

Biological Control of Mile-a-minute Weed (*Mikania micrantha*) in the Pacific Islands



Warea Orapa, Sarah Pene,
Apatia Macanawai and Michael Day



Introduction

Mikania or Mile-a-minute weed is an important agricultural and environmental weed of a number of countries within south-east Asia and the Pacific, and continues to expand its exotic range. Mikania has been recorded in 17 of the 22 SPC Pacific Island Countries and Territories. In some countries the weed is widespread, while in others it remains restricted to one or a few islands. Mikania has been continuously ranked in the top 3 most important weeds by Pacific Island countries and territories during regional meetings on plant protection in 1997, 2002, and 2004.

Impact and Control Options

In the Pacific Islands mikania is a fast-growing, aggressive perennial climbing vine in disturbed natural areas, as well as in agricultural systems. It impacts on forest succession and associated biodiversity and its rapid growth make mikania an aggressive competitor for nutrients, light and water in cropping systems.



In subsistence food gardens and plantations of sugarcane, coffee, cocoa, taro, oilpalm, nonu, kava, bananas, etc., mikania grows rapidly smothering crops, and interfere with harvesting. Mikania has also been shown to have allelopathic properties.



Cultural methods of controlling mikania are time consuming, labour intensive and generally inefficient due to its ability to grow back quickly. Herbicide applications can control mikania but can also harm food crops and cause undesirable human and environmental consequences.



The climbing and smothering impact of mikania is shown here on banana (top), sweet potato (middle) and coffee (above).

Classical biological control is a promising option to manage mikania because few indigenous Eupatoriae occur in the Pacific Islands region. The project in Papua New Guinea and Fiji aims to use three potential classical biological control agents, the rust *Puccinia spegazzinii* and two species of the butterfly *Actinote*.

Biological Control

Puccinia spegazzinii de Toni (Basidiomycetes: Uredinales)

The rust fungus *P. spegazzinii* is autoecious (completing all stages of its lifecycle) on *M. micrantha*. It infects all aerial parts of mikania, causing leaf, petiolar and stem cankering, which often leads to the eventual death of the plant (Ellison and Murphy, 2001).



Mikania plant infected by *P. spegazzinii*
(Photo courtesy: CAB International)

Additional research in 2006 indicated that a rust pathotype W1960 out of Eastern Ecuador is the most virulent against mikania in PNG and Fiji (C. Ellison, Unpub. Report, July 2006). *P. spegazzinii* will become the first pathogen deliberately introduced for weed biocontrol in a Pacific Island country.

Actinote spp. (Lepidoptera: Nymphaliidae)

*Actinote antea*s and *A. thalia pyrha* were collected from Venezuela in 1996 and have been previously screened in South Africa (Zacchariades et al., 2002) and Indonesia (Desmier de Chenon et al., 2002). The butterflies were introduced into a PEQ facility in Fiji in July 2006 and are being reared prior to the commencement of additional host specificity testing.



Various stages of the life cycle of *Actinote* sp. shown here:

- A: Mature eggs ready to hatch.
- B: Young caterpillars feeding on the leaf epidermis
- C: Older caterpillars feed on the entire leaf tissue
- D: Pupation
- E: Adult female laying eggs on the underside of a mikania leaf.

Host specificity research will commence in Fiji against a required test list of 33 plant species considered important in Fiji. The screening procedure will include both choice and no-choice tests and will measure feeding, oviposition and survival rates.

Monitoring and Evaluation

Monitoring sites have been established on three islands in Fiji and we plan to do likewise in PNG. Monitoring will evaluate establishment, spread and performance of the three biocontrol agents together and individually. Parameters to be measured include impact on mikania's general growth, ground cover, flowering and seed-setting capacity.



Baseline data collection at a monitoring site in Nadi, Fiji

Field days inviting community groups, landowners and farmers are planned in the two countries and to coincide with the field release of the biocontrol agents and will highlight weed problems, management and biocontrol.

Summary

Mikania is a serious weed in several Pacific Island countries. Biocontrol agents considered for use in PNG and Fiji include the butterflies *Actinote antea*s and *A. thalia pyrha*, and the autoecious obligate rust *Puccinia spegazzinii*. These agents will be mass-reared and field-released in Fiji and PNG once approved. There is an opportunity to utilise these agents later in other Pacific Islands interested in managing mikania.

References

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