

**Taxon:** *Syzygium syzygioides* (Miq.) Merr. & L.M.Perry

**Family:** Myrtaceae

**Common Name(s):** kelat hitam

**Synonym(s):** *Eugenia pseudosyzygioides*  
*Eugenia syzygioides*  
*Jambosa syzygioides*  
*Syzygium nelitricarpum*

**Assessor:** Chuck Chimera

**Status:** Assessor Approved

**End Date:** 27 Nov 2018

**WRA Score:** 6.0

**Designation:** EVALUATE

**Rating:** Evaluate

**Keywords:** Tropical Tree, Naturalized, Shade-Tolerant, Bird-Dispersed, Recalcitrant Seeds

| 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   | y      |
| 204   | Native or naturalized in regions with tropical or subtropical climates  | y=1, n=0   | y      |
| 205   | Does the species have a history of repeated introductions outside its natural range?  | y=-2, ?=-1, n=0                                    | n      |
| 301   | Naturalized beyond native range   | y = 1*multiplier (see Appendix 2), n= question 205 | y      |
| 302   | Garden/amenity/disturbance weed   | n=0, y = 1*multiplier (see Appendix 2)             | n      |
| 303   | Agricultural/forestry/horticultural weed  | n=0, y = 2*multiplier (see Appendix 2)             | 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  |  |        |
| 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   |  |        |

| Qsn # | Question   | Answer Option | Answer |
|-------|--|---------------|--------|
| 409   | Is a shade tolerant plant at some stage of its life cycle                                      | y=1, n=0      | y      |
| 410   | Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)   |               |        |
| 411   | Climbing or smothering growth habit  | y=1, n=0      | n      |
| 412   | Forms dense thickets   |               |        |
| 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   |               |        |
| 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)   |               |        |
| 708   | Propagules survive passage through the gut   | y=1, n=-1     | y      |
| 801   | Prolific seed production (>1000/m <sup>2</sup> )   |               |        |
| 802   | Evidence that a persistent propagule bank is formed (>1 yr)                                    | y=1, n=-1     | n      |
| 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   |
|       | Henderson, M. R. (1949). The genus Eugenia (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. | "Common in the lowlands from Langkawi and Trengganu to Singapore, chiefly in secondary growth, and often on rocky and sandy seashores. Distrib: Burma, Assam, Siam, Andamans, Indo-China, Malaysia." [No evidence of domestication throughout native range] |

|     |   |       |
|-----|---|-------|
| 102 | Has the species become naturalized where grown? |       |
|     | Source(s)                                       | Notes |
|     | WRA Specialist. 2018. Personal Communication    | NA    |

|     |  |       |
|-----|--|-------|
| 103 | Does the species have weedy races?           |       |
|     | Source(s)                                    | Notes |
|     | WRA Specialist. 2018. 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  |
|     | Henderson, M. R. (1949). The genus Eugenia (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp.                            | "Distrib: Burma, Assam, Siam, Andamans, Indo-China, Malaysia." |

|     |  |       |
|-----|--|-------|
| 202 | Quality of climate match data  | High  |
|     | Source(s)  | Notes |
|     | Henderson, M. R. (1949). The genus Eugenia (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. |       |

| Qsn # | Question   | Answer  |
|-------|--|---|
| 203   | <b>Broad climate suitability (environmental versatility)</b>   | <b>y</b>  |
|       | <b>Source(s)</b>   | <b>Notes</b>  |
|       | Lack, A. J., & Kevan, P. G. (1984). On the reproductive biology of a canopy tree, <i>Syzygium syzygioides</i> (Myrtaceae), in a rain forest in Sulawesi, Indonesia. <i>Biotropica</i> , 16(1): 31-36 | [Found up to 1500 m. Elevation range exceeds 1000 m, demonstrating environmental versatility] " <i>Syzygium syzygioides</i> is distributed through the islands of Java, Sumatra, Borneo and Sulawesi to an altitude of 1500 m. This species is very common in lowland forests in the study area. Sulawesi is an island of great biogeographical interest (Wallace 1892, Carlquist 1974) lying just off the Sunda shelf about 80 km from Borneo at its 1 Received 6 December 1982, revised 26 April 1983, accepted 5 May 1983. nearest point." |
|       | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. <i>The Garden's Bulletin Singapore</i> , Vol. XII, Part 1. 293 pp.  | [Lowland tropics] "Common in the lowlands from Langkawi and Trengganu to Singapore, chiefly in secondary growth, and often on rocky and sandy seashores. Distrib: Burma, Assam, Siam, Andamans, Indo-China, Malaysia."  |

| 204 | <b>Native or naturalized in regions with tropical or subtropical climates</b>   | <b>y</b>  |
|-----|---|---|
|     | <b>Source(s)</b>  | <b>Notes</b>  |
|     | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. <i>The Garden's Bulletin Singapore</i> , Vol. XII, Part 1. 293 pp.                                       | "Distrib: Burma, Assam, Siam, Andamans, Indo-China, Malaysia."  |
|     | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oahu. <i>Bishop Museum Occasional Papers</i> 87: 3-18 | "This tree, native to tropical Asia, was first planted in 1940. It is characterized by ellipticoblong or oblong-lanceolate leaves 4–10 cm long and 1.5–5.5 cm wide; white flowers with reddish calyces ca. 4 mm long; and globose, or depressed-globose fruit to 12 mm in diameter, dark red or purplish black when ripe (Lemmens et al. 1995: 471). Records indicate that six trees were planted, and several of these planted trees are known to have died. Nevertheless, dozens of large saplings and mature trees were found in Haukulu, mainly within 100 m of the original plantings. The naturalized plants are spreading into unmanaged areas consisting of <i>Ardisia elliptica</i> and <i>Psidium cattleianum</i> forest. The seeds are probably dispersed by birds, but the pattern of spread suggests that an efficient disperser is not present in Mānoa Valley. Material examined: OAHU: Edge of trail in <i>Psidium cattleianum</i> forest, upper Haukulu, Lyon Arboretum, 3 Mar 2005, C. Daehler 1089 (BISH); 5-m tall, unplanted tree in upper Haukulu growing among <i>Psidium cattleianum</i> , Mānoa Valley, 14 Jun 2005, C. Daehler 1312 (HAW)." |

| 205 | <b>Does the species have a history of repeated introductions outside its natural range?</b> | <b>n</b>   |
|-----|---|--|
|     | <b>Source(s)</b>  | <b>Notes</b>   |
|     | WRA Specialist. 2018. Personal Communication  | No evidence of widespread introduction outside native range. |

| 301 | <b>Naturalized beyond native range</b> | <b>y</b>     |
|-----|--|--------------|
|     | <b>Source(s)</b>                       | <b>Notes</b> |

| Qsn # | Question  | Answer  |
|-------|---|---|
|       | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, O'ahu. Bishop Museum Occasional Papers 87: 3-18 | "This tree, native to tropical Asia, was first planted in 1940. It is characterized by ellipticoblong or oblong-lanceolate leaves 4–10 cm long and 1.5–5.5 cm wide; white flowers with reddish calyces ca. 4 mm long; and globose, or depressed-globose fruit to 12 mm in diameter, dark red or purplish black when ripe (Lemmens et al. 1995: 471). Records indicate that six trees were planted, and several of these planted trees are known to have died. Nevertheless, dozens of large saplings and mature trees were found in Haukulu, mainly within 100 m of the original plantings. The naturalized plants are spreading into unmanaged areas consisting of <i>Ardisia elliptica</i> and <i>Psidium cattleianum</i> forest. The seeds are probably dispersed by birds, but the pattern of spread suggests that an efficient disperser is not present in Mānoa Valley. Material examined: OAHU: Edge of trail in <i>Psidium cattleianum</i> forest, upper Haukulu, Lyon Arboretum, 3 Mar 2005, C. Daehler 1089 (BISH); 5-m tall, unplanted tree in upper Haukulu growing among <i>Psidium cattleianum</i> , Mānoa Valley, 14 Jun 2005, C. Daehler 1312 (HAW)." |

| 302 | Garden/amenity/disturbance weed   | n   |
|-----|---|---|
|     | Source(s)   | Notes   |
|     | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, O'ahu. Bishop Museum Occasional Papers 87: 3-18 | [Spreading, but no impacts documented] "The naturalized plants are spreading into unmanaged areas consisting of <i>Ardisia elliptica</i> and <i>Psidium cattleianum</i> forest. The seeds are probably dispersed by birds, but the pattern of spread suggests that an efficient disperser is not present in Mānoa Valley" |
|     | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall   | No evidence to date   |

| 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 |

| 304 | Environmental weed  | n  |
|-----|---|--|
|     | Source(s)   | Notes  |
|     | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, O'ahu. Bishop Museum Occasional Papers 87: 3-18 | [No evidence in Hawaiian Islands] "The naturalized plants are spreading into unmanaged areas consisting of <i>Ardisia elliptica</i> and <i>Psidium cattleianum</i> forest. The seeds are probably dispersed by birds, but the pattern of spread suggests that an efficient disperser is not present in Mānoa Valley" |
|     | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall   | No evidence to date  |

| 305 | Congeneric weed | y     |
|-----|-----------------|-------|
|     | Source(s)       | Notes |

| Qsn # | Question  | Answer  |
|-------|---|---|
|       | Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK | [Taxonomy unresolved, but both Eugenia and Syzygium genera have species that are invasive] "Eugenia uniflora: forms dense thickets that displace native plants and prevents their regeneration" ... "Syzygium jambos: It is invasive because it forms dense impenetrable thickets that expand rapidly. The dense canopies shade out almost all native species and lead to monospecific stands. The tree resprouts vigorously after damage." |

| 401 | Produces spines, thorns or burrs   | n   |
|-----|--|---|
|     | Source(s)  | Notes   |
|     | Henderson, M. R. (1949). The genus Eugenia (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. | [No evidence] "A small to large tree; bark dull reddish brown or greyish brown, fibrous, in young trees nearly smooth, becoming longitudinally fissured, shaggy and flaky. Twigs slender, terete, drying greyish to reddish brown, bark smooth or somewhat flaky. Leaves thinly coriaceous, lanceolate or oblong lanceolate to elliptic or ovate elliptic, apex acuminate or caudate acuminate, base cuneate, from c. 4-10 cm long and 1.5-5.5 cm broad, upper surface drying reddish brown to nearly black, more or less polished, minutely punctate, lower surface slightly paler, dull, eglandular; midrib narrowly impressed above, elevated below; primary nerves numerous (to about 25 pairs) and close together, slightly ascending and running straight or curving up rather irregularly to an almost straight intramarginal nerve c. 1 mm or less from leaf margin, raised, fine and distinct below as are the secondaries and close reticulations which are hardly if at all distinguishable from primaries, less distinct above, sometimes raised, sometimes slender, channeled above, less than 1 cm long." |

| 402 | Allelopathic   | n   |
|-----|--|---|
|     | Source(s)  | Notes   |
|     | Singh, H. P., Batish, D. R., & Kohli, R. K. (2003). Allelopathic interactions and allelochemicals: new possibilities for sustainable weed management. Critical Reviews in Plant Sciences, 22(3-4): 239-311 | [Unknown. Other Syzygium species possess allelopathic chemicals] "Tworkoski (2002) tested 25 plant-derived essential oils for herbicidal activity and found that those from red thyme ( <i>Thymus vulgaris</i> L.), summer savory ( <i>Satureja hortensis</i> L.), cinnamon ( <i>Cinnamomum zeylanicum</i> Blume), and clove ( <i>Syzygium aromaticum</i> [L.] Merr. et Perry) were most toxic, causing cell death due to rapid electrolyte leakage on the detached leaves of dandelion ( <i>Taraxacum officinale</i> Weber in Wiggers). Further, the application of 5 to 10% of these essential oils in combination with adjuvants caused the death of common lambsquarters, common ragweed, and johnsongrass within 1 day." |

| 403 | Parasitic  | n  |
|-----|--|--|
|     | Source(s)  | Notes  |
|     | Henderson, M. R. (1949). The genus Eugenia (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. | "A small to large tree; bark dull reddish brown or greyish brown, fibrous, in young trees nearly smooth, becoming longitudinally fissured, shaggy and flaky." [Myrtaceae. No evidence] |

| Qsn # | Question   | Answer   |
|-------|--|--|
| 404   | <b>Unpalatable to grazing animals</b>  |  |
|       | <b>Source(s)</b>   | <b>Notes</b>   |
|       | Kumar, A., & Solanki, G. S. (2003). Food preference of rhesus monkey <i>Macaca mulatta</i> during the pre-monsoon and monsoon season, Pakhui Wildlife Sanctuary, Arunachal Pradesh. <i>Zoos's Print Journal</i> , 18(8), 1172-1174 | "Highly preferred plant species were Udal ( <i>Sterculia villosa</i> ), Pipal ( <i>Ficus religiosa</i> ), Jutali ( <i>Altingia excelsa</i> ), Panijamun ( <i>Syzygium syzygioides</i> ) and climbers. The monkeys primarily fed on young leaves, mature leaves, fruits, flowers, flower buds, petioles and seeds during study." [Table 1. Plant species and their parts - <i>Syzygium syzygioides</i> - Young leaves & Fruit are consumed] |
|       | WRA Specialist. 2018. Personal Communication   | Palatability unknown. Other <i>Syzygium</i> species are browsed by ungulates   |

| 405 | Toxic to animals   | n  |
|-----|--|--|
|     | <b>Source(s)</b>   | <b>Notes</b>   |
|     | Tropical Plants Database, Ken Fern. (2018). <i>Syzygium syzygioides</i> . <a href="http://tropical.theferns.info/viewtropical.php?id=Syzygium+syzygioides">http://tropical.theferns.info/viewtropical.php?id=Syzygium+syzygioides</a> . [Accessed 26 Nov 2018] | "Known Hazards None known"   |
|     | Kumar, A., & Solanki, G. S. (2003). Food preference of rhesus monkey <i>Macaca mulatta</i> during the pre-monsoon and monsoon season, Pakhui Wildlife Sanctuary, Arunachal Pradesh. <i>Zoos's Print Journal</i> , 18(8), 1172-1174                             | [No evidence] "Highly preferred plant species were Udal ( <i>Sterculia villosa</i> ), Pipal ( <i>Ficus religiosa</i> ), Jutali ( <i>Altingia excelsa</i> ), Panijamun ( <i>Syzygium syzygioides</i> ) and climbers. The monkeys primarily fed on young leaves, mature leaves, fruits, flowers, flower buds, petioles and seeds during study." [Table 1. Plant species and their parts - <i>Syzygium syzygioides</i> - Young leaves & Fruit are consumed] |
|     | Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL  | No evidence  |

| 406 | Host for recognized pests and pathogens      |  |
|-----|--|--|
|     | <b>Source(s)</b>                             | <b>Notes</b>   |
|     | WRA Specialist. 2018. Personal Communication | Unknown. A potential host of <i>Austropuccinia psidii</i> , as are other <i>Syzygium</i> species, but not documented to date |

| 407 | Causes allergies or is otherwise toxic to humans   | n                          |
|-----|--|----------------------------|
|     | <b>Source(s)</b>   | <b>Notes</b>               |
|     | Tropical Plants Database, Ken Fern. (2018). <i>Syzygium syzygioides</i> . <a href="http://tropical.theferns.info/viewtropical.php?id=Syzygium+syzygioides">http://tropical.theferns.info/viewtropical.php?id=Syzygium+syzygioides</a> . [Accessed 26 Nov 2018] | "Known Hazards None known" |
|     | Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL  | No evidence                |

| 408 | Creates a fire hazard in natural ecosystems |  |
|-----|---|--|
|     |   |  |

| Qsn # | Question                                     | Answer  |
|-------|--|---|
|       | <b>Source(s)</b>                             | <b>Notes</b>  |
|       | WRA Specialist. 2018. Personal Communication | Unknown, but unlikely. Occurs in tropical regions from India to Java. No information on fire ecology or fire regime found. Where it is currently naturalized in the Hawaiian Islands (Manoa Valley, Oahu), precipitation is high and fire risk is extremely low to non-existent |

| 409 | Is a shade tolerant plant at some stage of its life cycle  | y  |
|-----|--|--|
|     | <b>Source(s)</b>   | <b>Notes</b>   |
|     | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). Tropical trees of Indonesia. A Field Guide to Tropical Trees. Korea Forest Research Institute, Seoul | "Kelat can tolerate shade very well, and light shade promotes the formation of a desirable stem form and branching pattern." ...<br>"Natural regeneration is generally profuse and seedlings can survive under shade for several years." |
|     | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oāhu. Bishop Museum Occasional Papers 87: 3-18   | "The naturalized plants are spreading into unmanaged areas consisting of <i>Ardisia elliptica</i> and <i>Psidium cattleianum</i> forest."<br>[Presumably growing under the shade of these introduced trees]                              |

| 410 | Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)  |  |
|-----|---|--|
|     | <b>Source(s)</b>  | <b>Notes</b>   |
|     | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp.   | "chiefly in secondary growth, and often on rocky and sandy seashores." |
|     | NParks Flora&FaunaWeb. (2018). <i>Syzygium syzygioides</i> . <a href="https://florafauweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=3270">https://florafauweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=3270</a> . [Accessed 26 Nov 2018] | "Moist Soils, Well-Drained Soils, Saline Soils / Salt Spray"           |

| 411 | Climbing or smothering growth habit   | n   |
|-----|---|---|
|     | <b>Source(s)</b>  | <b>Notes</b>  |
|     | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. | "A small to large tree; bark dull reddish brown or greyish brown, fibrous, in young trees nearly smooth, becoming longitudinally fissured, shaggy and flaky." |

| 412 | Forms dense thickets  |   |
|-----|---|---|
|     | <b>Source(s)</b>  | <b>Notes</b>  |
|     | Datta, A., & Rawat, G. S. (2008). Dispersal modes and spatial patterns of tree species in a tropical forest in Arunachal Pradesh, northeast India. <i>Tropical Conservation Science</i> , 1(3): 163-185 | "Appendix 1. List of identified tree species, fruit type and color, dispersal mode, major consumers and tree density (trees per ha)."<br>[ <i>Syzygium syzygioides</i> - Tree density = 16.57 trees per ha]                             |
|     | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). Tropical trees of Indonesia. A Field Guide to Tropical Trees. Korea Forest Research Institute, Seoul                            | [Reported to dominate vegetation. Unknown if dense stands are formed] "Some species may dominate the vegetation, e.g., <i>S. grande</i> and <i>S. syzygioides</i> in forest bordering the rocky and sandy bays in Peninsular Malaysia." |

| 501 | Aquatic | n |
|-----|---------|---|
|-----|---------|---|

| Qsn # | Question  | Answer  |
|-------|---|---|
|       | <b>Source(s)</b>  | <b>Notes</b>  |
|       | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. | [Terrestrial] "Common in the lowlands from Langkawi and Trengganu to Singapore, chiefly in secondary growth, and often on rocky and sandy seashores." |

| 502 | Grass   | n  |
|-----|---|--|
|     | <b>Source(s)</b>  | <b>Notes</b>   |
|     | USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 23 Nov 2018] | Family: Myrtaceae<br>Subfamily: Myrtoideae<br>Tribe: Syzygieae |

| 503 | Nitrogen fixing woody plant   | n            |
|-----|---|--------------|
|     | <b>Source(s)</b>  | <b>Notes</b> |
|     | USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 23 Nov 2018] | Myrtaceae    |

| 504 | Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)  | n   |
|-----|---|---|
|     | <b>Source(s)</b>  | <b>Notes</b>  |
|     | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. | "A small to large tree; bark dull reddish brown or greyish brown, fibrous, in young trees nearly smooth, becoming longitudinally fissured, shaggy and flaky." |

| 601 | Evidence of substantial reproductive failure in native habitat  | n  |
|-----|---|--|
|     | <b>Source(s)</b>  | <b>Notes</b>   |
|     | Soh, W. K., & Parnell, J. (2015). A revision of <i>Syzygium</i> Gaertn.(Myrtaceae) in Indochina (Cambodia, Laos and Vietnam). <i>Adansonia</i> , 37(2), 179-275 | [No evidence] "Widespread from India to Java. In Indochina the species occurs in Cambodia, Laos and Vietnam" ... "Conservation status. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD)." |

| 602 | Produces viable seed   | y   |
|-----|--|---|
|     | <b>Source(s)</b>   | <b>Notes</b>  |
|     | Tropical Plants Database, Ken Fern. (2018). <i>Syzygium syzygioides</i> . <a href="http://tropical.theferns.info/viewtropical.php?id=Syzygium+syzygioides">http://tropical.theferns.info/viewtropical.php?id=Syzygium+syzygioides</a> . [Accessed 26 Nov 2018] | "Propagation Seed - best sown as soon as it is ripe." |

| Qsn # | Question   | Answer   |
|-------|--|--|
|       | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, O'ahu. Bishop Museum Occasional Papers 87: 3-18  | "Records indicate that six trees were planted, and several of these planted trees are known to have died. Nevertheless, dozens of large saplings and mature trees were found in Haukulu, mainly within 100 m of the original plantings. The naturalized plants are spreading into unmanaged areas consisting of <i>Ardisia elliptica</i> and <i>Psidium cattleianum</i> forest." |
|       | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). Tropical trees of Indonesia. A Field Guide to Tropical Trees. Korea Forest Research Institute, Seoul | " <i>Syzygium</i> is propagated by seed and sometimes by wildlings collected under adult trees."   |

| 603 | Hybridizes naturally  |  |
|-----|---|--|
|     | Source(s)   | Notes  |
|     | Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). <i>Prota 7(1): Timbers/Bois d'œuvre 1</i> . [CD-Rom]. PROTA, Wageningen, Netherlands | [Unknown. Hybridization documented in genus] " <i>Syzygium cordatum</i> hybridizes with <i>Syzygium guineense</i> (Willd.) DC., and the 2 species are connected by a complete range of intermediates." |

| 604 | Self-compatible or apomictic   |  |
|-----|--|--|
|     | Source(s)  | Notes  |
|     | Lack, A., & Kevan, P. (1985). Erratum: On the Reproductive Biology of a Canopy Tree, <i>Syzygium Syzyioides</i> (Myrtaceae) in a Rain Forest in Sulawesi, Indonesia. <i>Biotropica</i> , 17(1), 14   | "The species studies was incorrectly named. It has been redetermined as <i>Syzygium lineatum</i> (DC.) Merr. & Perry (syn. <i>Eugenia longiflora</i> (Pres!) Vill.), a widely distributed species through Indo-China, Malaya and islands of the Sunda shelf."  |
|     | Lack, A. J., & Kevan, P. G. (1984). On the reproductive biology of a canopy tree, <i>Syzygium syzygioides</i> (Myrtaceae), in a rain forest in Sulawesi, Indonesia. <i>Biotropica</i> , 16(1): 31-36 | [Unknown. Related species, <i>Syzygium lineatum</i> , determined to be self-incompatible. See Erratum] " <i>Syzygium syzygioides</i> appears to be a good example of a self-incompatible canopy tree with small flowers adapted for a wide range of generalist pollinators, a common pattern among rain forest species in all parts of the tropics (Ashton 1969; Bawa 1974; Frankie 1975, 1976). Cross pollination will be enhanced by the clumping of the adult trees, although none of the insects observed showed any behaviour pattern likely to promote crossing Frankie et al. 1976)." |

| 605 | Requires specialist pollinators   | n   |
|-----|---|---|
|     | Source(s)   | Notes   |
|     | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. <i>The Garden's Bulletin Singapore</i> , Vol. XII, Part 1. 293 pp. | "Panicles axillary or terminal, more usually axillary, not more than c. 6 cm long, usually shorter, often clustered, peduncled, sometimes lax, sometimes rather dense, branches very slender, distant, spreading-ascending, compressed or 4-angled with dark bark, bracts and bracteoles minute, subpersistent, ovate acute; flowers white with reddish calyx, sessile in trees or fours at branchlet ends; calyx campanulate, c. 6 mm long and 3 mm across mouth, contracted rather abruptly into a slender pseudostalk 2-2.5 mm long; lobes 4, subpersistent, very small, triangular, blunt, c. 1 mm across base and less than 0.5 mm tall; petals 4, free, orbicular, 2-2.5 mm in diameter, sparsely pellucidly glandular; stamens numerous, filaments slender, subulate, up to c. 4 mm long, anthers broadly oblong, c. 0.3-0.4 mm long, connective gland small but distinct; style much stouter than filaments, subulate, c. 5 mm long; ovary 2-celled, multiovulate." |

| Qsn # | Question   | Answer   |
|-------|--|--|
|       | Lack, A. J., & Kevan, P. G. (1984). On the reproductive biology of a canopy tree, <i>Syzygium syzygioides</i> (Myrtaceae), in a rain forest in Sulawesi, Indonesia. <i>Biotropica</i> , 16(1): 31-36 | " <i>Syzygium syzygioides</i> appears to be a good example of a self-incompatible canopy tree with small flowers adapted for a wide range of generalist pollinators, a common pattern among rain forest species in all parts of the tropics (Ashton 1969; Bawa 1974; Frankie 1975, 1976)." |

| 606 | Reproduction by vegetative fragmentation  | n  |
|-----|---|--|
|     | Source(s)   | Notes  |
|     | NParks Flora&FaunaWeb. (2018). <i>Syzygium syzygioides</i> . <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=3270">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=3270</a> . [Accessed 27 Nov 2018] | "Propagation Method : Seed"  |
|     | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). <i>Tropical trees of Indonesia. A Field Guide to Tropical Trees</i> . Korea Forest Research Institute, Seoul  | " <i>Syzygium</i> is propagated by seed and sometimes by wildlings collected under adult trees. Species well known for their edible fruits are commonly propagated by cuttings, air layering, grafting, and budding." [No evidence of suckering, or other natural vegetative spread, reported] |

| 607 | Minimum generative time (years)   |                                |
|-----|---|--------------------------------|
|     | Source(s)   | Notes                          |
|     | NParks Flora&FaunaWeb. (2018). <i>Syzygium syzygioides</i> . <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=3270">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=3270</a> . [Accessed 27 Nov 2018] | "Plant Growth Rate : Moderate" |
|     | WRA Specialist. 2018. Personal Communication  | Time to maturity unknown       |

| 701 | Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)   | n  |
|-----|--|--|
|     | Source(s)  | Notes  |
|     | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). <i>Tropical trees of Indonesia. A Field Guide to Tropical Trees</i> . Korea Forest Research Institute, Seoul | "Fruit setting is during the rainy season and the fruits are ripe before the end of this season. The seeds are dispersed by squirrels, birds and small fruit bats, but seed dispersal of river-bank and seashore species may be by water." |

| 702 | Propagules dispersed intentionally by people   | y  |
|-----|--|--|
|     | Source(s)  | Notes  |
|     | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, O'ahu. <i>Bishop Museum Occasional Papers</i> 87: 3-18 | "Records indicate that six trees were planted, and several of these planted trees are known to have died. Nevertheless, dozens of large saplings and mature trees were found in Haukulu, mainly within 100 m of the original plantings. The naturalized plants are spreading into unmanaged areas consisting of <i>Ardisia elliptica</i> and <i>Psidium cattleianum</i> forest. The seeds are probably dispersed by birds, but the pattern of spread suggests that an efficient disperser is not present in Mānoa Valley." |

| 703 | Propagules likely to disperse as a produce contaminant | n |
|-----|--|---|
|-----|--|---|

| Qsn # | Question  | Answer   |
|-------|---|--|
|       | Source(s)   | Notes  |
|       | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. | "A small to large tree ... Fruit ripening dark cherry red to purple black, globular -Or more or less depressed globular, 8-12 mm. diam., with conspicuous calyx rim c. 1 mm. high; pericarp 1-3 mm. thick, fleshy, seed oblong to globose, testa thick, rather leathery, or crustaceous, adhering closely to cotyledons" [No evidence. Unlikely. A tree with relatively large seeds that are unlikely to become an inadvertent contaminant, if grown with other commercial crops or produce] |

| 704 | Propagules adapted to wind dispersal  | n  |
|-----|---|--|
|     | Source(s)   | Notes  |
|     | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp. | "Fruit ripening dark cherry red to purple black, globular -Or more or less depressed globular, 8-12 mm. diam., with conspicuous calyx rim c. 1 mm. high; pericarp 1-3 mm. thick, fleshy, seed oblong to globose, testa thick, rather leathery, or crustaceous, adhering closely to cotyledons; cotyledons side by side, nearly equal, inner faces plane or slightly concave, point of attachment to hypocotyle close to periphery; plumule and radicle small." |

| 705 | Propagules water dispersed   |   |
|-----|--|---|
|     | Source(s)  | Notes   |
|     | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp.  | "chiefly in secondary growth, and often on rocky and sandy seashores." [Proximity to water suggests potential for water dispersal. Buoyancy or salt tolerance of seeds unknown] |
|     | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). Tropical trees of Indonesia. A Field Guide to Tropical Trees. Korea Forest Research Institute, Seoul | "The seeds are dispersed by squirrels, birds and small fruit bats, but seed dispersal of river-bank and seashore species may be by water."                                      |

| 706 | Propagules bird dispersed   | y   |
|-----|---|---|
|     | Source(s)   | Notes   |
|     | Henderson, M. R. (1949). The genus <i>Eugenia</i> (Myrtaceae) in Malaya. The Garden's Bulletin Singapore, Vol. XII, Part 1. 293 pp.   | "Fruit ripening dark cherry red to purple black, globular or more or less depressed globular, 8-12 mm in diameter, with conspicuous calyx rim c. 1 mm high; pericarp 1-3 mm thick, fleshy, seed oblong to globose, testa thick, rather leathery, or crustaceous, adhering closely to cotyledons; cotyledons side by side, nearly equal, inner faces plane or slightly concave, point of attachment to hypocotyle close to periphery; plumule and radicle small"   |
|     | Datta, A., & Rawat, G. S. (2008). Dispersal modes and spatial patterns of tree species in a tropical forest in Arunachal Pradesh, northeast India. <i>Tropical Conservation Science</i> , 1(3): 163-185 | "Ornithochory (dispersal by birds) was the most prevalent among the tree species. Bird-dispersed species such as <i>Phoebe</i> sp. (Lauraceae), <i>Chisocheton paniculatus</i> (Meliaceae), and <i>Syzygium syzygioides</i> (Myrtaceae) were among the top five species in terms of tree density." ... "Appendix 1. List of identified tree species, fruit type and color, dispersal mode, major consumers and tree density (trees per ha)." [ <i>Syzygium syzygioides</i> dispersed by Hornbills, other birds] |

| Qsn # | Question   | Answer  |
|-------|--|---|
|       | Lack, A. J., & Kevan, P. G. (1984). On the reproductive biology of a canopy tree, <i>Syzygium syzygioides</i> (Myrtaceae), in a rain forest in Sulawesi, Indonesia. <i>Biotropica</i> , 16(1): 31-36 | "The fruits appear to be adapted for animal dispersal, but no animal was observed. This may reflect the poor diversity of animal and plant life which the forest appeared to have." |
|       | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, O'ahu. Bishop Museum Occasional Papers 87: 3-18                          | "The seeds are probably dispersed by birds, but the pattern of spread suggests that an efficient disperser is not present in Manoa Valley."   |

| 707 | Propagules dispersed by other animals (externally)   |   |
|-----|--|---|
|     | Source(s)  | Notes   |
|     | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). Tropical trees of Indonesia. A Field Guide to Tropical Trees. Korea Forest Research Institute, Seoul | "Fruit setting is during the rainy season and the fruits are ripe before the end of this season. The seeds are dispersed by squirrels, birds and small fruit bats, but seed dispersal of river-bank and seashore species may be by water." [Rodents or mongoose in the Hawaiian Islands could possibly carry fruit from trees & disperse seeds without ingesting them, although direct evidence is lacking] |

| 708 | Propagules survive passage through the gut  | y   |
|-----|---|---|
|     | Source(s)   | Notes   |
|     | McConkey, K. R., & Brockelman, W. Y. (2011). Nonredundancy in the dispersal network of a generalist tropical forest tree. <i>Ecology</i> , 92(7), 1492-1502   | "Gibbons consumed a more diverse diet in 2003 (seven species) and 2005 (six species), compared to 2004 (four species). There was almost no overlap in the species consumed among years in March, and minimal overlap in April (Fig. 1). <i>P. javanica</i> was the second-most visited species in March of 2004 (19.6% of all fruit-feeding visits to trees and lianas), as <i>Eugenia</i> (¼ <i>Syzygium</i> ) <i>syzygioides</i> (an earlier fruiter) accounted for 47% of visits." |
|     | Datta, A., & Rawat, G. S. (2008). Dispersal modes and spatial patterns of tree species in a tropical forest in Arunachal Pradesh, northeast India. <i>Tropical Conservation Science</i> , 1(3): 163-185                                     | "Ornithochory (dispersal by birds) was the most prevalent among the tree species. Bird-dispersed species such as <i>Phoebe</i> sp. (Lauraceae), <i>Chisocheton paniculatus</i> (Meliaceae), and <i>Syzygium syzygioides</i> (Myrtaceae) were among the top five species in terms of tree density." [Bird-dispersed. Seeds presumably survive gut passage]   |
|     | Albert, A., Hambuckers, A., Culot, L., Savini, T., & Huynen, M. C. (2013). Frugivory and seed dispersal by northern pigtailed macaques ( <i>Macaca leonina</i> ), in Thailand. <i>International Journal of Primatology</i> , 34(1), 170-193 | "Table I Main species (>10 % of seeds for each size class) found in fecal (15 g each), spat-out, and dropped samples collected from a group of pigtailed macaques" [Includes <i>Syzygium syzygioides</i> ]  |

| 801 | Prolific seed production (>1000/m2)  |  |
|-----|--|--|
|     | Source(s)  | Notes  |
|     | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). Tropical trees of Indonesia. A Field Guide to Tropical Trees. Korea Forest Research Institute, Seoul | "The number of seeds per kg ranges from 3,000– 8,500." [Seed production for trees in the wild unknown] |

| 802 | Evidence that a persistent propagule bank is formed (>1 yr) | n |
|-----|---|---|
|     |   |   |

| Qsn # | Question   | Answer  |
|-------|--|---|
|       | <b>Source(s)</b>   | <b>Notes</b>  |
|       | Moon, H. K., Ujang, S. I., Park, S. Y., Park, C. H., & Yi J. S. (2011). Tropical trees of Indonesia. A Field Guide to Tropical Trees. Korea Forest Research Institute, Seoul | "Seeds loses its viability very rapidly; after 4-6 weeks it hardly germinates anymore. Therefore, seed should be sown directly from the fruit on top of loose soil and under shade. It should not be buried, as this seriously reduces the germination percentage. Germination is rapid, starting after 1-3 weeks and is complete after 5-12 weeks; 35-100% of the seed sown germinates." |

| 803 | Well controlled by herbicides  |  |
|-----|--|--|
|     | <b>Source(s)</b>   | <b>Notes</b>   |
|     | Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI | "Sensitive to picloram applied cut surface and to glyphosate applied to drilled holes. Good control with triclopyr applied basal bark and cut-surface(30)." [Herbicides effective on related invasive species S. jambos, so may also be effective on S. syzygioides] |

| 804 | Tolerates, or benefits from, mutilation, cultivation, or fire |   |
|-----|---|---|
|     | <b>Source(s)</b>  | <b>Notes</b>  |
|     | WRA Specialist. 2018. Personal Communication                  | Unknown. Other Syzygium species are able to resprout or coppice |

| 805 | Effective natural enemies present locally (e.g. introduced biocontrol agents)  |   |
|-----|--|---|
|     | <b>Source(s)</b>   | <b>Notes</b>  |
|     | Carnegie, A. J., & Lidbetter, J. R. (2012). Rapidly expanding host range for Puccinia psidii sensu lato in Australia. Australasian Plant Pathology, 41(1), 13-29 | [Pathogen present in Hawaiian Islands. Impacts Syzygium and Eugenia species. Effects on Syzygium syzygioides unknown] "A rust affecting Myrtaceae was recently detected in New South Wales, Australia." ... "In Australia, P. psidii s.l. has currently been found on 107 host species in 30 genera during surveys, including species in Angophora, Asteromyrtus, Austromyrtus, Backhousia, Callistemon, Chamelaucium, Choricarpia, Decaspermum, Eucalyptus, Eugenia, Gossia, Lenwebbia, Leptospermum, Lophomyrtus, Melaleuca, Metrosideros, Myrtus, Piliostigma, Rhodamnia, Rhodomyrtus, Ristantia, Stockwellia, Syncarpia, Syzygium, Tristania, Tristaniopsis, Ugni, Uromyrtus and Xanthostemon. Species under cultivation (in nurseries and gardens) that are severely affected include Gossia inophloia, Agonis flexuosa, Syzygium jambos and S. anisatum while species that are severely damaged in native bushland include Rhodamnia rubescens, Rhodomyrtus psidioides, Choricarpia leptopetala and Melaleuca quinquenervia." |

**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized on Oahu, Hawaiian Islands
- Other *Syzygium* and *Eugenia* species are invasive
- Shade-tolerant
- Reproduces by seeds
- Seeds dispersed by birds, other frugivorous animals, possibly by water & intentionally by people
- Gaps in biological and ecological information reduce accuracy of risk prediction

Low Risk Traits

- No reports of negative impacts in native or introduced range
- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Not reported to spread vegetatively
- Seeds recalcitrant, lose viability rapidly and are will not form a persistent seed bank

Second Screening Results for Tree/tree-like shrubs

- (A) Shade tolerant or known to form dense stands?> Yes. Shade tolerant. No evidence that it forms dense stands.  
(B) Bird or clearly wind-dispersed?> Yes. Dispersed by birds  
(C) Life cycle <4 years? Unknown.

Outcome = Evaluate