

Case history of the eradication of fringed spider flower, *Cleome rutidosperma* DC.

Andrew Mitchell¹ and Michael Schmid²

¹Northern Australia Quarantine Strategy, Australian Quarantine Inspection Service, PO Box 3000, Darwin, Northern Territory 0801, Australia

²Weeds Branch, Department of Business and Industry Development, PO Box 3000, Darwin, Northern Territory 0801, Australia

Summary The exotic weed, *Cleome rutidosperma* DC. (fringed spider flower) was found in Darwin at Fort Hill Wharf in August 2000. A media campaign commenced to determine its distribution and four additional populations were found in and around Darwin by October 2000. An eradication campaign commenced shortly afterwards and is continuing. A further population was found on Berrimah Farm with a small satellite population at Howard Springs, Darwin in February 2002. The eradication of this weed has to date cost \$42,000.

Keywords *Cleome rutidosperma*, fringed spider flower, eradication, Darwin.

INTRODUCTION

Cleome rutidosperma is a perennial herb that originated in tropical Africa (Soerjani *et al.* 1987). The Latin name refers to the very strong ribbing on the seeds. The origin of the common name is a mystery, except to say that other members of the genus are known as spider flowers for good reason but the flowers of this species are not large and spidery. The genus *Cleome* consists of about 150 species that have a largely tropical and warm climate distribution. The Americas have the most species whilst there are approximately 17 *Cleome* species in Australia. Some are endemic, others such as *Cleome viscosa* are pan-tropical weedy species that are probably pre-European introductions whilst others such as *Cleome aculeata* are recent arrivals.

Cleome rutidosperma has been rapidly spreading in the tropics (Flora of Australia 1993). It is a major weed of agriculture in Jamaica and Borneo and is important in Cambodia, Vietnam and the Philippines (Holm *et al.* 1991) as a weed of annual crops and the environment. It was placed on the Northern Australia Quarantine Strategy (NAQS) weeds target list by Michael (1989) and confirmed by Waterhouse and Mitchell (1998) as an important species not present on the Australian mainland. It is present on Christmas Island, Indian Ocean. It had also been placed on the Northern Territory weed list as a 'Class C species, not to be introduced to the Territory'.

MATERIALS AND METHODS

During a NAQS East Timor survey of the Darwin seaports in August 2000, a small population (approximately 40 plants) of *C. rutidosperma* was found at Fort Hill Wharf. During the discovery process the press was informed of a new weed and two television crews took good footage of *C. rutidosperma* at Fort Hill Wharf. This was broadcast on the nightly news and the Weeds Branch received a number of reports about the plant the next day, two of which subsequently proved to be *C. rutidosperma*. A media campaign then got underway with television advertisements for two months. Two more populations were subsequently reported by the public. There were many phone calls reporting sightings of blue flowered trifoliolate plants than confirmed findings but that is the nature of requesting information from the public. The most frequent plant *C. rutidosperma* was confused with was a weedy vine, *Centrosema molle*. A public seminar about the weed was held on Berrimah Farm in September 2000 and mainly attended by weed contractors and members of the then Department of Primary Industries and Fisheries.

Location of voucher specimens Voucher specimens of *C. rutidosperma* from Darwin reside in the following herbaria: Darwin (DNA), Brisbane (BRI), Canberra (CANB) and Adelaide (AD).

Locations supporting *C. rutidosperma* This species was found in five following locations in 2000:

Bees Creek	1 large block	0.5 ha
Darwin	Fort Hill Wharf	0.01 ha
Leanyer	1 market garden	1 ha
Moil	5 suburban blocks	1 ha
Parap	8 suburban blocks	2 ha

In February 2002 *C. rutidosperma* was found at Berrimah Farm, Darwin on the margins of about 50 ha of dense improved pasture and in the suburban block of one of the Berrimah Farm staff at Howard Springs where there were approximately 10 plants.

Length of time in Darwin Given the distribution of the species in the Darwin suburban and outer rural area it has probably been in Darwin 10 years before

its discovery. At all but the Bees Creek site it did not form a dense mat. The species is usually difficult to see amongst weedy annual herbs and grasses found in disturbed situations.

Method of spread How this species arrived in Darwin will probably always remain a mystery due to the unrelated nature of the sites and length of time since its probable introduction. The Weeds Branch and myself have been unable to ascertain any commonality between sites. The discovery of *C. rutidosperma* on Berrimah Farm in February 2002 has not resolved this issue.

Over long distances, it is probably spread in hay and soil and on vehicles and human footwear. The seeds have very distinctive ribbed seeds that would allow this species' seeds to grip into crevices in footwear. This species has two dispersal methods over short distances. The pods of *C. rutidosperma* and most other members of the genus explode when drying, throwing their seed perhaps one metre. Each seed also has a white elaiosome and Ruiz-Zapata and Escala (1995) have found that these with seed attached, are harvested by ants. This has unforeseen consequences for the weed control officers because at the Bees Creek site a large *C. rutidosperma* was found growing in the base of a palm frond 10 m above ground. Not only has the weed control officer to look for this species on the ground but up trees too!

Eradication program This commenced in August 2000 with the pulling out of the plants and treatment of the Fort Hill wharf site with a residual herbicide. At all but the Bees Creek site, the plants were pulled out, bagged and destroyed. At the Bees Creek site, *C. rutidosperma* had established a dense stand over a large raised mound, about 3 m tall and 10 m in diameter. This population was used as an experimental site to test herbicides that would provide the best control. Glyphosate at 1% gave a 100% kill. Follow-up control commenced with a monthly spraying of affected areas with glyphosate.

Biological and ecological features relevant to eradication Once the follow-up treatments commenced in December 2000 it was soon obvious that a monthly visit to each site was not enough. *C. rutidosperma* has an indeterminate growth pattern. It germinates and keeps growing and seeding continuously until it runs out of water. It appears that its base and roots can survive over the dry season whilst the stems die back. It is then able to start growing again from its rootstock. The young and even the mature plants are hard to see amongst other vegetation and the young

plants are very easy to miss. Weeds Branch staff were finding that either young plants had been missed on a visit and in a month's time these plants were seeding. Alternatively these plants were germinating and started producing seed within the month.

The follow-up period was reduced to two weeks in the wet season. In the dry season there were no new seedlings unless the areas were watered. Most were not and the period between follow up inspections in the dry season has remained at once per month. *C. rutidosperma* was not found uniformly over these suburban blocks but in discrete patches and as isolated individuals. Areas treated with glyphosate were bare on the next visit except for newly germinated *C. rutidosperma*.

This species also appears to be a poor competitor. In disturbed areas with adjoining lawns, the *C. rutidosperma* in the disturbed areas was twice the size of that in the lawn, where it looked sick and water stressed. Similarly in improved pasture it was growing on the edge of the paddock in the disturbed areas such as around troughs and beneath the electric fences, that had been sprayed six months previously with glyphosate. It was absent from the grass itself. This observation is partly confirmed by the results of Fantastico and Mercado (1985) in which they describe how *C. rutidosperma* seed germinates in response to light. It also explains how an existing garden bed had been excavated at Bees Creek and *C. rutidosperma* appeared where it had not been seen in the past.

Costs to date

Media campaign	\$7000
Respond to 50 public enqs × \$100 each	\$5000
Follow up control	<u>\$30000</u>
Total	\$42000

Spread by post-entry trade If this species were to grow in a nursery it would easily spread with the plants. Many wholesale nurseries have weeds growing with their pot plants and when they come to sell their plants the weeds are removed just before the plants leave the premises.

RESULTS

Of the five sites discovered in 2000, *C. rutidosperma* has been eliminated from the site at Fort Hill Wharf due to the use of a long acting herbicide. This unfortunately was not an option at the other sites. As a result, at the other sites, the seed in the ground continues to germinate but there seems to be fewer seedlings than in the past. However, this does vary depending whether it is dry season or not. The plants are not being allowed to seed and the occasional large plant that is the result of

a miss on the previous inspection is pulled out, bagged and destroyed. The seed bank appears to be declining on these sites. The situation at Berrimah Farm is at the very start of its eradication program with the full extent of the distribution only being determined in March 2002. Work has commenced on its eradication at Berrimah Farm.

DISCUSSION

Distribution Our main concern is that not all the populations of *C. rutidosperma* have been found and that a large one will be discovered that is the source of all the other populations.

Publicity The news footage was very important in finding more populations of this species after discovering the first population. If we had not had that publicity, the Fort Hill Wharf population would still be the only known population in Darwin. We inadvertently did not adhere to the rules of notifying the various government organisations when we discovered *C. rutidosperma* on Fort Hill Wharf and because of that the press and TV were able to obtain footage of the species as it was being destroyed. If we had adhered to the official guidelines the plants would have been ripped out and a week later the story would have been released without any press footage and the story would have quickly died. When authorities find a new weed on their patch, the first reaction is to rip it out. This should be resisted and saved for the press so that TV news footage can be taken in the hope that the public report other populations.

Control Using glyphosate to control *C. rutidosperma* causes problems due to increased seed germination of this species. Alternative selective herbicides may be a possibility. Another would be to treat sprayed areas with mulch. This isn't entirely satisfactory as it depends on the area never being disturbed for some years. The dormancy of the seed of this species is unknown but is at least two years. A selective herbicide would probably be the best option.

Legislation Although *C. rutidosperma* is being eradicated in the NT it is still not a declared noxious weed in

the NT. The NT Government is not receiving funding for its efforts. Many of the NAQS weeds target species are not declared species in the northern Australian States. This leads to a piecemeal approach to dealing with these species when they appear in Australia. In agreement with the States and the Commonwealth, legislation should be enacted that declares as noxious weeds, the species listed on the NAQS weeds target list. It would also help if a national contingency fund was set up for such events because new weeds, insects and plant diseases are continuing to appear at reasonably regular intervals.

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