Report
on the
Eradication of the Invasive Weed Pest
Wedelia trilobata
from Niue

Phase 1: Programme Development and Initiation

Pest Management in the Pacific Programme
(Component 7: Cook Islands, Niue and Tokelau)

Wilco Liebregts
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ACKNOWLEDGEMENTS

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Wilco Liebregts
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INTRODUCTION

The plant *Wedelia trilobata* (L.) has been introduced in the last decennia as an ornamental into many Pacific Island countries. In recent years however it has become recognised as a serious weed that is a threat to agricultural production and the environment. In the coastal zones of southern Viti Levu, Fiji, it covers considerable stretches of land along roadsides and near villages, from where it invades the nearby areas. It is particularly abundant in the Suva-Nausori area, where a number of islets in the Rewa river delta are completely covered by the weed.

*Wedelia trilobata* has a very wide ecological tolerance range, and seems to be equally suited to dry and moist sites. Although it seems to prefer and do best in sunny sites, it survives very well in shady sites. It grows well on almost all soil types, including bare limestone and nutrient poor sandy beaches and swampy or waterlogged soils. It is tolerant to inundation and high levels of salinity. Because it is very fast-growing, roots at the nodes of fast-growing stems, and is normally propagated vegetatively, it has greater potential than most plants for rapid and uncontrolled spread. Moreover, because it is a very weedy fast-growing groundcover, it is periodically pruned and cutback, and the cuttings are normally disposed elsewhere in waste places, at dump sites, are thrown along the banks or margins of, or even thrown into rivers, mangroves and the ocean, where the cuttings quickly establish themselves, or are dispersed to a new site where they might become established (Thaman, 1999).

In view of its restricted distribution, *Wedelia* seems to have been introduced only recently in Niue. Thaman (1999) urges its eradication as he believes that, given the suitability of the extensive areas of limestone and sandy soils for the development of *Wedelia*, the island could be almost totally overwhelmed by the weed. As this of course would have a very serious impact on the economy as well as on the overall environment, he urges its eradication. His recommendation is supported by Space and Flynn (2000), who recently conducted a survey on invasive plant species in Niue.

Projects aimed at eradicating weeds that have escaped from human-controlled areas and that are in the process of becoming naturalised generally demand a considerable, long term commitment from national agriculture authorities to provide for staff, equipment and funding. As these institutions are already constrained to meet the day-to-day demands in assisting the agriculture sector, they often cannot provide the expertise, equipment and capital needed for such activities. Although a quick coordinated response to eradicate newly observed invasive weeds generally has the best chance of success and is the least costly, any delays allow the weed to spread further. This leads to rapidly increasing costs and considerably reduce the likelihood of a successful conclusion of the campaign when (or if) it is started.
These factors have contributed to the general lack of weed eradication projects in Pacific Island Countries in the past. However, as in recent years more biological and ecological data on invasives became available as a result of increased public concern on their impact on primary industries and the environment, containment and eradication became options that in some circumstances were again considered feasible and appropriate.

The Plant Protection Service of the Secretariat of the Pacific Community (PPS–SPC) has recently launched two projects aimed at the eradication of two invasive weed species. The first project in Pohnpei State in the Federated States of Micronesia is aimed at eradicating false sakau (*Piper auritum*), which was introduced illegally in the misconception that it produces similar substances as those found in kava (*Piper methysticum*). The weed has since spread, and it is likely that a sustained campaign is necessary over a prolonged period to follow up on sightings of the weed and its removal.

A second eradication project on the giant sensitive plant (*Mimosa invisa*) was started in Niue in 2000. Following a likely accidental introduction of this weed some 10 years ago the weed was allowed to flower and produce seed, which has resulted in its spread to 4 locations on the island, and the built-up of a considerable seed bank. The eradication programme involves application of Round-Up (a.i. glyphosate) on seedlings of about 10 cm. While the herbicide has proven to be very effective in killing the weed, a constant vigil must be maintained for many years to come due to the long term viability of the seeds in the soil.

In view of the potential impact on agricultural development in Niue, the PPS–SPC has carefully examined several key factors and concluded that it supported before its decided to start a project to eradicate Wedelia. These factors include:

1. The weed’s limited distribution to roadsides and residential areas;
2. The vegetative reproduction of the weed which reduces the rate of spread, and the apparent infertility of the flowers.
3. The rapid invasion of the weed into plantations and forests from roadsides and disturbed areas in other Pacific Island countries
4. The lack of usefulness of the weed, apart from its aesthetic value.
5. The availability of herbicides that are effective in killing the weed
6. The estimated costs of the campaign
7. The anticipated short duration of the campaign

The SPC-PPS contracted the Consultant to assist the Niue Department of Agriculture, Forestry and Fisheries with the design, coordination and implementation of the project. The full Terms of Reference for the consultancy are attached in Appendix 1.

ACTIVITIES UNDERTAKEN TO ADDRESS THE TERMS OF REFERENCE

1. Design a programme to eradicate the weed *Wedelia trilobata*; including previous assessments made on the feasibility and cost effectiveness of eradicating Wedelia from Niue

2. Assist Niue DAFF with the organisation and implementation of the programme

The success of a project aimed at the total eradication of a weed from an island depends on a number of factors, some of which can be manipulated while others can not. A major factor that enhances the likelihood of a successful conclusion of the Wedelia project is the support of the public, which must be made aware of the weed and the potential problems it can cause. It must also be informed on the measures implemented by the Niue Department of Agriculture, Forestry and Fisheries (DAFF) to control the weed. Support of the general public will also help locate infestations of the weed on the island, as it is impractical for DAFF staff to inspect all gardens in the villages.

The following activities were considered appropriate as part of an eradication programme, and discussed with DAFF staff:

**A  Declaration of Wedelia trilobata as noxious weed**

Niue DAFF management indicated that this option may be considered in the near future. However, such a declaration can only be made by the national parliament, and would involve considerable time. It was concluded that the project should commence; depending on its success a proposal can be submitted at a later date.

**B  Assessment of distribution and total coverage of Wedelia**

Surveys conducted between 27 February and 8 March showed that Wedelia was found at 35 sites (Appendix 2). The sites were clearly marked by placing stakes of 90 – 150 cm at the perimeter of the infested area, which commonly included a ‘safety’ zone of approximately 1-2 meters within the perimeter. Approximately 70% of sites were located at residences, while the remaining areas of infestation were at roadsides. The weed was found in the villages: Alofi North (4 sites), Alofi Central (6), Alofi South (5), Tamakautonga (1), Matavai Resort (1), Hakupu (1), Tuapa (2), Mutalau (7), Toi (1), Lakepa (5) and Makefu (1).

The total coverage of the weed was estimated at 1 hectare (10,000 sq. m.). The area of the infestation varied between a few to 1000 sq.m. Excluded in this estimate is the infestation on the premises of the Matavai Resort, as well as a
few other sites on which DAFF was informed during the last days of the consultancy.

Letters providing information on the Wedelia eradication campaign and of forthcoming actions were delivered to owners of land or residences where Wedelia was found (Appendix 3)

C Identification and application of appropriate control measures

A spraying programme was developed and will be continued until all sites have been treated. For the majority of locations, a spray of Round-Up (a.i. Glyphosate) (10 ml/l with a knapsack sprayer) was applied to the whole area. Spot sprays were applied to few areas where the Wedelia plants were scattered over larger areas. In non-residential areas (roadsides outside villages), the herbicide was also applied with a mistblower but at a double rate (20 ml/l). For small areas of infestation the weed was removed by hand. It is expected that the first round of herbicide applications will be completed in the week of 19 – 23 March.

D Support to DAFF for hiring of additional labour and acquisition of appropriate materials and equipment

Funds were provided to purchase materials, equipment (brush cutter, bush knives), protective clothing (overalls, gumboots, gloves and dust masks), demarcation materials (sticks, paint, board for signs). A balance of NZD 5000- was deposited in a new WestPac bank account to cover further project expenditure in the ensuing months.

3. Develop public information materials aimed at increasing community awareness of the weed, and obtaining nationwide support for the campaign in Niue

A leaflet was prepared in English, providing details on the weed and the eradication programme for the public (Appendix 4). The leaflet will be bilingual, and a translation of the text in Niuean language will be made shortly.

The consultant and a DAFF staff member (Mr. Colin Etuate) were interviewed on the project by the Niue TV. The interview was broadcast in the evening news on Tuesday 6 March.

A sign was developed to provide information on the eradication campaign to the public. The first 3 signs had been placed already at strategically located sites around Niue at the time of departure of the consultant.

4. Identification of other serious invasive weeds and assessment of the feasibility, projected costs and cost effectiveness of their eradication and/or containment by biological, chemical and/or mechanical means
5. Write a separate report on the study of other invasive weeds of Niue


This report presents the results of a recent survey (May 2000) by the authors of invasive weeds in Niue. The report lists 22 species that are invasive elsewhere and are also invasive or potentially invasive on Niue. Although the list includes *Wedelia trilobata* and *Mimosa invisa*, most of the weeds in this group seem to have already reached a wide distribution over the island, that the success of an eradication effort of them would be seriously compromised. Species that may be considered as targets for eradication include the vine *Scindapsus aureus*, and the tree weed *Spathodea campanulata* (African Tulip tree). Serious consideration for an eradication effort should also be given to *Solanum torvum*, the prickly solanum, if it’s presence in Niue is confirmed.

Of the 97 species listed as “invasive or weedy elsewhere and (are) common, weedy or cultivated on Niue”, the Chain of Hearts, *Antigonon leptopus* may be considered a potential target for eradication or containment. This climbing vine was seen at some 6 locations in Alofi, where at one site it had fully overgrown a 6-7 m. tree in a residential backyard. With the exception of one other site only single or few plants were noticed. At one site (Waimanu Guest House, Alofi south), 2 plants were removed by the team.

It is difficult to estimate the costs of eradication efforts of the above mentioned weeds, as these are determined largely by biological and ecological factors, and the long term viability of seeds in the soil. These factors are as yet unknown. However, the consultant estimates that a the first phase of project to eradicate *S. campanulata* would cost less than NZ$ 10,000. Similarly, the initial costs to remove *A. leptopus* followed by regular monitoring surveys for approximately one year would be less than NZ$ 5,000. In contrast, an eradication effort of *S. aureus* is likely to cost between 50,000 – 100,000 as this weed has commenced invading indigenous rainforest from roadsides.

Phytophagous insects have been identified in SE Asia that may offer good prospects for a biological control project of the weed *Clerodendrum chinense*.

The consultant considers that the report provides excellent information which fully addresses Item 5 in the TOR for this consultancy.
RECOMMENDATIONS

It is important that a follow-up visit be carried out shortly after the completion of the first round of herbicide applications, to determine the effectiveness of the herbicide applications, and if necessary adjust programme to increase its effectiveness. This visit will also allow a consideration of further measures and uses of other herbicides that may be applied to improve the programme.

REFERENCES


Appendix 1

TERMS OF REFERENCE – SHORT TERM CONSULTANCY

1. Duration

The duration of the consultancy is 14 days. The consultancy should be completed by 31 March 2001.

2. Duties

1. Design a programme to eradicate the weed *Wedelia trilobata*; including in your report previous assessments made on the feasibility and cost effectiveness of eradicating Wedelia from Niue
2. Assist Niue DAFF with the organisation and implementation of the programme
3. Develop public information materials aimed at increasing community awareness of the weed, and obtaining nationwide support for the campaign in Niue.
4. Identify other serious invasive weeds and assess the feasibility, projected costs and cost effectiveness of their eradication and/or containment by biological, chemical and/or mechanical means
5. Write a separate report on the study of other invasive weeds of Niue.

3. Reporting Requirement

You are required to prepare a report in English for submission to the SPC no later than 21 days after the conclusion of the consultancy. It is advisable for the consultant to submit draft reports for review by the SPC before the report is finalised.

The report should outline a comprehensive overview of the problem, the feasibility and cost effectiveness assessments and probability of success. The action already taken and additional recommendations to eradicate the weed are to be included in the report. In addition, the report should include recommendations for sustaining the eradication campaign to a successful conclusion or, should complete eradication not be attained, a recommended Wedelia management programme to contain the weed.

The second report on other serious invasive weeds should provide an assessment of the feasibility, projected cost and cost effectiveness of their eradication and/or containment by biological, chemical and/or mechanical means.

The reports should be submitted as an electronic file to mickl@spc.int
Appendix 2
Appendix 3
Appendix 4