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STINK BUG DAMAGE ON AVOCADO FRUIT IN THE NELSPRUIT REGION

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ABSTRACT

Since stink bugs are generally incriminated as being one of the major insect groups responsible for crop loss in the avocado industry, this study was undertaken to determine the incidence of hemipteran damage on avocado fruit. Samples of harvested fruit (CV. Fuerte and Hass) were taken from three farms in the Nelspruit and White River districts and the stink bug damage calculated. On one of these sites, stink bugs were monitored on four occasions by spraying ten randomly selected trees with dichlorvos and identifying the dead bugs. The results indicate that mean damage varied between 1.2% (Fuerte) and 3.1% (Hass). From the nature of the lesions, it is suspected that the majority of damage is caused by the coconut stink bug, Pseudotheraptus wayi *(Coreidae). Seven pentatomid and two coreid species were collected during the surveys. During this particular season the mean percentage stink bug damage for both cultivars was well below the general accepted threshold level of 5%, but experience has shown that the situation could easily change during subsequent seasons. It is suggested that a strategy for the biological control of certain selected stink bugs be investigated.*

INTRODUCTION

According to Annecke & Moran (1982) South African avocados have relatively few serious insect pests. However, during the last few years there has been a significant increase in the number of insect species damaging avocado fruit (De Villiers & Van den Berg, 1987), which could probably be attributed to the expansion in the industry (Dennill & Dupont, 1992; Erichsen & Schoeman, 1992). It is therefore essential that this situation be monitored regularly in order to detect major trend changes in existing insect populations, as well as any new species which might impair the industry.

Recent studies (Dennill & Erasmus, 1991; Erichsen & Schoeman, 1992) have shown that during the past few years, hemipterans were by far the highest ranking pest on Fuerte, Hass, Edranol and Ryan in the Nelspruit and Hazyview regions. From these investigations it is also evident that the coconut stink bug *(Pseudotheraptus wayi)* is individually responsible for most of the damage inflicted on the fruit, while the remaining group of pentatomid bugs, including the green stink bug *(Nezara viridula)* is responsible for approximately the same amount of damage. Feeding of the stink bugs with their pierce-sucking mouthparts cause lesions on the fruit, rendering it unsuitable for marketing. Some of the fruit are attacked in the early stage of development, which could result in premature dropping during summer. Fruit which are damaged at a later stage

by the coconut stink bug e.g., will display fairly large indented lesions which are dark-brown to black in colour and could be confused with hail damage. It could even result in fruit having an asymmetrical or malformed appearance (De Villiers, 1990).

The present study was conducted to determine economic losses caused by stink bugs on avocado fruit in the districts of Nelspuit and White River during 1993.

METHOD

Samples of harvested Fuerte and Hass fruit were taken at three localities during the packing season of 1993. Fruit from the farm Mataffin (HL Hall & Sons) were evaluated at Pienaar Packers before they were washed and sorted. This farm was selected because trees were stripped and the fruit sent directly to the packhouse without any prior selection. Fruit from the farm Farndon near White River were evaluated in the orchards immediately after picking and prior to the producer's own selection process. A request by a producer on the farm Danroc near Kiepersol, led to the evaluation of Fuerte fruit in a particular orchard with a history of stink bug damage. The orchard was stripped of all fruit after which the sample was taken and the stink bug damage calculated.

On the farm Farndon, ten Fuerte trees were selected randomly and all the fruit that dropped during the first three months after fruit set were collected weekly and examined for stink bug damage. Fruit less than 5 mm in diameter were not included. This evaluation was done in an attempt to get a more comprehensive view of stink bug damage on avocado. On the same farm stink bugs were monitored on four occasions by spraying ten randomly selected trees with dichlorvos (150mℓ/ 100ℓ water), using a high pressure mist blower. This insecticide has a knock-down effect ascribed to its rapid vapour action (Green *et al.,* 1987). Canvases were placed under the drip zones of the trees and after one hour, when the feeding hemipterans had withdrawn their stylets and dropped, they were collected and identified.

Data with regard to stink bug damage on harvested fruit were subjected to analyses of variance for completely randomized designs and a multiple comparison of means was done with Bonferroni's method.

RESULTS AND DISCUSSION

The hemipteran species collected in a Fuerte orchard on the farm Farndon near White River, are given in Table 1. From the total numbers collected during the four surveys, it is evident that none of these species occurred abundantly. In the case of the green vegetable bug *(Nezara viridula)* e.g., which was the most numerous species present, less than 0,5 specimens per tree were collected on average. This trend with regard to all species found, is possibly reflected in the low percentage damage (1.21 %) on harvested Fuerte fruit recorded on this farm (Table 2). Although the coconut stink bug is only ranked fourth in abundancy, it is suspected that the majority of lesions are caused by this coreid. Malformation of fruit was frequently observed while most of the lesions on mature fruit were indented, dark-brown to black in colour and approximately 4 8 mm in diameter. These are all typical symptoms induced by the feeding of coconut stink bugs on avocado fruit. Bearing in mind that this bug has only been present in South Africa for a relatively short period and was observed on avocado for the first time in 1985 (De Villiers, 1990), it is possible that the damage could increase in future.

TABLE 1.
Hemipteran species collected on avocado trees on the farm Farndon in the White river district.

Family	Species	Number collected
Pentatomidae	*Nezara viridula*	19
	Nezara sp.	16
	Coenomorpha nervosa	12
	Atelocera raptoria	8
	Farnya sp.	3
	Bathycoelia rodhaini	1
	Unidentified sp.	1
Coreidae	*Pseudotheraptus wayi*	9
	Anoplocnemis sp.	2

TABLE 2
Mean percentage of harvested avocado fruit with stink bug damage. Means followed by the same letters are not significantly different ($p \leq 0,05$). S = standard deviation.

Locality	Cultivar	No. of samples	No. of fruit	Mean percentage damage ± S
Mataffin	Fuerte	7	5152	2.20 ± 0.37 A
	Hass	5	5446	3.14 ± 0.30 B
Farndon	Fuerte	8	4196	1.21 ± 0.29 C
	Hass	4	2274	2.72 ± 0.28 AB
Danroc	Fuerte	1	697	1.70

During the three month period in which the aborted Fuerte fruit were monitored on Farndon farm, a total number of 3 840 fruits were examined. Of these, only 51 (1.3%) displayed lesions associated with stink bug feeding. Although it is difficult to ascertain what percentage of fruit drop is caused by stink bugs, it could be assumed that at least a proportion of the aborted fruit with lesions, dropped due to stink bug feeding. These small aborted fruit with stink bug lesions are hardly ever noticed by producers and the full extent of damage caused by these insects, is therefore difficult to determine.

The mean percentage of avocado fruit with stink bug damage harvested at Mataffin, Farndon and Danroc is given in Table 2. From these results it is evident that relatively little damage was done by these insects at all three localities. If it is accepted that pest status is reached when there is a 5% loss in marketable yield on any particular crop (Edwards & Heath, 1964), then it can be stated that stink bugs were not of economic importance in these areas during the 1993 season. However, experience has shown that this situation could change rapidly during subsequent years, due to the dynamic processes involved in the manifestation of insect populations. For example, it has been demonstrated more than once that the average fruit cull as a result of hemipteran pests, amounts to approximately 6 % thereby costing the avocado industry up to R 6 million per annum (Dennill & Erasmus, 1991; Erichsen & Schoeman, 1992).

From the data in Table 2 it is evident that at Mataffin as well as Farndon, Hass displayed a significantly higher incidence of stink bug attack than Fuerte. In a study by Erichsen & Schoeman (1992) it was also demonstrated that Hass exhibits the highest overall incidence of pest attack. It is furthermore clear that the damage on both cultivars was lower at Farndon than at Mataffin. On the basis of the sample sizes involved, we can accept that more favourable habitats for the breeding of stink bugs exist on the latter farm.

The results of the present study indicate that less hemipteran damage occurred during the 1993 season, than during both 1990 (Dennill & Erasmus, 1991) and 1991 (Erichsen & Schoeman, 1992). It also seems that average stink bug damage in the entire avocado production area was never that high that the registration of an insecticide had to be considered. It is however important that the situation be monitored from time to time in order to detect major trend changes with regard to insect damage in the longer term. It should also be of great benefit if a strategy for the biological control of certain selected stink bugs, could be established successfully.

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