

Project summaries 1993-94

Project title:	Interaction with Sunflowers, Pest Status and Egg Parasitoids of <i>Nysius</i> spp.
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INDUSTRY IMPLICATIONS

These studies form a solid foundation for the development of IPM in sunflowers. Application of the findings should result in some reduction in insecticide application to sunflowers with consequent conservation of beneficial insects in sunflower crops.

BACKGROUND

The Rutherglen bug *Nysius vinitor* is a major pest of sunflowers in Australia. Although the grey cluster bug *N. clevelandensis* is assumed to be a pest, its actual pest status was unknown. In southern Queensland and northern NSW in late season autumn sunflower crops adult *Nysius* spp. produce only low numbers of offspring. High egg parasitism had been suggested as the reason for low autumn nymphal production.

Data has shown that *N. vinitor* invades southern Queensland and northern NSW in early spring from breeding areas in central and western Queensland. Data suggested that *N. clevelandensis* is the most common of the two species on sunflowers in Central Queensland in the late summer/autumn period.

Little was known of the relationship of the Rutherglen bug to the sunflower plant and even less of the grey cluster bug. Preliminary studies suggested that the Rutherglen bug laid most of its eggs within the corolla of the disc florets and did so mainly at the end of anthesis before petal fall. If this could be confirmed, spraying recommendations which advised control of adults after flowering may have to be changed.

The grey cluster bug may form a significant part of the *Nysius* population on sunflower in Queensland, perhaps particularly in Central Queensland. But the bug

had never been recorded breeding on sunflowers. For rational pest management and for the further development of sunflowers resistant to *Nysius spp.* a fundamental knowledge of the pest status of the grey cluster bug was required.

AIMS

- To determine *Nysius spp.* (Rutherglen bug and grey cluster bug) phenology in Queensland.
- To define *Nysius spp.* biological and damage relationships to the sunflower plant.
- To determine the impact of native species on egg parasitoids on *Nysius spp.* populations.

METHODS

In order to find distinguishing characters to separate the nymphs of both species, the progeny of single females were reared and subject to detailed morphological examination. Between budding and harvest, weekly sampling was carried out on 20 sunflower crops in southern Queensland in order to record numbers and identification of adults and nymphs, percentage of adults parasitised, sexual maturity status of adult females, and numbers of eggs and egg parasitism percentages. Similarly single samples were taken from 30 crops in central Queensland. Sampling of crops in central Queensland was generally carried out four times per year, covering each season.

The same parameters were also measured from samples taken from weeds. Fortnightly sampling was carried out in the two different regions of the West Moreton and the Darling Downs. Sampling from weeds in central Queensland was generally carried out in each season of the year, and twice in western Queensland.

Six trials were carried out in the field, screenhouse or laboratory to compare aspects of oviposition and damage of each species to sunflower. In three of the trials adults were caged on their heads and oviposition was measured. In one of these trials differences in adult damage from both species was assessed. In other trials the survival of, and damage caused by both species of nymphs when confined on heads in the screenhouse or laboratory was compared.

RESULTS

Adult *Nysius spp.* fed on a wide range of hosts. Adult *N. vinitor* were found on 34 different plant genera and *N. clevelandensis* on 16. However, breeding populations were confirmed from a more restrictive range. *N. vinitor* were found breeding on hosts from 23 genera in nine families, and *N. clevelandensis* from 12 genera in the Asteraceae only. Both species were found breeding in all seasons in southern and central Queensland, and on a similar range of hosts in western Queensland. Two new species were found on weeds, and one of these was found in very low numbers as adults on sunflower.

N. vinitor invades crops at budding and numbers increase until one week after flowering when they start to decline two or three weeks later. Immigrant females

contain immature ovaries but become sexually mature during and soon after flowering. Oviposition commences within the first week after flowering, increases for two weeks and remains relatively constant for the next six weeks.

Although adult *N. clevelandensis* are often found on buds, they leave the plants during flowering and are only found in low numbers during the post-flowering period. They were rarely found breeding on sunflowers.

Data obtained from central Queensland indicates that patterns of infestation in relation to crop phenology was essentially similar to those in southern Queensland.

When immature adults were caged on sunflower heads in the field, although there were some problems with cross contamination due to very large *N. vinitor* populations in the crop, there was no evidence that *N. clevelandensis* laid any eggs. Only *N. vinitor* nymphs developed and by the end of the trial, 22 days after application, 88.5% of *N. vinitor* females contained mature ovaries whereas only 24% of *N. clevelandensis* did. But if *N. clevelandensis* damaged seeds, the damage was less than half of that caused by *N. vinitor*.

When nymphs were caged on plants no significant differences occurred between species for survival or seed damage.

CONCLUSION

Although *N. vinitor* is a major pest of sunflowers, the very similar species *N. clevelandensis* is a very minor pest. It is often found on buds but causes little damage and rarely breeds in sunflower crops. The pest status and relationships to sunflowers of both species is essentially similar in both southern and central Queensland. *N. vinitor* has an extensive host range and occurs in all seasons in all areas of Queensland.

The egg parasitoid *T. sp.* near *nysivorus* seems to be an important biocontrol agent in sunflower particularly in autumn crops and undoubtedly contributes to the low nymphal populations in autumn crops.

RECOMMENDATIONS

The grey cluster bug should be considered a very minor pest of sunflowers and its economic injury level should be at least twice that of the Rutherglen bug.

The data should be incorporated into a computer management package planned for the development of sunflowers in north eastern Australia and knowledge of the differences in plant relationships/ecology of these bugs needs to be considered in future models incorporating insect damage effects on sunflower grain yields. Future developments of sunflowers resistant to *Nysius spp.* need only consider resistance to the Rutherglen bug.

PUBLISHED REPORTS

(1992) The Rutherglen bug and grey cluster bug in Queensland - their relationship to sunflower. *Proc 9th Aust. Sunflower Assoc. Workshop*, Yeppoon, 94-7.

(1994) Patterns of Rutherglen bug immigrant populations and oviposition on sunflowers, *Proc. Aust. Sunflower Assoc. 10th Conf./Workshop*, Gold Coast, 53-6.

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