# Managing Russian wheat aphid risk – late season and green bridge considerations

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**GRDC project code: UOA1805-018RTX**

*The GRDC investment, 'Russian wheat aphid risk assessment and regional thresholds', is investigating regional risk and management tactics for Russian wheat aphid (RWA). After sampling RWA throughout spring, the South Australian Research and Development Institute (SARDI), the research division of Primary Industries and Regions SA, and **cesar** have a picture of how a hot, dry summer and autumn leading into the winter cropping period has impacted aphid abundance in cereal hosts. In addition, in 2019 a new round of RWA trial site experiments was run at 13 locations throughout south eastern Australia, which has given researchers a second set of data to support development of regional economic thresholds. In this update we provide further details on RWA abundance and spread, describe preliminary results from aphid trials, highlight key management considerations for late spring and summer, and outline next research steps as the project draws to a close.*

## Key late season considerations

- Over spring, winged RWA will be migrating to alternate hosts, such as weedy grasses and pasture species.
- Migrating RWA are unlikely to infest cereals during spring beyond booting stage (GS40).
- RWA survival in the green bridge over summer will be influenced by environmental conditions, which will affect numbers of aphid capable of migration into newly sown cereal crops.
- When considering seed treatments for RWA control next season, assess the likelihood of infestation based on proximity of green bridge hosts, environmental conditions over summer, and the location of your property compared with RWA historical observations (see interactive map link under 'useful resources').
- Regrowth in paddocks cut for hay can provide a green bridge refuge for the aphid.

## Has there been an extension of range since the autumn update?

In the autumn update we reported that, to the best of our knowledge, there had been no extension of RWA range. Once again, at this current time it does not appear that the RWA has established populations north of its most northern detection in Coonabarabran (NSW), which was reported in October 2018. However, as the project team has emphasised previously, climatic modelling results clearly indicate that the aphid can establish in northern agroecological regions. This modelling was based on a non-drought year – current drought conditions may be limiting further spread of RWA.

We urge growers and advisers to make use of monitoring guidance in this information sheet, as well as the GRDC Tips and Tactics guide for RWA, and report any observations to your state Department of Agriculture. In the western region, where the aphid is not known to occur, the Department of Primary Industries and Regional Development has confirmed that there is no

formal monitoring for RWA occurring in Western Australia. In Western Australia, detection of this aphid will rely on reports received by PestFax and communications with agronomists.

Industry reports of RWA occurrence is extremely important for tracking of RWA distribution in south-eastern Australia and our continued ability to notify growers and advisers of any expansion of range.

**What was the level of RWA pressure on winter cereals this year?**
In autumn we predicted that the low abundance of RWA found during summer and preliminary autumn sampling is likely to work in the favour of growers this season in regard to RWA infestation of establishing crops.

Growers and advisers may have noticed that RWA has not been detected in cereal crops as frequently as in previous years. Pest Facts – south eastern and Pest Facts – South Australia services have experienced a drop in RWA reports in 2019 compared to the 2018 winter cropping period. Our green bridge RWA surveillance, which re-commenced in September and will continue until the end of 2019, also indicates that RWA abundance in cereals has been lower in 2019 compared with the same time period in 2017 and 2018 (figure 1).

When RWA populations were detected during recent green bridge surveillance, most were very small populations. Only at a small number of sites have RWA numbers been high, with 'hotspots' of aphid activity displaying in excess of 150 aphids per tiller in multiple locations on cereal crops. However, these colonies were quite localised. No reports of populations above intervention thresholds were received.

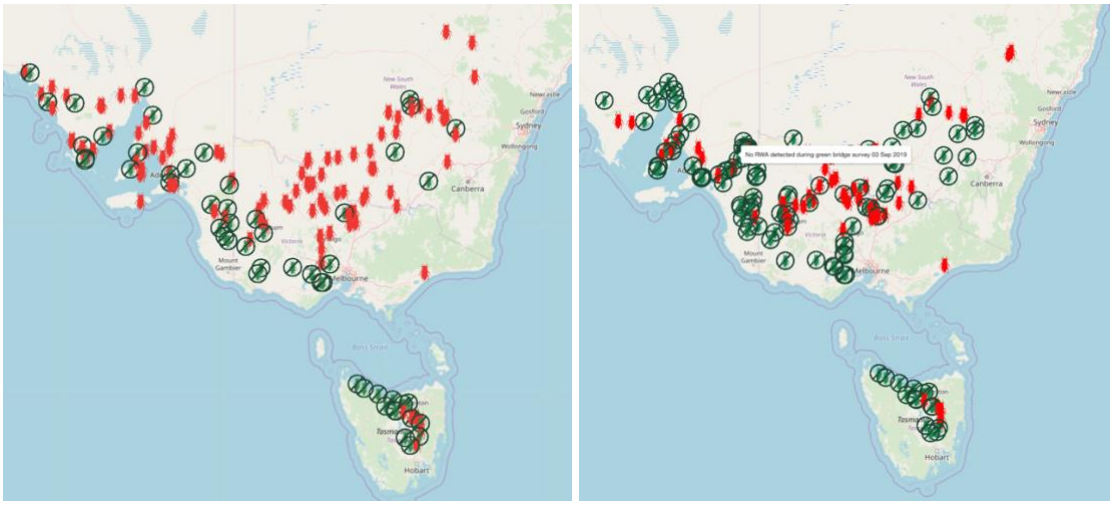


Figure 1. All RWA reports (green bridge surveillance and Pest Facts contributions) for the period of July-Nov 2018 (left) and July-Nov 2019 (right). Presence is represented by red aphids, and absence by green aphids with cross out. View interactive map.

**Why is RWA abundance in cereals lower in 2019 compared with 2018?**
A low number of detections during green bridge surveillance and the localised nature of detected populations indicate limited migration from the green bridge into autumn sown cereal crops compared to 2018. So what factors were at play over the 2018/2019 summer period when RWA were relying on volunteer cereal and pasture hosts?

1. Below average rainfall and above average mean daytime temperatures.
2. Low availability of growing 'green material' (grasses).
3. RWA populations were supported by irrigated hosts over summer-autumn, or by hosts in high rainfall areas.
4. Late break to the season (it had become too cold for migration by the time there was suitable green material to host new colonies).
5. RWA populations were less common from late summer-autumn.

After surviving at low densities in the 2018-2019 green bridge, few aphids capable of successful migration from summer host vegetation to newly sown crops during autumn may explain the patchy distribution and low abundance that we are currently observing. A comparison between spring 2018 sampling results and summer 2019 sampling results in figure 2 demonstrates the impact of summer conditions on RWA range. Continued surveillance has highlighted that environmental conditions leading up to autumn sowing is an important factor in determining risk posed by RWA each season.

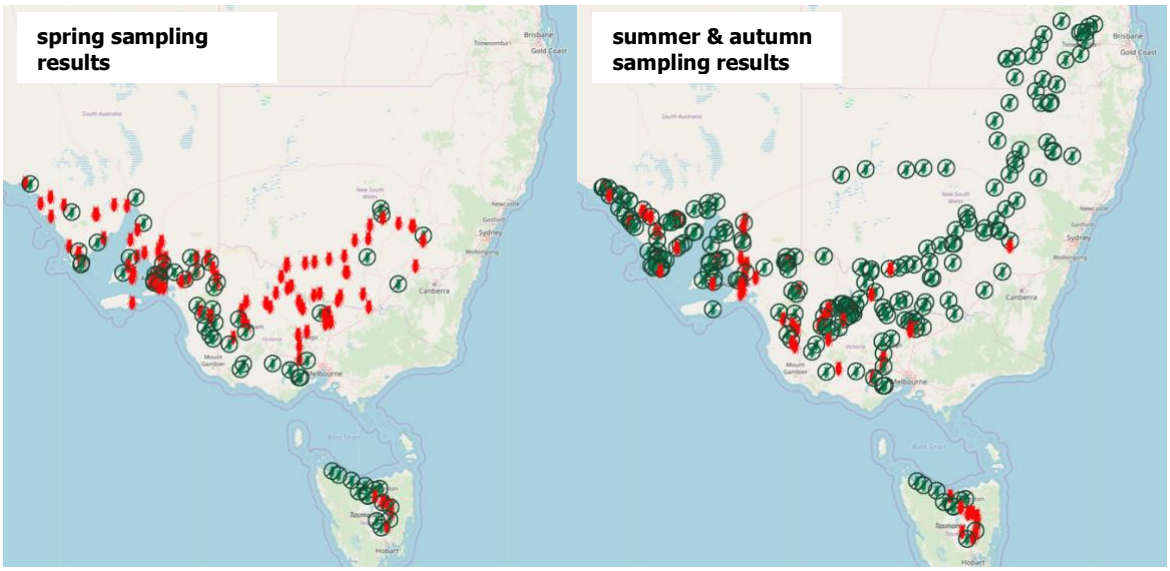


Figure 2. During spring 2018 green bridge sampling, RWA were detected in most locations sampled (bottom left). Several months later, during summer and autumn monitoring in 2019, RWA detections had decreased (bottom right). Red = present, green with cross out = not detected. Data collected by **cesar** and SARDI, map developer: James Maino, **cesar**

## Migration of RWA – where is the next stop?

With warmer weather, there is likely to be a build-up of RWA numbers, leading to populations becoming crowded and plant nutrients becoming less available. This will activate the development of winged RWA (alates), which will migrate during spring (**cesar** researchers made detections of individual winged RWA over early spring, indicating that at this point aphids were migrating and have not yet settled down to begin new colonies). According to project trapping results, spring migration covers 3-4 months over August until November. Autumn migration mainly appears to occur in March-May with lower numbers of aphid migrating at this time.

At later stages of growth, cereal crops are unlikely to attract migratory aphids. In the unlikely event that infestation does occur at an advanced growth stage (>GS 40), impact on yield is

highly unlikely. Winged aphids are more likely to seek out actively growing alternate hosts, such as weeds, pasture species or regrowth from mown paddocks.

Our surveillance of the green bridge during late 2018-early 2019, as well as past work by SARDI, indicated that key alternate host species include barley grass, prairie grass, great brome, soft brome, and volunteer cereals (regrowth from hay cuts and spilt grain volunteers) (figure 3).

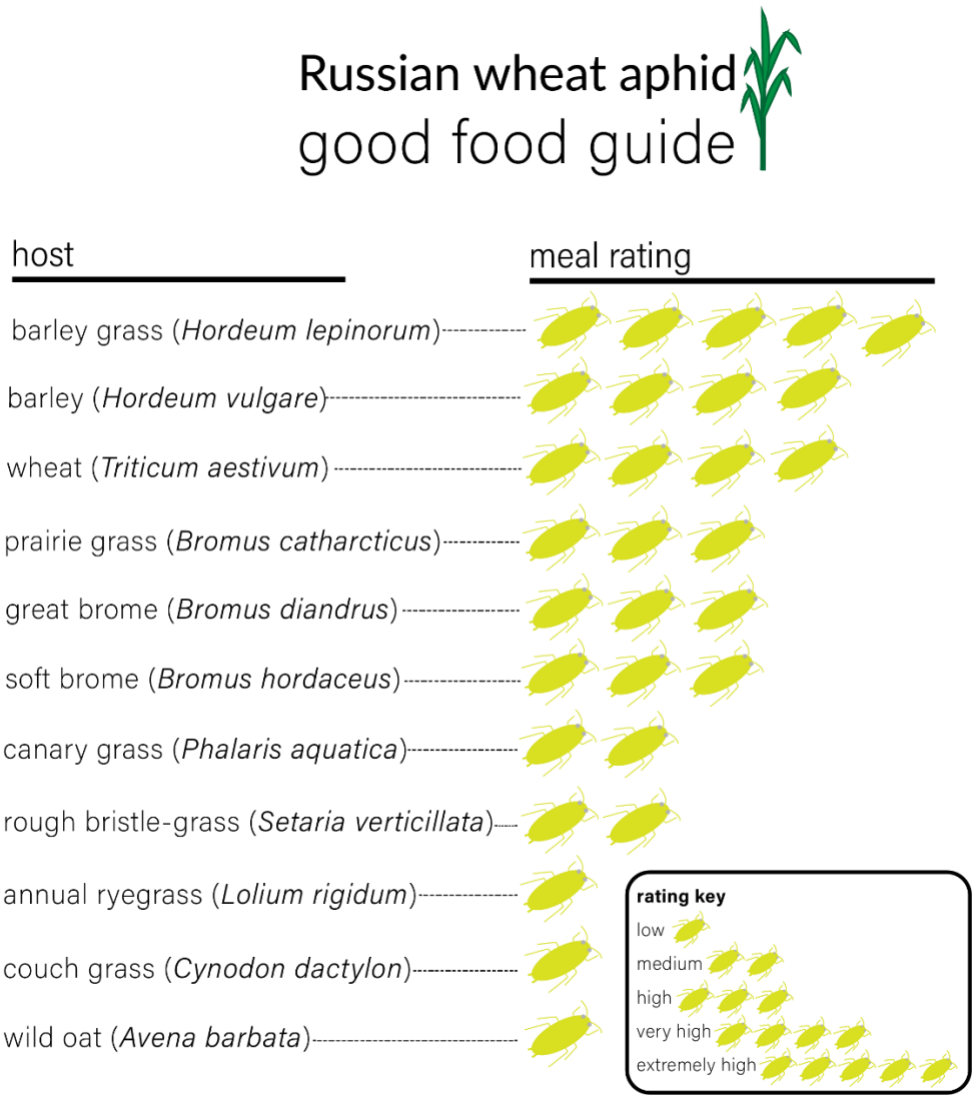


Figure 3. Relative host preferences of RWA in Australia, observed by SARDI and **cesar** researchers.

**What beneficials are impacting on RWA?**

With the weather warming, beneficial insects have become more abundant. High numbers of parasitoid wasps, lacewings and ladybird beetle larvae and adults have been observed to be feeding on RWA this spring. Keep an eye on your local beneficial populations and during the remainder of spring – you are likely to see plenty of predator activity. Parasitism is very easy to spot by the presence of aphid 'mummies', which are shiny and bronze in colour. Parasitoids

belonging to the Aphiidine (Hymenoptera:Braconidae) and Aphelinidae (Hymenoptera: Chalcidoidea) families are responsible for parasitism of RWA.

Figure 4. Parasitism of RWA (left) and ladybird beetle larvae observed to be feeding on RWA during recent green bridge surveillance (right). Credit: Dr Elia Pirtle, **cesar**.

**How close are we to developing Australian economic thresholds?**

We cannot expect that every season will produce such low numbers of RWA. While this aphid is manageable, green bridge conditions that favour aphid reproduction (mild and wet) and migration would increase the seasonal risk of experiencing a yield impact from RWA. Under these circumstances, active monitoring and following guidelines on the best time to actively manage the aphid will be critical. Spray decisions should be based on monitoring in late winter/early spring (GS32-35), giving time to control aphids if numbers are above the current threshold (figure 5). In 2017 and 2018, trials spraying aphids before GS40 seemed to efficiently eliminate the yield reduction.

As such, regional economic thresholds will be a key step in managing RWA during high risk years (seed treatments are often used to manage RWA, however this control must be used responsibly and according to regional risk). To continue collection of data that will enable project researchers to develop thresholds, 13 trial sites were set up in 2019 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.

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

To determine scientifically robust thresholds, pest infestation must occur. In 2018, some sites were inoculated with wingless RWA at GS 20. Inoculations occurred only in regions where the aphid had been established 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. We have produced a Frequently Asked Questions sheet to supply further information about inoculation of sites.

So far, none of the natural infestation trial sites have shown significant numbers of RWA, confirming that pressure is low. In the inoculated trial sites populations are developing to levels

around or above the preliminary intervention threshold. This will allow the project team to validate overseas intervention thresholds for Australian conditions during early 2020.

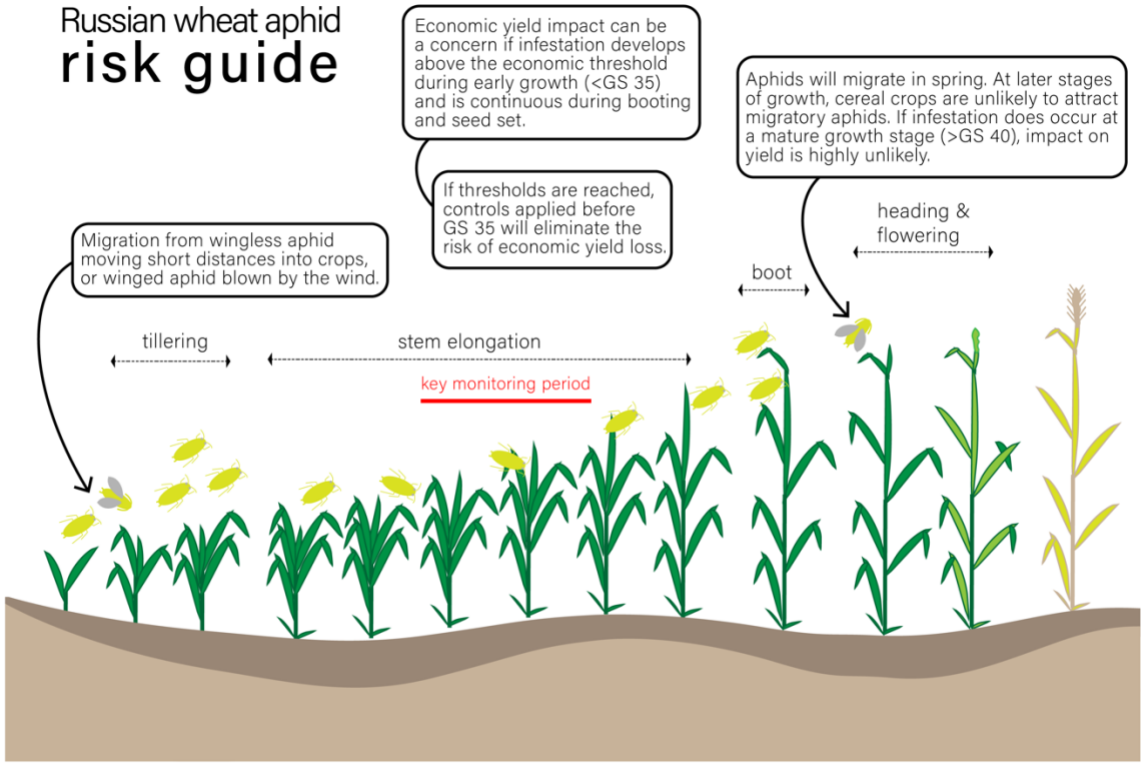


Figure 5. An assessment of infestation level against the economic threshold is key to informing a decision to take action. Current project work will allow validation of the overseas threshold currently in use.

**What remaining activities are planned for this project?**
The project team has accumulated almost two years of RWA surveillance data, with green bridge surveillance to continue over spring and summer. This data has allowed us to begin drawing correlations between RWA abundance in the green bridge and environmental conditions.

The aim is to develop a tool for growers to forecast RWA abundance leading into the winter growing season. This tool will be of particular importance when determining the need for seed treatments. In addition, the monitoring of yellow pan traps at each RWA trial site has allowed the project team to begin assessing the drivers of RWA migration. If the factors that lead to development and flight of winged RWA are better understood, predications can be made about the timing of migratory flights.

**Remember to report**
Refer to this **RWA identification video** to take a closer look at key RWA features, which can be viewed using a hand lens.

If you see RWA symptoms and aphids, please make a report. Send a photo with a date, place (GPS location) and host plant (if known) to the contacts below. These observations will be added to the distribution map on the RWA portal.

Contacts for reporting:
Maarten van Helden: 0481 544 429, maarten.vanhelden@sa.gov.au
Rebecca Hamdorf (PestFacts SA): rebecca.hamdorf@sa.gov.au
Julia Severi (Pestfacts South Eastern): jseveri@cesaraustralia.com

For questions about this project update:
Maarten VanHelden: 0481 544 429, maarten.vanhelden@sa.gov.au
Jessica Lye, **cesar**: 04015 555 567, jlye@cesaraustralia.com

**Useful resources**
To view the RWA Interactive Map
http://www.cesaraustralia.com/sustainable-agriculture/rwa-portal/

GrowNotes Tips & Tactics for Russian Wheat Aphid
https://grdc.com.au/__data/assets/pdf_file/0025/289321/GRDC-Tips-and-Tactics-Russian-Wheat-Aphid.pdf

Russian Wheat Aphid Tactics for Future Control
https://grdc.com.au/__data/assets/pdf_file/0027/244377/Russian-Wheat-Aphid-Tactics-for-Future-Control.PDF

Russian Wheat Aphid Dynamics in 2017 (research update)
https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2017/08/russian-wheat-aphid-dynamics-in-2017

Russian Wheat Aphid – Current investigations and recent findings (research update)
https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2019/02/russian-wheat-aphid-current-investigations-and-recent-findings

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