

Taxon: <i>Paullinia yoco</i> R. E. Schult. & Killip	Family: Sapindaceae
Common Name(s): yoco yoko	Synonym(s): NA

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 14 Apr 2016
WRA Score: 3.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Tropical Liana, Caffeine Source, Unarmed, Bee-Pollinated, Bird-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	n
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
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)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		
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		
405	Toxic to animals	y=1, n=0	n
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	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
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)		
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	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	y
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)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Hernando Bermejo, J.E. & Leon, J. (eds.). (1994). <i>Neglected Crops: 1492 from a Different Perspective</i> . FAO, Rome, Italy	" <i>Paullinia yoco</i> , the other species used as a stimulant, is only known in the wild state and is distributed in a relatively small region along the Putumayo River on the frontier between Colombia and Peru."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

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
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 14 Apr 2016]	"Native: Southern America Western South America: Colombia; Ecuador; Peru - Loreto"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 14 Apr 2016]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Tropicos.org. 2016. Tropicos [Online Database]. Missouri Botanical Garden. http://www.tropicos.org/ . [Accessed 14 Apr 2016]	Collected from 122 m - 800 m elevation, & from 00°54'00"N - 04°55'00"S latitude. [Low elevation tropical latitudes]

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	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	"Central and Southern America."

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	Hanelt, P. (ed.). 2001. Mansfeld's Encyclopedia of Agricultural and Horticultural Crops, Volume 2. Springer-Verlag, Berlin, Heidelberg, New York	"Rio Putomayo area (bordering area of Colombia, Ecuador and Peru). Here formerly occasionally planted in gardens. In recent times apparently not more cultivated because of its slow growth."
	WRA Specialist. 2016. Personal Communication	Limited evidence of cultivation outside native range

Qsn #	Question	Answer
301	Naturalized beyond native range	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R. & Lorence, D.H. 2016. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm . [Accessed 14 Apr 2016]	No evidence

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

Qsn #	Question	Answer
303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

Qsn #	Question	Answer
304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
305	Congeneric weed	
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Four <i>Paullinia</i> species have been included in unpublished weed lists, but impacts are unspecified
401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	[No evidence] "Widely spreading liana, the robust scabro-lenticellate stems attaining 12 cm. in diameter, the younger branches pulverulent and with approximate stout tendrils, these becoming woody; leaves usually 5-foliolate to 3.5 (4.5) dm. long and nearly as wide, the sparsely puberulent rachis sulcate but emarginate; leaflets elliptic (upper obovate), all shortly and obtusely acuminate, entire, coriaceous, chartaceous, glabrous (except puberulent nerves), 1.5 to 2.5 dm. long, 8-11 cm. wide, dark green but lustrous, drying yellowish- brown beneath, clathrate-veined, the 7-9 nerves prominent; panicles solitary, sparsely pulverulent, 10-15 (25) cm. long, the rachis 3 mm. thick, axillary, racemiform, sometimes with a tendril"
402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown
403	Parasitic	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	"Widely spreading liana" [Sapindaceae. No evidence]
404	Unpalatable to grazing animals	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown
405	Toxic to animals	n

Qsn #	Question	Answer
	Source(s)	Notes
	Useful Tropical Plants Database. (2016). <i>Paullinia yoco</i> . http://tropical.theferns.info/viewtropical.php?id=Paullinia+yoco . [Accessed 14 Apr 2016]	"Known Hazards: None known"
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	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	"Caffeine-rich, narcotic and stimulant"
	Useful Tropical Plants Database. (2016). <i>Paullinia yoco</i> . http://tropical.theferns.info/viewtropical.php?id=Paullinia+yoco . [Accessed 14 Apr 2016]	"Known Hazards: None known"
	Correal, C., Zuluaga, G., Madrigal, L., Caicedo, S., Plotkin, M., & Kuhnlein, H. (2009). Ingano Traditional Food and Health: phase 1, 2004-2005. Indigenous Peoples' Food Systems: the Many Dimensions of Culture, Diversity and Environment for Nutrition and Health. United Nations Food and Agriculture Organization, Rome.	"Nutritional characteristics There is no available data on its nutritional structure, but its components classify it as a medicinal plant, since the main component is caffeine (12%), mineral matter and diverse alkaloids."
	Hanelt, P. (ed.). 2001. Mansfeld's Encyclopedia of Agricultural and Horticultural Crops, Volume 2. Springer-Verlag, Berlin, Heidelberg, New York	"The stem bark is scraped off and soaked in cold water. The extract also from twigs and branches is made into a bitter tasting, caffeine-rich, stimulating beverage to resist hunger and fatigue."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Hernando Bermejo, J.E. & Leon, J. (eds.). (1994). Neglected Crops: 1492 from a Different Perspective. FAO, Rome, Italy	[No evidence. Rainforest species] " <i>Paullinia yoco</i> , the other species used as a stimulant, is only known in the wild state and is distributed in a relatively small region along the Putumayo River on the frontier between Colombia and Peru."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Hawaiian Tropical Plant Nursery. 2016. Medicinal and Ethobotanical Plants. http://www.hawaiiantropicalplants.com/medicinal.html . [Accessed 14 Apr 2016]	"Young plants seem to prefer light shade. Slightly acidic soil high in organic matter."

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Hawaiian Tropical Plant Nursery. 2016. Medicinal and Ethobotanical Plants. http://www.hawaiiantropicalplants.com/medicinal.html . [Accessed 14 Apr 2016]	"Young plants seem to prefer light shade. Slightly acidic soil high in organic matter."

411	Climbing or smothering growth habit	y
	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	"Extensively climbing woody liana, stout"

412	Forms dense thickets	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	[Climbing] "Widely spreading liana"

501	Aquatic	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	[Terrestrial] "Widely spreading liana"

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 14 Apr 2016]	"Family: Sapindaceae Subfamily: Sapindoideae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 14 Apr 2016]	"Family: Sapindaceae Subfamily: Sapindoideae"

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	"Widely spreading liana, the robust scabro-lenticellate stems attaining 12 cm. in diameter, the younger branches pulverulent and with approximate stout tendrils, these becoming woody"

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Hernando Bermejo, J.E. & Leon, J. (eds.). (1994). Neglected Crops: 1492 from a Different Perspective. FAO, Rome, Italy	[No evidence] "Paullinia yoco, the other species used as a stimulant, is only known in the wild state and is distributed in a relatively small region along the Putumayo River on the frontier between Colombia and Peru."

602	Produces viable seed	y
	Source(s)	Notes
	Useful Tropical Plants Database. (2016). <i>Paullinia yoco</i> . http://tropical.theferns.info/viewtropical.php?id=Paullinia+yoco . [Accessed 14 Apr 2016]	"Propagation: Seed"

603	Hybridizes naturally	
	Source(s)	Notes
	Hernando Bermejo, J.E. & Leon, J. (eds.). (1994). Neglected Crops: 1492 from a Different Perspective. FAO, Rome, Italy	[Artificial hybridization may be possible in genus. Unknown if natural hybrids occur] "The production of hybrids, either through traditional methods or using genetic engineering techniques, will also be of great importance, especially in conjunction with the production of clonal material which allows more uniform treatment and management to be achieved."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Roubik, D.W. 1995. Pollination of cultivated plants in the tropics. FAO Services Bulletin 118. FAO, Rome, Italy	Appendix I ... <i>Paullinia yoco</i> ... Breed. Sys. = SC = self-compatible

Qsn #	Question	Answer
605	Requires specialist pollinators	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	"pedicels 3-8 mm. long, minutely hirtellous as the acuminate bracts; outer 2 sepals subcoriaceous, tomentulose without and ciliate as the larger membranous inner three; petals entire, obovate, minutely pilose within, 2.3 mm. long; filaments lanate; ovary globose, glabrous, the stigma deeply trifid"
	Roubik, D.W. 1995. Pollination of cultivated plants in the tropics. FAO Services Bulletin 118. FAO, Rome, Italy	Paullinia yoco - Pollinators = bee, Melipona

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Useful Tropical Plants Database. (2016). Paullinia yoco. http://tropical.theferns.info/viewtropical.php?id=Paullinia+yoco . [Accessed 14 Apr 2016]	"Propagation: Seed"

607	Minimum generative time (years)	
	Source(s)	Notes
	Hanelt, P. (ed.). 2001. Mansfeld's Encyclopedia of Agricultural and Horticultural Crops, Volume 2. Springer-Verlag, Berlin, Heidelberg, New York	" In recent times apparently not more cultivated because of its slow growth."
	Hawaiian Tropical Plant Nursery. 2016. Medicinal and Ethobotanical Plants. http://www.hawaiiantropicalplants.com/medicinal.html . [Accessed 14 Apr 2016]	"Very young plants are slow to establish and we lose about half of the seedlings. Growth becomes fast once they get to about 12 to 15 inches "
	Erickson, H. T., Correa, M. P. F., & Ricardo Escobar, J. (1984). Guaraná (<i>Paullinia cupana</i>) as a commercial crop in Brazilian Amazonia. <i>Economic Botany</i> , 38(3), 273-286	[Related species flowers at 18 months] "The juvenile stage persists about 1 yr. Some plants flower when 1 1/2 yr old, but 3-4 yr are required for commercially significant production."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	"fruits subdrupaceous, obliquely ovoid, 10-14 mm. long, 4-7 mm. wide, attenuate into stipe, red." [No evidence. Fruits & seeds lack means of external attachment]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Fruit Lover's Seed Co. 2016. Tropical Fruit Seed List. http://www.fruitlovers.com/seedlistUSA.html . [Accessed]	Seeds sold online

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes

Qsn #	Question	Answer
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	"fruits subdrupaceous, obliquely ovoid, 10-14 mm. long, 4-7 mm. wide, attenuate into stipe, red." [No evidence. Unlikely. Fruits & seeds are relatively large & unlikely to become a produce contaminant]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	"fruits subdrupaceous, obliquely ovoid, 10-14 mm. long, 4-7 mm. wide, attenuate into stipe, red."

705	Propagules water dispersed	
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	[Buoyancy of fruit unknown] "fruits subdrupaceous, obliquely ovoid, 10-14 mm. long, 4-7 mm. wide, attenuate into stipe, red."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	[Presumably Yes. Fleshy-fruited] "fruits subdrupaceous, obliquely ovoid, 10-14 mm. long, 4-7 mm. wide, attenuate into stipe, red."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	"fruits subdrupaceous, obliquely ovoid, 10-14 mm. long, 4-7 mm. wide, attenuate into stipe, red." [Internally dispersed. No means of external attachment]

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Macbride, J.F. 1956. Flora of Peru. Volume XIII, Part IIIA, Number 2. Field Museum of Natural History, Chicago	[Presumably Yes. Fleshy-fruited] "fruits subdrupaceous, obliquely ovoid, 10-14 mm. long, 4-7 mm. wide, attenuate into stipe, red."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Erickson, H. T., Correa, M. P. F., & Ricardo Escobar, J. (1984). Guaraná (<i>Paullinia cupana</i>) as a commercial crop in Brazilian Amazonia. <i>Economic Botany</i> , 38(3), 273-286	[Unknown for <i>P. yoco</i>] " <i>Paullinia cupana</i> ... Germination is hypogeous and requires 1-3 mo. Seeds lose viability rapidly if permitted to dry out."

Qsn #	Question	Answer
803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	Hernando Bermejo, J.E. & Leon, J. (eds.). (1994). Neglected Crops: 1492 from a Different Perspective. FAO, Rome, Italy	[Unknown. <i>Paullinia cupana</i> tolerates some pruning] "After the second year, pruning is carried out to remove old and diseased branches and those which 1lowered the previous year."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Shade tolerant
- Reproduces by seeds
- Seeds dispersed by birds & intentionally by people
- Limited ecological information may reduce accuracy of risk prediction

Low Risk Traits

- No reports of invasiveness or naturalization, but no evidence of widespread introduction outside native range
- Unarmed (no spines, thorns or burrs)
- Not reported to spread vegetatively