Practical experiences in management for control of bridal creeper (*Asparagus asparagoides*) on nature reserves in the southern wheatbelt of Western Australia

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Summary

During the last six years significant steps have been made towards controlling bridal creeper (*Asparagus asparagoides*) on nature reserves in CALM's Katanning District. The District has adopted an approach to the bridal creeper problem which involves planning, control measures, management strategies and (importantly) a commitment to achieve positive results by a wide range of staff.

This approach has resulted in improvements in techniques for control, increased efficiencies in operations and management strategies for reducing spread of this weed. These improvements have been, and will continue to be, incorporated into a planned approach to the control of bridal creeper.

Introduction

The Katanning District covers approximately 3.5 million hectares in 12 Local Authorities and forms part of CALM's Wheatbelt Region. The District boundaries are shown in Figure 1. A total of seven District staff are responsible for the management of lands and natural resources under Departmental control in the District. This includes some 200 reserves, ranging in size from 2 to 107 615 hectares. The majority of these reserves are set aside for the purpose of 'Conservation of Flora and Fauna'.

In late 1987 staff responded to a request from the Science and Information Division (CALM) by opportunistically recording the occurrence of bridal creeper on reserves. By May 1989 the weed had been recorded from eight reserves, with infestations ranging in size from one to two square metres to several hectares. In consequence it was decided to:

i. systematically examine all nature reserves for infestation, and
ii. investigate options for control and initiate trials.

To date bridal creeper has been detected on 21 reserves throughout the District (Figure 1) and control works have been undertaken at 19 reserves. Of the reserves treated, five are now subject to annual monitoring only after no plants were detected for two consecutive years.

In 1990 a five-year bridal creeper program was prepared with two objectives for all reserves under CALM's control in the District:

i. eradicating all minor infestations, and
ii. significantly reducing the extent of major infestations.

The program described here is based upon three main strategies: Planning, Management and Control Operations.

Planning

Distribution of occurrence

Prior to any actions to control bridal creeper a sound knowledge of the size of the problem was considered essential in view of the recognized limitations imposed by restricted resources and seasonal factors. Systematic surveys during routine reserve inspections increased the number of known infestations from 8 in 1989, to 20 in 1992. The only infestation recorded since that time was not a new infestation, but the result of improved observation skills,. The resulting bridal creeper database has been used to prioritize control operations and allocate resources with maximum efficiency.

Setting priorities

Initially the priority was to initiate control on the maximum amount of bridal creeper

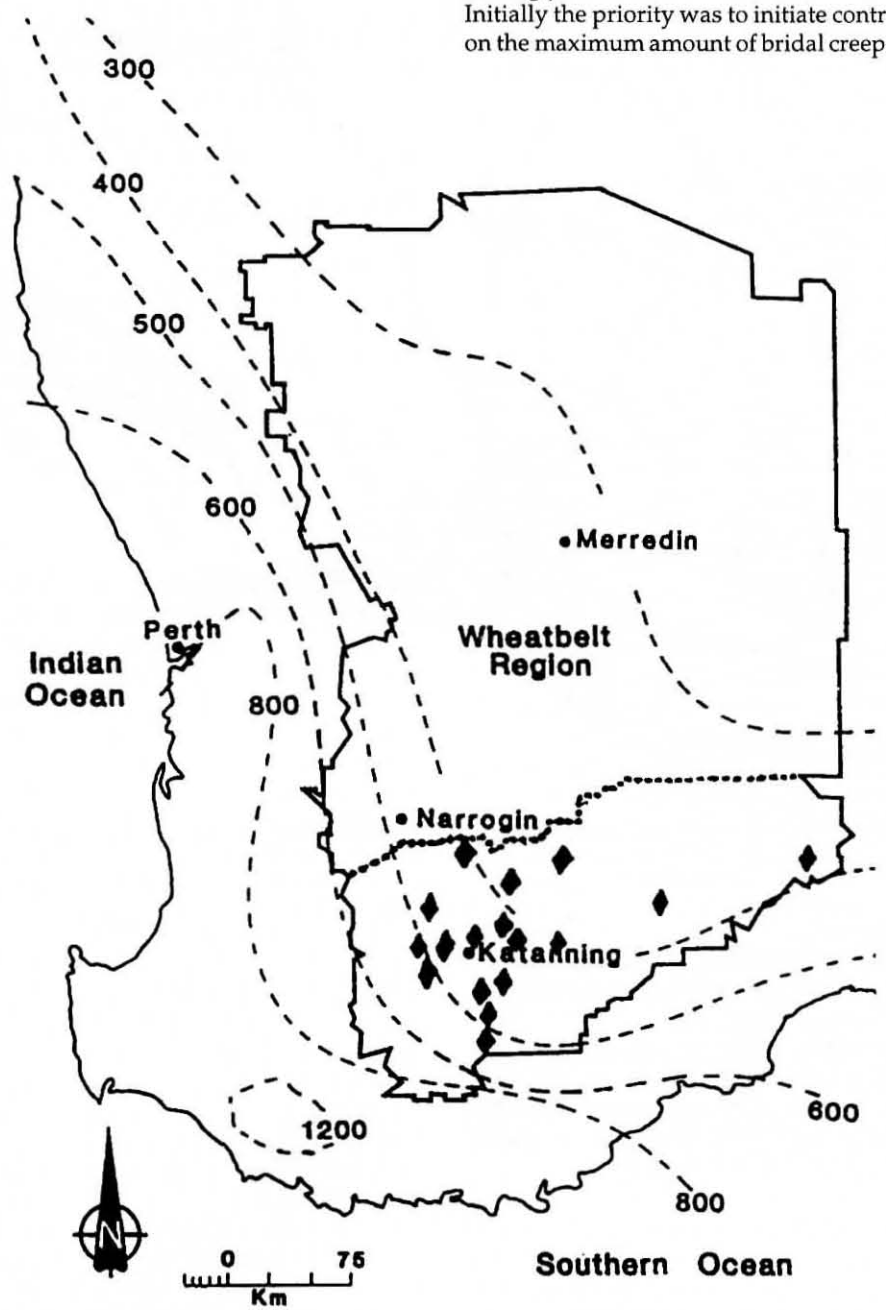

Figure 1. Regional/District boundaries; rainfall and occurrence of bridal creeper on nature reserves. — Wheatbelt Region boundary, ... Katanning District, - - - isohyets (mm), ◆ bridal creeper (on nature reserves).

with the limited resources available (see below). Early trials with herbicides indicated that best results were gained when plants were sprayed at maximum growth stage, just before flowering. Although available information indicated the species as flowering from late August to October, field observation showed that in this District at least, flowering could be as early as mid-July. Also, depending upon seasonal conditions, flowering was not simultaneous across the District. In consequence several groups of priorities could be set depending upon seasonal conditions and other work commitments.

Three further factors are considered when setting priorities:

i. accessibility for operations, whether due to terrain or seasonal conditions,
ii. the likelihood of reinfestation from non-CALM managed land, and
iii. conservation considerations, e.g. presence of rare or priority flora and any approvals or additional survey requirements.

Allocation of resources

The main limiting factors are the availability of funds and people at the right time. Vehicles and equipment are generally multi-functional and are available at the same times as are the people.

One of the benefits of a long-term, planned program is that managers can make a commitment to funding. Since commencement of the Katanning program an average annual budget of $5300 has been set aside for bridal creeper control. The approximate annual division of this budget has been, salaries and wages 45%, materials 40% and vehicle running 15%.

The allocation of people-time has proved to be much more complex than the allocation of funds, if the use of the latter is to be maximized. Given that the available funds equate to something under 20 working days this appears to be simple. However the following also require consideration:-

i. late-winter to spring is when staff resources are reduced due to leave and training commitments during the non-fire season,
ii. the use of herbicides is impractical on wet and/or windy days and alternative tasks must be available,
iii. within the Katanning District observation has shown that plant 'die off' may start as little as two weeks after the commencement of flowering, giving a very narrow 'window' for effective operations, and finally
iv. small, remote infestations which may require less than 2–3 hours work should be piggy-backed with other operations in the vicinity to remain efficient.

Given that availability of funds and people are identified as limiting factors in a control program the obvious solution is to supplement these from external (outside of CALM) sources.

In 1993 the Katanning District applied for, and received, Commonwealth funding under the CEPANCRM Program to employ and train a small group of Aboriginal people for four weeks on bridal creeper control techniques. This project resulted in the control of the two largest bridal creeper infestations in the District with herbicide. The program was considered to be very successful. The project did not continue beyond 1993, mainly due to a breakdown in communication between the actual participants and the Aboriginal and government agencies involved. The opportunities for similar projects will continue to be considered.

Monitoring

Monitoring need not be formal and can be based on observation provided that the mechanism exists to communicate the information for the benefits of the program. Two aspects need to be monitored efficiently to implement an effective program:-

i. information of the growth stage of plants across a broad range and in a diversity of habitats is required to ensure resource allocation and priorities for action are efficient,
ii. results of spraying and other operations, with 'best guess' reasons, based upon observation, for particular failures or successes.

As an example of the latter point, an infestation at Kojonup failed to show any response to spraying in 1995. Investigation revealed that on an otherwise perfect day for spraying a localized rainfall of less than 2 mm some two hours after completion of spraying was the probable cause of the failure.

Management

CALM operations

One of the objects in bridal creeper control is to minimize the risk of spread of the weed during other reserve management operations and to contain its spread by non-human agents. The strategies to meet this objective are based upon an assessment of the weed spread vectors.

Plant and machinery

Although bridal creeper spread is primarily by seed, linear spread caused by disturbance of the root mass is not uncommon, e.g. during maintenance of roads and tracks. This type of spread can be by ensuring that all plant and equipment is cleaned down prior to commencing any operation and that examination and clean down are conducted regularly during the operation. In principle this procedure involves standard hygiene practices with bridal creeper factored into the task prescription. Where the weed is known to occur in proximity to other operations, alternative methods should be investigated, e.g. using herbicides for maintenance of fire-access tracks.

Rubbish disposal

Within the wheatbelt many isolated infestation can be sourced to old rubbish dumping, particularly garden refuse. Another example is where it was planted around a pet's grave. A complete clean-up of the site, including some surface scalping, is the recommended option. Subsequent disposal may be by high temperature burning or deep burial (at least 2 metres); dumping at the local tip is not recommended.

Seed dispersal by birds

The aim of this strategy is reducing the amount of seed available for birds to spread. Whereas the generally accepted method of containing weed infestations is to commence around the perimeter and work inwards, we now target the core of the infestation with the largest plants on the basis that this is where the most seed is produced.

Spread by rabbits

Spread of seed in rabbit droppings has been observed, particularly in the vicinity of warrens. A strategy of rabbit control, where necessary, in conjunction with bridal creeper control operations is now being implemented.

Spread along watercourses

Occurrence of bridal creeper along watercourses has previously been attributed to the fact that in this District watercourses tend to be corridors which concentrate seed distribution by birds. Recent observations of dense seedling germination along the high watermark following summer thunderstorms indicate that waterborne seed dispersal does occur. Although no firm strategy to address this vector has yet evolved placing a higher priority on stream edge control within individual infestations is being considered.

Non-CALM lands

The Katanning District does not have the resources to asses the impact and distribution of bridal creeper on non-CALM lands throughout the District, although it is known that infestations are widespread and in some instances severe. Similarly resources are not available to undertake control works on non-CALM land and this is unlikely to change.

None the less to ignore the broad scale impacts of environmental weeds, and especially their potential to re-invade CALM managed land would be a recipe for disaster. The District has adopted a practice of publicizing our efforts to

control bridal creeper in the local media and promoting the control of this and other environmental weeds to Landcare groups and local authorities. Other promotions, such as by the Roadside Conservation Committee, have further highlighted these issues. Five Local Authorities within the Katanning District are now actively promoting bridal creeper control.

Control operations

Of the three options for bridal creeper control, biological, physical and chemical, the first is unavailable at present and the second was found to be impractical in the field. Consequently the Districts control operations are based upon the use of chemicals. During 1988 initial trials on herbicide selection, concentration and application techniques were initiated on private property. Further development continued on nature reserves in subsequent years and is ongoing.

Herbicide selection and concentration

Roundup® (glyphosate 360) and Glean® (chlorosulfuron 750) at 1:100 are recommended in several publications. Trials showed this formulation to be effective, however concerns are held as to the long term effects of the use of Glean in nature reserves.

Roundup alone at a rate of 1:100 was trialled as an alternative with variable results. It is probable that in some instances insufficient active ingredient is available to effect the large root mass of some plants.

Roundup at an increased concentration of 1:50 was then found to be as effective as the Roundup-Glean mix. With the advantages of a simplified mixing procedure, reduced risk to conservation values and a reasonable on ground cost Roundup at 1:50 has been utilized for bridal creeper control in the Katanning District since 1990.

Application equipment

Most bridal creeper infestations in the Katanning District were found in bushland difficult to access. Therefore vehicle-mounted spraying equipment has only limited application along the margins of tracks and roads.

Portable sprayers in the 8–10 litre capacity range are used for District spraying operations. Larger capacity back-pack types have been found to be clumsy and uncomfortable for bush operations. The additional weight caused fatigue which resulted in inefficiency when larger units were used for extended periods. To reduce time lost in refilling portable sprayers from a nearby vehicular unit mixed herbicide can be delivered to operators. One method of doing this has been to convey the mix to the operator in 20 litre containers using a wheelbarrow. It was also useful to store bulk mixed herbicide for filling portable sprayers and reduce the down-time of individually mixing chemical in small lots.

A further refinement of the wheelbarrow technique was to utilize a 4-wheel motor cycle. The addition of a hand-gun and small hose reel to the motor cycle unit, when used in tandem with an operator using a portable unit, resulted in increased productivity in excess of 250%.

Application techniques

Effective control of bridal creeper using Roundup depends upon total cover spraying of plants to 'drip off' point. Poor early results were attributed to plants being missed or only partly sprayed. The use of marker dye in the mix and delineating grids using flagging tape improved control and is recommended.

Within natural vegetation the death of native species as a result of over-spraying is cause for concern. In practice it has been found that sprayers with an adjustable nozzle can be set to distribute a coarse droplet size on a narrow band which produces little, if any, over-spray in the hands of a careful operator.

As Roundup is only effective on green plant tissue bridal creeper clinging to tree trunks, the stems of woody shrubs can be sprayed with little risk of damage to the 'host' plant. In consequence spraying within denser vegetation is often much more practical than might have been anticipated by the casual observer. In practice it has been found that some overspray onto the 'host' plant in very dense situations, whilst killing some leaves and small branches, can be tolerated.

Within denser native vegetation where it is obvious that bridal creeper cannot be sprayed without serious risk to its 'host', it may be practical to physically strip the creeper down without breaking it off from its root mass, lay it on the ground and then spray it. This technique, whilst physically possible, is inefficient in that an additional operator is required to assist the person doing the spraying. None the less it remains an option where conservation values are high enough to warrant the effort, e.g. in proximity to rare flora.

Further options

The application techniques given above are essentially methods of spot control. There will no doubt be situations where an infestation is so dense that even the most extreme of these techniques is impractical.

One option in such situations is to collect propagation material, i.e. seeds and cuttings, from the infested area and propagate them off site. Once this has been done the site can be cover sprayed until bridal creeper is controlled sufficiently to allow reintroduction of the native species.

A possible further option is based upon a single observation which probably warrants investigation.

Fire

Following an autumn fire on a small infestation on private property one of the first species to emerge was bridal creeper. In this situation access for control is considerably improved as many native species have not emerged. An opportunity exists to initiate control works in previously difficult situations. Observations and results of trials in these situations are needed.

Conclusions

The experiences with bridal creeper in the Katanning District since 1987 have shown that difficult problems can be tackled with very limited resources provided that certain ingredients are present:

i. a commitment to tackle the problem from all staff,
ii. a planned approach to the problem, and
iii. a commitment to try new ideas and techniques based upon the observations and experience of all staff.

Based on results of the control programme in the Katanning District, bridal creeper will be successfully controlled on lands under CALM management in the near future.