

RUSSIAN WHEAT APHID RISK ASSESSMENT AND REGIONAL THRESHOLDS

GRDC Investment 9176535

Trial site FAQ sheet

Economic thresholds will be a key step in managing Russian wheat aphid (RWA). They provide guidance on when (and if) to action chemical control measures in order to avoid significant yield loss and can save time and money. Seed treatments are often used to manage RWA, however this control must be used responsibly and only when regional risk of early RWA infestation is deemed to be high. As a part of this investment the South Australian Research & Development Institute (SARDI) is developing regional economic thresholds to guide RWA management decisions into the future. This FAQ sheet provides information on the purpose and design of local aphid trials that will support development of thresholds.

Q. How are regional economic thresholds being developed?

A. In 2018, 15 trial sites were set up throughout South Australia, Victoria, southern NSW, and Tasmania in collaboration with regional organisations. Trial site operators, under the guidance of SARDI, recorded RWA infestation levels, symptoms and subsequent yield.

Since the project team currently has only one season of trial site data no inferences can yet be made about what thresholds will work best. However, there will be a large amount of valuable information gained from running these trials and this information is crucial for determining the point at which intervention makes the most economic sense.

Q. Can I use international thresholds?

A. Currently, threshold recommendations are based on US research, which is the best advice that researchers can supply. This research recommends control at >20% of all seedlings infested up to GS 30 and >10% of tillers infested from GS 30.

The current GRDC investment is developing regionally relevant economic thresholds. This is an important objective because farming systems, climate, and varieties differ between Australia and the US. This investment will ensure growers have access to the most appropriate and effective thresholds that can be developed for RWA in affected Australian regions. Local trials are crucial to the development of these regional thresholds.

Q. How can you be sure RWA will be found at trial sites?

A. To determine scientifically robust thresholds pest infestation must occur. In 2018, to ensure damage was obtained, a subset of sites were 'inoculated' with wingless RWA at GS 20. Inoculations occurred only in regions where the aphid had been detected and a series of measures were put in place to minimise the risk of the increased population to surrounding areas during and after the trials.

The non-inoculated trials did not show significant RWA numbers and these sites provided insufficient data for threshold development. In contrast, inoculations resulted in aphid infestations above US thresholds and yield loss was observed in low rainfall zone sites. This resulted in data that can be used for threshold development and emphasises the benefit of using inoculations to achieve enough infestation to determine thresholds.*

Q. What trials are planned during 2019?

A. In areas where RWA has established recently (northern NSW), trials will rely on natural infestation of RWA at these sites. As was the case in 2018, the next set of inoculated trials are only being conducted in areas where RWA has been confirmed as established since 2017. Since the project team expects the RWA pressure will again be very low after a dry summer, inoculation will give the best chance of success in developing regionally relevant economic thresholds.

Q. How will inoculated trials be structured?

A. Inoculated trials are made up of 52 plots (~8 x 1.5m) - 16 naturally infested control plots and 36 inoculated plots (0.05 ha in total). Inoculated plots will receive 500 un-winged aphids each at GS 20 (June/July). In addition, 1/3 of these plots will be seed-treated and 1/3 will be sprayed using chlorpyrifos at GS 35. The remaining plots will be untreated.

"We didn't know what to expect with an inoculated trial. Once established, there was some movement of aphids from inoculated plots to adjacent plots due to prevailing winds. However, we had a large buffer zone around this trial. We managed neighbouring trials and the surrounding paddock resulting in successful control of aphid spread. There was a little more movement later in the season as the weather warmed up but this was also picked up early and managed.

As trial managers, it was our responsibility to be vigilant on controlling aphid spread outside of the trial area. When in the paddock other trial work was completed prior to walking through the RWA trial to reduce spread by our staff and vehicles. Awareness is key, we knew there was a chance of spread so we kept on top of it and didn't run into any major issues." - Birchip Cropping Group, manager of 2018 Birchip trial site

*Overall, the inoculated trial results from 2018 showed little yield loss. Only extreme aphid infestations combined with extreme drought stress in low rainfall areas resulted in significant yield loss.

Q. Is there a risk of RWA movement onto my farm from trial site plots?

A. Though it is possible that some aphids could migrate from the trial plots, there is minimal risk to the surrounding area. During 2018 movement of RWA between plots (i.e. inside the trials) was extremely low. Once unwinged aphids have settled into the trial site in late autumn further movement is minimal during autumn and winter as these aphids have a ready food source and temperatures are too low to allow migration. Buffers of seed treated cereals around the trial, monitoring and (if needed) an additional chlorpyrifos spray of part of the surrounding paddock where the trial is located will provide extra security. RWA migration leading to potential damage in other paddocks in the region is highly unlikely. As the trial site crops mature in late spring, they will become less palatable to RWA. Prior to ripening, winged aphids will develop at trial sites and take flight, looking for non-cereal hosts.

Migration of winged aphids require local conditions to be just right. In order for winged RWA to migrate temperatures need be high (20-25 degrees) and wind speed must be low. In 2018, migrating aphids were observed around all trial sites in spring, including the non-inoculated trials, demonstrating that natural populations are persisting everywhere that trial sites were located. However, at this point commercial cereal crops in the area are past the 'palatable' stage and are at minimal risk of an infestation. In the unlikely event that infestation does occur at a mature growth stage (>GS 40) impact on yield is highly unlikely.

Q. Can you tell me about any additional trial site measures that will minimise RWA movement further?

A. Under the guidance of aphid experts at SARDI, local trial site operators will be taking the following measures:

- The aphids added to inoculated trial sites will not have wings and are therefore unable to travel more than a few metres.
- Aphids at trial sites will not develop wings as long as the host plant quality is reasonably good. Trial site operators will monitor the crop quality and the proportion of non-winged aphids during observations,

and will place yellow pan traps at each site to record migration.

- Trials will have buffers of seed-treated cereals around the inoculated area or will be located within a non-cereal paddock. Operators will observe these buffers regularly for signs of aphid migration.

These measures will further reduce the risk of RWA added to trial site plots infesting the surroundings. If aphid migration into the surrounding paddock area is observed an additional insecticide will be applied to the area.

Q. Are you consulting in my region about this trial?

A. Subcontractors and SARDI will consult with local growers and agronomists to ensure stakeholders agree that RWA is established in the region and understand how the trial sites will be structured and managed. The project team hopes this has helped you to understand how these trials will contribute to effective management of RWA in your region.

Q. How can I find out further information?

A. Contact the Project Lead, Dr Maarten van Helden at SARDI
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View RWA detections in affected regions at: cesaraustralia.com/sustainable-agriculture/RWA-portal

What is the Russian wheat aphid?

A pest of cereals, particularly wheat and barley, RWA was detected in Australia in 2016. RWA is present in a large and still expanding area covering all cereal growing regions of South Australia, Victoria, Tasmania and most of New South Wales. Late last year RWA was detected on the Liverpool Plains in NSW – almost 400 km north of its previously reported range.

There is still much we do not know about RWA biology in Australia. Observations over the last three years confirm that presence of RWA in a region does not automatically result in crop infestation and yield loss. The presence or absence of an autumn green bridge depending on irrigation or summer rainfall seems to be a key factor.



This research initiative is a GRDC investment that seeks to deliver information on Russian Wheat Aphid management for grain growers. This project is being undertaken by the South Australian Research & Development Institute (SARDI) and cesar.