Stink bug numbers much higher in 2007

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in a rice hull

- Stink bug numbers in 2007 rice crops were approximately six times higher than in the previous season
- 84% of stink bugs collected during the 2-year survey were a species known as *Anaxilaus vesiculosus*, which was not previously known to feed on rice
- *Anaxilaus* was reared from egg to adulthood on rice plants with no other food source. Grain from the plants used to rear the bugs showed high levels of feeding damage, confirming the relationship between *Anaxilaus* and 'pecky' rice

Damage to export shipments of long grain rice was characteristic of that caused by stink bugs, and a 2-year survey was initiated in early 2006 to determine what stink bug species were present in NSW rice crops. Whilst numbers were low prior to the 2006 harvest, much higher numbers were found in 2007.

Stink bugs feed on developing rice grain, and different species attack rice crops throughout the world. Some species, such as the green vegetable bug *Nezara viridula*, are found in many different countries, whilst others are more localised in their distribution. Stink bugs have piercing mouthparts that are used to suck the fluids from developing grain.

High stink bug densities are required to affect yield, but even relatively low densities of bugs can have an impact on grain quality. This is because grain that is attacked at the dough stage often develops dark spots that are not fully removed during milling. The spots are caused by digestive enzymes released into the grain at the feeding site, or by subsequent bacterial contamination.

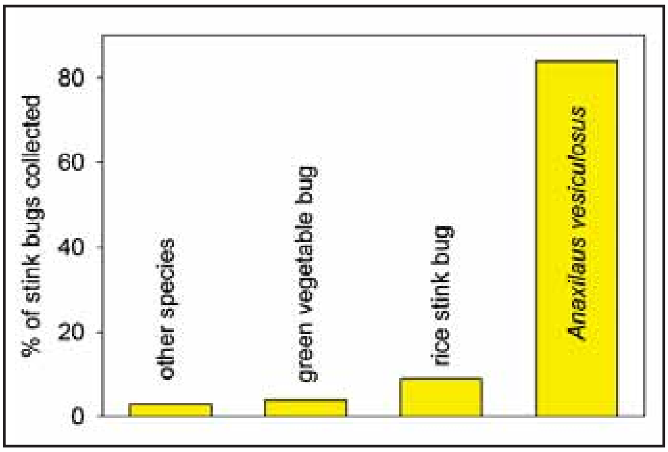

Figure 1: Composition of stink bug samples taken from 38 rice crops prior to the 2006 and 2007 harvests

In 2006 we sampled 21 crops for stink bugs, with two people sweep-netting each crop for 40 minutes. While we found seven different species, only three were plant-feeding species abundant enough to be a potential cause for concern. Only 43 bugs were recovered in total (see *Farmers' Newsletter* No. 174).

In 2007, the second season of the study, a further 17 crops were sampled. No additional species were found, however 214 bugs were collected – around six times more bugs per crop than in 2006. The same sampling effort per crop was used as in the previous year.

***Figure 2: Adult* Anaxilaus vesiculosus**

Survey results

Overall results of the 2-year survey are summarised in Figure 1. The major discovery in the first season of the survey was that a small orange and black bug, *Anaxilaus vesiculosus* (Figure 2) was the most abundant species, accounting for about 60% of the bugs recovered. Unlike the other common species found in the survey, Anaxilaus had never previously been recorded from rice.

Anaxilaus was even more dominant in the 2007 collections, and across the full study accounted for 84% of the bugs collected. The rice stink bug (*Eysarcoris trimaculatus*, 9%) and green vegetable bug (4%) accounted for the majority of other stink bugs recovered.

Grain damage

To confirm the association between *Anaxilaus* and grain damage, we put 20 field-collected individuals on a potted rice plant (cv Doongara with grain at the milk stage) underneath a screened cage, and monitored their survival and reproduction. The adults survived for up to 20 days, by which time many of the females had laid eggs on the rice plant. These eggs hatched and the immature stink bugs (known as nymphs) could be observed feeding on the panicles. The first adults originating from these nymphs appeared 45 days after the original field-collected adults were placed on the plant, confirming that *Anaxilaus* can complete its entire life cycle on rice plants.

Grain from the plant used for rearing the *Anaxilaus* nymphs was de-hulled, and 7% (174 grains) showed characteristic stink bug damage (Figure 3). Many of the damaged grains were extremely brittle and shattered during de-hulling. When the damaged grains were milled further shattering occurred, and some grains retained the dark spots characteristic of 'pecky' rice (Figure 4).

Seasonal differences & climate change

Why were so many more stink bugs collected during 2007?

The answer isn't immediately clear, but it may relate to seasonal differences. Cooler conditions during grain development would allow the bugs more time on the developing grain prior to harvest, potentially allowing numbers to increase, but conversely these conditions would also be expected to slow the development rate of the insects.

Answering this question will require further research on how temperature affects rates of stink bug population increase relative to the period over which the developing rice grain remains a suitable food source.

There is currently far too little data on stink bug densities in NSW rice crops to suggest that climate change may be influencing stink bug populations. In Japan, where much more data is available, climate change has been identified as a having a significant role in changing the status of different rice pests. Stink bugs are now considered the most important pest group affecting Japanese rice production, gradually assuming dominance over migratory planthoppers as temperatures increase.

In theory, global warming should lead to some insect species expanding their ranges pole-wards, and this has been observed with some Japanese stink bugs. Increases in winter temperatures also improve the survival of stink bugs overwintering on alternative host plants.

Options for control

Whilst chemical control of stink bugs is feasible if it becomes necessary, it is not the most desirable or sustainable option. Rice is only vulnerable to stink bugs during grain development, and outside this period *Anaxilaus* must be using alternative host plants to survive. Identifying these alternative hosts and removing them from the areas adjacent to rice fields has the potential to provide effective stink bug management without the use of pesticides.

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Figure 3: De-hulled rice previously exposed to* Anaxilaus *adults and nymphs during grain filling

Figure 4. Milled rice previously exposed to* Anaxilaus *adults and nymphs, with blemishes at points of mouthpart entry