Northern Territory Government

DEPARTMENT OF **LAND RESOURCE MANAGEMENT**

Parkinsonia Biocontrol

Optimising rearing and release of UU in the NT

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The Northern Territory Government is releasing a new biological control agent for parkinsonia

Summary

The biocontrol agent is a moth called UU and the aim is to establish self-sustaining populations in the wild to control parkinsonia.

Challenges include:

1. **Harsh seasonal climate affecting parkinsonia leaves and site access**
2. **Long distances between rearing facilities and release sites**
3. **Predation of larvae**

Rearing and release techniques have been modified to optimise use of resources in response to these challenges.

The three main solutions are:

1. **Restrict releases to the most suitable time of year**
2. **Fewer larger releases instead of a greater number of smaller releases**
3. **Release pupae and adults instead of larvae**

Background

Parkinsonia

Parkinsonia aculeata is an invasive shrub from the Americas with long thorns that can form thickets in rangelands of northern Australia. It is a declared weed in all states and territories and has negative impacts on cattle production and the environment by replacing desirable vegetation and impeding mustering and access.

A new biocontrol agent for parkinsonia

A new biological control agent *Eueupithecia cisplatensis* (UU) became available in mid-2013. The moth originates from South America and the larvae only eat the fresh leaves of parkinsonia.

UU is currently being mass reared and released on parkinsonia infestations across the NT, Queensland and Western Australia by four government agencies.

Initial rearing efforts concentrated on larvae which are easier to produce than pupae and adults. Larvae are released directly on to plants in the field.

Challenges

Climate

- A long, hot dry season of up to eight months results in extensive leaf drop in the late dry.
- UU populations are unlikely to establish when parkinsonia is in poor condition, especially from a relatively small founder population (<5000 individuals).
- During the wet season, most areas with parkinsonia become inaccessible due to flooding.

Distance

- There are large distances between rearing facilities, population centres and parkinsonia release sites.
- These remote sites are difficult and expensive to travel to with very low human population density and minimal infrastructure.
- Larvae can easily become sick or die during transportation (eg. from fungal pathogens).
- There is the opportunity to release UU in conjunction with other business, to reduce cost. However, follow-up visits may not be practical.

Predation

- There are large numbers of ants, spiders and other insect predators that eat UU larvae.
- Larvae rely on camouflage and are relatively unprotected from predators.

Solutions

Restriction of releases to the most suitable time of year

- Chance of establishment maximised when there is good quality food.
- Not practical to access sites during the wet season.

Fewer larger releases instead of a greater number of smaller releases

- Concentrate output into a narrower time frame to make bigger single releases.
- Results in lower overall production than a continuous system, but is much more resource efficient when there are long distances to travel to release sites.
- Single release saves travel resources but requires larger release numbers to increase the chance of establishment.

Release pupae and adults instead of larvae

- Allows moth to be transported in its dormant stage, rather when it is exposed and needs to feed. Avoids any reduction in health from long-distance transport.
- Protection from predators provided by specialised pupa release boxes, combined with a sticky barrier on the branches (eg. Tac Gel).
- Adults can fly out of the pupa release box to lay eggs directly on plants where they can select healthy leaves and protection from predators.
- Nearly all pupae are expected to emerge as reproductive adults, whereas only a small proportion of reared larvae would survive to become moths.

Note: pupae are produced in lower numbers than larvae and take longer to rear (eg. 19-21 days compared to 10-14 days for larvae).

Conclusion

An optimal rearing and release strategy in the Northern Territory will:

- Invest resources only when seasonal conditions are suitable.
- Mitigate the effects of distance by making fewer larger releases and transporting pupae instead of larvae.
- Mitigate the effect of predators by releasing pupae in special release boxes.

This will result in improved resource efficiency and a greater chance of establishing UU in the wild.

Collaboration

There are four government agencies involved in the rearing and release of UU in northern Australia.

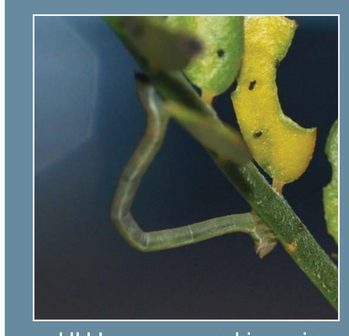
CSIRO conducted the initial exploration and host-testing and has a rearing facility in Brisbane where UU is produced for release in Queensland and Western Australia.

NT Department of Land Resource Management has a rearing facility at Berrimah, Darwin and produces UU for release in the NT.

The Queensland Department of Agriculture and Fisheries has a rearing facility at Charters Towers and produces UU for release in Queensland.

The Department of Agriculture and Food assists with release of UU in Western Australia assists with release of UU in Western Australia.

Potted parkinsonia plants for rearing UU in cage



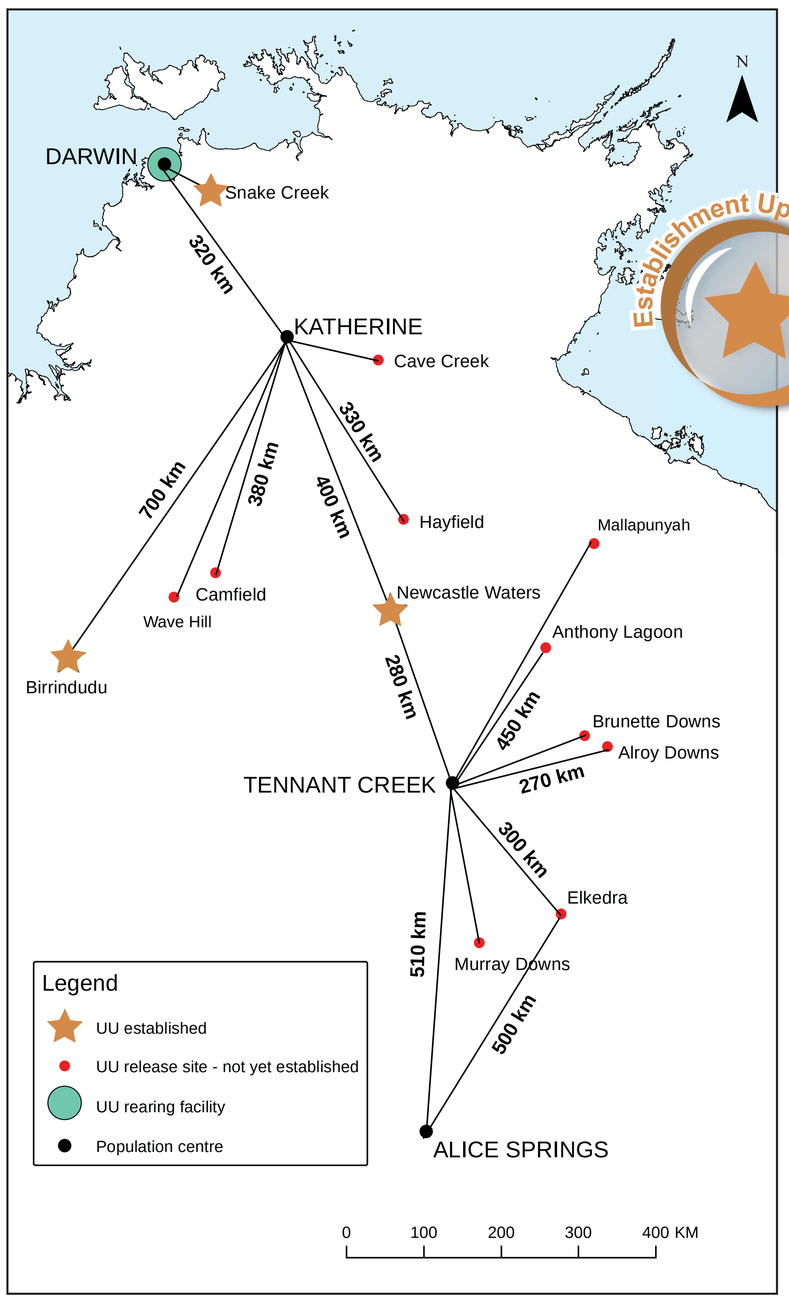
UU larvae on parkinsonia leaf

UU pupae and pre-pupae

Pupa release box

Emerging adults can fly out of holes in the mesh window on top of the box. Pupa are protected from predation by ants by a glue applied to the suspending string.

Tyranny of distance



Map showing the driving distances in kilometres between the UU rearing facility, population centres and release sites.

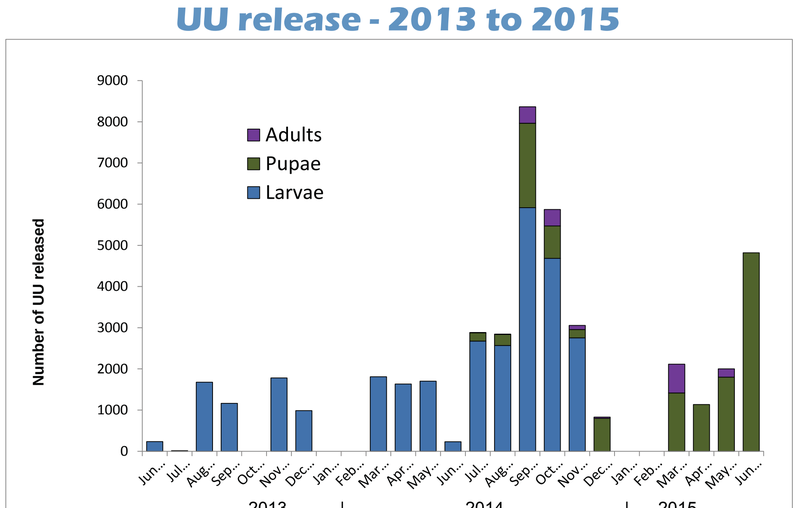
Eueupithecia cisplatensis 'UU'

Female Male

Establishment Update

- Weeds Officers conducted a UU survey at five parkinsonia monitoring sites in May 2015.
- UU was established at three sites and absent at two sites.
- UU has established at Birrindudu Station in the Victoria River District with approximately 12 000 UU larvae per hectare of canopy. This is a healthy population, but not sufficient to affect the parkinsonia plants.
- UU has established at two other stations with between 400 and 3500 UU larvae per hectare of canopy. The stations are Newcastle Waters in the Barkly, and Snake Creek in the Adelaide River catchment.
- Where UU has established, at least 6 months has passed since the last UU release.
- This demonstrates that the parkinsonia looper moth UU can survive in the wild in the NT.
- We hope that these populations will continue to increase further during the next wet season to damaging levels.
- Further releases of UU are scheduled for July and August 2015.

UU release - 2013 to 2015



Releases of UU in the Northern Territory in 2013-2014 showing the transition from larvae to pupae release strategy.

Parkinsonia stand with excellent leaf condition

Newcastle Waters Station, 3 April 2014.
Rainfall Nov to March 2014 = 1031 mm.

Parkinsonia leaf-drop in the late dry season. Not a suitable time to release a leaf-feeder.

Anthony Lagoon Station, 20 Nov 2014.
Rainfall April – October 2014 = 4 mm.

Acknowledgements

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