

Impact of native vegetation on the flight of aphids and their natural enemies into crops in southern WA

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KEY MESSAGES

- Less aphids are found flying in crops close to native vegetation
- Native vegetation does not influence the presence of aphid predators

BACKGROUND

Cotton grown in landscapes with native vegetation has fewer pests such as aphids and more natural enemies (Bianchi 2001). It was decided to see if the same was true for crops especially cereal crops in a broad-acre environment. Aphids can vector viruses that lead to yield loss in crops eg BYDV in cereals can decrease crop yields by 50% if plants are infected prior to tillering; or cause direct feeding damage which can cause yield losses of up to 10% in cereals (DAFWA 2007).

AIM

To determine if the presence of flying aphids and their natural enemies differs in a cereal to crop interface or a cereal to native vegetation interface.

METHOD

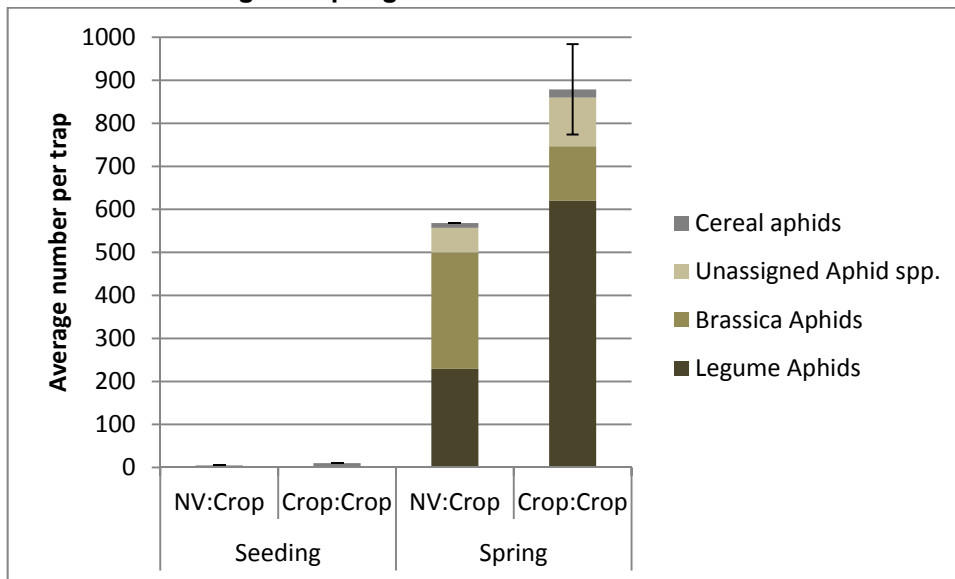
Six cereal fields from the South Stirlings (WA) were selected so that the crops were either adjacent to remnant bush (i.e. 'Near': 3 fields) or at least 400 m from it (i.e. 'Far': 3 fields). In each field, bi-directional malaise traps were placed adjacent to the fenceline. Traps were orientated to face the same compass direction, so wind was not a factor in catches of insects. Traps were opened from seeding for 7 weeks, in Spring for 7 weeks and catches were collected weekly. Catches from both sides of the malaise trap were pooled.

RESULTS

Effect of native vegetation on aphid abundance

The proximity of native vegetation to the malaise trap influenced trap catches. Traps close to native vegetation had significantly less ($p < 0.001$) cereal aphids than traps at a cereal to crop interface (Figure 1). However, traps also captured brassica, legume and aphids with unknown hosts (unassigned aphid spp.). Significantly more ($p < 0.001$) brassica aphids were found in traps that were close to native vegetation whereas traps that were far from native vegetation had significantly ($p > 0.001$) higher numbers of legume aphids and aphids whose hosts were unknown.

Figure 1: Average number of aphids from trap catches at a cereal to native vegetation (NV) or a cereal to crop interface at seeding and spring



Proximity of plant hosts to traps

Aphids are known to predominately use short range flight to colonise crops, rather than long migratory flights (Loxdale *et al.* 1993). Consequently, plant hosts of aphids need to be present in the landscape to allow colonisation of crops. Each trap had similar aphid crop hosts present in a 2 km radius i.e. each trap had one or more brassica (canola) crops, legume based pastures and cereal crops present.

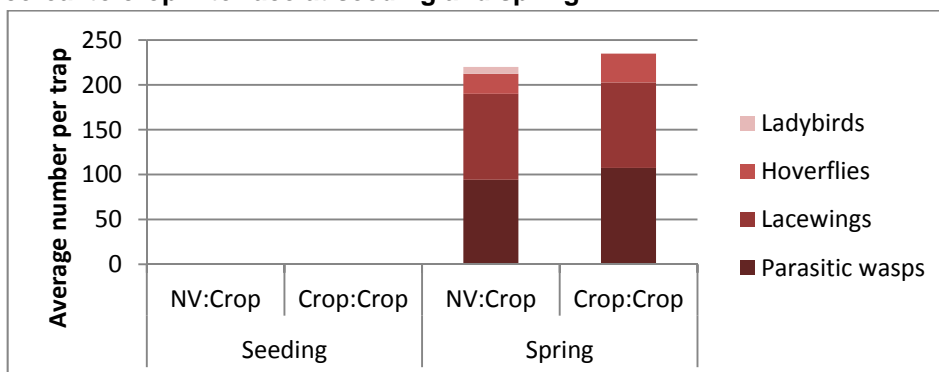
Each patch of native vegetation adjacent to traps was weed free. However, the interface between the crop and the native vegetation did contain weeds and these weeds changed as the season progressed. At seeding weeds were predominantly grasses but by spring brassica weeds were present. This may account for the higher number of brassica aphids present in traps close to native vegetation.

Aphids and their predators

Early in the season low numbers of aphids were present (Figure 1) and no aphid predators were present in trap catches (Figure 2). Consequently, aphid colonisation of cereal crops and spread of viruses such as BYDV was unlikely in this year. In spring higher numbers of aphids and consequently their predators were found (Figures 1, 2). In this case, native vegetation does not appear to have led to increases in numbers of aphid predators.

Host specific predators can suppress pest populations so that there is no need to control the pest. Parasitic wasps, ladybirds, hoverfly larvae and lacewing larvae are aphid specific predators. In this trial predators were not caught in the absence of aphids and higher catches of aphids coincided with higher catches of predators.

Figure 2: Average number of aphid predators from trap catches at a cereal to native vegetation (NV) or a cereal to crop interface at seeding and spring



CONCLUSION

Crops adjacent to native vegetation may have less aphids flying into them if the native vegetation is free of aphid host plants. Aphid predators are not found in higher numbers in crops adjacent to native vegetation, rather their abundance is related to aphid presence.

KEY WORDS

Aphid, native vegetation, aphid predators

ACKNOWLEDGEMENTS

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