Pest Status of the Coconut Bug *Pseudotheraptus wayi* Brown *(Hemiptera: Coreidae)* on Avocados in South Africa*

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ABSTRACT

Avocado (cv. Fuerte) crop loss caused by the coconut bug (*Pseudotheraptus wayi)* was studied over a 2-year period in 3 areas. Three orchards (10 trees / orchard) were monitored weekly to assess fruit drop and harvest loss. None of these orchards had been sprayed with insecticides. Damage ranged from 1.7% on aborted fruit to 76.2% on ripe fruit, with means of 6.6% damage on aborted fruit and 15.9% on harvested fruit.

KEYWORDS

Persea americana, avocados, South Africa, pests of plants, damage, experiments.

La situation du ravageur *Pseudotheraptus wayi* Brown *(Hemiptera : Coreidae)*, la punaise du cocotier, sur les avocats en Afrique du Sud.

RÉSUMÉ

La baisse de production de l'avocat provoquée par *Pseudotheraptus wayi*, un ravageur du cocotier, a fait l'objet d'une étude pendant deux ans dans trois régions d'Afrique du Sud. Trois vergers, avec un échantillon de 10 arbres par verger, ont été surveillés une fois par semaine pour permettre l'évaluation de la chute des fruits et de la perte de récolte. Ces vergers n'ont subi aucun traitement insecticide. Les dégâts varient de 1,7 % sur les fruits avortés à 76,2 % sur les fruits mûrs, les moyennes atteignant 6,6 % pour les fruits avortés et 15,9 % pour les fruits récoltés.

MOTS CLÉS

Persea americana, avocat, Afrique du Sud, ravageurs des plantes, dégât, expérimentation.

La situación de *Pseudotheraptus wayi* Brown *(Hemiptera : Coreidae)*, el chinche del cocotero, sobre la producción del aguacate en Africa del Sur.

RESUMEN

La caída de la producción en el aguacate provocada por *Pseudotheraptus wayi*, la chinche del cocotero, fue objeto de un estudio durante dos años en tres regiones de Africa del Sur.
Tres huertos con una muestra de 10 árboles cada uno, fueron observados una vez por semana, lo cual permitió evaluar la caída de frutos y la pérdida de la cosecha.
Estos huertos no tuvieron ningún tratamiento insecticida.
Los daños variaron de 1,7 % en los frutos abortados a 76,2 % en los frutos maduros.
Los promedios fueron 6,6 % para los frutos abortados y 15,9 % para los frutos cosechados.

PALABRAS CLAVE

Persea americana, aguacate, Sudafrica, plagas de plantas, daños, experimentos.

introduction

The coconut bug, *Pseudotheraptus wayi* Brown *(Hemiptera: Coreidae)*, a coconut pest in East Africa (MARIAU, 1969), was first reported in 1977 in South Africa on mangoes and guavas (DE VILLIERS and WOLMARANS, 1980). It is now known to attack macadamia (DE VILLIERS, 1986), avocado (DE VILLIERS and VAN DEN BERG, 1984) and mango (VAN DER MEULEN, 1990). VAN DER MEULEN (1992) reported observing up to 52.4% damage in an untreated guava orchard.

According to LEVER (1969), the biology of the coconut bug (Figure 1) on coconuts is as follows: on average the female lays 74 eggs during its life cycle. First-instar nymphs have not been observed feeding on coconut palms, but they can cause severe tissue damage once they are about half-grown. Adults of both sexes fly readily when disturbed. Each individual is responsible for approximately 200 punctures during the course of its life. The insect always lives in the crown of the palm and nymphs are only found on or near the spadix. They are rarely observed during the day to avoid direct sunshine and heavy rain. They feed in the late afternoon and early morning, and are most active on cloudy but not heavily overcast days. Population densities vary markedly between trees, but are always low, with a per-tree average of only about one specimen.

Damage to avocado is caused by both adults and nymphs as they extract sap from the fruit with their piercing-sucking mouth parts (VAN DER MEULEN, 1992). To our knowledge, there are no other reports of *P. wayi*-induced damage to avocado in other parts of the world, but according to WAITE (1990) a biologically and visually similar species, *Amblypelta* spp., causes quite severe fruit drop in Australia.

Producers often confuse damage caused by the coconut bug (Photo 1) with hail damage, and sometimes even with fruit fly damage. However, hail damage is normally only superficial, whereas the coconut bug produces a hard internal knob just underneath the surface. This knob can be up to 10 mm in diameter when damage is inflicted at a young stage and normally comes off when the peel is removed. The fruit can also be malformed (Photo 2) when infestation by adult coconut bugs occurs at an early stage of fruit development, but internal fruit rot is seldom observed. Coconut bug damage may be distinguished from that caused by fruit flies, which form star-like lesions (Photo 2) on the outside of the peel. In South Africa, there are no available insecticides to control coconut bugs on avocados (VERMEULEN *et al.*, 1992).

The aim of the present study was twofold: to determine whether the coconut bug causes fruit drop, and to assess the economic impact of the coconut bug as an avocado pest in Eastern Transvaal (South Africa).

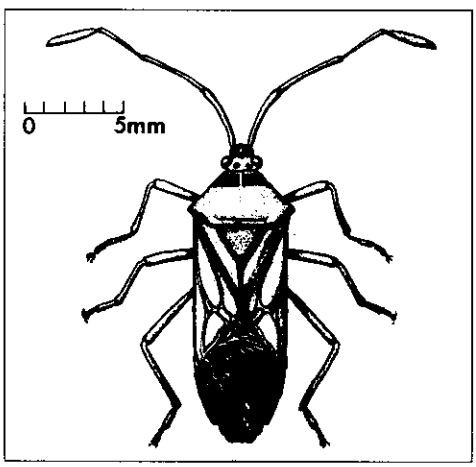

Figure 1
The adult coconut bug
Pseudotheraptus wayi.

materials and methods

Three avocado (cv. Fuerte) orchards in three different areas, were assessed in the study. The sites were: Westfalia (23.05 S, 30.07 E), Burgershall (25.05 S, 31.05 E) and Excelsior (25.02 S, 31.18 E). The trees were between 10 and 15 years old. Ten trees were chosen at random at each site and monitored during the study.

Firstly, adult coconut bugs were put in gauze cages along with bunches of young avocado fruit (10-20 mm in length)

to determine whether they could induce fruit drop, and to observe how the lesions develop into damage marks. Two coconut bugs were placed in each cage with ± 5 fruits, with 5 replicates hung only in the orchard at Excelsior. After feeding, the bugs were removed and the lesions assessed.

Secondly, a trial was conducted to determine what percentage of aborted fruit dropped as a result of coconut bug damage *per se*, and what percentage of damage to non-aborted fruit was inflicted by the coconut bug. This trial was conducted over a 2-year period (1989-1991). To facilitate collection of aborted fruit, and to standardize sample sizes, pieces of shadow cloth (2 m x 1 m) were stretched between wooden poles 1 m above ground under the trees, and all fruit that dropped on these traps during the first 2 months after fruit set were collected on a weekly basis. The fruit were then assessed for coconut bug damage, except for fruit which dropped directly after fruit set when they were too small (5 mm diameter and smaller). A sample of 50 ripe fruits per tree were harvested at random at the end of each season. These fruit were examined to determine the effects of coconut bug infestation.

•••• results and discussion

Most of the coconut bugs placed in gauze cages began attacking the young avocado fruit almost immediately. Within a few hours, watermark lesions, visible as slightly darker patches than the rest of the peel, appeared on the surface of the fruit. Within 2 days, these marks had become indented dark patches of about 10 mm diameter. Within 7 days, 80% of these fruits had dropped and all were aborted after 14 days.

On older fruit, lesions were often not visible on the outside, except for a slight indentation.

Total numbers of aborted fruit, ripe harvested fruit, and the number of avocados damaged by coconut bugs are given in Table 1. Percentages of damage due to coconut bug are given as a mean per orchard per season.

On harvested fruit, the mean damage due to coconut bugs ranged from 1.7% at Burgershall in the 1989/90 season to 76.2% at Excelsior in the same season. Losses of up to 98% on individual trees were recorded on the latter farm. On aborted fruit, damage ranged from 3.8% to 9.4% over the 2-year period. With the exception of Excelsior, the mean damage for all orchards was 5.3%, which is close to the generally accepted threshold level of 5% (EDWARDS and HEATH, 1964). However, the damage levels obtained at Excelsior are not uncommon and,

Photo 1
Typical coconut bug damage, often referred to as pencil damage.

Photo 2
Malformed fruit (far right) due to coconut bug damage. The two fruits on the left were punctured by fruit flies.

Table 1
Total counts of dropped fruit and harvested fruit, with percentage of coconut bug damage in every orchard (data collected from 10 trees per orchard).

	Locality							
	Westfalia		Burgershall		Excelsior		Total	
	AF*	HF**	AF	HF	AF	HF	AF	HF
1989/90								
Number examined	2206	500	423	463	4567	500	7196	1463
Damaged fruit	207	21	19	8	362	381	588	410
Mean (%)	9.4	4.2	4.5	1.7	7.9	76.2	8.2	28.0
1990/91								
Number examined	1534	500	849	500	3291	500	5674	1500
Damaged fruit	134	37	32	12	176	18	342	67
Mean (%)	8.7	7.4	3.8	2.4	5.3	3.6	6.0	4.5
Mean 1989/91	9.1	5.8	4.2	2.1	6.6	39.9	6.6	15.9

* AF = aborted fruit collected. ** HF = harvested ripe fruit.

according to producers, damage in the 1992 season was even much higher than in 1990/91. The differences in damage recorded at the different sites – which have very similar climates – is difficult to explain. One possibility is that since *P. wayi* is a relatively new pest in South Africa, it is still busy becoming established in the country. It should also be mentioned that *P. wayi* is a very active flying insect, and therefore these differences are only the result of this insects' biology and that similar patterns could occur in the future.

In similar studies on guavas (Van der Meulen, 1992), damage ranged from 12.2% to 52.2%. Way (1953) found that in some areas, and under specific conditions, up to 98% of a coconut crop could be destroyed by the coconut bug. The damage to harvested avocados observed in this study was less than the levels obtained by the above-mentioned authors, but on average always higher than the 5% threshold level.

Waite (1990) investigated fruit spotting bugs, *Amblypelta* spp., on litchis in Australia and obtained evidence of green fruit drop caused by these bugs. In the present study, we also obtained evidence that fruit drop can occur as a result of coconut bug infestation. Although a mean 6.6% aborted fruit with coconut bug damage was recorded in the 2-year period, it was assumed that at least part of these fruits would have fallen naturally. However, lesions developed quickly and were quite severe, indicating that natural fruit drop was negligible, thus having little effect on our results.

Damaged fruit does not reach the packing-houses, which means that most producers are unaware of this loss.

Based on the assumption that the pest status is reached when there is 5% loss in the marketable yield of any particular crop, as suggested by Edwards and Heath (1964), the coconut bug has thus become an avocado pest of economic importance in certain areas of South Africa. Furthermore, since the coconut bug has only been present in South Africa for a relatively short period of time, damage could increase in the future through further dispersion of this pest. ●

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