ulbrich or Gossypium gossypioides (Ulbrich) Standley. It grows naturally on the coasts of Peru and Ecuador. It was domesticated in north-western South America." [Native range not well defined, but still suited to tropical climates]
203	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Broad climate suitability (environmental versatility)? Yes] "Gossypium barbadense requires a temperature of (15–)22–32(–38)°C and a rainfall of (500–)750–1250(–1500) mm during the growing season. It is able to germinate at lower temperatures than Gossypium hirsutum. A dry period is needed for fruit ripening." … "In Central Africa Gossypium barbadense is naturalised in savanna, abandoned villages, around houses and along rivers; in Rwanda and Burundi it occurs up to 1650 m altitude. In East Africa it occurs from sea-level up to 1200 m altitude in gardens and experimental plots and as an escape." [Elevation range exceeds 1000 m, demonstrating environmental versatility]
204	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.	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Native to tropical America, but cultivated and sometimes spontaneous; in Hawai'i naturalized in dry, disturbed areas, 10-200 m…"
205	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Does the species have a history of repeated introductions outside its natural range? Yes] "Cultivation spread over South and Central America and Gossypium barbadense has been introduced after 1492 into Africa, Asia and the Pacific Islands. It was introduced into the United States in 1785 where it was known as 'sea island cotton', as opposed to 'upland cotton' (Gossypium hirsutum L.). It is now widely cultivated in the warmer parts of the world and sometimes naturalized. It is the main cotton in Egypt and the West Indies, while other major producers include Sudan, Peru and the United States. In some parts of tropical Africa, e.g. in Côte d'Ivoire, it has to a large extent been replaced by the more productive Gossypium hirsutum."
301	1970. Stone, B.C.. The flora of Guam. Micronesica. 6: 1-659.	[Naturalized beyond native range? Possibly In Guam] "occasionally seen escaped from cultivation"

301	1997. Florence, J./Lorence, D.H.. Introduction to the Flora and Vegetation of the Marquesas Islands. Allertonia. 7(4): 226-237.	[Naturalized beyond native range? Yes] "Following human disturbance and grazing, secondary shrubland dominated by species of Malvaceae and Sterculiaceae and, eventually, secondary forest replaces the indigenous dry and semi-dry forest communities. Sidastrum paniculatum (L.) Fryxell, the dominant secondary species here, occurs with two other introduced Malvaceae, Abutilon grandifolium (Willd.) Sweet and Gossypium barbadense L., and two indigenous Sterculiaceae, Waltheria indica L. and W. tomentosa (J. R. & G. Forst.) H. St. John."
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] "… in Hawai'i naturalized in dry, disturbed areas, 10-200 m…"
301	2000. Liogier, A.H./ Martorell, L.F.. Flora of Puerto Rico and adjacent islands: a systematic synopsis. Second Edition Revised. La Editorial, UPR, San Juan, Puerto Rico	[Naturalized beyond native range? Yes] "Gossypium barbadense var. acuminatum" … "In was grounds and river banks, spontaneous after cultivation, Puerto Rico" … "Gossypium barbadense var. barbadense" … "In was grounds and thickets, spontaneous after cultivation, Puerto Rico; widely cultivated and naturalized in tropical and subtropical countries."
301	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Naturalized beyond native range? Yes] "Naturalized G. barbadense has been found in QLD and NT and data from the Australia Virtual Herbarium confirm that these specimens were collected primarily from the eastern coastal regions of QLD and northern areas of NT (Australia's Virtual Herbarium 2007)."
301	2011. Jaramillo Díaz, P./Guézou, A./Mauchamp, A./Tye, A.. CDF Checklist of Galapagos Flowering Plants. In: Bungartz, F. et al. (eds.). Charles Darwin Foundation Galapagos Species Checklist. Charles Darwin Foundation, Puerto Ayora, Galapagos http://www.dar	[Naturalized beyond native range? Possibly. No evidence from Galapagos] "Origin: Introduced, Cultivated."
302	2007. Randall, R.P.. Global Compendium of Weeds - Gossypium barbadense. http://www.hear.org/gcw/species/gossypium_barbadense/	[Garden/amenity/disturbance weed? Possibly] Reported as naturalized and/or a weed, but evidence of detrimental impacts is difficult to determine. Most references refer to its naturalization, without specification of negative impacts.
302	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Garden/amenity/disturbance weed? Possibly No] "As G. barbadense is not regarded as a problematic weed, it is probable that the herbarium specimens highlight the existence of occasional individuals, and or small ephemeral populations, rather than a significant weed problem."
303	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Agricultural/forestry/horticultural weed? No] "G. hirsutm and G. barbadense may occur as escapes from agriculture and/or as small populations of naturalised exotic species (Lazarides et al. 1997; Sindel 1997). Where such populations have established, they are not considered to threaten agricultural productivity or native biodiversity."
304	2007. Munster, P./Wieczorek, A.M.. Potential gene flow from agricultural crops to native plant relatives in the Hawaiian Islands. Agriculture, Ecosystems and Environment. 119(1-2): 1–10.	[Environmental weed? Potentially. Ecological impacts may be manifested in genetic contamination to native G. tomentosum plants] "G. tomentosum is reported to be cytogenetically similar to and equidistant from G. barbadense and G. hirsutum (DeJoode and Wendel, 1992). Ironically, although all the information suggests a threat to Hawaiian cotton from G. hirsutum, the only reported natural hybridization was between G. tomentosum and G. barbadense in western O'ahu (Stephens, 1964). Intermediacy was found in the hybrid with respect to pubescence, leaf nectarines, corolla colors, and petal spots. A population of hybrids (G. barbadense G. tomentosum) is known from the Nanakuli area (western O'ahu) (Morden, personal communication)." … "In the distribution analysis, it was that found many populations of both G. tomentosum and Kokia spp. fall into agricultural areas on the main islands of Hawai'i. Though their distribution is not extensive, the knowledge of the hybridization potential (G. tomentosum x G. barbadense) and their low population numbers place G. tomentosum and Kokia spp. in a very precarious position."
305	2007. Randall, R.P.. Global Compendium of Weeds - Index. http://www.hear.org/gcw/	[Congeneric weed? Potentially] Several Gossypium species are reported as weeds, but evidence of detrimental impacts is difficult to determine. Most species appear to be naturalized, without specification of negative impacts.
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] "Shrubs or annual subshrubs 1-2 (-3) m tall, glabrous to sparsely stellate pubescent. Leaf blades usually somewhat wider than long, 5 15 cm wide, cut usually beyond the middle into 3, 5 or 7 lobes, the lobes lanceolate to ovate, acuminate, midvein on lower surface with a basal gland, stipules 1-5 cm long."

402	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Allelopathic? No evidence] "Cotton is usually grown in rotation with other crops to control pests and soil-borne diseases. It may be intercropped with other annual crops, such as maize, sorghum and grain legumes. In southern Nigeria Gossypium barbadense is often grown in mixed cropping systems with yams, maize and cowpea. In Cameroon it can be found along paths and in medicinal gardens."
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] "Shrubs or annual subshrubs 1-2 (-3) m tall, glabrous to sparsely stellate pubescent."
404	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Unpalatable to grazing animals? No] "There is no indication, however, that these volunteers sponsor self-perpetuating feral populations. Typically, however, such volunteers are killed by roadside management practices and/or grazed by livestock, thereby limiting their potential to reproduce and become weedy."
405	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Toxic to animals? Potentially Yes. Seeds may be toxic] "Cotton (G. hirsutum and G. barbadense) tissue, particularly the seeds, can be toxic if ingested in excessive quantities because of the presence of anti-nutritional and toxic factors including gossypol and cyclopropenoid fatty acids (including dihydrosterculic, sterculic and malvalic acids."

406	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Host for recognized pests and pathogens? Yes] "Diseases are less important in cotton than pests. The most widespread diseases are bacterial blight, leaf spot, blackarm or boll rot caused by Xanthomonas axonopodis pv. malvacearum (synonym: Xanthomonas campestris pv. malvacearum), anthracnose caused by Glomerella gossypii (anamorph: Colletotrichum gossypii), Fusarium wilt caused by Fusarium oxysporum, and Verticillium wilt caused by Verticillium dahliae. Bacterial blight is controlled by growing cotton only once every 3 or more years on the same field, removing the harvest remains and seed treatment. Anthracnose can be controlled by the same measures, but resistant cultivars are not available. Gossypium barbadense cultivars with resistance against Fusarium wilt and Verticillium wilt are available. Cropping methods to control wilt diseases include crop rotation, sufficient K-fertilization and the control of nematodes. The most important virus diseases of cotton in tropical Africa are leaf curl, African cotton mosaic and cotton blue disease. Virus diseases are controlled by eliminating reservoir hosts and vectors, and by using tolerant or resistant cultivars. Cotton suffers from a wide spectrum of pests. Bollworms are among the most serious pests. They feed inside the bolls, damaging lint and seed and so causing considerable reduction in yield and quality. The main bollworms are American bollworm (Helicoverpa armigera), pink bollworm (Pectinophora gossypiella) and spiny bollworm (Earias spp.). Spiny bollworm, to which Gossypium arboreum and Gossypium barbadense seem less susceptible than Gossypium hirsutum, has a serious early effect of tipboring in the main stem leading to excessive formation of vegetative branches and delaying the setting of bolls, which makes them vulnerable to mid-season American bollworm and stainers. Resistance to bollworms has not been achieved to the desired extent, and their control has long relied heavily on insecticides. Leaf, stem and bud-sucking bugs can cause considerable damage. Jassids (Amrasca, Empoasca, Erythroneura, Jacobiella and Jacobisca spp.) are the first pests to appear, but a dense coating of long hairs on leaves and stems provides good protection. Whitefly (Bemisia tabaci) and cotton aphid (Aphis gossypii) are pests later in the season; the former is the vector of leaf curl and African cotton mosaic, the latter of cotton blue disease. Early sowing, weeding and harvesting and the use of short-season cultivars can reduce their damage. Cotton stainers (Dysdercus spp.) occur in all cotton growing countries. They pierce the green bolls and inject the fungus Nematospora gossypii, which causes yellow staining of the lint, resulting in lower quality. About 4 alternating sprays of organophosphates and pyrethroids can overcome this pest. Fairly effective preventive control can be obtained by strict phyto sanitation, early cropping of maize or sorghum followed by early ploughing and close planting of cotton using an early maturing cultivar. The boll weevil (Anthonomus grandis) is economically the most serious cotton pest in the United States. Close relatives of cotton, such as Abutilon species growing nearby are alternative hosts of cotton pests, especially stainers. Insect pests in cotton have been effectively controlled since 1945 with the use of insecticides. The repeated development of resistance of insect pests (especially the American bollworm) to new insecticides has in some countries led to excessive spraying, up to 15 sprays per season, killing all natural enemies. This may also induce outbreaks of previously minor pests, requiring additional spraying. To reduce the use of pesticides, the application of Integrated Pest Management (IPM) or Integrated Weed and Pest Management (IWPM) is advocated. Very early field preparation including repeated weeding, fertilizer application, early planting of jassid resistant cultivars, gapping, thinning and judicious use of pesticides on the basis of insect monitoring and damage thresholds, form the basis of interacting IWPM farming practices. Preventive weed control by ploughing or hoeing promptly after clearing the preceding crop stores moisture from unexpected storms in the subsoil which makes it possible to plant early. This encourages early fruiting well ahead of the main pest, American bollworm, and provides ample time for compensatory fruiting in case of early fruit damage. As insecticides against jassids are no longer needed they do not kill the natural enemies which control American bollworm in its vulnerable young stage. By the time the later pink bollworms, stainers and whitefly occur, the main crop will be safe. The most widely distributed economically important nematode in cotton is the root knot nematode (Meloidogyne spp.), whereas the reniform nematode (Rotylenchus spp.) is more restricted to tropical and subtropical environments. Gossypium arboreum, Gossypium herbaceum and Gossypium barbadense are less susceptible to the reniform nematode than Gossypium hirsutum. Nematodes can be controlled by rotation and chemicals, whereas cotton genotypes have been developed with some tolerance to the reniform nematode."

407	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Causes allergies or is otherwise toxic to humans? No] "Cotton pollen is not allergenic. It is relatively large, sticky and heavy, and not easily dispersed by wind (McGregor 1976; Moffett 1983), so the potential for cotton pollen to act as an airborne allergen is particularly low." [Seeds may be toxic to animals, but otherwise no evidence of human toxicity or inadvertent poisoning]
408	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Creates a fire hazard in natural ecosystems? No] "Weed competition and fire were also identified to further reduce the probability of permanent cotton populations establishing in the identified areas (Rogers et al. 2007)." [Fire eliminates cotton plants from an area. Not a fire adapted plant]
409	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Is a shade tolerant plant at some stage of its life cycle? No] "Gossypium barbadense is sensitive to frost and does not tolerate shading."
410	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Tolerates a wide range of soil conditions? Yes] "It can be grown on medium to deep, light to heavy, well-drained soils with a moderate fertility and a pH of (5.0–)5.2–7.2(–8.5)."
411	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.	[Climbing or smothering growth habit? No] "Shrubs or annual subshrubs 1-2 (-3) m tall, glabrous to sparsely stellate pubescent."
412	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.	Forms dense thickets? No evidence]
412	2000. Liogier, A.H./ Martorell, L.F.. Flora of Puerto Rico and adjacent islands: a systematic synopsis. Second Edition Revised. La Editorial, UPR, San Juan, Puerto Rico	[Forms dense thickets? No] "In was grounds and thickets, spontaneous after cultivation, Puerto Rico; widely cultivated and naturalized in tropical and subtropical countries." [No evidence that it forms monocultures, however]
412	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	Forms dense thickets? No evidence]
501	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.	[Aquatic? No] Terrestrial
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] Malvaceae
503	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.	[Nitrogen fixing woody plant? No] Malvaceae
504	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.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Shrubs or annual subshrubs 1-2 (-3) m tall, glabrous to sparsely stellate pubescent. Leaf blades usually somewhat wider than long, 5 15 cm wide, cut usually beyond the middle into 3, 5 or 7 lobes, the lobes lanceolate to ovate, acuminate, midvein on lower surface with a basal gland, stipules 1-5 cm long."
601	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Evidence of substantial reproductive failure in native habitat? No] No evidence, although native range not well known.
602	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 viable seed? Yes] "Capsules 3-celled, narrowly ovoid, tapering to an acute tip, (2.5-) 3-5 cm long, pitted black punctate. Seeds several per cell, distinct or connate, lint copious, white"

602	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Produces viable seed? Yes] "Cotton is propagated by seed. Seed saved from the previous harvest is rarely used, as the entire harvest is usually sold for ginning."
603	2002. Anonymous. The biology and ecology of cotton (Gossypium hirsutum) in Australia. Office of the Gene Technology Regulator, Canberra	[Hybridizes naturally? Yes, but may be limited] "Fertile progeny are also produced when G. hirsutum is cross-pollinated with G. barbadense (Brubaker et al. 1999a), thereby potentially providing another ready means by which G. hirsutum genes may be spread in the environment. The geographic isolation of naturalised G. barbadense from cultivated G. hirsutum poses a significant barrier to gene flow between these species in Australia."
603	2007. Munster, P./Wieczorek, A.M.. Potential gene flow from agricultural crops to native plant relatives in the Hawaiian Islands. Agriculture, Ecosystems and Environment. 119(1-2): 1–10.	[Hybridizes naturally? Yes] "G. tomentosum is reported to be cytogenetically similar to and equidistant from G. barbadense and G. hirsutum (DeJoode and Wendel, 1992). Ironically, although all the information suggests a threat to Hawaiian cotton from G. hirsutum, the only reported natural hybridization was between G. tomentosum and G. barbadense in western O'ahu (Stephens, 1964). Intermediacy was found in the hybrid with respect to pubescence, leaf nectarines, corolla colors, and petal spots. A population of hybrids (G. barbadense G. tomentosum) is known from the Nanakuli area (western O'ahu) (Morden, personal communication)." … "In the distribution analysis, it was that found many populations of both G. tomentosum and Kokia spp. fall into agricultural areas on the main islands of Hawai'i. Though their distribution is not extensive, the knowledge of the hybridization potential (G. tomentosum G. barbadense) and their low population numbers place G. tomentosum and Kokia spp. in a very precarious position."
603	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Hybridizes naturally? Yes] :Hybridisation can occur naturally between G. barbadense and G. hirsutum (Brubaker et al. 1999b)."
603	2010. Pleasants, J.M./Wendel, J.F.. Reproductive and Pollination Biology of the Endemic Hawaiian Cotton, Gossypium tomentosum (Malvaceae). Pacific Science. 64(1): 45-55.	[Hybridizes naturally? Presumably Yes] "Today, naturalized populations of G. barbadense can be found ''on all the main islands except Kahoolawe and Maui,'' and G. hirsutum is found ''at least sparingly naturalized at Haleiwa, Oahu and perhaps elsewhere'' (Bates 1990:876). This history of cultivation raises the possibility that historical gene flow has occurred between the introduced species and the Hawaiian endemic. This is suggested by our own morphological observations of floral and leaf characters of putatively introgressant accessions that we have grown in the greenhouse (J.F.W., pers. obs.) and by Stephens (1964), who reported hybridization between G. tomentosum and G. barbadense in western O'ahu."
604	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Self-compatible or apomictic? Yes] "Self-pollination is the predominant mating system, but visiting insects can cause considerable outcrossing (up to 40%)."
605	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.	[Requires specialist pollinators? No. Flowers not specialized] "Flowers solitary or in sympodial inflorescences, pedicels 1-4 cm long, with 3 subterminal, fringed nectaries; involucral bracts ovate, usually 40-50 (-65) mm long, lacerate, the teeth 5-17, acuminate from the base and separated by rounded sinuses; calyx usually truncate, 0.7-1 cm long; petals usually yellow with a basal maroon spot, fading pinkish purple, 5-8 cm long."
605	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Requires specialist pollinators? No. Insect-pollinated] "Cotton flowers mostly open near dawn and pollination normally occurs within a few hours. Self-pollination is the predominant mating system, but visiting insects can cause considerable outcrossing (up to 40%). The flowers turn pink in the afternoon and red by the following day. They start withering late on the second day and die on the third day. Flowering peaks at 3(–6) weeks after the onset and may continue for about 6 weeks."
606	2002. Anonymous. The biology and ecology of cotton (Gossypium hirsutum) in Australia. Office of the Gene Technology Regulator, Canberra	[Reproduction by vegetative fragmentation? No "As cotton does not generally reproduce vegetatively (Serdy et al. 1995), spread within the environment occurs by seed dispersal." [Similar for G. barbadense]

606	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Reproduction by vegetative fragmentation? No evidence of natural vegetative spread] "Cotton is propagated by seed." … "It is possible to propagate cotton vegetatively by cuttings, budding or grafting. In experiments with Gossypium barbadense it was found that the rooting ability of cuttings decreased with increasing age of the parent plant from 6 (100% rooting) to 18 weeks (10% rooting). Good results were obtained with cuttings with several internodes, taken from the monopodial, vegetative branches and from the upper half of the main shoot (with the apex removed), but cuttings from generative branches did not form roots. "
607	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Minimum generative time (years)? <1] "Cotton is normally a perennial plant with an indeterminate growth habit, but is usually grown as an annual, with the formation of nodes on the main stem stopped by fruit load, temperature, soil moisture, photoperiod, or a combination of these factors. The crop cycle is 120–220 days. Seedlings emerge 5–15(–30) days after sowing and the first true leaf unfolds 7–9 days later, but these processes vary with temperature. Upon germination, seedlings initiate a long taproot, which can reach a depth of more than 25 cm by the time the cotyledons unfold and may reach a depth of 3 m by mid-season. The plant remains unbranched for about 1 month. The shoot system is dimorphic, with the main axis and lower branches (emerging from axillary buds) being monopodial and vegetative, whereas the fruiting branches (emerging from extra axillary buds) are sympodial. Fruiting branches develop as primary branches higher on the main stem and as secondary branches on vegetative branches. Generally only one fruiting branch develops at each node, with 3–5 fruits per branch. In Gossypium barbadense the first fruiting branch appears at node 10–12 of the main stem, and 50–65 days after emergence the first visible flower buds appear as small, green, pyramidal structures, known as 'squares'." [Wild or naturalized plants may take longer than 1 year to reach reproductive maturity]
701	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Possibly] "…during harvesting some cotton seed may be lost from the plants into the fields. Some dispersal of cotton seed may occur in areas where cotton seed is stored. Seed is stored on farms in various ways (for example in sheds) that maintain its quality and protect it from animals and weathering thereby limiting dispersal. Wider dispersal of cotton seed may occur during transport, stock feeding, adverse weather conditions and animals…"
702	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Propagules dispersed intentionally by people? Yes] "Cotton will remain very important on a worldwide scale, because of its excellent fibre properties and low price. Although Gossypium barbadense yields high-quality fibre (longer and stronger than that of Gossypium hirsutum), the largest part of the world cotton production comes from Gossypium hirsutum, because Gossypium barbadense needs longer to mature than Gossypium hirsutum, gives lower yields and is more sensitive to suboptimal growing conditions. This situation is unlikely to change much, although it must be added that the distinction between the 2 species becomes more and more blurred as a result of natural and artificial hybridization and gene transfer."
703	2002. Eastick, R.. The Potential Weediness of Transgenic Cotton in Northern Australia. Technical Bulletin NO. 305. N.T. Department of Business, Industry and Resource Development, Darwin	[Propagules likely to disperse as a produce contaminant? No. Intentional dispersal via cattle feed] "Fuzzy seed (ginned) had the greatest potential for intentional spread as cattle feed introduced into non-cropping habitats, but had a low risk of unintentional escape as feed lots were physically restricted, although viable cottonseed can pass through the digestive tract of cattle."
704	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Propagules adapted to wind dispersal? Yes, but more likely dispersed by gravity] "The seeds remain attached to the placenta and are only separated by picking or by very strong rain or wind."
705	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Propagules water dispersed? Potentially] "Some seed from cotton plants may be dispersed from areas where the cotton is grown or harvested, or from areas used for stockfeed of GM cotton seed, during flooding or other extreme environmental conditions such as cyclones. Seed may also be washed into drains, creeks, rivers and sinkholes close by." …"…extended soaking of both G. barbadense and G. hirsutum seed in water generally reduces cotton seedling emergence and results in smaller seedlings (Buxton et al. 1977)."

705	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Propagules water dispersed? Potentially] "The seeds remain attached to the placenta and are only separated by picking or by very strong rain or wind."
706	2004. Francis, J.K. (ed.). Wildland Shrubs of the United States & its Territories: Thamnic Descriptions volume 1. Gen. Tech. Rep. IITF-GTR-26. USDA Forest Service Internation Institute of Tropical Forestry, San Juan, PR	[Propagules bird dispersed? Yes for G. hirsutum] "Birds also move seeds when they use cotton lint for nest building materials." [No evidence for G. barbadense, but theoretically possible]
706	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Propagules bird dispersed? Possibly No] "Similarly, there is no evidence of avian species transporting cotton seeds."
707	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Propagules dispersed by other animals (externally)? No evidence] "There are no reports of mammals, including rodents, feeding on mature cotton bolls or carrying seed cotton any great distance from the cotton fields."
708	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Propagules survive passage through the gut? Yes] "In addition to seed dispersal during feeding, a small percentage of cotton seed consumed by stock can pass through the digestive system intact and is able to germinate (Eastick 2002). G. barbadense seed is not digested as thoroughly as G. hirsutum and so more whole seed is likely to pass through into the faeces (Sullivan et al. 1993a, Sullivan et al. 1993b; Zinn 1995; Solomon et al. 2005). It has been estimated that 11% of fed G. barbadense cotton seed are excreted whole compared to 5.2% of the G. hirsutum seed that is fed to cattle 9Sullivan et al. 1993a), although other studies have indicated that as much as 347 g/day/cow of whole (Sullivan et al. 1993b) unlinted seed can be excreted 9Coppock et al. 1985)."
801	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Prolific seed production (>1000/m2)? No] "A seed cotton yield of up to 4 t/ha is possible under optimal conditions, but in practice it is seldom over 2.5 t/ha and the average world yield is about 2 t/ha. In most tropical African countries the yield is around 1 t/ha. Seed cotton of primitive cultivars yields 20–25% fibre after ginning, whereas good cultivars of upland cotton have a 'ginning-outturn' of at least 35% and sometimes over 40%. The yields of Gossypium barbadense are relatively low, compared to those of Gossypium hirsutum." [Unlikely to reach such high seed densities, even under cultivation]
802	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "In humid environments, seed left in the field will not usually survive until the next season (Jenkins 2003). The existence of a soil seed bank seems unlikely because dispersed seeds that do not germinate are rapidly weathered, leading to significant decreases in their viability (Halloin 1975; Woodstock et al. 1985)." … "Experiments with G. barbadense have shown no significant dormancy (His & Reeder 1953)."
802	2011. Todou, G./Konsala, S.. Gossypium barbadense L. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Evidence that a persistent propagule bank is formed (>1 yr)? Probably not under natural conditions unless in very dry areas] "Seeds lose their viability rapidly if their moisture content exceeds 10%, but seeds with a moisture content of 7% can be stored in sealed jars for up to 15 years. The 1000-seed weight of Gossypium barbadense is 50–100 g."
803	2002. Eastick, R.. The Potential Weediness of Transgenic Cotton in Northern Australia. Technical Bulletin NO. 305. N.T. Department of Business, Industry and Resource Development, Darwin	[Well controlled by herbicides? Yes] "Cultivated fields were not included since control of cotton volunteers in production areas is successfully managed through cultivation and herbicide application."
803	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Well controlled by herbicides? Yes] "Herbicides can be used to control seedling cotton volunteers. Glyphosate has been the most common herbicide used to control these volunteers…"
804	2008. Anonymous. The Biology of Gossypium hirsutum L. and Gossypium barbadense L. (cotton). Version 2. Office of the Gene Technology Regulator, Canberra	[Tolerates, or benefits from, mutilation, cultivation, or fire? Intolerant of Fire but may be able to resprout following cutting] "Weed competition and fire were also identified to further reduce the probability of permanent cotton populations establishing in the identified areas (Rogers et al. 2007)." [Fire eliminates cotton plants from an area] "Ratoon cotton is cotton that has regrown from left over root stock, either from volunteer cotton slashed earlier in the same season or from cotton grown in a previous season."

805	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.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown] "… in Hawai'i naturalized in dry, disturbed areas, 10-200 m…" [Established in Hawaiian Islands, but unknown if any natural pests or pathogens are limiting its spread]

Summary of Risk Traits

High Risk / Undesirable Traits

- Naturalized in the Hawaiian Islands
- Naturalized in Australia
- Thrives in tropical climates
- Seeds may be toxic to animals
- Tolerates many soil conditions (and potentially able to exploit many different habitat types)
- Host of pests and pathogens
- Capable of hybridization with other *Gossypium* species including *G. tomentosum*
- A facultative self-pollinator
- May reach reproductive maturity in less than 1 year
- Seeds dispersed accidentally along roads, by wind, possibly water and by passage through cattle, among other vectors
- May be able to resprout following cutting

Low Risk / Desirable Traits

- Despite ability to spread, evidence of negative impacts are generally not reported or unspecified
- Palatable
- Non-toxic foliage (although seeds may be toxic)
- Shade intolerant
- Important commercial crop
- Seeds apparently do not persist in the soil