Biocontrol of *Chromolaena odorata* in Papua New Guinea

Michael Day & Ingu Bofeng
Chromolaena in PNG

- Found in 13 provinces
- Plantations
- Subsistence farms
- Grazing lands
- Roadsides
- Spread by wind & machinery

Biosecurity Queensland
Project Background & Relevance

- Began in Indonesia & Philippines 1996
- Included PNG 1998
- Chromolaena is a Class 1 weed
- Control in PNG reduces risk to Australia
- Assist in eradication or containment in Qld
- Completed December 2007
Aim of Project

- Reduce the impact of chromolaena
- Train local staff in biocontrol
- Identify all sites with chromolaena
- Introduce, rear, release & monitor impact of biocontrol agents
- Increase public awareness of chromolaena & adopt project
- Document impacts/benefits
Biocontrol Agents

- 3 agents introduced into PNG
  - *Cecidocharaes connexa*
  - *Pareuchaetes pseudoinsulata*
  - *Calycomyza eupatorivora*

- Other agents are being studied in South Africa
Cecidochares connexa

- Gall fly from West Indies
- Introduced from Philippines in 2001
- Highly host specific
- Stops flowering, kills branches & plants
- High searching efficiency & disperses rapidly
- Easy to rear, collect, release & establ.
Cecidochares connexa

- Galls released widely
- Establish. rate 98%
- >80 galls/plant
- Spread >100 km
- Control > 30% sites
Biocontrol by gallfly, New Ireland, PNG
East New Britain, PNG (top) Sandaun, PNG (bottom)
Impact Assessment

- Quadrat & transect data Morobe & ENB
  - Increase in galls/plant at all sites
  - General decrease in % plant cover
  - Decrease in plants/quadrat
  - Decrease in plant height
  - 50% reduction in flowering & seeding
Economic & social assessment

• 50% decrease in time weeding
• 50% increase in crop production
• 50% increase in income
  • av. A$650 pa/ha
  • if 200 ha is converted to crops, funds spent by ACIAR returned in 8 years
• Production increase also due increase in soil quality
Benefits

• Control seen in 8 provinces
• Economic
  • increased production in plantations & crops
  • decreased production costs (weeding)
• Community & social
  • re-establishment of village gardens
  • increased food security
  • increased access to roads and rivers
• Decreased seed production and weed spread
  • reduced risk to Australia and other countries - Solomons
Biocontrol of *Mikania micrantha* in Papua New Guinea

Annastasia Kawi, Kiteni Kurika & Michael Day
Mikania micrantha in the Pacific

- Found in 17 South Pacific island countries
- Confirmed in 14 provinces in PNG
  - potential to affect most of PNG
- Plantations
- Subsistence farms
- Grows 1 m/month
Project Background

- Project began in PNG & Fiji 2006
- Completion due December 2009
- Extension likely to December 2010
- Control in PNG & Fiji should reduce risk to Qld
Aim of Project

- Reduce the impact of mikania
- Train local staff in biocontrol
- Identify all sites with mikania
- Introduce, rear, release & monitor impact of biocontrol agents
- Increase public awareness of mikania & adopt project
- Document impacts/benefits
Biocontrol Agents

- 3 agents introduced into Fiji
  - *Actinote* spp.
  - *Puccinia spegazzinii*
- 1 agent introduced into PNG
  - *Puccinia spegazzinii*
Actinote spp.

- Nymphalidae
- Also attacks chromolaena
  - assists in control in Indonesia
- Imported into Fiji
- Host testing commenced
- Colony died out
- Approved for release in PNG
  - some testing desirable
**Puccinia spegazzinii**

- Autoecious, microcyclic
- Ex eastern Ecuador
- Host testing by CABI - UK
- Approved for release in India, China
- Imported into Fiji & PNG Nov 2008
Puccinia spegazzinii

- Mass reared at NARI Kerevat
- Biology studies conducted
- Field released at 250 sites in 11 provinces
  - pustules at 36 sites in 5 prov.
  - monitoring & impact studies continuing
**Puccinia spegazzinii**

- **Chlorotic spots** – 6 days
- **Teliospores** – 11 days
- **Basidiospores** – 15 days (3 mm)
Impact Assessment

• Comparative growth experiments conducted
  • rust sign. reduced growth rate, nodes and final dry weight
Kerevat

- In nine months, pustule density & plant parts affected have increased and pustules have spread 200 m
Summary

- Mikania grows 1 m/mth, potential to affect most of PNG
- Rust is host specific, easy to rear, release & establ.
- Field populations quickly increase & spread
- Has significant impact on growth of mikania
- Potential for other countries where mikania is a problem