

Heteropterans causing epidermal protuberances on avocado fruit and investigation of possible chemical control methods

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ABSTRACT

The aim of this follow up trial was to determine what insects caused the ugly pimple like protuberances on the skin of Fuerte and Hass avocado fruit in the Soutpansberg district. Good control was obtained in a spray trial comparing 3 chemicals. Follow up spray trials need to be done to register chemicals which will give good control and to incorporate them in a general Integrated Pest Management strategy.

UITTREKSEL

Die doel van hierdie opvolgproef was om vas te stel watter insekte die lelike skillletsels op Fuerte- en Hass-vrugte in die Soutpansberg-distrik veroorsaak. Goeie beheer is in 'n spuitproef verkry waar drie chemikalieë vergelyk is. Opvolgwerk om die geskikte chemikalieë geregistreer te kry sal nou gedoen moet word. 'n Algemene geïntegreerde plaagbeheerstrategie sal ook opgestel moet word.

INTRODUCTION

Hemipteran insect damage to avocado fruit was reported as early as 1993 when Du Toit *et al.* reported on a mirid causing bumps on avocado fruit.

These bumps, called “vosknoppe”, were later found to be caused by the avocado bug (*Taylorilygus* sp.) feeding on the fruit at early stages. The typical white exudate on the fruit, as a result of feeding by this bug, was used to identify the problem in its early stages. The typical “vosknoppe” appeared only about a month after feeding.

In the later work done on the Hemiptera since 1996 by Bruwer (Bruwer, 1996, 1997, 1998, 2000), it was found that a *Taylorilygus* sp. infested early cultivars (e.g. Fuerte) at flowering as a first generation infestation, causing little damage.

Their offspring which later fed on the young fruit caused considerable more damage.

The skin protuberances which were observed on avocado fruit in the Soutpansberg district for some years did not match up to the typical “vosknoppe”.

These new skin protuberances on avocado fruit lacked the typical white exudate and they never developed into “vosknoppe”. A rather pimple like protuberance occurred only on the skin of the avocado and no damage to the flesh of the avocado was observed.

During the 2003/04 season a different complex of Hemiptera was found on avocado fruit in the Soutpansberg district (Alberts, 2004). Five heteropteran species and six auchenorrhynchan species were distinguished.

During the 2004/05 season another three heteropteran species were added to the complex.

MATERIALS AND METHODS

Orchard

This trial was laid out in a Fuerte orchard on Springfield farm (23°04'00.50”S, 30°10'37.70”E) where for the past few seasons

many fruit were discarded as a result of the pimple like protuberances. This specific orchard is flanked by a eucalyptus plantation on one side and indigenous bush and a Hass orchard on the other sides.

Scouting and trapping

The orchard was scouted at regular intervals of 7 to 10 days during the flowering and fruit set periods from May to November.

Some flowers were bagged at the cauliflower stage (Fig. 1) to prevent insects from reaching them.



Figure 1. Avocado flower at early cauliflower stage.

Later some fruits were covered with a sticky transparent substance (Rever Fly™) to catch the insects that visited the fruit (Fig. 2).



Figure 2. Insects trapped on sticky fruit.

Chemicals

The three chemicals, belonging to three different chemical groups included in the spray trial, were:

- Chlorpyrifos (organophosphate) (48 g/100 L)
- Beta-cyfluthrin (pyrethroid) (15 ml/100 L)
- Imidacloprid (nicotinoid) (380 ml/100 L)
- A control treatment sprayed with only water was also included.

Method

Avocados flower over extended periods which sometimes can exceed 2 months. This makes it very difficult to time any chemical spray on a specific stage of flower development. The main flowering period however is squeezed into a three week period and selected branches on 5 trees per treatment were sprayed manually on 5 August 2004 using a rucksack sprayer. Care was taken to spray only branches with flowers in the early cauliflower stage. These branches were marked clearly. Some fruit were later painted with a sticky substance to trap insects visiting the fruit. All the fruit on the treated branches were inspected for insect activity and protuberances on a weekly basis after flowering.

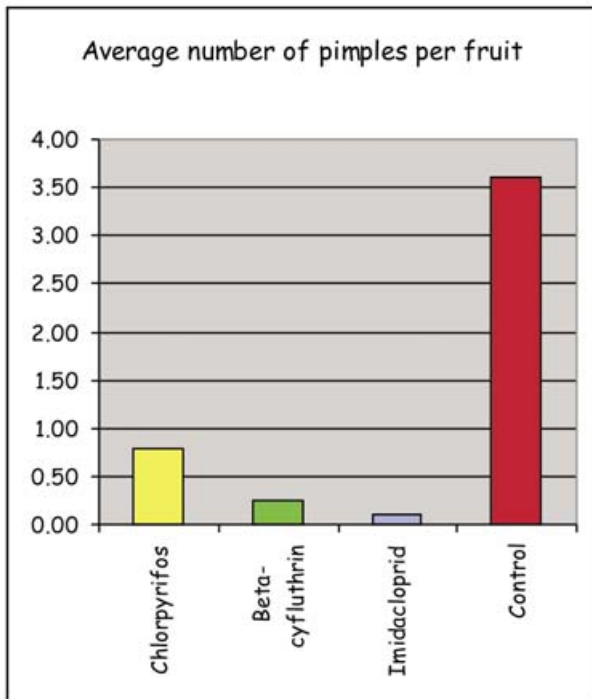


Figure 3. The average number of pimples per fruit.

RESULTS

A survey was done one month after flowering on the small fruit before the November drop. From the data presented in figure 3 it is clear that all the chemicals gave good control of the insects that caused the epidermal protuberances.

The organophosphate (chlorpyrifos) gave the poorest control of all the chemicals with an average of 0.79 lesions per fruit but this treatment was still much better than the control which had 3.6 lesions per fruit. (Fig. 3 and Table 1). The nicotinoid (imidacloprid) and the registered pyrethroid (beta-cyfluthrin) gave the best control with 0.11 and 0.25 lesions per fruit respectively.

Table 1. The average number of protuberances per fruit for the different treatments.

Chlorpyrifos	Beta-cyfluthrin	Imidacloprid	Control
0.79	0.25	0.11	3.60

DISCUSSION

The avocado bug (*Taylorilygus* sp.) causes lesions by a second generation of nymphs that feed after flowering on the avocado fruit. The heteropteran complex that cause the pimple-like lesions on the skin of avocado fruit in the Soutpansberg area feeds as a first generation on the avocado fruit while it is still in the flower. After the flowers have shed their petals the small fruits are already scarred with these pimple-like lesions (Fig. 4). No new lesions form after the petals have been shed (Fig. 5).



Figure 4. Pimples on young fruit just after petal drop.

A complex of at least 8 heteropteran species were found visiting the flowers. The most common heteropteran belongs to either the *Taylorilygus* or *Lygus* genera. Standard text books (McGavin 2001, Picker *et.al.*, 2003 and Van den Berg *et.al.*, 2001) were used to classify the insects up to family level.



Figure 5. No new lesions form after petal drop.

These heteropterans have been found feeding on the young ovary while it is still enclosed by the petals. The most common heteropterans has olive green adult insects which are 3 mm in length with a conspicuous bright green scutellum (Fig. 6).



Figure 6. The most common heteropterans found on the avocado flowers.

No adults or nymphs were found on the flowers after the petals dropped. No heteropterans were caught on any sticky fruit after flowering. It seems therefore that the specific heteropteran complex found in the Soutpansberg region that cause the epidermal protuberances are only attracted by the avocado flowers.

No fruit was obtained from the bagged flowers which demonstrate the importance of cross pollination in setting an avocado crop.

CONCLUSION

It is possible to control the pimple like lesions caused by heteropterans (*Taylorilygus* or *Lygus* sp.) feeding on avocado fruit in

the very early stages. Care must be taken to use only registered chemicals (at this stage beta-cyfluthrin) and to time the spraying that it will not interfere with pollinating insects that visit the orchards during the flowering period. The best time for spraying is on the early cauliflower stage.

To establish a sound Integrated Pest Management (IPM) strategy, more chemicals should be registered, and more work on the understanding of the life cycles of the insects needs to be done. Spray trials to register more chemicals for EUREP Gap purposes are therefore essential.

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