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factsheet

Release of biological control agents: additional strains of leaf-rust fungus to control blackberry



r u s t t o c o n t r o l b l a c k b e r r y

Background

European blackberry (*Rubus fruticosus* aggregate) is one of Australia's 20 Weeds of National Significance.

Blackberry infests about 8.8 million hectares of southern Australia (more than the area of Tasmania). At least 15 different but closely related taxa (for simplicity referred to as species) of weedy blackberry have been identified in Australia. Many species have the potential to spread further within the climatic limits of blackberry's range.

Blackberry can be managed using a range of control methods including chemical, physical and biological control. Biological control (eg using rust fungus) is particularly useful in large inaccessible areas.

Rust fungus

Presence in Australia

The leaf-rust fungus *Phragmidium violaceum* is present on European weedy blackberry in Australia.

The rust has been introduced on a number of occasions. There was:

- an unauthorised introduction in 1984; and
- authorised releases of strain F15 as a biological control agent in 1991 and 1992 after extensive host-specificity testing.

Spread of the rust disease throughout southern Australia was rapid and the rust now occurs in most blackberry infestations in Australia.

Project: National blackberry biological control program in partnership with the community to release and monitor the establishment, persistence and impact of new rust strains in blackberry-infested regions.

Participants: Land managers, CSIRO, University of Tasmania,

Commonwealth, State and Local governments, Natural Resource Management regions.

Location: Across Australia

VET sector resource: RTD3707A
Release biological control agents

Ideal conditions

Since its introduction this rust fungus has provided useful control in some situations. In some areas climatic conditions are unsuitable for this rust's establishment and growth, or the rust strains are not suited to the blackberry species.

The most significant impacts of rust on susceptible blackberry species have been in localities where the annual rainfall is greater than 800 mm and the average maximum daily temperature for the month of January is about 20°C.

Since introduction to south-east Victoria *P. violaceum* has significantly

reduced the biomass of at least two species of the *R. ruticosus* agg.

Work in the 1990s by the Weeds CRC improved understanding of genetic variation in blackberry, and improved prospects for its biological control.

Characteristics of the rust

The rust fungus *P. violaceum* completes its life cycle on members of the host species *R. fruticosus* agg.

The rust fruiting bodies (spores) damage the leaves. One type is bright yellow, wind-dispersed and responsible for epidemics during the growing season. Another is black, produced at the end of the growing season and allows the rust to overwinter on infected plants.

The rust infects leaves and occasionally green stems, leaf stalks, sepals, and unripe fruits. It obtains nutrients and water from blackberry plant cells reducing its ability to grow and reproduce.

The rust fungus is capable of reducing daughter plant production of blackberry, which reduces its vegetative spread.



Blackberry infected with the rust fungus, *Phragmidium violaceum*.
Photo: CSIRO Entomology

Additional rust strains

A garden of European genotypes of blackberry found in Australia was established in France in 1999 by CSIRO and the Weeds CRC. The aim was to "trap" additional strains of *P. violaceum* that are virulent on these plants. These additional rust strains would enhance biological control options in Australia.

Selection and testing

During 2002, eight additional strains of the rust were selected from the trap garden and imported and tested in the Canberra CSIRO High Security Quarantine Facility. Their virulence and their host-specificity was determined.

Release in Australia

In 2004 Biosecurity Australia approved the release of additional strains of rust. First releases were made in April 2004. Limited releases of additional rust strains have been made in NSW and WA (by CSIRO) and in Victoria (by Department of Primary Industries). This



Release of additional blackberry rust strains.
Photo: CSIRO Entomology

has enabled the trialling of various techniques and timing, before embarking on a large-scale national rust release program.

Identifying additional strains

In the field, additional rust strains cannot be visually distinguished from existing rust populations.

A molecular diagnostic tool is being developed to distinguish between rust strains. This technique will allow extensive screening of rust samples to monitor establishment of recently released strains.

Future community involvement

National release of rust

Funding is being sought to establish a coordinated national release and monitoring program for the additional strains of blackberry rust. Assuming funding is received the project will commence in April 2006.

Suitable release sites

The new project will require sites suitable for release of the additional rust strains. Strategically located release sites will be identified through an **Expression of Interest** process involving the community. Community-based rust releases will be supported with field days and written information

including release guidelines. Success of the releases will be measured by evidence of rust strains persistence and impact at selected sites. Natural spread of the rust strains should lead to self-sustaining biological control.

Collection of samples

Participants in the Weeds CRC blackberry identification workshops will be encouraged to collect blackberry specimens from severely weed infested sites in their regions. (See Weeds CRC Factsheet *Weed Management: collecting blackberry specimens for identification*).

Pressed blackberry specimens and their details should be sent to Dr Louise Morin at CSIRO Entomology who will organise lodgment at herbaria and have their identification confirmed. Information compiled about the sites will be used to map various blackberry types and devise the rust release strategies.



Inoculation of blackberry with rust fungus.
Photo: CSIRO Entomology

For further information visit the Weeds CRC's website: www.weeds.crc.org.au

CRC for Australian Weed Management

Waite Road, Urrbrae
PMB 1, Waite Campus
Glen Osmond, SA 5064

T 08 8303 6590
F 08 8303 7311

E crcweeds@adelaide.edu.au

Written by: Annette Beer, Education Officer, Weeds CRC (DPI Wagga Wagga, NSW); and Dr Louise Morin, Weeds CRC, (CSIRO Entomology, GPO Box 1700, Canberra, ACT 2601).

Further reading: Weeds CRC Factsheet *Collecting blackberry specimens for identification*; *Weed Management Guide: Blackberry*, (NHT & Weeds CRC); and www.ento.csiro.au/weeds/blackberry



Established and supported under the Australian Government's Cooperative Research Centres Program

Ref: 43/2005/fs

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