

# Guidelines for community participation in the wandering trad biological control release program in New South Wales

## Project aims

The primary aim of this project is to facilitate the broadscale release in NSW of the leaf-smut fungus named *Kordyana brasiliensis*, a biological control (biocontrol) agent that specifically attacks the environmental weed wandering trad (*Tradescantia fluminensis*). The project is co-funded by CSIRO and the New South Wales Government through its Environmental Trust between July 2020 and June 2023.

Biocontrol agent releases will be undertaken by CSIRO in partnership with community stakeholders, including private landholders, weed control operators, government agencies and volunteer community groups, such as Landcare and Bushcare. In parallel to community releases, CSIRO will also evaluate the establishment, spread and impacts of the biocontrol agent on wandering trad at several monitoring plots over the next few years. This monitoring will also reveal the flow-on effects of wandering trad biocontrol for native vegetation regeneration.

For more information:

- **Landholders** wishing to release the biocontrol agent on a private property, please register your interest with John Lester ([John.Lester@csiro.au](mailto:John.Lester@csiro.au); +61 2 6246 4325) and Ben Gooden ([Ben.Gooden@csiro.au](mailto:Ben.Gooden@csiro.au); +61 2 6218 3896).
- **Government officers** wishing to make coordinated biocontrol releases across a particular jurisdiction, please register your interest and request a meeting to discuss a release strategy with Ben Gooden ([Ben.Gooden@csiro.au](mailto:Ben.Gooden@csiro.au); +61 2 6218 3896).
- **Volunteer community groups** (e.g. a Bushcare, Landcare, etc) wishing to make coordinated biocontrol releases as part of site 'working bees', please register your interest with Ben Gooden ([Ben.Gooden@csiro.au](mailto:Ben.Gooden@csiro.au); +61 2 6218 3896), citing the name of the organisation, the region in which you work, and contact details of the site leader or coordinator. Upon request, CSIRO researchers will work with each group to co-design a release strategy catered to the specific site conditions.

We would appreciate if all prospective participants could read these guidelines before requesting participation in the release program.

## Background information on the biocontrol agent

### What is wandering trad?

Wandering trad (*Tradescantia fluminensis*) is an herbaceous, semi-succulent groundcover native to South America that has become a significant environmental weed of temperate to subtropical regions of Australia, with hotspots of invasion in moist forests of eastern NSW, south east Queensland and the Dandenong Ranges region of Victoria (see photos below). Wandering trad spreads rapidly by vegetative growth of lateral stems, thereby forming dense, matted 'carpets' that smother the undergrowth of vulnerable native forests, especially along drainage lines and creek embankments. Unlike many other weeds, wandering trad is highly competitive under low light conditions and can successfully invade sheltered, deeply shaded rainforest communities, where it can significantly reduce the diversity and health of native vegetation.

## What is the biocontrol agent for wandering trad?

The biocontrol agent (*Kordyana brasiliensis*) is a leaf-smut fungus that was discovered by researchers at the Universidade Federal de Viçosa during surveys in Brazil to identify candidate biocontrol agents for wandering trad. When infected by the fungus, wandering trad develops lesions on its leaves that eventually cause leaf death and overall reduction in foliage cover.

The main visible symptoms of fungal infection appear as light-green-yellowish 'spots' on the upper leaf surfaces and corresponding white-woolly patches on the lower leaf surfaces where spores are produced. Under optimal conditions (described below) the fungus can complete its life cycle within 2-3 weeks.

Infection by the fungus reduces wandering trad's capacity to photosynthesise and therefore its ability to grow. Our research suggests that the fungus will not completely kill wandering trad, but gradually defoliate the weed, thus reducing its competitive vigour.



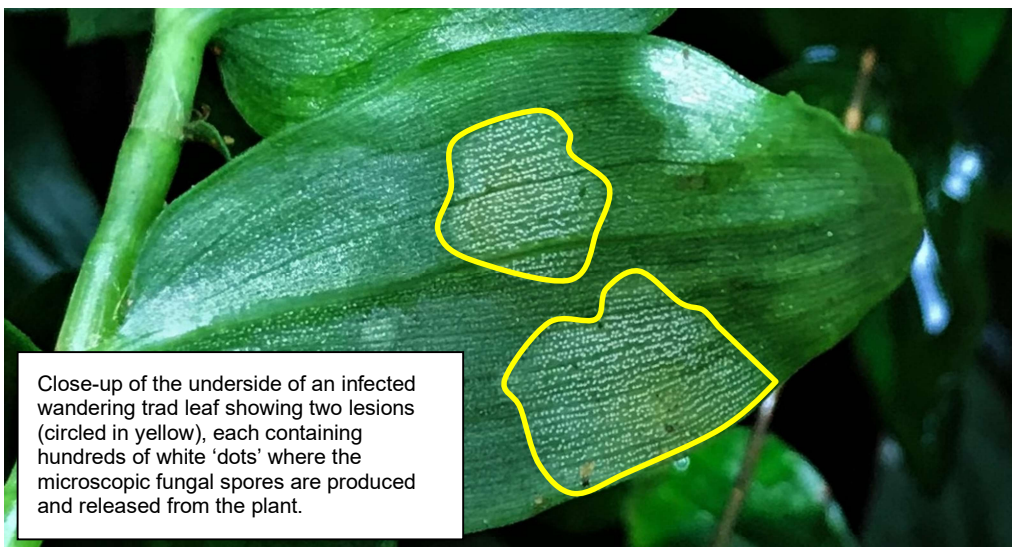




Disease symptoms caused by the leaf-smut fungus *Kordyana brasiliensis* on leaves of wandering trad (*Tradescantia fluminensis*). These are characterised by diffuse chlorotic (i.e. yellowish) spots on the upper surface of leaves (A) and corresponding whitish lesions on the lower surface of leaves where fungal spores are produced (B). Lesions become necrotic as they mature, eventually causing leaf death (B. Gooden; Kangaroo Valley, NSW).

### What conditions promote fungal infection and spread?

White fungal spores are produced on the underside of infected wandering trad leaves (see photo below). These spores then spread over short distance and must land on the undersides of nearby wandering trad leaves to infect via the stomata (tiny openings in plant tissue that allow gas exchange for photosynthesis). Fungal spores that land on any other surface (e.g. on soil, in water, on a rock, leaf litter, or on the leaf of another plant species that is not wandering trad) will die. The probability of fungal infection and establishment will most likely be higher in humid, shaded habitats with a high density of wandering trad. Very dry, hot and sunny conditions will impede fungal activity.



Close-up of the underside of an infected wandering trad leaf showing two lesions (circled in yellow), each containing hundreds of white 'dots' where the microscopic fungal spores are produced and released from the plant.

Previous research has shown that, under ideal conditions (i.e. humid, shaded), the fungus may take between one to six months to establish, and begin spreading several hundred metres from the initial release point after one year. Over many years, as more and more leaves become infected and the fungus spreads out from the initial release point, it is expected that the rate of infection will increase exponentially. However, levels of fungal infection may fluctuate dramatically through time, even in sheltered locations, in response to unfavourable seasonal weather variability, such as hot, dry summers and prolonged drought events.

Ongoing research by CSIRO will seek to determine the specific environmental, habitat and climate conditions underpinning successful fungal establishment, spread and impacts on wandering trad.

### **Is it safe to release the biocontrol agent into the Australian environment?**

In 2014, CSIRO began rigorous evaluation of the risks of the fungus on non-target plants in Australia. Research focussed particularly on native species within the family Commelinaceae that are relatively closely related to wandering trad; these included species of *Commelina*, *Polliia* and *Aneilema*. This extensive testing was performed in a high security quarantine facility and involved exposing wandering trad and non-target plant species to the fungus under optimal conditions for infection. It was found that the fungus was **not** able to develop on any species other than wandering trad. No plant species other than wandering trad were adversely affected by fungal infection.

Based on these research results, in late 2018 the Federal Department of Agriculture, Water and the Environment approved release of the biocontrol agent into the Australian environment, with support from state and territory governments. The information package that supported the application to release the fungus in Australia, which includes all results, can be found here: <https://www.agriculture.gov.au/biosecurity/risk-analysis/biological-control-agents/risk-analyses/completed-risk-analyses/ra-release-kordyana-brasiliensis>.

### **What effect will the biocontrol agent have on native ecosystems?**

Providing that the biocontrol agent establishes and thrives, it is predicted that the overall effects of the fungus in ecosystems invaded by wandering trad will be positive. Over time, as the cover of wandering trad decreases as a result of fungal infection, native vegetation may be released from competition with wandering trad and begin to regenerate. Native regeneration may be particularly vigorous in relatively healthy remnant patches of rainforest with species rich seed banks. It must be considered, however, that any form of primary weed control, including with a biocontrol agent, may lead to secondary invasion by other weed species as the cover of wandering trad declines. The long-term capacity for native ecosystem recovery and risks of secondary weed invasion will be evaluated as part of CSIRO's ongoing vegetation monitoring program.

### **How should the biocontrol agent be deployed in concert with other control treatments for wandering trad?**

There are many ways that wandering trad is controlled, depending on the scale of invasion, land use type and management objective. Manual and mechanical control (including raking, soil scraping) is often used to remove small infestations from sensitive habitats (e.g. endangered rainforests along streams), but this often requires intensive follow-up visits over many years to suppress re-invasion. Hand-pulling and raking trad can also disturb the soil and promote invasion by other problematic weeds. Chemical control can reduce the cover of wandering trad over a broader area with less soil disturbance but may lead to non-target damage to native vegetation and is not desirable along sensitive waterways.

Biocontrol offers a more ecologically sustainable means of managing wandering trad in sensitive ecosystems where herbicide application is undesirable. Over many years, biocontrol may suppress wandering trad infestations in remote locations where repeated mechanical control is not feasible. Although the biocontrol agent will not entirely replace the need for other control methods, it may minimise the need for these in some sensitive ecosystems over many years. The benefits of biocontrol may also include reduced effort (time and

labour), reduced amount of herbicide required, and reduced risk of off-target damage, which equate to a reduction in cost.

In the first instance, we do **not** recommend releasing the fungus in patches of wandering trad already planned for herbicide control. The slow-growing fungus may not be suitable for use where large patches of trad need to be removed quickly (e.g. in preparation for mulching and planting native tree seedling tubestock). Herbicides may remain the most effective option in such cases.

It remains the responsibility of site custodians to meet the terms of any weed control compliance order imposed by the relevant authority in the area selected for a biocontrol release. Release of a biocontrol agent cannot be used as an excuse to not control wandering trad or other weeds at a site. There is no guarantee that the fungus will establish and have an impact on wandering trad at the release site.

## 2. Community participation in biocontrol releases in NSW

### Who is eligible to receive the biocontrol agent?

This project, funded by the New South Wales Government through its Environmental Trust, will fund release of the fungus in partnership with interested participants from NSW. Participants can include private landholders, government agents (e.g. NPWS, LLS, DPIE, Council, etc.) and members of volunteer community groups (e.g. Bushcare, Landcare etc) working in NSW.

- **Landholders** wishing to release the fungus on a private property, please register your interest with John Lester ([John.Lester@csiro.au](mailto:John.Lester@csiro.au); +61 2 6246 4325) and Ben Gooden ([Ben.Gooden@csiro.au](mailto:Ben.Gooden@csiro.au); +61 2 6218 3896).
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### When will the biocontrol agent be made available for release?

The fungus will be provided to registered participants at regular intervals between September 2020 and June 2023. The specific timing of delivery will be determined by prevailing climate conditions, quantity of available material for releases and level of demand from registered participants. Our aim will be to release the fungus equitably throughout NSW multiple times per year under suitable climate conditions.

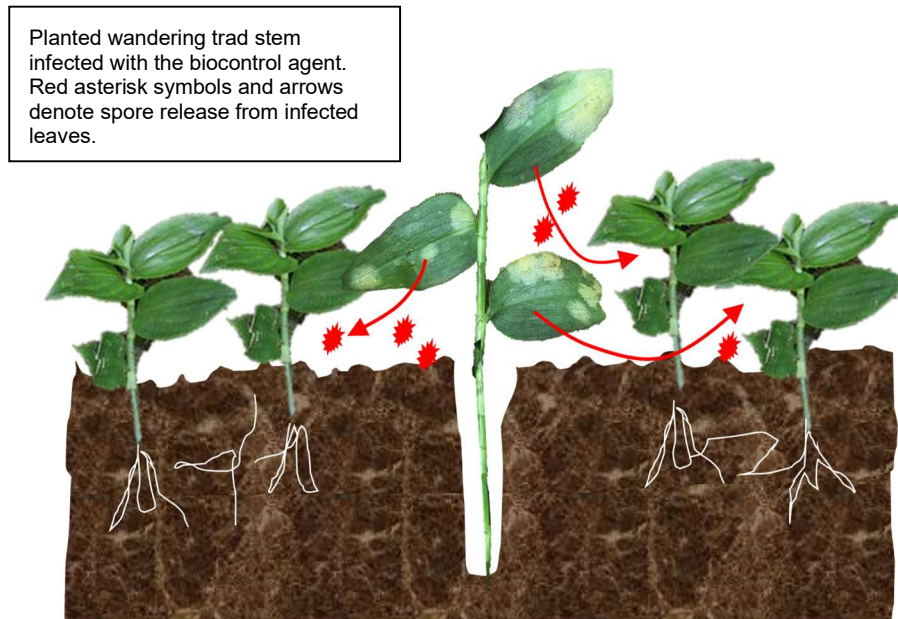
### How will the fungus be delivered to participants?

Wandering trad stems infected with the fungus will be delivered via post, contained within plastic bags. We recommend that participants release the fungus as soon as possible upon receipt. However, the stems can be stored for a couple of days if required before planting by removing them from the plastic bag as soon as the parcel is received and placing the stems in a vase with water (as one would for cut flowers) stored on a window sill out of direct sunlight until ready for planting in the outdoors.



### How should the fungus be released?

Simply make a small hole in the soil (using the end of a pen or small stick), insert a couple of inches of one of the infected wandering trad stems received and gently press the hole closed. Water-in the stem if the soil is dry. There is no right or wrong way to distribute the infected stems at a release site. For example, if you receive 10 infected stems for release, you may choose to plant each stem about one metre apart in a single dense patch of wandering trad. Alternatively, you could plant five infected stems clustered together in one location and the other five stems in a second location a few kilometres from the first group on a separate creek line – it is up to you.



### Where and when should the fungus be released?

The fungus can be released anywhere where a wandering trad infestation occurs with permission from the relevant landholder or site manager. In the first instance, we recommend releasing the fungus under the following conditions:

- Where possible, infected stems should be preferentially planted in dense infestations of wandering trad (e.g. photo below), where the dense foliage cover will increase chances of surrounding plants becoming infected.
- Stems should be planted in relatively shady areas, sheltered from direct sunlight (especially in summer) to increase chances of establishment.
- Stems should be planted under humid, cool conditions, e.g. along creek lines, under shaded forest canopies, drainage lines, gullies etc. Moderate to high humidity coupled with cool-warm temperatures will most likely promote successful fungal establishment and spread. As such, we do not recommend releasing the fungus during periods of severe frost or under hot, dry summer conditions.

### What information do I need to supply to CSIRO in exchange for the fungus?

In exchange for the fungus, participants should return the following information to CSIRO researchers via email (or telephone if requested). All personal information will be treated confidentially:



- Name of participant
- Affiliations (i.e. were releases made as a private property owner, as part of a coordinated 'working bee' at a Bushcare or Landcare site, etc).
- Release date/s.
- Release location. This may be in the form of a GPS coordinate or a location description.
- Number of stems planted at each location.
- General description of habitat and weather conditions during the week in which the stems were planted.
- A photo depicting the general condition of the habitat infested with wandering trad (see example below).

Information should be emailed to John Lester ([John.Lester@csiro.au](mailto:John.Lester@csiro.au), +61 2 6246 4325).

**If you would like more detailed information about the project, please contact Ben Gooden.**



Landscape view of the vegetation where infected stems were planted in a dense patch of wandering trad showing general site condition.