**Appendix 3** - List of the sources of information used for each question of *the Momordica charantia* risk assessment in Continental Ecuador.

| **INSTITUTO HÓRUS DE DESENVOLVIMENTO E CONSERVAÇÃO AMBIENTAL** |
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| **Risk Assessment for exotic plants** | ***Momordica charantia* L. (melón amargo)** |
| **Section** | **Group** | **N°** | **Question** | **References** |
| **Biogeographic history** |
| A | Cultivation / Domestication | 1.01 | Is there strong evidence of domestication? | **1.01a** Ames, 1939, as cited in Marr *et al.*, 2004: “the domesticate and/or its wild progenitor are listed in floras of tropical Africa, Asia, and India, as well as the New World tropics, where it first arrived in Brazil via the slave trade from Africa, and then spread into Middle America”. **1.01b** Marr *et al.*, 2004: “in Yunnan, domesticated *M. charantia* was commonly grown in home gardens and upland swidden fields planted to upland rice, corn or cotton. In Nepal, the domesticate was grown in home gardens”. **1.01c** Walters & Decker-Walters, 1988: “most widespread is *M. charantia* (bitter melon in English), wild and domesticated forms of which can be found throughout the tropics. Much of the pantropical distribution of this species is probably due to dispersal of the red-arillate seeds by birds. The center of domestication of bitter melon lies in eastern Asia, possibly in India or southern China”. |
| 1.02 | Are there records of the taxon spreading spontaneously in places where it has been domesticated? | **1.02a** Holm *et al.*, 1991, as cited in Rojas-Sandoval & Acevedo-Rodríguez, 2022 - Resume: “it is reported as invasive in Ecuador”.**1.02b** PIER, 2013 - Resume: “it is reported as invasive in Galapagos (cultivated)”. **1.02c** GBIF, 2023: “Protected Areas - Global Register of Introduced and Invasive Species - Galápagos Islands, Ecuador”. **1.02d** Morton, 1967: “it is now found naturalized in nearly all tropical and subtropical regions. The plant is a rank-smelling, fast-growing”.**1.02e** CDF, 2008 - Resume: “reporta a *M. charantia* como introducida-establecida”.**1.02f** Walters & Decker-Walters, 1988:“*M. charantia* is widely distributed throughout tropical and subtropical regions on all continents. It appears to be native to the African and Australian continents, but its actual origin has been obscured by its spread as a food crop. Currently it can be found cultivated and naturalized in North, Central and South America, the West Indies and on several islands in the Pacific Ocean”. |
| 1.03 | Are taxa of the species registered as weeds or nuisance species? | **1.03a** Venegas & Muñoz, 1984: “reportada como maleza para Ecuador”. **1.03b** Amaya *et al.*, 2018: “en el cultivo de plátano y banano (Figura 4) las especies con mayor dominancia fueron *Momordica charantia* L. (36,4%) y el helecho *Pteridium arachnoideum* (Kaulf.) Maxon (54,5%), esta última especie se reporta por primera vez en la Provincia de Guayas. Ambas especies son malezas cuyas sustancias alelopáticas afectan los cultivos que invaden, además se registran como tóxicas para el ganado”.**1.03c** Vera *et al.*, 2018: “reportada como malezas en la tabla 3”.  |
| Climate | 2.01 | Does the taxon occur naturally, or are there records of establishment in some region of equatorial and semiarid climate? | *Citizen science observations on the platform.***2.01a** iNaturalist, 2022. **2.01b** Tjitrosoedirdjo, 1990, as cited in Rojas-Sandoval & Acevedo-Rodríguez, 2022: iIt grows from sea level to over 1300 m, and in areas with annual rainfall as low as 480 mm”. **2.01c** Rojas-Sandoval & Acevedo-Rodríguez, 2022: “preferred: Aw - Tropical wet and dry savanna climate - < 60mm precipitation driest month (in winter) and < (100 - [total annual precipitation{mm}/25])”. |
| 2.02 | Does the taxon occur naturally, or are there records of establishment in some region of climate of plains and humid heights? | *Citizen science observations on the platform iNaturalist.***2.02a** iNaturalist, 2022. **2.02b** Rojas-Sandoval & Acevedo-Rodríguez, 2022: “tolerated: Cf - Warm temperate climate, wet all year - Warm average temp. > 10°C, Cold average temp. > 0°C, wet all year”. |
| 2.03 | Does the taxon occur naturally, or are there records of establishment in some region with a rainy and humid temperate equatorial climate? | *Citizen science observations on the platform iNaturalist.* **2.03a** iNaturalist, 2022. **2.03b** Rojas-Sandoval & Acevedo-Rodríguez, 2022: “preferred: Af - Tropical rainforest climate -> 60mm precipitation per month”. |
| Records of occurrence and invasion | 3.01 | Is there history of repeated introductions outside its native range? | **3.01a** McMullen, 1999 as cited in PIER, 2013: Abstract: “found as introduced at the Transition Zone in Galapagos Islands”.**3.01b** CDF, 2008 - Resume: “reporta a *M. charantia* como introducida-establecida”. **3.01c** Villaseñor & Espinosa, 1998: “reported as alien species in Mexico”. **3.01d** Walters & Decker-Walters, 1988: “wild and cultivated populations of *M. charantia* are pantropical in distribution". **3.01e** Jaramillo-Hernández *et al.*, 2021 - Resume: “*M. charantia* is reported as introduced and escaped in the CDF Checklist of Galapagos Flowering Plants, distributed in the Isabela, San Cristóbal, Santa Cruz islands”. **3.01f** PROTA, 2014: “*M. charantia* is native to the Old World and was possibly domesticated in India and southern China. It is now found naturalized in almost all tropical and subtropical regions. It is believed that *M. charantia* was introduced into America from West Africa with the slave trade”.  |
| 3.02 | Are there records of establishment outside its historically known native range? | **3.02a** Holm *et al.*,1997: “*M. charantia* is native to the old-world tropics but is now a weed in tropical and subtropical regions in most of Latin America, all of Asia and parts of Africa”. **3.02b** PROTA, 2014: “it is now found naturalized in almost all tropical and subtropical regions”. **3.02c** Wagner *et al.*, 1999, as cited in PIER, 2013: “in Hawaii, widely naturalized in disturbed sites, 0-300 m”.  |
| 3.03 | Is there evidence of impacts in gardens, infrastructure or degraded areas? | *The species is cited as invasive only in crops. It is voluntary cultivated in gardens for medical and edible use:***3.03a** Amaya *et al.*, 2018: “maleza para el plátano y cacao”.**3.03b** Torre *et al*., 2008 - Resume: *M. charantia* es cultivada como alimento y medicina por las etnias Tsa’chi, Secoya y Mestiza.**3.03c** Venegas & Muñoz, 1984: “en la costa ecuatoriana, la achocha invade cultivos de arroz, maíz y soya”. |
| 3.04 | Are there records of impacts in agriculture, cattle raising, silviculture or horticulture? | **3.04a** Venegas & Muñoz, 1984: “maleza en cultivos de arroz, maíz, soya y cultivos perennes y tóxica para el ganado”. **3.04b** Amaya *et al.*, 2018: “maleza para el plátano y cacao (tabla 1) y se registran como tóxicas para el ganado” **3.04c** Holm, 1997: “a weed in 22 crops in over 50 countries, frequently reported in sugarcane and other plantation crops. It is a principal weed of bananas in Surinam; cacao in Ecuador; citrus in the southern United States, etc”. |
| 3.05 | Are there records of invasion in natural areas anywhere in the world? | **3.05a** Hall et al., 2012 as cited in Rojas-Sandoval & Acevedo-Rodríguez, 2022: “*M. charantia* is a fast-growing vine and quickly covers the supporting vegetation or structure. In general, this species can be found growing in coastal areas, along creeks and rivers, forest edges and disturbed sites”.**3.05b** Venegas & Muñoz, 1984: “en la costa ecuatoriana, la achocha invade cultivos de arroz, maíz y soya”. |
| 3.06 | Are other species in the same genus considered invasive in other parts of the world or are they established in Brazil? | **3.06a** Singh, 2017, as cited in Dueñas-López, 2022: “*Momordica balsamina* is reported in India as an invasive species in the northwestern Indo-Gangetic Plains”. **3.06b** Bean, 2007: “*Momordica balsamina* it is considered to be very invasive in northern Australia in highly disturbed habitats, outcompeting native vegetation”. **3.06c** GBIF, 2023: “reportada como invasora en Estados Unidos de América, Cuba, Libia y Chad”.  |
| **Undesirable traits** |
| B | Undesirable traits | 4.01 | Does the taxon have thorns, spines or burrs, or other structures that might harm people or block the passage of people or animals? | **4.01a** Holm *et al.*, 1997: “no spines, thorns or burrs”.*In several studies of the species with a botanical description it does not mention that it may have thorns or any type of prominence such as:* **4.01b** Gupta *et al.*, 2007. **4.01c** Villarreal-La Torre *et al.*, 2020. **4.01d** Kumar *et al.*, 2010. |
| 4.02 | Is there evidence that the taxon produces chemical changes in the soil? (Allelopathy, pH changes, nitrogen fixation, others) | **4.02a** Conceição *et al.*, 2010: “esta inibição de germinação pode ser um indicativo que esta espécie apresenta propriedades alelopáticas”. **4.02b** Amaya *et al.*, 2018: “en el cultivo de plátano y banano (Figura 4) las especies con mayor dominancia fueron *Momordica charantia* L. (36,4%) y el helecho *Pteridium arachnoideum* (Kaulf.) Maxon (54,5%), esta última especie se reporta por primera vez en la Provincia de Guayas. Ambas especies son malezas cuyas sustancias alelopáticas afectan los cultivos que invaden, además se registran como tóxicas para el ganado”. **4.02c** Singh, 2014: “inhibition of various metabolic activities under allelopathic stress resulted in decreased plant growth and development. The fruit leachate of *Momordica* was more inhibitory than leaf leachate”. |
| 4.03 | Is the taxon a parasite? | **4.03a** Holm *et al.*, 1997: “no evidence of parasitism”. *Within the descriptions in different studies, it is not mentioned that there is evidence of parasitism as:* **4.03b**Kumar et al, 2010. **4.03c** Khalid *et al.*, 2021. |
| 4.04 | Is the taxon unpalatable to native or introduced grazing animals? | **4.04a** Holm *et al.*, 1997: “cattle seemed to avoid eating this weed, probably due to its offensive odor”. **4.04b** Degener, 1946, as cited in Morton, 1967: “pigs that feed heavily on the fruits and leaves of *M. charantia* have unpalatable flesh and those other grazing animals avoid the plant”. **4.04c** Hiaso, 1996, as cited in Rojas-Sandoval & Acevedo-Rodríguez, 2022: “this weed is a nuisance in pastures as it has an unpleasant odour when bruised and is unpalatable to stock. It may even be harmful to livestock”. |
| 4.05 | Is the taxon toxic to humans or to economically important native or introduced domesticated animals? | **4.05a** Morton, 1967: “the Balsam Pear an Edible, Medicinal and Toxic Plant”, “in South Florida, there have been several instances of illness in children from eating the ripe fruits of the wild vine”.**4.05b** Hiaso, 1996, as cited in Rojas-Sandoval & Acevedo-Rodríguez, 2022: “it may even be harmful to livestock”. **4.05c** NCSE, 2023: “toxic only if large quantities eaten. Ripe fruits, fruit coats, and seeds cause headache, salivation, facial redness, pupil dilation, stomach pain, nausea, vomiting, diarrhea, and muscular weakness”.**4.05d** Vibrans, 2009: “impacto sobre la salud humana: contiene sustancias tóxicas”.**4.05e** Neuwinger, 1996: “Toxicology: in India the juice of the plant caused the death of a child through sever vomiting and purging”. **4.05f** Walters & Decker-Walters, 1988: “the death of a child was blamed on an overdose of juice from the leaves”. |
| 4.06 | Are there records of the taxon as a host or vector of known pests or pathogens that may affect economically important species? | **4.06a** Venegas & Muñoz, 1984: “Cuadro 3: virus del papayo”. **4.06b** Sakthivel *et al*., 2012: “*M. charantia* is one of the host Plants of Invasive Papaya Mealybug, *Paracoccus marginatus* (Williams and Granara de Willink) in Tamil Nadu”.**4.06c** Muniappan *et al.*, 2002, as cited in PIER, 2013: “it serves as a wild host for the melonfly, *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae), as serious pest of fruit crops and also of quarantine importance”. **4.06d** Rojas-Sandoval & Acevedo-Rodríguez, 2022: “*M. charantia* is also an alternative host for viruses and leafhoppers that affect celery, pawpaw and watermelon, and is a host for many other pests”. |
| 4.07 | Is the taxon allergenic to humans? | **4.07a** Kumar & Bhowmik, 2010 - Resume: the species is use in Haiti for treating rhinitis, skin problem, eye infections. In Malaya for asthma; in Nicaragua for skin problems.**4.07b** Sagkan, 2013: “in conclusion, *Momordica charantia* may elicit a non-allergic type-I like hypersensitivity reaction in especially susceptible individuals”. |
| Habit and potential competition for resources in natural areas | 5.01 | Is there evidence that the taxon produces physical changes in ecological cycles? (Such as increasing the risk of fire, erosion, or altering the water cycle) | *No reports found* |
| 5.02 | Does the taxon tolerate shade in any phase of its life cycle? | **5.02a** Rojas-Sandoval & Acevedo-Rodríguez, 2022: “it interferes with the growth of a wide range of vegetables, annual, perennial, orchard and plantation crops by climbing over them, competing for light and possibly for nutrients and water, raising the humidity around their bases, and interfering with access, management and harvesting”. **5.02b** FFW, 2023: “light Preference: Full Sun”. **5.02c** Correia & Zeitoum, 2010: “há um grande avanço na ocorrência de melão-de-são-caetano (*Momordica charantia* L.) em áreas cultivadas, em especial com cana-de-açúcar, o que é extremamente prejudicial as culturas agrícolas, pois essa espécie de planta daninha acarreta prejuízos pela competição por luz, nutriente e espaço, e no caso da cana-de-açúcar há ainda interferência na colheita mecanizada, ocorrendo perdas no rendimento das máquinas e na qualidade do produto colhido”. |
| 5.03 | Does the taxon tolerate sandy, acidic or low fertility soils? | **5.03a** Gupta *et al.*, 2007: “when calcium is deficient (<4 mM) or excessive (8 mM) in sand grown plants, biomass is reduced, fruit yield is reduced, leaf chlorophyll is reduced, and changes in the Hill reaction and biochemical pathways occur”.**5.03b** Holm *et al.*, 1997: “it prefers deep well-drained sandy loam or silt loam soils with a high organic matter content, water-retaining capacity and with pH ranging from 4.3 to 8.7.” **5.03c** Agarwal, 2015: “the plant grows well in a variety of soils, and begins flowering about one month after planting”. |
| 5.04 | Is the taxon a climber or does it have another growth form that may suffocate or supress other plants? | **5.04a** Vibrans, 2009: “Hábito y forma de vida: planta herbácea de vida corta, trepadora”. **5.04b** Rojas-Sandoval & Acevedo-Rodríguez, 2022: “it interferes with the growth of a wide range of vegetables, annual, perennial, orchard and plantation crops by climbing over them, competing for light and possibly for nutrients and water, raising the humidity around their bases, and interfering with access, management and harvesting”.**5.04c** Holm *et al.,* 1997: “an annual creeping or climbing, herbaceous vine with a strong, foul odor; root a taproot; stems 2 to 3 m long, often forming a dense carpet over other plants”. |
| 5.05 | Does the taxon form dense thickets (especially woody perennials)? | **5.05a** Holm *et al.*, 1997: “an annual creeping or climbing, herbaceous vine with a strong, foul odor; root a taproot; stems 2 to 3 m long, often forming a dense carpet over other plants”. **5.05b** Panday *et al.*, 2014: “Habitat: common in coastal thickets, along creeks and streams and also cultivated”. **5.05c** Saifi *et al.*, 2014: “it is annual herb and commonly cultivated in coastal thickets, along creeks and streams and lowland forest”. |
| 5.06 | Is the taxon a tree, perennial woody shrub, herb, grass or geophyte? (If none of these, "no") reply "tree" or "shrub" or "herb" or "grass" or "geophyte" or "no" | **5.06a** Vibrans, 2009: “Hábito y forma de vida: planta herbácea de vida corta, trepadora”. **5.06b** Holm *et al.*, 1997: “an annual creeping or climbing, herbaceous vine with a strong, foul odor; root a taproot; stems 2 to 3 m long, often forming a dense carpet over other plants”.**5.06c** Holm *et al.*, 1997: “terrestrial vine”. |
| **Biological and ecological traits** |
| C | Reproductive mechanisms | 6.01 | Is there evidence of biotic factors in the taxon native range that reduce its reproductive output? | *No reports found* |
| 6.02 | Does the taxon produce viable seeds? | **6.02a** Holm *et al.*, 1997: “seeds kept in dry storage remain viable for up to 24 months”. **6.02b** Walters & Decker-Walters, 1988: “at maturity, the three valves of the dehiscent fruit curl back to expose 5-20 seeds, each surrounded by a scarlet, sticky, pulpy aril. Seeds are 5-9 mm long and 2.5-6 mm wide and are slightly three-toothed at the apex and base”. **6.02c** Holm *et al.*, 1997: “seeds light brown to black, embedded in sticky, moist, crimson pulp (aril), 5 to 9 mm long, 2.5 to 6 mm wide with ridged or pitted surface and thick ragged margin as though carved”. |
| 6.03 | Is there evidence that the taxon is capable of interspecific hybridization? | *No reports found* |
| 6.04 | Is there an endemic congener in the country? | **6.04a** Robinson & Decker-Walters, 1997, as cited in Rojas-Sandoval & Acevedo-Rodríguez, 2022: “the genus *Momordica* (Cucurbitaceae) is a native of the Paleotropics”. **6.04b** Schaefer & Renner, 2010: “dated biogeographic analyses suggest that *Momordica* originated in tropical Africa and the Asian species are the result of one long-distance dispersal event about 19 million years ago. The pantropical vegetable *M. charantia* is of African, not Asian origin as had previously been suggested”. **6.04c** León *et al*., 2012: “en cuanto a géneros endémicos, la flora ecuatoriana incluye 24 géneros (Tabla 3) restringidos al Ecuador" (There are not *Momordica* genus listed as an endemic genus)”. |
| 6.05 | Is the taxon capable of self polliation or apomixis? | **6.05a** Deyto & Cervancia, 2009: “practically speaking, however, insect pollination is more appropriate since hand pollination is regarded as a very tedious and laborious process”. **6.05b** Schaefer & Renner, 2010: “natural pollination of balsam apple and bitter gourd in the field is usually by polylectic bees while spine gourd is pollinated by moth and teasel gourd, sweet gourd and other Asiatic *Momordica* spp. by oil bees”. **6.05c** Bharathi & John, 2013: “honey bees are chief insect pollinators for bitter gourd and honey bees should be in abundance in the field at the time of flowering. Hand pollination can be avoided by introducing bee hives”.**6.05d** Morgan & Midmore, 2002: “most bitter melon grown in Australia is open pollinated with seed usually selected by individual growers to suit their customers’ requirements and their production methods”. |
| 6.06 | Does the taxon require specialized pollinators? | **6.06a** Deyto & Cervancia, 2009: “the pollinator species were honey bees (*Apis mellifera* and *Apis cerana*), stingless bees (*Trigona* spp.) and *Halictus* spp”. **6.06b** PROTA, 2014: “flowers are pollinated by bees and other insects”. **6.06c** Saeed *et al.*, 2012: “bees were the most dominant (435 individuals) floral visitors followed by butterflies (345 individuals) and flies (248 individuals) while moths and wasps were observed occasionally”. |
| 6.07 | Does the taxon reproduce by vegetative fragments other than apomictic or geophytic? | **6.07a** Vibrans, 2009: “además tiene rizomas que pueden servir para la propagación vegetativa”. **6.07b** Holm *et al.*, 1997: “*M. charantia* spreads sexually by seeds and vegetatively by underground stems”. **6.07c** Villaseñor & Espinosa, 1998: “la planta tiene rizomas que pueden servir para la propagación vegetativa”. |
| 6.08 | How long is the juvenile period? [a] up to 1 year; [b] 1-4 years; [c] more than 4 years | **6.08a** Purseglove, 1968, as cited inHolm *et al.*, 1997: “flowering can begin 30 to 35 days after planting and fruits mature 15 to 20 days later”. **6.08b** PROTA, 2014: “flowering starts with male flowers 5–6 weeks after sowing, while female flowers appear 10 days later. Flowering may continue for 6 months. Flowers open early in the morning”. **6.08c** Villaseñor & Espinosa, 1998: “la floración comienza a los 55 días de ser sembrada”. |
| Dispersal mechanisms | 7.01 | Is the taxon dispersed involuntarily by people, machinery, etc.? | **7.01a** Holm *et al.*, 1997: “Pathways vectors: machinery and equipment. The most widespread use of *M. charantia* is as a vegetable and occasionally as an ornamental”. |
| 7.02 | Is the taxon dispersed intentionally or is it cultivated by people? | **7.02a** Holm *et al.*, 1997: “the most widespread use of *M. charantia* is as a vegetable and occasionally as an ornamental”. **7.02b** PIER, 2013: “this species is a fast-growing vine which has been widely introduced to be consumed as a vegetable and to be used in traditional medicine, and which has escaped from cultivation and naturalized becoming a serious threat for native plant communities”. **7.02c** Alam *et al*., 2009: “*Momordica charantia* L., commonly known as 'bitter gourd', is a multi-purpose herb cultivated in different parts of the world for its edible fruits”. |
| 7.03 | Are the propagules likely to be dispersed as product contaminants? | *No reports found* |
| 7.04 | Are the propagules wind-dispersed? | *Several studies mention that M. charantia is dispersed only by animals (zoochory).***7.04a** Holm *et al.*, 1997: “seeds light brown to black, embedded in sticky, moist, crimson pulp (aril), 5 to 9 mm long, 2.5 to 6 mm wide with ridged or pitted surface and thick ragged margin as though carved”. **7.04b** Moura *et al.*, 2011 - Resume: Table 1 showed that *M. charantia* only was characterized in zoochory – dispersion by animals*.***7.04c** Ishara & Maimoni-Rodella, 2011- Resume: Table 2 mention that dispersal system of *M. charantia* is endozoochory. |
| 7.05 | Are the propagules dispersed by water? | *Several studies mention that M. charantia is dispersed only by animals (zoochory).***7.05a** Moura *et al.*, 2011 - Resume: Table 1 showed that *M. charantia* only was characterized in zoochory – dispersion by animals*.***7.05b** Ishara & Maimoni-Rodella, 2011- Resume: Table 2 mention that dispersal system of *M. charantia* is endozoochory.**7.05c** Ferreira *et al*., 2019 - Resume: Table 2 mention that dispersal system of *M. charantia* is zoochory. |
| 7.06 | Are the propagules dispersed by birds or bats? | **7.06** Ridley, 1930: “the bright red aril which surrounds the seed may attract birds and mammals which then eat and disperse the seeds”. **7.06b** PIER, 2013: “Propagation: bird and animal dispersed seed and underground stems”.**7.06c** Vibrans, 2009: “las semillas son dispersados por aves y mamíferos”. |
| 7.07 | Are the propagules dispersed by animals (externally)? | **7.07a** Ridley, 1930: “the bright red aril which surrounds the seed may attract birds and mammals which then eat and disperse the seeds”.**7.07b** Villaseñor & Espinosa, 1998: “las semillas son dispersadas por aves y mamíferos”.**7.07c** Correll & Johnston, 1970 as cited in Alfaro, 2020: “Su propagación es principalmente por semilla, las cuales están cubiertas por un mucílago rojo que las envuelve, principalmente atrayente de hormigas y aves, las cuales se encargan de dispersarlas por el campo”. |
| 7.08 | Are the propagules dispersed by animals that feed on the fruit and the seeds survive the passage through the digestive system? | **7.08a** Ridley, 1930: “the bright red aril which surrounds the seed may attract birds and mammals which then eat and disperse the seeds”. **7.08b** Guerrero & Tye, 2011: “four regurgitated pellets contained seeds of *Castela galapageia* (Simaroubaceae) (5.0 mm, from fruit 9 mm diam.), *Momordica charantia* (Cucurbitaceae) (4.5 mm), and *Scutia spicata*. *Castela* and *Momordica* were only found in mockingbird pellets, while *Scutia* seeds were also found in its feces”.**7.08c** Benítez-Malvido *et al.*, 2003: “individuals of *I. iguana* were selective in their diet and consumed only four of 11 fruit species offered as food (*C. alba, M. charantia, P. dulce*, and *L. esculentum*). To determine whether passage through iguana digestive tract affects germination we collected seeds from feces and sowed ingested and control seeds in Petri dishes...Nevertheless, the seeds of these four fruit species collected from *I. iguana* feces were defecated intact, which is a characteristic of an effective disperser”. |
| Persistence attributes | 8.01 | Is the taxon a prolific seeder? | **8.01a** Holm *et al.*, 1997: “seeds kept in dry storage remain viable for up to 24 months”. **8.01b** Padua *et al.*, 1999: "the number of fruits per plant may reach 20- 25 during the cropping period [gives 300-500 seeds per plant]”. **8.01c** Walters & Decker-Walters, 1988: “at maturity, the three valves of the dehiscent fruit curl back to expose 5-20 seeds, each surrounded by a scarlet, sticky, pulpy aril”.  |
| 8.02 | Is there evidence that the seeds remain viable in the soil longer than one year? | **8.02a** Holm *et al.*, 1997: “seeds kept in dry storage remain viable for up to 24 months [but viability from field conditions unknown]”.  |
| 8.03 | Is it viable and easy to find an efficient control method at reasonable cost? | **8.03a** Morton, 1967: “spraying with 2,4-D (500 ppm.) kills the vine and its roots, but seedlings may spring up and completely shroud the trees anew within three to four weeks unless spraying is repeated”. **8.03b** Tjitrosoedirdjo, 1990, as cited in Rojas-Sandoval & Acevedo-Rodríguez, 2022: “*M. charantia* may be uprooted by hand or hoed out so long as the tap root is cut through at, or just below, ground level”. **8.03c** Englberger, 2009, as cited in Rojas-Sandoval & Acevedo-Rodríguez, 2022: “physical removal of the entire plant with roots is effective if done repeatedly for an extended period. Herbicides like triclopyr (Garlon 4) or glyphosate (Roundup) can be used”. |
| 8.04 | Are there any efficient natural predators present in the country? | *Unknown, there are not enough studies about the specie controls in Ecuador.* |

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