A note on the qualitative damage caused to cocoa pods by *Sahlbergella singularis* (Hagl.) (Hemiptera: Miridae).

Resumen. Se estudió el daño causado por el mírido *Sahlbergella singularis* (Hagl.) (Hemiptera: Miridae) a mazorcas de cacao. Se encontró una reducción significativa en el peso de la mazorca, así como en el peso del pericarpio, a niveles de daño superiores al 25% de la mazorca cubierta por lesiones. No hubo diferencia significativa entre niveles de daño (0, 25, 50 y 100% de la superficie de la mazorca con lesiones) para las variables peso de las semillas, longitud de la mazorca, anchura de la mazorca, número total de semillas por mazorca y número de semillas deformes por mazorca.

The cocoa mirids, *Sahlbergella singularis* (Hagl.) and *Distantiella theobroma* (Dist.) feed on cocoa shoots, chupons and pods. These mirid bugs have a major impact on the cocoa industry and their feeding activities alone have been reported to reduce the yield of cocoa by about 20%–25% of the annual crop (1, 2).

It has been difficult to assess the direct damage to cocoa pods and beans by the cocoa mirid because of the indirect nature of the damage done during the feeding activities of the bugs. Toxopeus and Gerard (7) observed that very little differences existed between infested and uninfested cocoa pods unless infestation was at the early development stage of cherelles which would then wilt. This report examines the ultimate effect of the insect feeding by comparing affected pods with pods free of infestation. It is therefore easy to determine at what level appreciable loss due to mirid feeding lesions could be recorded.

Methods

100 ripe pods, harvested from Amazon cocoa plots planted at the Headquarters of the Cocoa Research Institute of Nigeria, Ibadan, were selected monthly from January to December, 1980 at the pod breaking depot. The pods were categorised according to the incidence of mirid lesiones (marks of mirid feeding on pods).

The categories were:

(i) Pods free from lesions;
(ii) Pods with one quarter of the surface covered by lesions;
(iii) Pods with half of the surface covered by lesions; and
(iv) Pods with almost all the surface covered by lesions and having surface cracks (Figure 1).

The monthly selection for a year would therefore cover all the seasons, including the light and heavy crop seasons. It also covers the periods of high and low mirid populations.

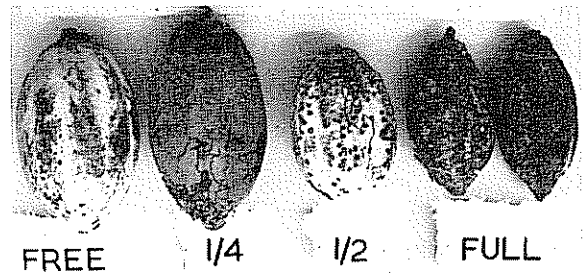

Fig. 1 Incidence of mirid lesions on pods.

Measurements were made of the length (cm) width (cm) and weight (g) of the pods. Pod husk weight (g) was taken after breaking the pod and removing the wet beans. Total bean numbers were recorded, as well as number damaged (woody, deformed or germinating).

Results and discussion

Both pod and husk weight showed statistically significant differences ($P > 5\%$) when over half of the pod surface was covered with mirid lesions Table 1. No significant difference was obtained in the weight of wet beans (Table 1). Toxopeus and Gerard (7) suggested that there was no difference in the fat contents of the beans from pods with or without mirid lesions.

There was no significant differences in the length and width of pods although pods with over half of the surface covered by lesions were slightly smaller than those free from lesions (Figure 1). There was also no difference in the number of beans showing deformity either when infested or when free from lesion cover.

In effect, mirids like most sucking bugs impose a drain on the host plants and probably introduce toxic saliva (3, 6).

Nuorteva (4) suggested that the wounding of plant tissues and secondary infestation by fungi contribute to the damage done to the plant. Mirids are insects with appreciable mouth parts and may also damage cocoa tissues in similar manner, in addition to secondary infection following mirid feeding (Entwistle, 1).

Cocoa mirid feeding is complicated and the adverse effect of each stage during feeding is not fully known. It may therefore be of interest if future work could be centered on whether the salivary glands of these bugs contain substances stimulating or inhibiting plant growth, as has been demonstrated in the case of some aphids and bugs (5, 8).

Table 1. The effect of incidence of mirid lesions on cocoa pods and beans.

Parameters	Extent of cover					
	Free	1/4	1/2	Full	P > 5%	L.S.D.
Weight of pods (g)	550.60	473.77	420.19	435.70	*	74.89
Weight of pod husk (g)	432.30	366.43	328.09	326.70	*	59.59
Weight of beans (g)	118.30	137.33	92.10	108.84	ns	23.70
Length of pods (cm)	17.60	17.05	16.45	16.40	ns	1.412
Width of pods (cm)	8.54	8.25	8.01	8.30	ns	0.411+
Total bean number/pod	40.32	36.84	34.72	36.60	ns	0.441+
Total deformed beans/pod	1.04	0.64	1.08	2.60	ns	0.168+

* Significant at P > 5%

ns Not significant

\+ Log transformation analysed.

It is however interesting to note that the plant, pods and beans may be able to stand an appreciable amount of mirid feeding lesions. If this is the case, the heavy the use of insecticide, which has resulted in a resurgence of new pests and resistance of insects to insecticide, could be reduced and biological agents (parasites and predators) would become available for use against the mirids.

The major differences recorded in attacked and unattacked cocoa pods are in the weight of pod husks, and it is likely that the pods may be losing useful materials (protein and carbohydrates). Some of the items removed are either used by the insect and the excess is excreted, as has been observed when aphids feed on brussels sprouts plants (Van Emden, *et al*, 8). If the loss in weight of pod husk from pods lesions means that the insect is removing valuable nutrients, it may be necessary to replenish the lost materials artificially when pod husks are used in the fertilizer and animal feed industry.

Summary

The damage caused to cocoa pods by the mirid *Sahlbergella singularis* Hagl. was studied. Pod weight and husk weight were significantly reduced at damage levels over 25% of the pod surface covered by mirid lesions. There were no significant difference between damage levels (0, 25, 50 and 100% of the pod surface covered by mirid lesions) for bean weight, pod lenght, pod width, total bean number/pod and deformed bean number/pod.

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