Cereal Aphid Risk Assessment South Australia (CARASA)

SOUTH AUSTRALIAN RESEARCH & DEVELOPMENT INSTITUTE
PIRSA

SARDI Staff Maarten van Helden and Tom Heddle are piloting the SAGIT funded Project CARASA (**C**ereal **A**phid **R**isk **A**ssessment **S**outh **A**ustralia) on the risk of cereal aphids.

Cereals (Barley, Wheat, Durum Wheat) were sown every month (April to July) in three sites (Bool Lagoon, Loxton, Roseworthy) and cereal aphids (Russian Wheat Aphid, Oat Aphid, Corn Aphid) and symptoms are observed fortnightly.

Observation results as of October 10th 2017

SPECTACULAR APHIDS NUMBERS ON YOUNG PLANTS

SUMMARY: Russian Wheat Aphids (RWA) have almost entirely deserted all plants that are post- flowering. They have however successfully invaded the late sown crops some weeks ago if these were still below GS39 and are now quickly building up on these. This causes a very sharp increase in the number of tillers with symptoms in these young crops. The developmental stage of the crop seems of major importance for the risk of colonisation when Russian Wheat Aphids are migrating.

RUSSIAN WHEAT APHID NUMBERS and SYMPTOMS: Early sown crops (April and May) are now at the flowering stage or beyond and symptoms and RWA infestation levels on these early sown crops have dropped to almost zero (fig a). On a few tightly-rolled flag leaves, some Russian Wheat Aphids do continue to develop. Only very few white heads are observed on these crops, that earlier had up to 10% of tillers with symptoms.

On the late sown crops (June and July sowing) that were in tillering or early booting stage mid-august, the increase in symptoms and aphids is very significant (fig b, d and e). The percentage of these young plants with aphids is now far above the intervention threshold (see fig e) and growth is inhibited by these high aphid numbers.

OTHER APHIDS: Corn and Oat aphids are present only in very small numbers (fig c).

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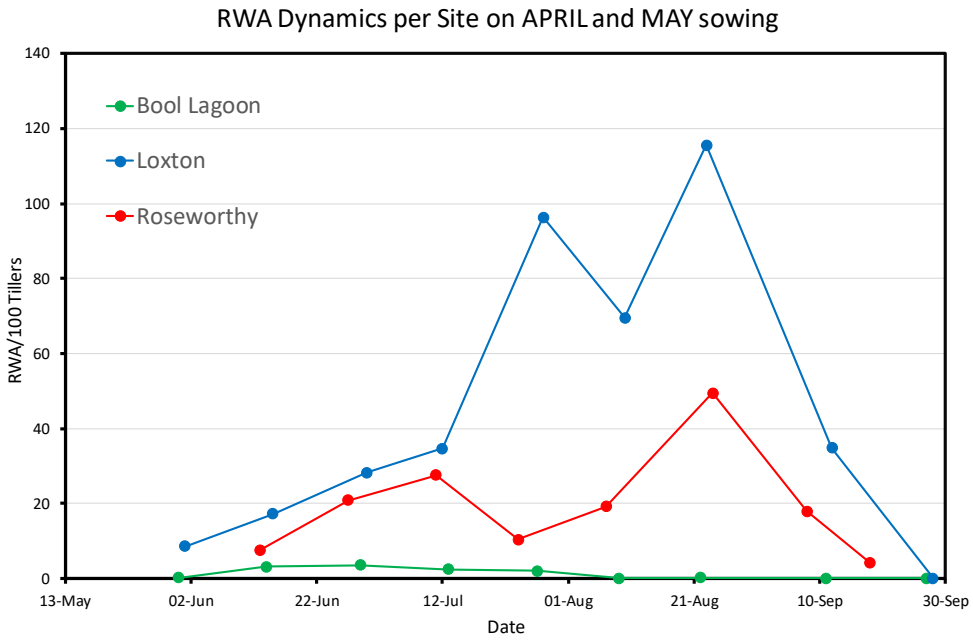

*Figure a: On the **April and May sown crops** (now post-flowering) Russian Wheat Aphid have completely disappeared RWA have however invaded the younger plants of late sowings (see fig b below)*

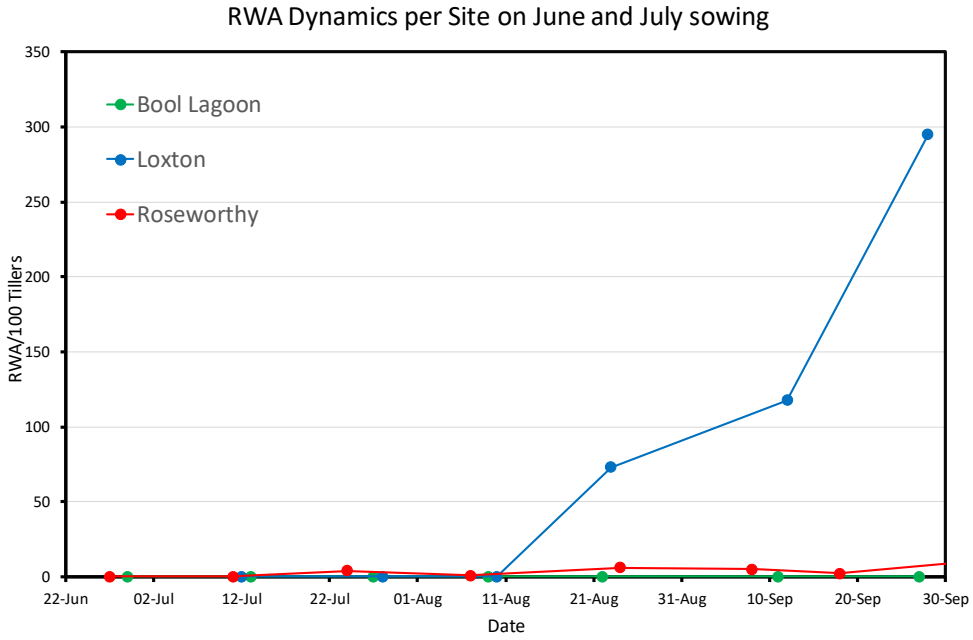

*Figure b: On the **June- and July sown** crops at Loxton, Russian Wheat Aphid have invaded these younger plants in mid-August and densities continue to increase on these (drought-stressed) plants, building up to very high populations.*

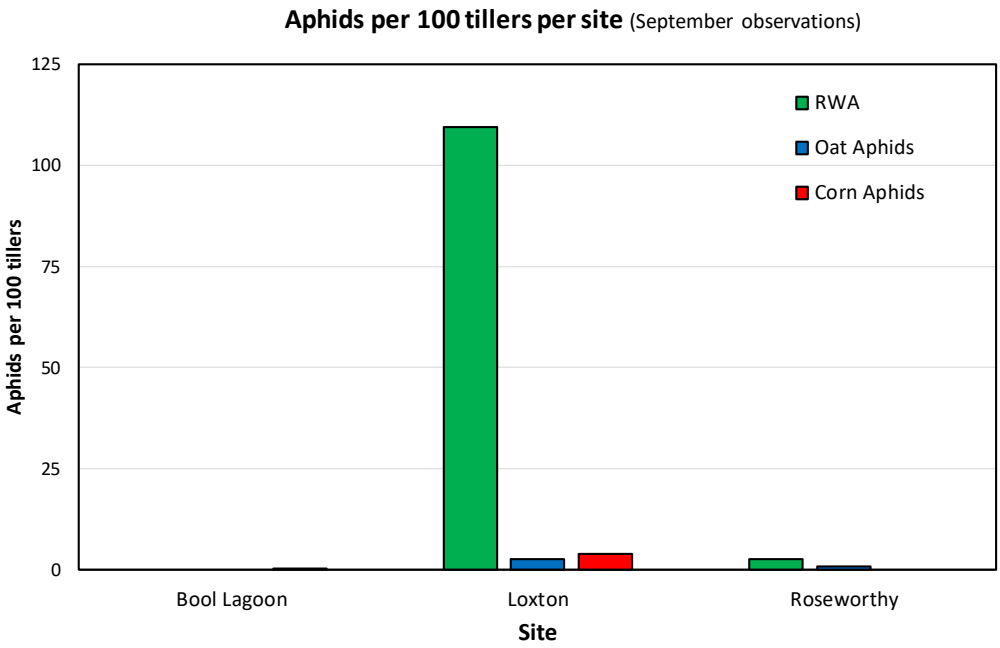

Figure c: The abundance of the aphid species is very different among sites, with RWA abundant at Loxton but virtually absent at Bool Lagoon and Roseworthy. Corn aphid and Oat aphid are present in very low numbers.

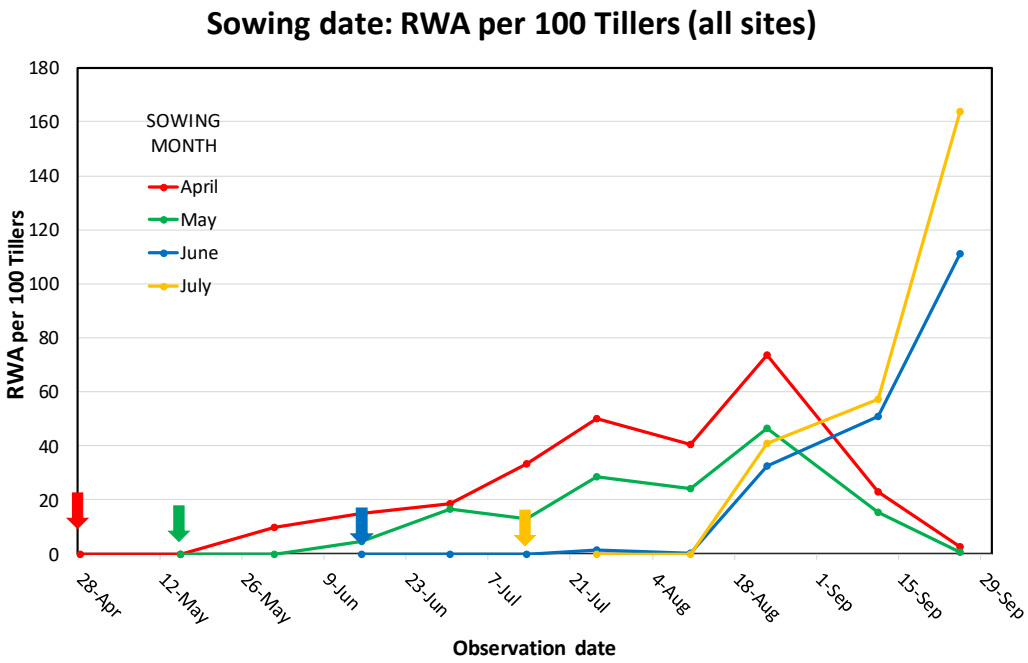

Figure d: Across all sites, Russian Wheat Aphid have now completely deserted early sown crops but continue to increase in the late sown crops (at Loxton and to a lesser extent Roseworthy). Arrows indicate sowing date.

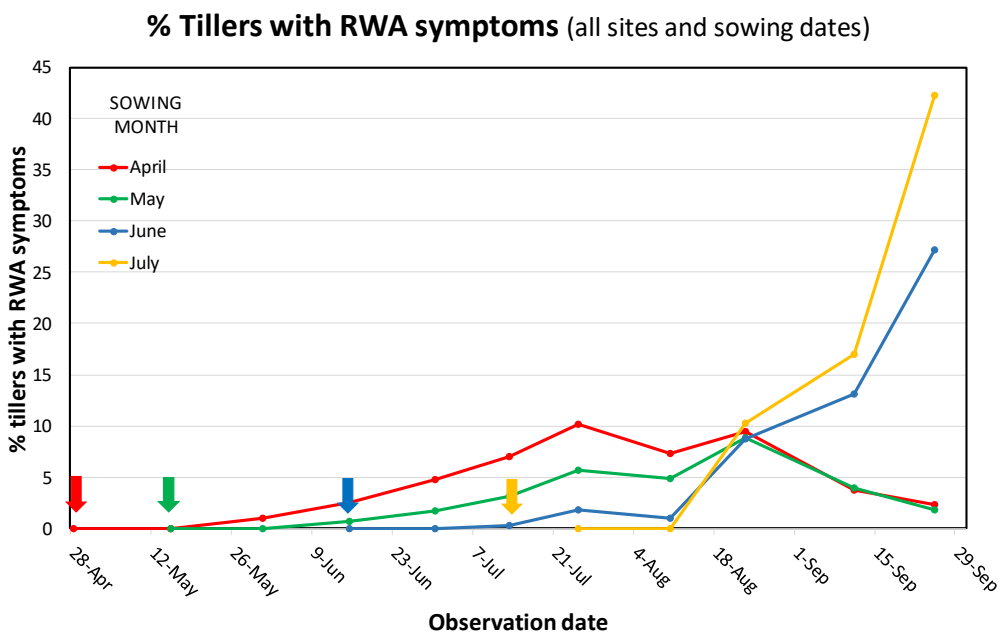

Figure e: Tillers with symptoms continue to increase in late sown crops and now clearly exceed the intervention threshold (10% infested tillers). Many tillers with symptoms do not contain any RWA. Arrows indicate sowing date.

INTERVENTION THRESHOLD: We consider the period between stem elongation and soft dough stage as the most critical for RWA damage risk. Maintaining healthy leaves at this stage is important. On wheat the big flag leaf needs to be protected, and on barley (with only small flag leaves) the top 3 to 4 leaves. See below for observation methods.

Growers are advised to closely follow their crops at this stage, especially if they are still below growth stage 39 and suffering from drought stress. Observations should always focus on tillers with aphids, not just symptoms (fig f). See below for a simple and efficient way of observing aphids in the crop.

Across all sites, none of the early (April and May) sown crops are infested with aphids or showing symptoms this spring, even those crops that earlier had over 10% of tillers with symptoms. Yield data will show if any significant damage has occurred.

Only the late sown (June and July) crops in the Loxton area (now still in early developmental stages, around stem elongation or booting) are now clearly above 20% of tillers with symptoms and >10% of tillers with aphids, so above the intervention threshold. The rapidly increasing populations observed on these crops clearly slow the growth of the plants.

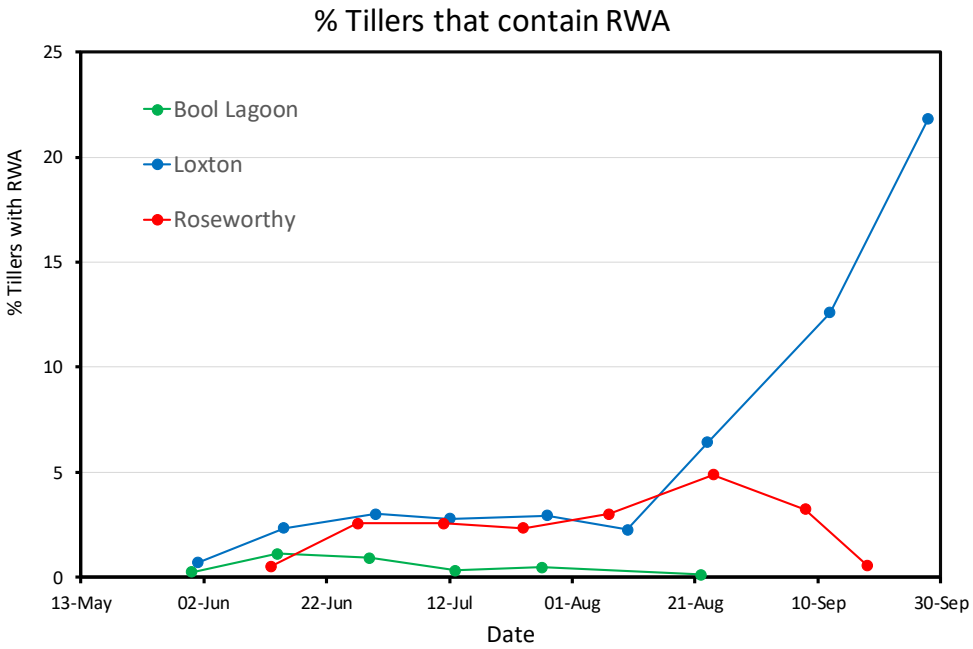

*Figure f: Across all sowing times, the percentage of **Tillers with RWA**, increase sharply in Loxton due to a high number of tillers in the late sown crop that now have some aphids on them. This population is now over the intervention threshold on the late sown crops*

SEED TREATMENT EFFECTS: In the late sown seed-treated crops at Loxton, we now observe a very sharp increase in tillers with symptoms (fig h) and aphids are also building up quickly (fig g). It seems that the difference in aphid populations on seed treated versus non-treated crops is due to a difference in early-season colonisation of crops by aphids (that occurred in August, fig b), and not due to a difference in population increase since that period.

The early sown crops are no longer protected, but also no longer attractive to the aphids.

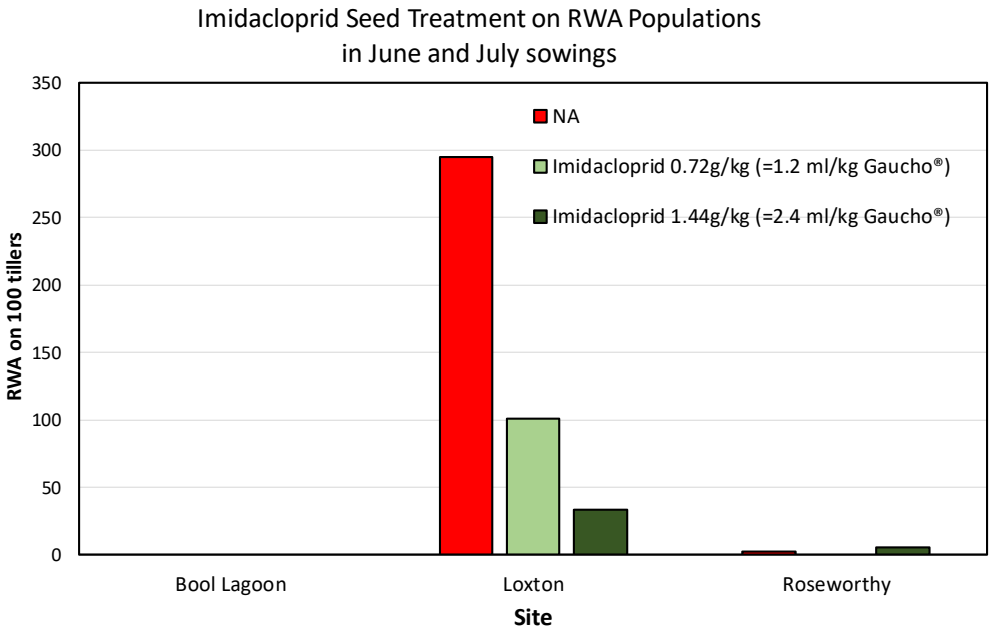

Figure g: APHID NUMBERS in the June and July sowing reach very high levels. The effect of seed treatments (imidacloprid) on June and July sowings is now slowly wearing off, aphids are now observed on these seed treated plants at Loxton and some at Roseworthy

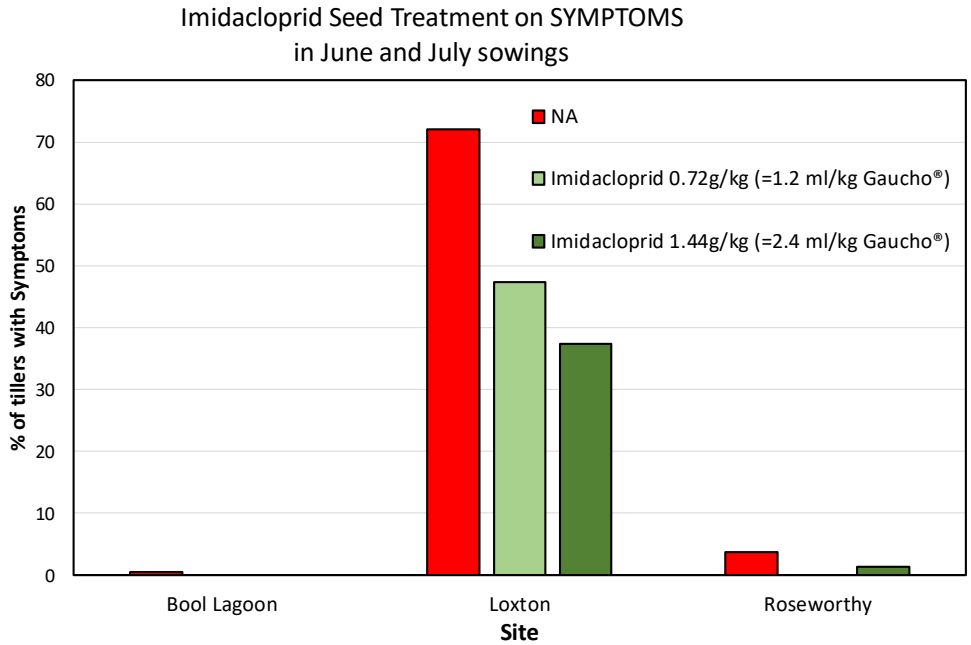

Figure h: On June and July sown crops the SYMPTOMS have increased at least 4 fold in the last period. Symptoms on seed treated plants are still a little lower than on the untreated plants.

HOW TO DO OBSERVATIONS: The best way to establish population dynamics is a two-step approach:

1. Count the number of tillers on several lengths of row (30 or 50 cm) or small areas and count the number of tillers with symptoms in that same area. This will allow to establish a percentage of tillers with symptoms.
2. Then take 25-50 tillers with symptoms and count the number that have live aphids on them (frequency of infestation) and the number of aphids per tiller (intensity of infestation).

Repeat these observations regularly (every two weeks) to get a good picture of population development over time (as in figure e). During the observations, keep an eye open for predators, parasitoids (aphid turning into brown mummies) and fungus-infested aphids, these are increasing rapidly in many sites.

In addition to this SAGIT research, GRDC funded trials conducted by SARDI in Loxton and Adelaide are looking into the aphid-damage relationship.

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