Taxon: Hibiscus acetosella Welw. ex Hiern **Family:** Malvaceae

Common Name(s): African rosemallow
cranberry hibiscus
false roselle
red-leaf hibiscus
red-leaved hibiscus

Synonym(s): Hibiscus eetveldeanus De Wild. & T.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 9 Oct 2020

WRA Score: 3.0 **Designation:** L **Rating:** Low Risk

Keywords: Annual to Perennial, Herb to Subshrub, Naturalized Elsewhere, Edible, Self-Fertile

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	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
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		
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		
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)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
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**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[Possible hybrid origin, but apparently not highly domesticated] "Hibiscus acetosella is an amphidiploid species possibly originating from hybridization between Hibiscus asper Hook.f. and Hibiscus surattensis L., most probably in the region of southern DR Congo-Angola-Zambia. The hybridization may have occurred as a result of cultivation. Hibiscus acetosella is cultivated, but also occurs under natural conditions, usually in ruderal habitats, where it may have become naturalized after escape from cultivation. It is a popular vegetable in Cameroon and DR Congo. The crop was introduced to South-East Asia and to Brazil. In Brazil, where it was probably used as food for slaves, it is now more popular than in Africa. Red flowered types with dark red leaves are mainly used as ornamentals and can be found throughout Africa as well as the tropics and subtropics of other continents"

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2020). 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, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 8 Oct 2020]	"Native Africa NORTHEAST TROPICAL AFRICA: Sudan EAST TROPICAL AFRICA: Tanzania, Uganda WEST-CENTRAL TROPICAL AFRICA: Cameroon, Democratic Republic of the Congo, Congo, Sao Tome and Principe WEST TROPICAL AFRICA: Côte D'Ivoire SOUTH TROPICAL AFRICA: Angola, Mozambique, Zambia, Zimbabwe WESTERN INDIAN OCEAN: Mauritius"

Qsn #	Question	Answer
202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 8 Oct 2020]	

203	**Broad climate suitability (environmental versatility)**	**n**
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"Grows in secondary regrowth after trampling by animals or after cultivation. Occurs mainly in low- and medium-altitude areas."
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"It is cultivated at low to medium altitudes, usually in high rainfall areas, and requires good drainage."
	Plants for a Future. (2020). Hibiscus acetosella. https://pfaf.org. [Accessed 8 Oct 2020]	"USDA hardiness - 9-11"

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	"Native Africa NORTHEAST TROPICAL AFRICA: Sudan EAST TROPICAL AFRICA: Tanzania, Uganda WEST-CENTRAL TROPICAL AFRICA: Cameroon, Democratic Republic of the Congo, Congo, Sao Tome and Principe WEST TROPICAL AFRICA: Côte D'Ivoire SOUTH TROPICAL AFRICA: Angola, Mozambique, Zambia, Zimbabwe WESTERN INDIAN OCEAN: Mauritius Cultivated REGION: Asia-Tropical MALESIA: Indonesia Southern America BRAZIL: Brazil Other (exact native range in Africa obscure)"
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

Qsn #	Question	Answer
205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Hibiscus acetosella is cultivated, but also occurs under natural conditions, usually in ruderal habitats, where it may have become naturalized after escape from cultivation. It is a popular vegetable in Cameroon and DR Congo. The crop was introduced to South-East Asia and to Brazil. In Brazil, where it was probably used as food for slaves, it is now more popular than in Africa. Red-flowered types with dark red leaves are mainly used as ornamentals and can be found throughout Africa as well as the tropics and subtropics of other continents."
	Fryxell, P. (1988). Malvaceae of Mexico. Systematic Botany Monographs, 25, 1-522	"Hibiscus acetosella is introduced from Africa and is occasionally seen in Mexican gardens. It flowers more or less throughout the year. Although I have seen this species in cultivation in many parts of Mexico, I have seen few Mexican specimens in herbaria. It is grown both as an ornamental and as a salad plant or vegetable. Green-leaved forms are known but evidently only the red-leaved forms are grown in Mexico."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Hibiscus acetosella is treated as an annual or short-lived perennial. It grows anywhere in Hawai'i except the oceanfront"
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/. [Accessed 8 Oct 2020]	"Hibiscus acetosella Welwitsch ex Hiern (Confirmed) Synonyms: Syn. Hibiscus eetveldeanus De Wildeman & T. Durand Common Names: Red-leaved hibiscus First Collected: 1957 Locations: Foster Botanical Garden (Confirmed) Harold L. Lyon Arboretum (Confirmed) Waimea Arboretum & Botanical Garden"

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"Collected from the wild, as an escape, but also cultivated as a vegetable in homegardens." [Possibly, but cultivation occurs within native range]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Escapee References: Global-N-85, Puerto Rico-CW-261, Global-C-659, Costa Rica-I-975, United States of America-N-101, United States of America-W-179, Costa Rica-N-872, Global-N-1059, Australia-Q-1134, Peru-N-1293, Global-CD-1611, Sao Tome and Principe-N-1805, Costa Rica-W-1977, Democratic Republic of the Congo-W-1977, Rwanda-W-1977."
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	[In SE Asia, occasionally found wild] "False roselle is of African origin and was possibly domesticated in Angola or Zaire. It is only known as a cultivated plant. It is well-distributed throughout tropical Africa and must have been introduced as a vegetable or as an ornamental plant into South-East Asia, occasionally found wild."

Qsn #	Question	Answer
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

302	Garden/amenity/disturbance weed	
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	[Disturbance adapted] "ECOLOGY: Grows in secondary regrowth after trampling by animals or after cultivation. Occurs mainly in low- and medium-altitude areas."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Possibly. Cited as a weed in several references, but negative impacts have not been corroborated] "References: Global-N-85, Puerto Rico-CW-261, Global-C-659, Costa Rica-I-975, United States of America-N-101, United States of America-W-179, Costa Rica-N-872, Global-N-1059, Australia-Q-1134,Peru-N-1293, Global-CD-1611, Sao Tome and Principe-N-1805, Costa Rica-W-1977, Democratic Republic of the Congo-W-1977, Rwanda-W-1977."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[No evidence] "References: Global-N-85, Puerto Rico-CW-261, Global-C-659, Costa Rica-I-975, United States of America-N-101, United States of America-W-179, Costa Rica-N-872, Global-N-1059, Australia-Q-1134,Peru-N-1293, Global-CD-1611, Sao Tome and Principe-N-1805, Costa Rica-W-1977, Democratic Republic of the Congo-W-1977, Rwanda-W-1977."

304	Environmental weed	n
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	[No evidence. Disturbance adapted] "Grows in secondary regrowth after trampling by animals or after cultivation."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[No evidence] "References: Global-N-85, Puerto Rico-CW-261, Global-C-659, Costa Rica-I-975, United States of America-N-101, United States of America-W-179, Costa Rica-N-872, Global-N-1059, Australia-Q-1134,Peru-N-1293, Global-CD-1611, Sao Tome and Principe-N-1805, Costa Rica-W-1977, Democratic Republic of the Congo-W-1977, Rwanda-W-1977."

305	Congeneric weed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Chachalis, D., Korres, N., & Khah, E. M. 2008. Factors affecting seed germination and emergence of Venice mallow (Hibiscus trionum). Weed Science, 56(4): 509-515	"Venice mallow is considered an emerging weed problem in many regions in the world in crops such as cotton (Gossypium hirsutum L.; Prostko et al. 1998), soybean [Glycine max (L.) Merr.], and corn (Zea mays L.; Westra et al. 1990)." ... "The species was on the list of weed shifts due to the widespread use of herbicide-tolerant crops (Knezevic and Cassman 2003). In Australia, the species is also known as bladder ketmia and has been referred to as a serious emerging weed problem."
	Hussey, B.M.J., Keighery, G. J., Dodd, J., Lloyd, S.G. & Cousens, R.D. 2007. Western Weeds. A Guide to the Weeds of Western Australia. The Weed Society of Westerr Australia, Victoria Park, WA	[Hibiscus trionum] "Found as a weed of disturbed and cultivated land in parts of the Kimberley, the Pilbara, and the southwest from Moora to Donnybrook."

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[No evidence] "Annual or perennial herb or subshrub up to 2(–2.5) m tall; stem glabrous to sparsely pubescent. Leaves alternate, simple; stipules very narrowly lanceolate to linear, up to 1.5 cm long; petiole 3–11 cm long; blade shallowly to deeply palmately 3–5-lobed but upper leaves sometimes undivided, up to 10 cm × 10 cm, margin crenate, glabrous or sparsely pubescent, palmately veined, with a distinct nectary at base of midrib. Flowers solitary in leaf axils, bisexual, regular, 5-merous; pedicel up to 1 cm long, articulate; epicalyx segments 8–10, bifurcate at apex, one fork lanceolate and spoon-shaped, the other linear, both c. 3 mm long; calyx campanulate, up to 2.5 cm long, lobes nearly glabrous; petals free, obovate, up to 5.5 cm × 3.5 cm, lemon-yellow with red-purple base or wine-red; stamens numerous, united into a column up to 2 cm long, red-purple; ovary superior, 5-celled, style with 5 branches. Fruit an ovoid capsule up to 2.5 cm long, almost glabrous to appressed-pubescent, many-seeded. Seeds reniform, c. 3 mm × 2.5 mm, dark brown. Seedling with epigeal germination; cotyledons rounded, up to 2 cm × 2 cm, leafy. "

402	Allelopathic	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Shinwari, M. I., Iida, O., Shinwari, M. I., & Fujii, Y. (2017). Evaluation of phytodiversity for allelopathic activity and application to minimize climate change impact: Japanese Medicinal Plants. Pakistan Journal of Botany, 49, 139-144	[Possibly. Allelopathic under laboratory conditions] "Climate change impact is ready to interfere in agro-ecosystems. Improvement of adaptations of crops to forthcoming climatic changes must be focused in research. In the present study, leaf liter of 160 medicinal plant samples (156 species) belonging to 134 genera and 74 families were collected from Research Center for Medicinal Plant Resources, Tanegashima, Japan and subjected to evaluation of their allelopathic effects using the Sandwich method. Lettuce (Lactuca sativa L.) was used as a test plant material in the bioassay because of its reliability for germination. Top ten medicinal plant species found with maximum inhibition activity were Melia azedarach (Meliaceae) followed by Tylophora tanakae (Ascepiadaceae), Cinchona sp. (Rubiaceae), Flueggea virosa (Phyllanthaceae), Hibiscus acetosella (Malvaceae), Justicia procumbens (Acanthaceae), Terminalia chebula (Combretaceae), Hibiscus syriacus (Malvaceae), Lycium chinense (Solanaceae) and Elaeocarpus japonicas (Elaeocarpaceae). Moreover, the presented results also showed minimum growth inhibition or maximum growth stimulation by Ligustrum japonicum (Oleaceae) followed by Vitex rotundifolia (Lamiaceae) and Alpnia intermedia (Zingiberaceae).These results may be utilized as benchmark information for further research on the elucidation of chemicals involved in the allelopathy in nature. The information obtained could also be helpful in the development of new and potent bioactive chemicals from natural products."

403	Parasitic	n
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Annual or perennial herb or subshrub up to 2(–2.5) m tall; stem glabrous to sparsely pubescent."

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Etsy. (2020). Cranberry Hibiscus - Hibiscus acetosella - Edible leaves and flowers - One Live Plant. https://www.etsy.com. [Accessed 8 Oct 2020]	"Cranberry hibiscus is a striking red leaved hibiscus that has edible leaves and flowers. Great for teas and salad greens. A good source of fodder for animals especially bunnies. It also is a brilliant landscaping plant delivering vibrant color in the garden."
	Clauss, M., et al. (2012). IOD in rhinos—nutrition group report: report from the nutrition working group of the international workshop on iron overload disorder in browsing rhinoceros (February 2011). Journal of Zoo and Wildlife Medicine, 43(3s), S108-S113	"Table 2. Potential varieties of browse consumed by browser rhinos." [Includes Hibiscus acetosella]

405	Toxic to animals	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Plants for a Future. (2020). Hibiscus acetosella. https://pfaf.org. [Accessed 8 Oct 2020]	"Known Hazards - None known"
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Hibiscus acetosella is highly resistant to root-knot nematodes and is therefore an excellent crop to be used after tomatoes or other solanaceous vegetables that are affected by nematodes."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"The foliage attracts Chinese rose beetles, which feed on and skeletonize the leaves at night. These attacks can be minimized by planting this hibiscus under a street lamp or other nocturnal light source, which deters the beetles."

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	"leaves eaten in small amount as a vegetable or salad"
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"USES: Food: Leaves are collected, chopped and wilted in the sun. Then they are washed, boiled and mixed with beans or peas. Simsim or groundnut paste may also be added and the dish served with a staple. It tastes bitter, has an attractive consistency and is used occasionally to thicken sauces and improve the consistency of a dish. Eaten in small amounts (Nyakyusa). Medicinal: Leaves are crushed and soaked in cold water and the infusion is used for washing babies who have body pains."

Qsn #	Question	Answer
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[No evidence. Edible and medicinal uses] "The young, somewhat fleshy leaves and shoots are used as a vegetable. Yellow-flowered types with green leaves are most popular for this purpose, but red-flowered types with dark red leaves are also eaten. The leaves are mucilaginous and more sour than the similar looking Hibiscus sabdariffa L. and are used as a cooked vegetable, sometimes with pounded peanuts added to improve the flavour. The red leaves remain reddish after cooking. In South America, people often use types with decorative pinkish-brown leaves in fresh salads and appreciate their special rather sour taste. The red flowers and possibly also the leaves are occasionally used to make a tea, somewhat similar to the use of the red calyces of Hibiscus sabdariffa L. The root is edible but insipid and fibrous. Pink- or red-flowered types are often grown as ornamental plants in gardens. Some people in Cameroon and DR Congo combine the use of Hibiscus acetosella as a vegetable with its use as a hedge to separate plots. In Angola an infusion of the leaves in water is used as post-fever tonic; it is also used as medicine to treat anaemia. In East Africa children with an aching body are washed in cold water to which some mashed Hibiscus acetosella leaves have been added. "

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[No evidence. Occurs in high rainfall areas] "Hibiscus acetosella occurs in abandoned fields and plantations, on waste ground near habitations, in marshes and forest clearings. It is cultivated at low to medium altitudes, usually in high rainfall areas, and requires good drainage."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"It can be fully exposed to the sun, but prefers some shade."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"It grows anywhere in Hawai'i except the oceanfront but thrives best in sites sheltered from strong winds on fertile, well-drained soils in full sun."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	"It grows on all kinds of soils, but requires good drainage."

Qsn #	Question	Answer
411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Annual or perennial herb or subshrub up to 2(–2.5) m tall; stem glabrous to sparsely pubescent."

Qsn #	Question	Answer
412	**Forms dense thickets**	**n**
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	"False roselle is generally encountered in home gardens, but also as an escape in waste places and on roadsides. Because of insufficient care, it usually remains small, sometimes hardly 15 cm tall."
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	[No evidence] "Grows in secondary regrowth after trampling by animals or after cultivation."
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[No evidence] "Hibiscus acetosella occurs in abandoned fields and plantations, on waste ground near habitations, in marshes and forest clearings."

Qsn #	Question	Answer
501	**Aquatic**	**n**
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[Terrestrial] "Hibiscus acetosella occurs in abandoned fields and plantations, on waste ground near habitations, in marshes and forest clearings. It is cultivated at low to medium altitudes, usually in high rainfall areas, and requires good drainage."

Qsn #	Question	Answer
502	**Grass**	**n**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 8 Oct 2020]	Genus: Hibiscus Family: Malvaceae Subfamily: Malvoideae Tribe: Hibisceae

Qsn #	Question	Answer
503	**Nitrogen fixing woody plant**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 8 Oct 2020]	Genus: Hibiscus Family: Malvaceae Subfamily: Malvoideae Tribe: Hibisceae

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Annual or perennial herb or subshrub up to 2(–2.5) m tall; stem glabrous to sparsely pubescent."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[No evidence] "Hibiscus acetosella is an amphidiploid species possibly originating from hybridization between Hibiscus asper Hook.f. and Hibiscus surattensis L., most probably in the region of southern DR Congo-Angola-Zambia. The hybridization may have occurred as a result of cultivation. Hibiscus acetosella is cultivated, but also occurs under natural conditions, usually in ruderal habitats, where it may have become naturalized after escape from cultivation. It is a popular vegetable in Cameroon and DR Congo. The crop was introduced to South-East Asia and to Brazil. In Brazil, where it was probably used as food for slaves, it is now more popular than in Africa. Red-flowered types with dark red leaves are mainly used as ornamentals and can be found throughout Africa as well as the tropics and subtropics of other continents."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Red-leaved hibiscus is propagated by seeds or cuttings."
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Vegetable types of Hibiscus acetosella are almost always propagated by seed, whereas the use of cuttings is a more common method of propagation for ornamental types. Market gardeners propagate Hibiscus acetosella in the same way as more common Hibiscus leaf crops by broadcasting the seed, but some farmers sow in lines. It may also be grown as an intercrop. When grown in home gardens, people usually establish a small nursery, from where they transplant seedlings."

Qsn #	Question	Answer
603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Kuwada, H. (1977). Interspecific Hybridization Between Hibiscus acetosella and H. radiatus: Studies on Interspecific and Intergeneric Hybridization in the Malvaceae XVI. Japanese Journal of Breeding, 27(4), 345-349	[Artificial hybrids possible] "Vigorous, comparatively high fertile F 1 hybrids were easily obtained from H. radiatus x H. acetosella, and they showed almost complete chromosome pairing, and gave rise to the vigorous fertile F 2 • Almost all characteristics of the hybrids were either intermediate between or similar to one of the parents. Apparently the parental species have similar genome constitutions and arc closely related."
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[Unknown if naturally hybridization occurs. Species of putative hybrid origin] "Hibiscus acetosella is an amphidiploid species possibly originating from hybridization between Hibiscus asper Hook.f. and Hibiscus surattensis L., most probably in the region of southern DR Congo-Angola-Zambia. The hybridization may have occurred as a result of cultivation."

604	**Self-compatible or apomictic**	**y**
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	"The flower structure favours self-pollination, but some outcrossing by insects may occur."
	Akpan, G. A. (2000). Cytogenetic characteristics and the breeding system in six Hibiscus species. Theoretical and Applied Genetics, 100(2), 315-318	[Hibiscus acetosella is an outbreeder, but capable of self-pollination] "Cytogenetic characteristics confirm that Hibiscus acetosella and Hibiscus cannabinus are outbreeders, while Hibiscus asper, Hibiscus physaloides, Hibiscus sabdariffa and Hibiscus surattensis have evolved into inbreeders. The inbreeding species appear to have coevolved a floral structure in which some anthers abut on the stigma prior to anthesis."
	Ault, J. R. (1987). Somaclonal Variation in Hibiscus Acetosella Welw. Ex Hiern: Altered Fertility and Floral Ontogeny. PhD Dissertation. Louisiana State University, Baton Rouge, LA	[Wild type plants are self-fertile] "A study was undertaken to examine fecundity and floral ontogeny in wild type (WT) and tissue culture-derived (TC) plants of Hibiscus acetosella Welw. ex Hiern. Twenty-eight plants regenerated in vitro from somatic embryos were outplanted and established in the greenhouse, as were three WT plants from seed. The TC and WT plants were self-pollinated. Nine of the TC plants were self-fertile but exhibited a reduction in fruit set and seed set when compared to WT. Days to maturity for fertile fruit varied significantly among TC plants. There was no correlation of days to maturity and number of seed set. Days to abortion of non-fertile fruit varied significantly among TC plants. Data suggested both pre- and post-fertilization, self-incompatibility barriers were present in the TC plants. Comparison of days to abortion for self-pollinated fruit and days to abortion for emasculated flowers indicated that pre-fertilization barriers to fertility occurred within eight to ten days of pollination."

605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Tropical Plants Database, Ken Fern. (2020). Hibiscus acetosella. http://tropical.theferns.info/viewtropical.php?id=Hibiscus+acetosella. [Accessed 8 Oct 2020]	"Pollinators Insects"
	Plants for a Future. (2020). Hibiscus acetosella. https://pfaf.org. [Accessed 8 Oct 2020]	"The species is hermaphrodite (has both male and female organs) and is pollinated by Insects."

606	Reproduction by vegetative fragmentation	n
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Vegetable types of Hibiscus acetosella are almost always propagated by seed, whereas the use of cuttings is a more common method of propagation for ornamental types."

607	Minimum generative time (years)	1
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Annual or perennial herb or subshrub up to 2(–2.5) m tall"
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Hibiscus acetosella is treated as an annual or short-lived perennial."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	[Fruit & seeds lack means of external attachment, but occurrence along roadsides suggest it may be dispersed inadvertently with human activity along roads] "False roselle is generally encountered in home gardens, but also as an escape in waste places and on roadsides."
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[Fruits and seeds lack means of attachment, but as a plant of abandoned fields, it may be dispersed inadvertently with soil movement related to cultivation] "Fruit an ovoid capsule up to 2.5 cm long, almost glabrous to appressed-pubescent, many-seeded. Seeds reniform, c. 3 mm × 2.5 mm, dark brown." … "Hibiscus acetosella occurs in abandoned fields and plantations, on waste ground near habitations, in marshes and forest clearings."

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Hibiscus acetosella is cultivated, but also occurs under natural conditions, usually in ruderal habitats, where it may have become naturalized after escape from cultivation. It is a popular vegetable in Cameroon and DR Congo. The crop was introduced to South-East Asia and to Brazil. In Brazil, where it was probably used as food for slaves, it is now more popular than in Africa."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Hibiscus acetosella is treated as an annual or short-lived perennial. It grows anywhere in Hawai'i except the oceanfront"

703	**Propagules likely to disperse as a produce contaminant**	
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	[Occurs in abandoned fields, but also cultivated. Could possibly be dispersed as a seed contaminant if new crops are cultivated in abandoned fields. Direct evidence is lacking] "Hibiscus acetosella occurs in abandoned fields and plantations, on waste ground near habitations, in marshes and forest clearings."

704	**Propagules adapted to wind dispersal**	**n**
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	[No evidence, although wind may aid dispersal of seeds that dehisce from capsules] "Fruit an ovoid capsule, 1-2.5 cm x 1-1.5 cm, very acute, densely tuberculate, hispid, red, many-seeded. Seed reniform to globular, 3-5 mm in diameter, dark brown when ripe, verruculose."

705	**Propagules water dispersed**	**n**
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	"False roselle is generally encountered in home gardens, but also as an escape in waste places and on roadsides." [Not a riparian species]

706	**Propagules bird dispersed**	**n**
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	"Fruit an ovoid capsule, 1-2.5 cm x 1-1.5 cm, very acute, densely tuberculate, hispid, red, many-seeded. Seed reniform to globular, 3-5 mm in diameter, dark brown when ripe, verruculose."

Qsn #	Question	Answer
707	**Propagules dispersed by other animals (externally)**	**n**
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	[No adaptations for external dispersal] "Fruit an ovoid capsule, 1-2.5 cm x 1-1.5 cm, very acute, densely tuberculate, hispid, red, many-seeded. Seed reniform to globular, 3-5 mm in diameter, dark brown when ripe, verruculose."

708	Propagules survive passage through the gut	n
	Source(s)	**Notes**
	Siemonsma, J. S. & Piluek, K. (Eds.). (1993). Plant Resources of South-East Asia. No. 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands	[No adaptations for frugivory, & unlikely to be internally dispersed] "Fruit an ovoid capsule, 1-2.5 cm x 1-1.5 cm, very acute, densely tuberculate, hispid, red, many-seeded. Seed reniform to globular, 3-5 mm in diameter, dark brown when ripe, verruculose."

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**
	Schippers, R.R. (2004). Hibiscus acetosella Welw. ex Hiern. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 8 Oct 2020]	"Fruit an ovoid capsule up to 2.5 cm long, almost glabrous to appressed-pubescent, many-seeded. Seeds reniform, c. 3 mm × 2.5 mm, dark brown."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"Seeds are collected and stored for planting next season."
	Walters, C., Wheeler, L. M., & Grotenhuis, J. M. (2005). Longevity of seeds stored in a genebank: species characteristics. Seed Science Research, 15(01), 1-20	[Hibiscus acetosella seeds retain 76% viability after 39.5 years of storage] "Table 1. Storage performance of seeds in the USDA National Plant Germplasm System (NPGS) collection. The study includes accessions that were harvested between 1934 and 1975 and had initial germination percentages greater than 75% (except where indicated). Seeds were initially stored at 5°C, but were transferred to 2188C in 1978. Data for most species reflect storage for 24– 26 years at -18°C. Initial and final germination values are averages calculated within 1 year of harvest and after the indicated storage time, respectively. Time courses were drawn for each species as shown in Fig. 2. Coefficients calculated from the Avramicurve fitting routine (see Methods section) were used to calculate the time for germination to decrease from the initial value to 50%, or to half of the initial germination for species with initial germination ,70%. Symbols by family names are used in Figs 5–8. Letters in the family column adjacent to Gossypium species indicate the genome type"

Qsn #	Question	Answer
803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	Kamble, S. I. 2008. Effect of spray application of glyphosate on morphological characters of Hibiscus cannabinus Linn. Biosciences, Biotechnology Research Asia 5(2): 823-828	[Would likely be effective on Hibiscus acetosella] "In present study, the herbicidal activities of glyphosate on Hibiscus cannabinus Linn. have been studied. The morphological responses might produce some light on the manner by which this compound affected on plants. The plants were sprayed with aqueous solution of different concentrations of herbicide from 100 to 5000 ppm. Glyphosate was efficient in killing the weed. The lethal dose of glyphosate was 1200 ppm."
	WRA Specialist. (2020). Personal Communication	Herbicides used to control similar species would likely be effective if necessary.

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y**
	Source(s)	**Notes**
	Clay, H.F., Hubbard, J.C. & Golt, R. (1987). The Hawaii Garden: Tropical Shrubs. University of Hawaii Press, Honolulu, HI	[Tolerates heavy pruning] "Prune to remove dead or damaged branches; may be pruned heavily to induce new growth and flowering; weak stems and branches should be removed."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"The foliage attracts Chinese rose beetles, which feed on and skeletonize the leaves at night. These attacks can be minimized by planting this hibiscus under a street lamp or other nocturnal light source, which deters the beetles."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Grows, and capable of spreading in regions with tropical climates
• Naturalized or escaped from cultivation in SE Asia (no evidence in Hawaiian Islands to date)
• Other species have become invasive
• Tolerates many soil types
• Reproduces by seeds and cuttings
• Self-fertile
• Capable of reaching maturity in one year or more
• Seeds dispersed by humans (intentionally and possibly unintentionally)
• Seeds able to be stored for extended periods; May form a persistent seed bank
• Tolerates and resprouts after heavy pruning

Low Risk Traits
• Despite some references of weediness, no negative impacts have been documented where cultivated
• Unarmed (no spines, thorns, or burrs)
• Foliage palatable to animals and people
• Not reported to spread vegetatively
• Herbicides provide effective control of Hibiscus species if needed

Second Screening Results for Herb or Low Stature Shrubby Life Form

(A) Reported as a weed of cultivated lands?> No. Colonizes abandoned fields, but not reported to negatively impact cultivated lands
(B) Unpalatable to grazers or known to form dense stands?> No. Palatable to animals. Not known to form dense stands
Outcome = Accept (Low Risk)