U.S. Fish & Wildlife Service

Palay Rubbervine (*Cryptostegia grandiflora*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, May 2015
Revised, February 2018
Web Version, 1/16/2020

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1 Native Range and Status in the United States

Native Range

GISD (2018) lists *Cryptostegia grandiflora* as native to Madagascar.

Status in the United States

From Texas Invasive (2009):

"U.S. Present: FL, TX"

GISD (2018) lists *Cryptostegia grandiflora* as present in containment facilities in Hawaii.

GISD (2018) lists *Cryptostegia grandiflora* as alien, established, and invasive in the U.S. Virgin Islands.

USDA, NRCS (2018) shows *Cryptostegia grandiflora* as introduced in Texas, Florida, Puerto Rico, and the U.S. Virgin Islands.

CABI (2018) lists *Cryptostegia grandiflora* as introduced and invasive in Arizona and Hawaii.

CABI (2018) lists *Cryptostegia grandiflora* as introduced and not invasive in California, Texas, and the U.S. Virgin Islands.

From CABI (2018):

"*C. grandiflora* has been reported in error by Acevedo-Rodriguez (2005) and by Acevedo-Rodríguez and Strong (2012) for Puerto Rico and the Virgin Islands, based on misidentifications of *C. madagascariensis*."

Means of Introductions in the United States

From Texas Invasive (2009):

"Introduced as an ornamental."

Remarks

From CABI (2018):

"Putative hybrids formed between *C. grandiflora* and *C. madagascariensis* in the small sympatric range in Madagascar (Marohasy and Forster, 1991), distinguished by intermediate floral morphology. Tomley (1995) reported an interspecific hybrid from Florida, developed in the 1930s for horticultural purposes."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

"Kingdom Plantae
  Subkingdom Viridiplantae
    Infrakingdom Streptophyta
      Superdivision Embryophyta
        Division Tracheophyta
          Subdivision Spermatophytina
            Class Magnoliopsida
              Superorder Asteranae

Order Gentianales
Family Apocynaceae
Genus *Cryptostegia*
Species *Cryptostegia grandiflora* R. Br."

"Taxonomic Status:
Current Standing: accepted"

Size, Weight, and Age Range

From Mackey (1996):

"[…], forming a rambling sub-shrub of 1.3-2 m height, […]"

From CABI (2018):

"Growth rate is initially slow, but plants can reach 4-5 m in the first year, […]"

Environment

From GISD (2018):

"Prefers high levels of soil moisture for rapid growth, and subsequently is often found bordering rivers, (WA, Department of Agriculture). However roots have been known to grow up to 13m deep allowing growth even in arid conditions."

From CABI (2018):

"*C. grandiflora* occurs in the dry south-west of Madagascar where annual rainfall is less than 600 mm and as low as 300 mm, at an altitude below 600 m (Marohasy and Forster, 1991). The dry season lasts at least 8 months, but droughts of 12-18 months are not uncommon […] However, in Australia it has extended its range into wetter areas, with up to 1400 mm annual rainfall; although it does not seed well at high rainfall. *C. grandiflora* is tolerant of a wide variety of soil types and grows on soils ranging from beach sand to heavy clay soils (Tomley, 1995), but is particularly favoured by dry tropical areas where run-off and accessible groundwater collect. Establishment in the dry areas is favoured by a leaf litter cover and the absence of fires (Humphries et al., 1991)."

Climate/Range

From Mackey (1996):

"Rubber vine originates from Madagascar where it is restricted in distribution to areas below 500 m elevation which receive 350-800 mm rainfall annually (McFadyen and Harvey 1990). Currently, in Australia, rubber vine is restricted to tropical and sub-tropical Queensland receiving 400-1400 mm summer dominant rainfall. The species does not occur in areas with more than 100 days frost per annum, with the zone between 50-100 days frost per annum being a less suitable habitat (Chippendale 1991)."

Distribution Outside the United States

Native

GISD (2018) lists *Cryptostegia grandiflora* as native to Madagascar.

Introduced

GISD (2018) lists *Cryptostegia grandiflora* as alien, established, and not invasive in Aruba, Netherlands Antilles (Curacao Island and Saint Martin).

GISD (2018) lists *Cryptostegia grandiflora* as alien, established, and invasive in the Caribbean Sea, Australia (North Queensland and Queensland), Cayman Islands, Ecuador (Santa Cruz Island), Montserrat, New Caledonia (Gatope, New Caledonia, Voh).

GISD (2018) lists *Cryptostegia grandiflora* as alien, established, but invasiveness unknown in Fiji, Guam, India, Mauritius, Northern Mariana Islands (Saipan Island), Reunion, southeast Asia.

GISD (2018) lists *Cryptostegia grandiflora* as alien and status uncertain in Australia (Kimberley).

GISD (2018) lists *Cryptostegia grandiflora* as present in containment facilities in French Polynesia, Marshall Islands (Kwajalein Island), Mayotte.

CABI (2018) lists *Cryptostegia grandiflora* as introduced and invasive in Mexico, Aruba, Cuba, Curaçao, Australia, and New Caledonia.

CABI (2018) lists *Cryptostegia grandiflora* as introduced but not invasive in India, Taiwan, Egypt, Ethiopia, Mauritius, Morocco, Namibia, Argentina, Colombia, Peru, Venezuela, Fiji, Guam, and Marshall Islands.

CABI (2018) lists *Cryptostegia grandiflora* as introduced but no indicator of status of invasiveness in Singapore, Seychelles, Bermuda, Bahamas, Dominican Republic, Grenada, Haiti, Jamaica, Panama, Brazil, Ecuador, French Polynesia, Northern Mariana Islands, and Solomon Islands.

CABI (2018) lists *Cryptostegia grandiflora* as present with no indicator of introduced or native status in the Philippines.

From GISD (2018):

"It is known to densely infest 700,000 hectares in tropical and subtropical Queensland while it is has [*sic*] been found across 34 million hectares (Agriculture and Resource Management Council of Australia and New Zealand)."

"*Cryptostegia grandiflora* is only known from Santa Cruz Island [Ecuador], where it was found in four sites in the coastal village of Puerto Ayora. Four adult plants and hundreds of juveniles have been recorded (Rachel Atkinson., pers.comm., July 2008)."

From Witt and Luke (2017:219):

"According to Goyder et al. (2003), it is present in the Afar and Shewa regions of Ethiopia and is "naturalized in riverine forest along the Awash River." It is now widespread and abundant in these regions, smothering vegetation, including native Acacia species, and is posing a significant threat to biodiversity in the Awash National Park. Goyder et al. (2012) claims that it is not present in East Africa "but may have been overlooked". According to KHS (1995) it is present in East Africa.

Means of Introduction Outside the United States

From GISD (2018):

"Introduced for cultivation in India to produce a poor quality rubber latex, (WA, Department of Agriculture). Initially introduced to Australia as an ornamental species, (CSIRO Australia, 2001)."

"Most of the known infestations appear to have started from mining towns and other settlements [in North Queensland, Australia]."

"Imported into Queensland as an ornamental in the 1860's this plant was also touted as a source of rubber during the 1940's."

From CABI (2018):

"Based on the type being described from India in 1819, it is most likely that the plant was introduced into botanical gardens throughout the British tropical colonies during the latter part of the 1700s and the early part of the 1800s when the British had a strong influence in Madagascar. According to Tomley (1995), *C. grandiflora* was listed in the records of the Brisbane botanic gardens, published in 1875, although Parsons and Cuthbertson (1992) concluded that it was probably present in Australia in the 1860s, specifically cultivated as an ornamental in the mining districts of north and central Queensland. There are anecdotal reports that it was used to cover and stabilize the mine spoil tips, and that subsequently, it became naturalized and weedy by the early 1900s (White, 1917). […] Apparently, *C. grandiflora* was first introduced into Curação during the First World War for the purpose of latex production (Anon., 2002), but it was the period leading up to the Second World War when the plant was widely distributed throughout the drier tropics and sub-tropics for this purpose (Nath, 1943; Jenkins, 1943).

For the West Indies, *C. grandiflora* appears reported for the first time in an 1886 collection made by J. Hart in Jamaica (Smithsonian Herbarium). Later, this species appears reported as a "cultivated plant" by I. Boldingh in 1914 for the islands of Aruba, Curaçao and Bonaire (Boldingh, 1914). […] It was also reported by N.L. Britton and C.F. Millspaugh for the Bahamas in 1920 as "escaped from cultivation"."

Short Description

From GISD (2018):

"*Cryptostegia grandiflora*, is a self supporting, scrambling, many-stemmed vine that grows to 2 metres tall with long trailing whips. A milky sap oozes from stems, leaves and seedpods when cut or broken. Leaves are dark green and glossy, 6-10cm long, 3-5cm wide and in opposite pairs. Roots have been found at a depth of 13 metres in mine shafts. Roots of seedlings are twice as long as shoots. The growth form of the vine differs depending on the surrounding conditions. They can form dense canopies of overpapping [sic] plants with long whips, form towers upto [sic] 30mts high the height of native trees and grow as freestanding shrubs in the absence of other vegetation. Flowers are large and showy, with five white to light purple petals in a funnel shape. The seedpods are rigid, 10-12cm long, 3-4cm wide and grow in pairs at the end of a short stalk. The flowers resemble those of the purple Allamanda (Allamanda violacea) (PIER, 2003)."

From Witt and Luke (2017:218):

"Follicles (dry fruits having one compartment that opens, along one side only, at maturity), greenish turning brown as they mature, two-horned, three-angled in crosssection (10–12 cm long and 2–4.5 cm wide), held in pairs on one stalk, containing 200–450 brown seeds (5–10 mm long and 1.5–3 mm wide) that are topped with a tuft of white hairs; follicles are generally larger (>10 cm long) than in *C. madagascariensis* (<10 cm long)."

Biology

From GISD (2018):

"*Cryptostegia grandiflora* produces seeds that last more than 12 months in the soil (Grice, 1996). Plants begin reproducing at about 200 days (CSIRO Australia, 2001)."

"*Cryptostegia grandiflora* is an aggressive woody climbing shrub which is capable of growing over trees up to 30m high. Plants are common in disturbed situations where there is temporary or permanent water, such as along gullies, rivers, creeks, waterholes and in saltmarsh areas (Marohasy and Forster, 1991. In PIER, 2003). It [*sic*] found growing in dry forest, roadsides, moist forest, rainforest openings at low elevations (PIER, 2003)."

"Wind- and water-dispersed seeds. Seeds form in large pods about 15cm long which are often found in pairs, joined at the base. Each pod contains numerous seeds, each seed has a tuft of long white silky hairs. (WA, Department of Agriculture).
It can produce more than 8000 seeds in a single reproductive episode and can set seed at least twice per year. More than 90% of seeds will germinate within 10 days of moisture becoming available (Grice 1996). Each seed pod produces 340-840 seeds, and seeds can float in salt water for up to 40 days, and may still remain 60% viable after this."

Human Uses

From GISD (2018):

"Because of its weed potential and the increase in tourist traffic across the north of the country, rubber vine has been gazetted a declared plant (noxious weed) in Western Australia. It may not be imported into, or grown in the state and any plants present must be destroyed by the owner or occupier of land on which they are growing."

From CABI (2018):

"Even prior to the First World War, *C. grandiflora* was cultivated as a source of rubber in India, as evidenced by a report from the Punjab detailing its agronomy and tapping methods for the period 1911-1913 (Mohendru, 1943). However, it was during the Second World War that the plant was fully exploited and was widely planted in both the Neo- and Palaeotropics to help meet wartime emergency requirements for natural rubber, and between 30-40,000 ha were planted in Haiti alone (Fennel, 1944). Nevertheless, as Martin (1944) predicted, alternative rubber plants such as *C. grandiflora*, could not compete with *Hevea brasiliensis* as they are generally inferior to it in yield, quality and ease of treatment of the latex (Stewart et al., 1948). Many of the plants of India, including introduced species, seem to have been evaluated at some time as potential sources of useful products, so it comes as no surprise that there are a number of references to alternative uses of *C. grandiflora*. Mukherjee et al. (1999) investigated the antibacterial properties of leaf extract; Doskotch et al. (1972) screened for antitumor agents; and Augustus et al. (2000) considered it as a potential source of industrial raw materials and as an alternative for conventional oil. Jenkins (1987) compiled an ethnobotanical database of Madagascar and *Cryptostegia* spp. are listed as having several uses, roots for toothache and the latex to cure ulcers and skin problems such as scabies."

Diseases

From GISD (2018):

"Rubber vine rust *Maravalia cryptostegiae* is established over a wide area. Yellow spores are formed under the leaves and are spread mainly by the wind. It is most active over summer, abundance being directly related to leaf wetness which is dependant on rainfall and dew. Over summer a generation is completed every seven days. Rust activity is reduced over the dry season. Continued heavy infection causes defoliation, appears to reduce seed production, can kill small seedlings and causes dieback of the whip-like stems. Established plants are not killed."

From CABI (2018):

"A number of fungal natural enemies, mainly leaf pathogens were also collected, most of which proved to be undescribed *Coelomycetes*. […] In its introduced range, several new fungal pathogens have been described on *C. grandiflora*: *Pleosphaeropsis cryptostegiae* Chona & Munjal and *Colletotrichum cryptostegiae* Chiplonkar, both from India, and *Pseudocercospora cryptostegiae* (Yamam.) Deighton from Taiwan (Chona and Munjal, 1950; Chiplonkar, 1965; Deighton, 1976)."

Threat to Humans

From Witt and Luke (2017:219):

"The plant contains toxic glycosides which cause heart malfunction as well as stomach and intestinal disorders in both humans and animals (Cook et al., 1990; Parsons and Cuthbertson, 1992; Paman, 2008)."

From CABI (2018):

"Local people in Madagascar are extremely wary of 'lombiry' (*C. grandiflora*) and warn against handling it, supported by reports concerning the latex and dried plant trimmings as irritants of the eyes, nose and throat (White, 1923; Oakes and Butcher, 1962)."

3 Impacts of Introductions

From GISD (2018):

"*Cryptostegia grandiflora* forms impenetrable thickets and smothers vegetation resulting in a loss of trees and native vines which in turn leads to a loss of biodiversity and habitat, (CSIRO Australia, 2001). *C. grandiflora* is poisonous to stock when consumed and its rampant growth may restrict stock access to water points reducing productivity and pasture production, (WA, Department of Agriculture)."

"Rubber vine is an extremely aggressive invader of woodlands. It is a vigorous climber which will smother and kill plants and shade out the ground layer. There is an increase in soil erosion due to loss of grasses and other ground cover species.

The environmental costs of rubber vine infestations are immense, with the potential to destroy many unique ecosystems such as gallery forest and dry rainforest."

"Rubber vine impacts on: four vulnerable animal species, thirteen threatened plant communities, one Ramsar site, thirteen important wetlands and a total of forty eight reserve areas in Queensland."

"Rubber vine spread has the potential to destroy all deciduous vine thickets in north Queensland, leading to the loss of unique ecosystems. The Big Mitchell Creek gallery forest infestation led to the disappearance of the rufous owl *Ninox rufa*, and bower's shrike thrush *Colluricincla boeri*."

"Estimated cost in terms of lost beef production in north Queensland due to loss of pasture in excess of $18 million per year."

"Increased difficulty and expense of mustering stock."

"Increased fencing costs to keep cattle out of dense rubber vine areas. Impedes access of stock to water."

“Decreased property values.”

“Potential to seriously threaten the World Heritage areas of northern Queensland and the Northern Territory. The Undarra Volcanic National Park was affected when rubber vine covered the entrance of the volcanic lava tubes, thus decreasing the appeal of this attraction.”

“The heaviest infestations of rubber vine occur along rivers and creeks, completely choking the river edge. In some areas it forms impenetrable barriers up to 400m wide on each side of riverbanks. The species will then aggressively and invade open woodlands and pastures.”

“Due to the choking of river and stream edges, rubber vine infestations can cause changes to waterflow and water courses”

From Mackey (1996):

“The major impact on primary industry is through the loss of cattle production from infested areas and subsequent control costs. As rubber vine invades open pasture, grass growth decreases as rubber vine cover increases (Vitelli 1995) and the weed utilises soil moisture and this translates directly into a loss of carrying capacity. Since rubber vine usually infests creeks and rivers and invades pasture from there, it is often the fertile and productive river flats that are primarily affected.”

“Dense infestations along watercourses impede access to water for cattle. They also make mustering more difficult and expensive (1985 figures from Chippendale 1991 show that mustering costs in infested country are 167% more than those in uninfested country).

Incomplete mustering means that missed cattle become aggressive and more difficult to muster subsequently. Herd improvement programmes are jeopardised by missing stock during mustering and the eradication of disease and the maintenance of herd quality is made more difficult (Chippendale1991). Stock can also become entangled in rubber vine to such an extent that they die through lack of water, or they become so debilitated that they have tobe destroyed. Rubber vine also provides a habitat for animals such as feral pigs and dingoes.

Feeding tests have shown the leaves of rubber vine to be toxic to cattle, horses, goats and sheep (McGavin 1969, Everist 1974). Horses are particularly susceptible; toxic effects follow after consumption of only 0.03-0.06% of their body weight (McGavin 1969, Cook et al. 1990). The leaves contain cardiac glycosides (Doskotch et al. 1972) but stock losses are few as rubber vine is seldom eaten by stock unless other feed is very scarce.

Estimated direct losses to primary industry due to rubber vine were $5.67 million per annum (Chippendale 1990, 1991) (Table 1) over an estimated infestation of 349,537 ha in 1989/90. Extrapolating these costs to the recorded 700,000 ha infestation present in 1992 (Vitelli 1995) gives a loss of $13.10 million (1995 dollars) and for the predicted 1995 infestation, $18.13 million (1995 dollars).”

“The majority of control costs are borne by landholders, many of who use fencing, stock management, herbicides and mechanical measures for the control of rubber vine. In a survey of nineteen shires in which rubber vine was perceived to be a problem, Chippendale (1991) estimated control costs to be about $2.27 million (Table 1) or $6.50 per hectare. For the 700,000 ha of rubber vine present in 1993 this would be $4.55 million and for the predicted 1995 infestation, $9.05 million (1995 $’s).”

“It is a vigorous climber and can scramble up trees to 30 m in height, eventually completely smothering and killing them and shading out the ground layer. In the northern rivers of the Gulf it can form impenetrable barriers up to 400 m wide on each bank (Chippendale 1991).”

“Rubber vine invasion of the gallery forest on Big Mitchell Creek, north of Mareeba, has apparently led to the decline of the white-browed robin (*Poecilodryas superciliosa*) and the disappearance of the rufous owl (*Ninox rufa*) and Bower’s shrike thrush (*Colluricincla boweri*) (Humphries et al. 1991). The greater glider (*Petauroides volans*) and the squirrel glider (*Petraurus norfolicensis*) are also under threat (Chippendale 1991). Rubber vine has the potential to completely destroy all deciduous vine thickets in northern Queensland, leading to the complete loss of some unique ecosystems and the extinction of many plant and animal species. In north Queensland, 8,490 ha of national park are infested and a further 1.1 million ha is at risk (Chippendale 1991).”

“Chippendale (1991) reported that landholders perceived that property values in his survey area had dropped by a total of $35.3 million due to infestation by rubber vine. This equates to an average loss of approximately $30,300 per property or $0.88 per hectare. Whilst the price of land is not a good indicator of the total cost of land degradation (Chippendale 1991) it is indicative of the fact that landholders recognise that rubber vine is a serious enough problem to affect their capital investment.”

From Witt and Luke (2017):

“In Australia, infestations of rubbervine (*Cryptostegia grandiflora* Roxb. ex R. Br; Asclepiadaceae) have reduced the carrying capacities of some pastures by 100%. Economic losses incurred by rubbervine infestations, resulting in reduced cattle-carrying capacities and in increased management costs, have been estimated atA$ 18 million annually to the beef industry of north Queensland, Australia, alone (Agriculture and Resource Management, 2001).”

“In Australia, herpetologists looking for reptiles in a habitat invaded by rubbervine (*C. grandiflora*) could find only a single lizard, compared with 131 lizards in nearby native vegetation (Valentine, 2006).”

“In being able to cover trees up to 40 m high, it has destroyed the upper-storey vegetation, depriving native birds and other endemic animals of important habitats (Humphries et al., 1991). It threatens semi-arid monsoonal forest and fragile gallery forest ecosystems, as well as dry rainforest and vine thickets (Humphries et al., 1991; Tomley, 1995; Fensham, 1996).”

From CABI (2018):

“The ground flora is also affected and native grasses in particular, are under threat in the national parks of northern Queensland. There is a proposal to establish a 100 km wide, *C. grandiflora*-free buffer zone to prevent further westward spread of the weed into the Northern Territory where the prestigious Kakadu National Park lies in its path (Fuller, 1993; Tomley, 1995). A similar threat is also being posed in the National Park of Curação where endemic plants, especially cacti, are being smothered by *C. grandiflora*, 'the arch-enemy no.1" (Anon., 2002).”

“*C. grandiflora* is having an increasing impact on tourism in the Gulf and Peninsula regions of Queensland, Australia as it invades national parks, and a similar situation is present in Curação. Local people in Madagascar are extremely wary of 'lombiry' (*C. grandiflora*) and warn against handling it, supported by reports concerning the latex and dried plant trimmings as irritants of the eyes, nose and throat (White, 1923; Oakes and Butcher, 1962). When ingested, the latex also causes heart malfunction as well as both stomach and intestinal disorders in both humans and animals, due to the presence of toxic glycosides (Cook et al., 1990; Parsons and Cuthbertson, 1992; MISC, 2002).”

From Mandle et al. (2011):

“Rubber vine (*Cryptostegia grandiflora*), a woody vine from Madagascar that is invasive in Australia, promotes crown fires by functioning as a ladder fuel (Grice et al. 2008) while reducing the frequency of low-intensity ground fires by suppressing grasses (Grice 1997).”

4 Global Distribution

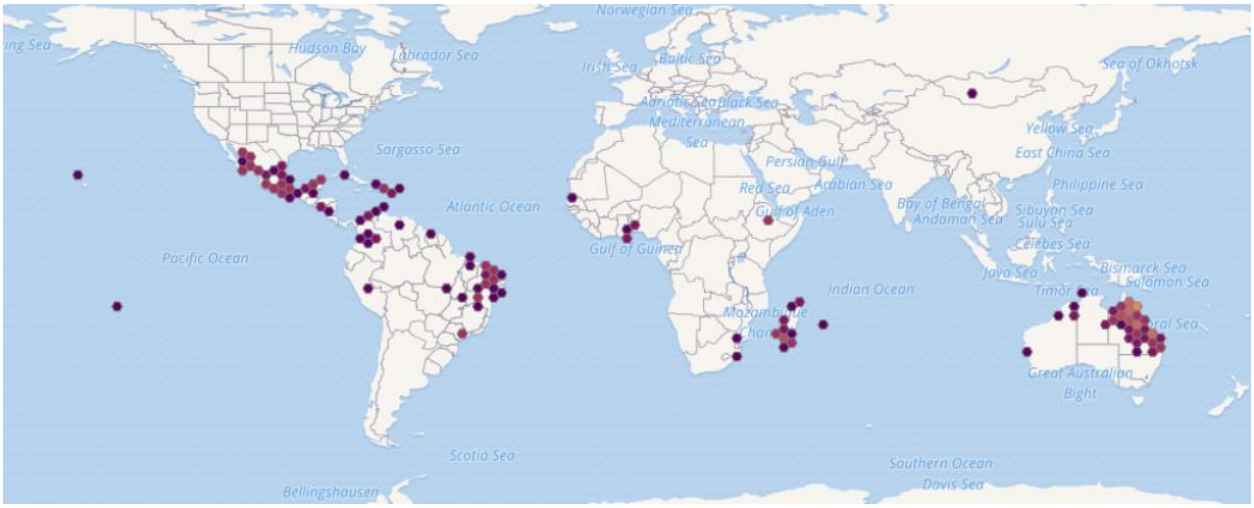

Figure 1. Known global distribution of *Cryptostegia grandiflora*. Map from GBIF Secretariat (2018). The location in Mongolia was not used to select source points for the climate match. No other information sources list a population in Mongolia and the record information for that point is sparse and only lists ‘Asie’ as a locality.

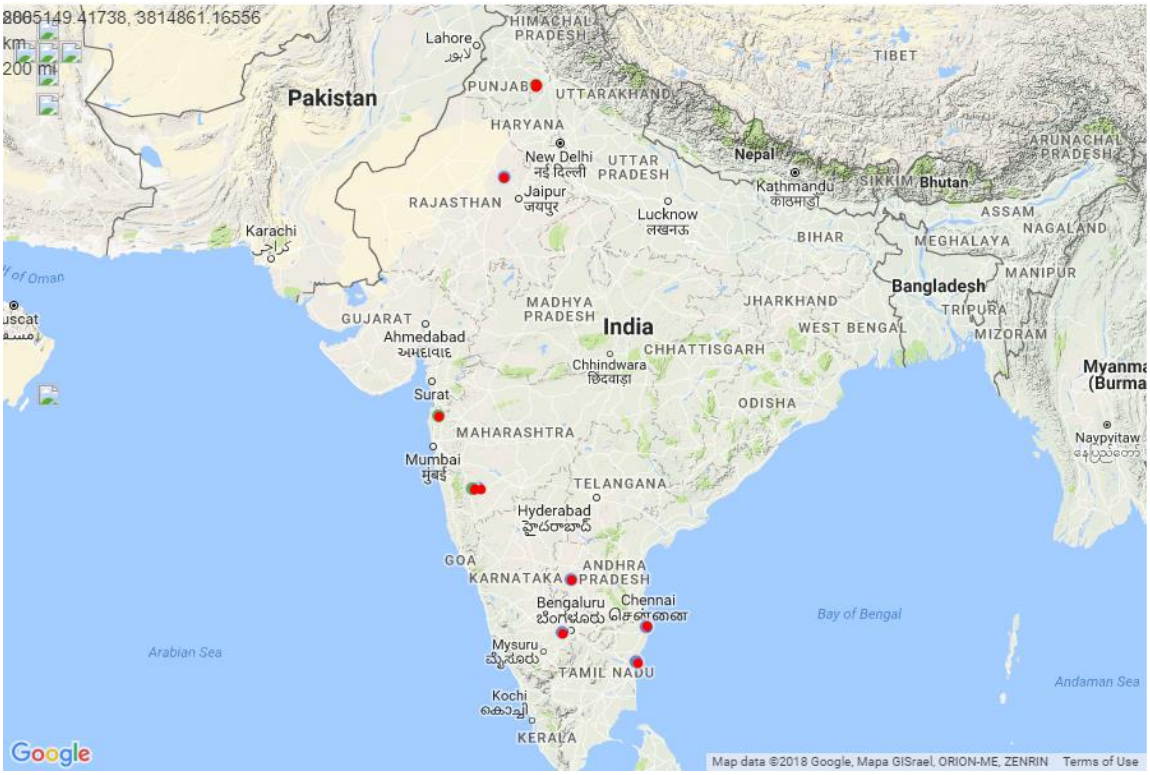

Figure 2. Distribution of *Cryptosetgia grandiflora* in India. Map adapted from India Biodiversity Portal (no date).

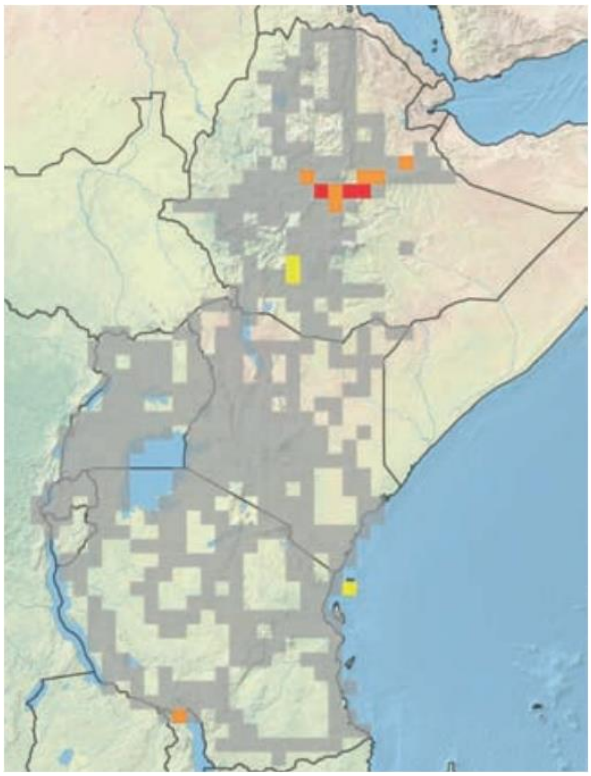

Figure 3. Distribution of *Cryptostegia grandiflora* in eastern Africa. Known locations are in Ethiopia, Tanzania, and Malawi. Yellow, orange, and red squares indicate survey areas where the

species was present; grey squares indicate survey areas where the species was not detected. Map from Witt and Luke (2017; licensed under Creative Commons BY-NC).

5 Distribution Within the United States

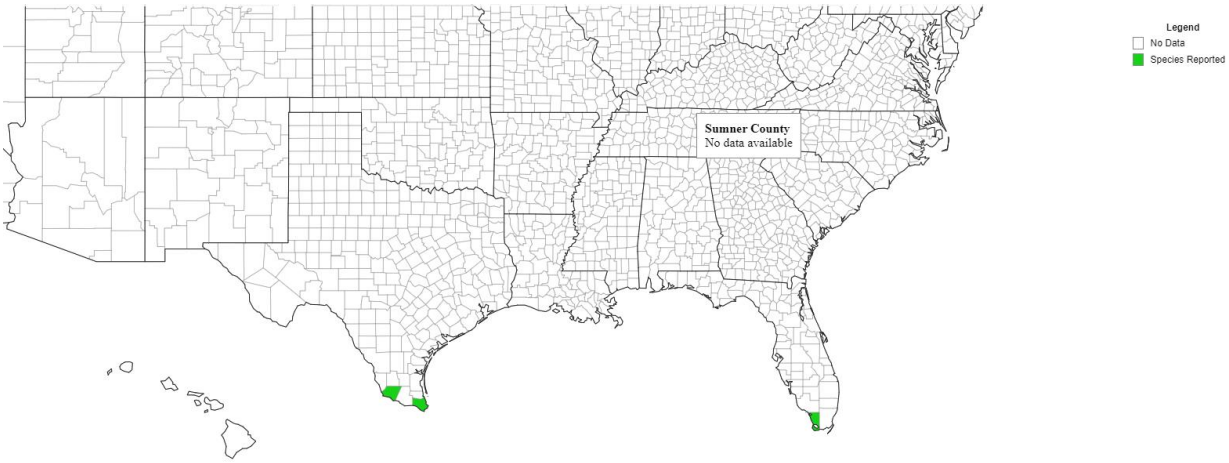

Figure 4. Known distribution of *Cryptostegia grandiflora* by county in the United States. Map from EDDMapS (2018).

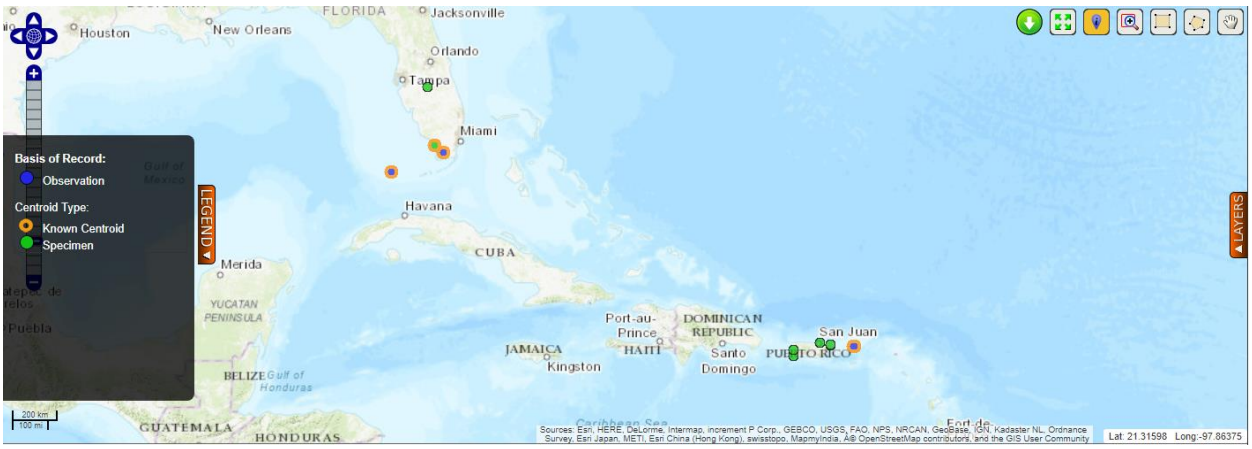

Figure 5. Known distribution of *Cryptostegia grandiflora* in Florida and the United States' Caribbean territories. Map from BISON (2018). The locations reported in Puerto Rico and the U.S. Virgin Islands may be in error and actually pertain to the cogener *Cryptostegia madagascariensis* (CABI 2018). These locations were not used to select source points for the climate match.

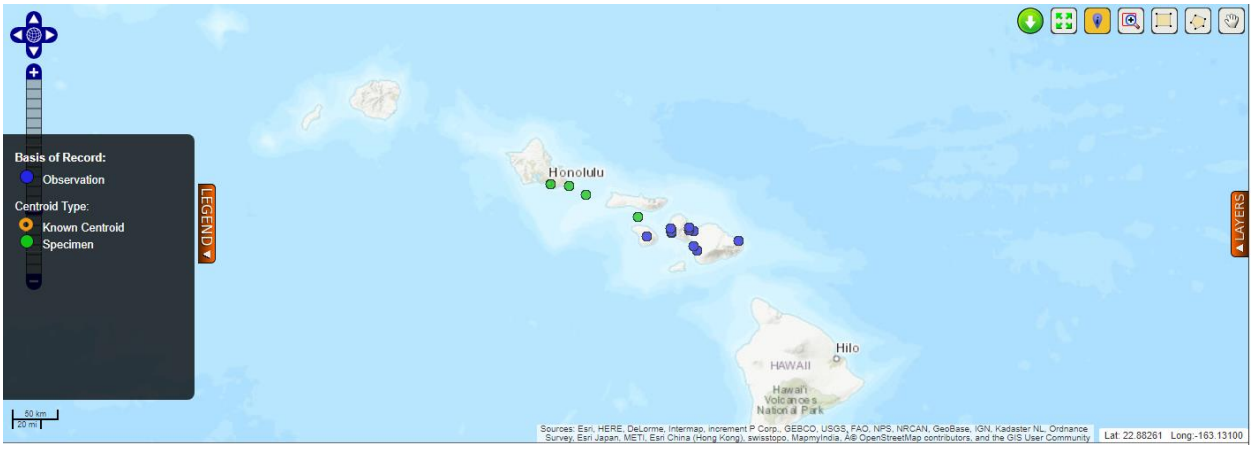

Figure 6. Known distribution of *Cryptostegia grandiflora* in Hawaii. Map from BISON (2018).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Cryptostegia grandiflora* was high in Florida and the southwest from California to Texas. The climate match was medium along the southern Atlantic Coast, small areas of the Gulf Coast, and southern portions of the Great Plains; the match was low everywhere else. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.134, high (scores 0.103 and greater are classified as high). Most States had low individual Climate 6 scores, except for Arizona, California, Florida, Georgia, New Mexico, and Texas, which had high individual scores, and Oklahoma and South Carolina, which had medium individual scores.

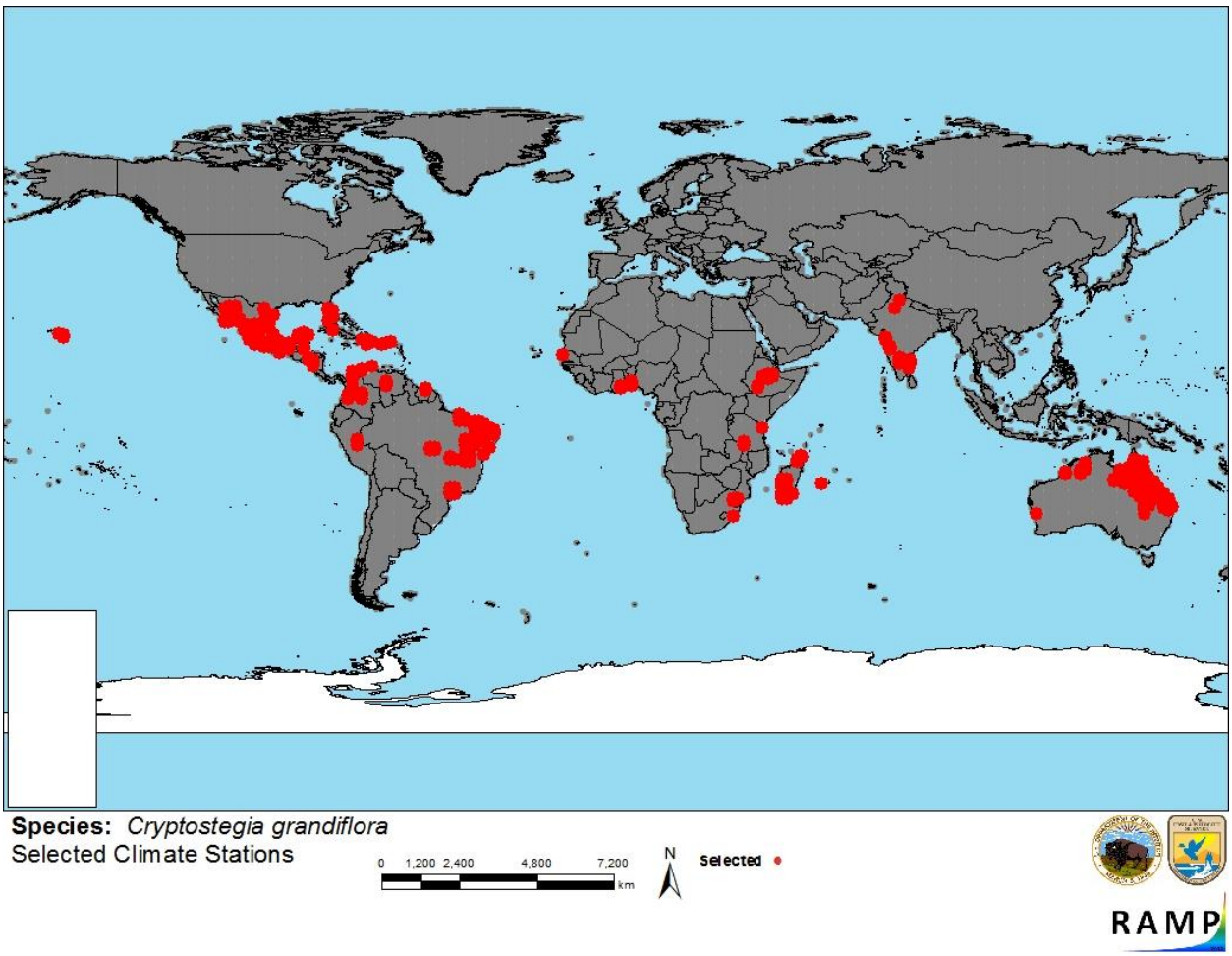

Figure 7. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Cryptostegia grandiflora* climate matching. Source locations from Witt and Luke (2017), BISON (2018), CABI (2018), EDDMapS (2018), GBIF Secretariat (2018), and India Biodiversity Portal (no date). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

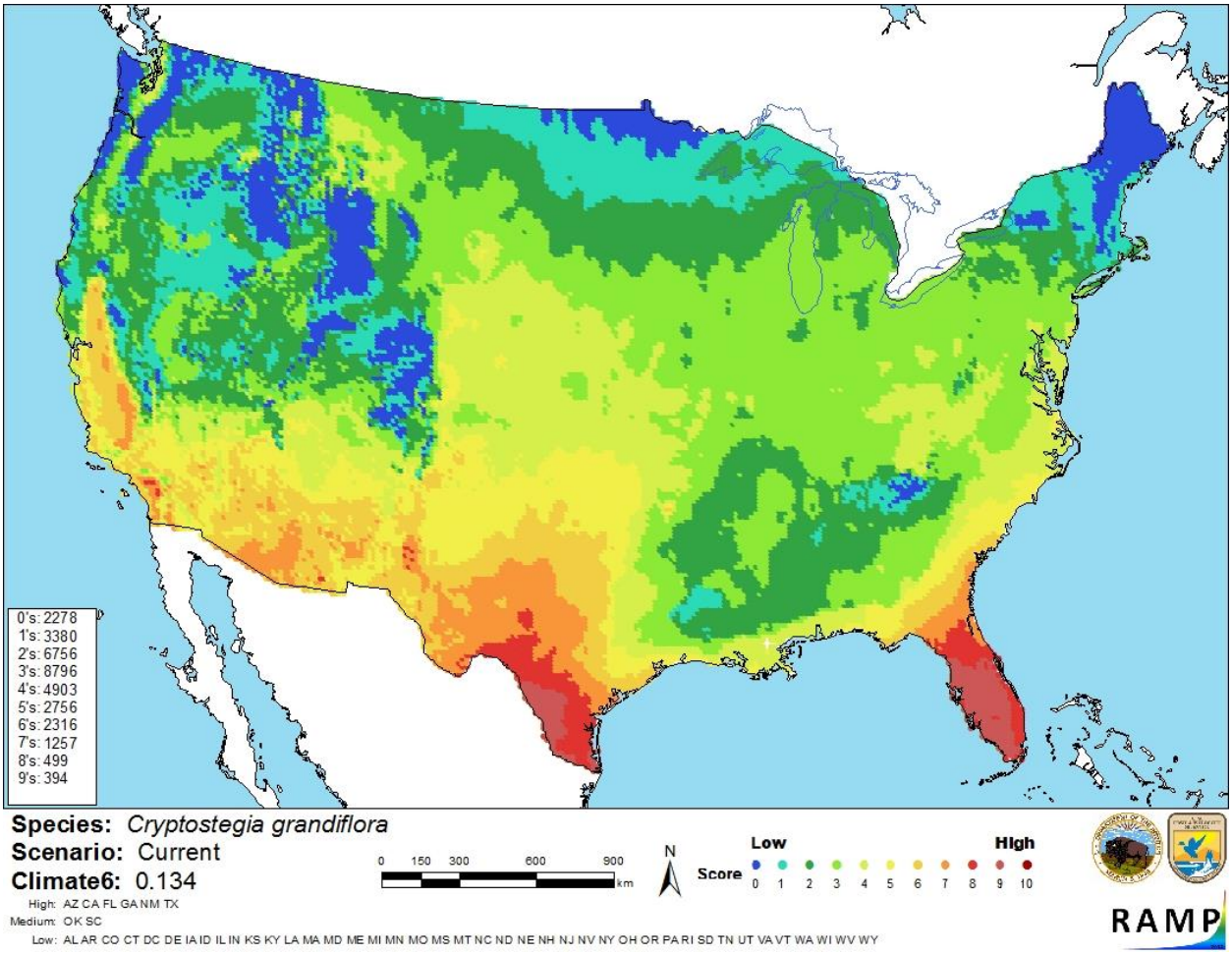

Figure 8. Map of RAMP (Sanders et al. 2014) climate matches for *Cryptostegia grandiflora* in the contiguous United States based on source locations reported by Witt and Luke (2017), BISON (2018), CABI (2018), EDDMapS (2018), GBIF Secretariat (2018), and India Biodiversity Portal (no date). Counts of climate match scores are tabulated on the left. 0 = Lowest match, 10 = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

The certainty of assessment for *Cryptostegia grandiflora* is high. Information on the biology, invasion history and impacts of this species is available, with some peer-reviewed literature. There is enough information available to describe the risks posed by this species.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Palay Rubbervine (*Cryptostegia grandiflora*) is a vine native to Madagascar that is commonly found along rivers. As the common name suggests, this plant has been used historically as a source material for rubber production. It has also been used to some extent as an ornamental plant. The history of invasiveness for *Cryptostegia grandiflora* is high. *C. grandiflora* has spread substantially from its native range in Madagascar. The species has been introduced as an ornamental plant and for rubber production. *C. grandiflora* has caused substantial ecological and economic problems since being introduced in Australia. Climate matching indicated the contiguous United States has a high climate match with established *C. grandiflora* populations in some southern states. The certainty of assessment is high. The overall risk assessment is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): High**
- **Remarks/Important additional information** No additional information.
- **Overall Risk Assessment Category: High**

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