

PROGRAM Cooperative Lands Forest Health Management – Invasive Plants

Biological Control of Ivy Gourd, *Coccinia grandis* on Guam

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Budget Request : \$ 20,000 (for one year)

Ivy gourd, *Coccinia grandis* (L.) Voigt is member of the family Cucurbitaceae in the order Violales. It is a native of East Africa but naturalized in Asia, Australia, Pacific Islands and the Caribbean Islands (Jeffrey 1967, Murai et al. 1998). It is a rapidly growing, climbing or trailing vine. In its native habitat it is common but not a serious weed because it is kept in check by competing plants and natural enemies. However, in recent years it has become an invasive weed in Hawaii, Guam, Saipan and Rota by forming thick mats that overgrow forest and roadside vegetation, walls, fences, and utility poles. Ivy gourd is also a host for most of the pests of cucurbitaceous crops such as cucumber worm, (*Diaphania indica*), pumpkin beetle (*Aulacophora foveicollis*), melon fly (*Bactrocera cucurbitae*), melon aphid (*Aphis gossypii*), leafminers (*Liriomyza* spp.), leaf footed bug (*Leptoglossus australis*), whiteflies and others. Suppression of this weed is a prerequisite to starting a melon fly eradication program in the Mariana Islands (McGregor and Vargas 2002). Rapid spread of ivy gourd after introduction into a new area is attributable to vigorous growth, easy reproduction from stem fragments, and prolific seed production.

It has been estimated that over 1500 acres in Saipan, 500 acres in Guam and 5 acres in Rota are now infested and infestations continue to spread. Successful control of this weed has occurred in the Hawaiian Islands by releasing *Acythopeus cocciniae* (Coleoptera: Curculionidae) and *Acythopeus burkhartorum* (Coleoptera: Curculionidae) and *Melittia oedipus* (Lepidoptera: Sesiidae) (Kenneth Teramoto, pers. comm.).

Acythopeus cocciniae and *Acythopeus burkhartorum* have already been released in Guam and Saipan (Horner 2003, Muniappan and Horner 2004).

The larvae of *A. cocciniae* mine the leaves and the adults feed on the leaves causing small holes. The larvae of *A. burkhartorum* causes galls on petioles and tendrils and adults feed on the leaves. Significant defoliation of *C. grandis* has been observed in the release sites of *A. cocciniae*. *Acythopeus burkhartorum* was released very recently and its effect in the field is yet to be evaluated.

In March 2005, a culture of *Melittia oedipus* was brought from Kona, Hawaii to the containment laboratory at the University of Guam. In Hawaii, plants for host specificity testing were selected based on the centrifugal phylogenetic method advocated by Wapshere (1974). Under the protocol, all species commercially grown, naturalized, and endemic to Hawaii in the family Cucurbitaceae were tested. Additionally, plants belonging to the order Violales to which the family Cucurbitaceae belongs, as well as several plants in other orders were also tested. Adult moths laid very few eggs on test plants compared to ivy gourd. Since its release in 1996 on Hawaiian Islands, there have been no reports of attack on non-target species (Chun 2001). In communication between the University of Guam, Department of Land and Natural Resources of the Northern Marianas, the Fish and Wildlife Service, and APHIS, USDA, the endemic plant species, *Zehneria guamensis* (Cucurbitaceae), was selected for host specificity testing on Guam as most other concerned species have been tested in Hawaii. Both “choice” and “nochoice” test were conducted. No eggs laying on *Z. guamensis* was observed in the “choice” (except for four eggs out of 785 eggs laid) and “no choice” tests.

An Environmental Assessment draft has been prepared and submitted to APHIS in August 2005. It is expected to get clearance for field release of *M. oedipus* in the next three or four months.

Objective: Develop a self-sustaining population of *M. Oedipus* in 15 acres to reduce cover and extent of ivy gourd.

METHODS:

1. To multiply *M. oedipus* in the laboratory for field release.
2. Field establish *M. oedipus* when the APHIS permit is received.
3. Monitor its spread of in the field.
4. Evaluate its efficacy in the field.

Procedure:

1. A specialized technique for culture of *Melittia oedipus* in the laboratory has been developed. Adults mate only under natural sunlight or sodium vapor lamps. Potted *C. grandis* plants need to be provided for egg laying. Eggs need to be collected from the plants and kept in containers with *C. grandis* stem cuttings. Emerged larvae will bore into the cuttings and fresh cuttings need to be provided once in three days. Pupation takes place in the cuttings and the pupae need to be removed and kept in separate containers for emergence of adults.
2. *Coccinia grandis* cuttings with first instar larvae of *M. oedipus* will be taken to the field and tied to the vines in the field. The larvae as they grow will migrate to the vines. Periodic observations will be made to observe the boring of larvae in the vines. Identified locations for release are as follows:
 1. Back Gate to Anderson Air Force Base
 2. Public Health Building Area, Mangilao
 3. Ipan, Talofofu
 4. DanDan, Malojloj

Forestry Staff is assisting with conducting monitoring in these sites.

1. Belmina Soliva, Forester I
2. Abelardo Losbanes, Forestry Aide II
3. Patrick Quenga, Forestry Aide I
3. Monthly surveys will be made to note the spread of *M. oedipus* from the original release site. Spatial and temporal spread of this moth will be recorded.
4. Monthly photographs will be taken in the release area and other areas as the moth spreads, to document the decline of *C. grandis* due to damage by *M. oedipus*. One meter square quadrants will be established at different parts of the island wherein *C.*

Supplies	1,000.00
Local Match:	
Dr. Muniappan	\$20,000.00
Total	\$ 40,000.00