

Integrated management of *Parkinsonia aculeata* on the Roper River, Northern Territory, Australia

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Abstract. *Parkinsonia aculeata*, a woody weed of central and southern Northern Territory, Australia was identified by landholders as the major weed in the Roper River catchment. It is the subject of a three-year project jointly administered by the Roper River Landcare Group and the Northern Territory Parks and Wildlife Commission with technical advice and assistance from the Northern Territory Department of Primary Industry and Fisheries Weeds Branch. The project promotes a coordinated approach to land management in the catchment, to achieve an improvement in the quality of riparian habitat along the Roper River, and reduce the threat to the pastoral and tourist industries and traditional aboriginal lifestyles through the containment and reduction of parkinsonia populations.

Introduction

Parkinsonia aculeata (parkinsonia) is a woody, thorny shrub or small tree. It can form dense thickets, making areas inaccessible for man or animals, preventing access to water, hindering mustering, and shading-out valuable pastures (Wilson and Miller 1987). It is native to hot and dry regions between south western United States of America and Argentina and has been introduced into California, Florida, Hawaii, the Galapagos Islands, South Africa, the drier parts of tropical Africa, most of India, Pakistan, the Middle East, Italy, and Cyprus (Wilson and Miller 1987). It was introduced into Australia in the late 1800s or early 1900s (Woods 1986) as a shade tree for planting around bore holes, dams and homesteads. It is now naturalized across much of semi-arid Australia with infestations in Queensland, the Northern Territory, Western Australia and northern New South Wales. Parkinsonia tolerates a wide range of temperatures and rainfall conditions, so it has the potential to become troublesome over considerably larger areas than are already affected (Parsons and Cuthbertson 1992).

By 1987 parkinsonia was considered one of the most troublesome weeds in the Northern Territory especially on the Barkly Tablelands (Wilson and Miller 1987) (Fig.1). It is now considered to infest some

230000 ha of the Gulf district, Barkly Tablelands and Victoria River district (Fig.1). It has been declared a Class B noxious weed over the whole of the Northern Territory, and as such its growth and spread to clean areas should be controlled (Wilson and Miller 1987).

Biological control

In 1983, Western Australia, the Northern Territory and Queensland started a joint biological control programme with natural enemies being sought in southern USA, Mexico, and central America (Woods 1986). This resulted in the introduction of three insects: the mirid, *Rhinacloa callicrates*, which stunts or kills developing leaves and flower buds and two seed-feeding bruchids, *Mimosestes ulkei* from Arizona and Mexico and *Penthobruchus germani* from Argentina and Chile. All of these have been released in the Northern Territory and in the Roper River catchment.

Parkinsonia on the Roper River

The Roper River, some 400 km south of Darwin, flows eastward into the Gulf of Carpentaria (Fig. 1). About 80 km from the coast the river forms the southern border of the relatively weed-free Arnhem Land and its catchment covers some 45000 km² and includes a national park, pastoral enterprises and aboriginal land. There is a small mining industry in the

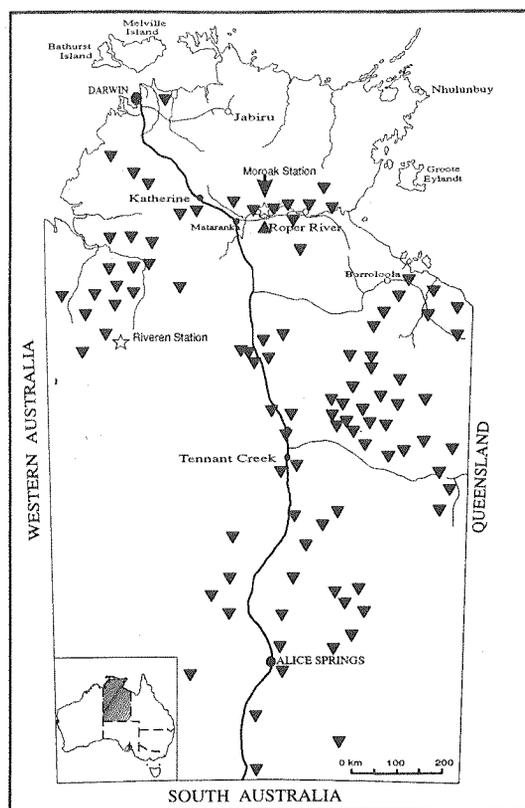


Fig. 1. The distribution of *Parkinsonia aculeata* (closed triangles) in the Northern Territory (Wilson and Miller 1987).

catchment and the impact of tourists is increasing. The river flows through limestone country producing a unique riparian habitat as well as unusual natural formations. In addition the catchment contains some of the most productive cattle-country in the area. The region is of great historical significance to the pastoral industry in the Northern Territory and of spiritual significance to the indigenous aboriginal population.

The Project

The Roper River Landcare Group is a community-based organization with representation from all pastoralists in the catchment, the Djilkminggan aboriginal community, the Northern Territory Parks and Wildlife Commission and the Department of Primary Industry and Fisheries (DPIF), along with other stakeholders in the catchment. The group is set up under the National Landcare Program which funds projects which protect or restore the nation's natural resources. The aim of the project is to promote a

coordinated approach to land management by landholders in the catchment and to achieve an improvement in the quality of the riparian habitat along the Roper River through the containment and reduction of parkinsonia infestations.

The project is jointly administered by the Northern Territory Parks and Wildlife Commission and the Roper River Landcare Group with technical advice and assistance from the DPIF Weeds Branch in Katherine and Biological Control Section in Darwin. The project which commenced in November 1994, is funded by the Federal government through the National Landcare Program for three years at AUS\$30000 - \$35000 pa.

In conjunction with the project, funding has been provided by the Federal Government's Labour Market Training Program for eight members of the Djilkminggan aboriginal community to be trained in weed control and subsequently work on the project. This funding provided a vehicle, chemicals and spray equipment. Federal funds were also provided for 50 km of fencing around parts of the infestation.

Control methods

The first task was to map the infestation. To achieve this the catchment was overflown in a helicopter for two days in November 1994. The data were added to those already held by the Katherine Weeds Branch and those of the various landholders. This information was then loaded into a Geographic Information Systems database and the distribution of the weed was mapped. Areas were then prioritized and appropriate control methods assigned to each. In the first year, the highest priority was assigned to treating plants in the upper catchment areas with herbicide and the establishment of a mass-rearing programme for biocontrol agents to be released in the larger, denser infestations lower in the catchment.

The difficult terrain and low plant densities in the upper catchment areas meant that mechanical control and biological control were not appropriate options, and residual, soil-applied herbicides were not considered for environmental reasons. Basal-bark treatment with Garlon (480 g/l triclopyr) and diesel (1:50) was found to be effective and subsequently used. During the 1994-1995 wet season (October - March) teams combed the catchment, on foot or 'quadbike', beginning upstream of the infestation.

In November 1994, a colony of the bruchid, *M. ulkei*, was obtained from the Queensland

Department of Lands. Members of the Roper River Landcare Group were trained in mass-rearing techniques at the DPIF Weeds Branch, Biocontrol laboratories in Darwin. The culture was moved to Moroak Station (Fig. 1). In mid 1995, a colony of the second bruchid, *P. germani*, was sent to the Roper River Landcare Group for mass-rearing. Initially, progress was slow but following the employment of an apiarist to conduct the mass-rearing, production increased, resulting in the release of over 12000 *P. germani* and 2000 *M. ulkei* at three sites in the catchment, and another 2000 *P. germani* at Riveren station in the Victoria River district. In December 1995 emergence holes were observed on pods *in situ* at one release site and adult *P. germani* were recovered from pods collected at both sites on the Roper River.

Future control

Approximately 60% of parkinsonia seeds are hard coated (Wilson and Miller 1987) and germinate over a period of time, possibly up to 10 years in this region (M. Ashley personal communication). The upper catchment area will be retreated with herbicides, although due to effective treatment in 1994-1995 we expect to find considerably fewer mature plants. An aerial spraying-programme using Graslan (20% tebuthiuron) will begin on the denser infestations in the lower catchment, this will be complemented by a ground control programme applying the techniques used in the upper catchment. Rearing of the two species of bruchids for release in the catchment, as well as supplying other Landcare groups will continue. Consideration will also be given to mass-rearing the mirid *R. callicrates*. Another ten insects have been identified as potential biocontrol agents, however they have been rejected on the basis of well-documented evidence that they are not specific to parkinsonia or have failed initial host-specificity testing (Woods 1992).

Conclusion

Adopting a catchment-management approach and treating plants in the upper catchment first will result in

more cost-effective long-term control of the denser infestations lower in the catchment as these areas will not be reinvaded by seeds carried downstream. The integration of basal-bark and aerial application of herbicide with biological control has reduced off-target damage and contributed to the cost-effectiveness of the programme. By the conclusion of the programme in 1997 the cost and effort of controlling parkinsonia in the catchment should be well within the means of landholders.

The nature of the infestation and the longevity of parkinsonia seed will mean that control will be required for several years after the completion of the programme. However the programme has developed a sense of cooperation amongst stakeholders in the catchment, a sense of ownership of the problem, and responsibility towards weed control (lacking in many other regions), which would suggest that parkinsonia control will continue after the programme is completed in 1997.

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