

A Complex of Lepidopterous Defoliators on Sorghum and Maize in Southern Honduras

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Resumen: Los agricultores hondureños se refieren a la "langosta" cuando hablan de los insectos (larvas=gusanos) que atacan los cultivos de sorgo y maíz. La langosta puede destruir o causar daños serios a las plantas durante las siembras de primera y postrera. Observaciones en el sur de Honduras en 1986 y 1987 revelaron que el complejo de lepidopteros noctuidos consistente en cogollero [*Spodoptera frugiperda* (J. E. Smith)], gusano soldado del sur [*S. eridania* (Cramer)] y *Metaponpneumata rogenhoferi* Möschler causaron daños severos a plantas jóvenes de sorgo y maíz en campos planos y de ladera durante las siembras de la primera. Un cuarto noctuido, *Mocis latipes* (Guenée), el falso medidor fue ocasionalmente encontrado dentro y en los alrededores de los campos de siembra y por eso podría estar envuelto como parte del complejo de la langosta en algunos años. El extensivo daño defoliador de las larvas, comúnmente resulta en la destrucción del cultivo. Las malezas dentro y en alrededores de los campos de producción sirven como hospederos para estos insectos plaga antes de la emergencia del cultivo de sorgo y maíz. La remoción de esta vegetación debe influenciar las poblaciones de las larvas y el daño al cultivo en los campos de producción.

ABSTRACT

Farmers in Honduras refer to the *langosta* when discussing insects (larvae=worms) that attack sorghum and maize crops. The *langosta* may destroy or seriously damage the crop plants during the *primera* (first) and *postrera* (second) growing seasons. Observations in southern Honduras in 1986 and 1987 revealed that the noctuid lepidopterous complex consisting of the fall armyworm [*Spodoptera frugiperda* (J. E. Smith)], southern armyworm [*S. eridania* (Cramer)] and *Metaponpneumata rogenhoferi* Möschler caused severe damage to young sorghum and maize plants in fields on hillsides and on the plains during the *primera*. A fourth noctuid, *Mocis latipes* (Guenée), the grasslooper, was occasionally encountered in and around the

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fields and therefore could be involved as part of the *langosta* complex in some years. The extensive feeding damage by the larvae, often resulting in crop destruction, identified by farmers to be associated with large locust populations, thus the name *langosta*, which in Spanish means locust. The non-crop vegetation in and around the production fields served as host plants for these insect pests prior to crop emergence. Removal of this vegetation should influence populations of larvae and crop damage in the production fields.

INTRODUCTION

Native land race sorghums called *maicillos criollos* are intercropped with maize by subsistence farmers on small farms (fields averaging less than 1.5 ha) in southern Honduras. Ninety three percent of the sorghum grown in Honduras is intercropped with maize (SRN, 1980). These tropical sorghums are three to four meters tall and sensitive to photoperiod. Although planted in May after the start of the rainy season, they do not differentiate and begin internode elongation until the first part of October (Meckenstock, et al. 1985). This is after maize reaches maturity and is harvested.

The *maicillos criollos* are exposed to insect pests from planting in May to harvest in December. DeWalt and DeWalt (1982, p. 42) included the fall armyworm, [*Spodoptera frugiperda* (J. E. Smith)], as a pest considered to be a principal constraint to sorghum and maize production in southern Honduras. Other lepidopterous caterpillars (larvae) have been observed feeding on sorghum and maize in intercropped plantings in this area, but their identification and role as pests on these crops have not been elucidated. This paper reports observations on occurrence of lepidopterous insect pests in intercropped sorghum and maize fields in southern Honduras during May and early June when the crop plants are in early developmental stages.

STUDY LOCATION AND PRODUCTION SYSTEMS

The observations reported here were made primarily during 1986 and 1987, but additional information was obtained from studies conducted in several areas in southern Honduras during

earlier years. Fields in the Alianza area were selected for study. Two contrasting agricultural systems were chosen for comparison, one on the plains at El Conchal, and another in the hills at La Coyota.

The hills and plains areas of southern Honduras differ the level of agricultural technology employed. The fields in the hills have a lower technology input level than the fields on the plain. In the hills the steep slopes do not permit the use of mechanical or animal land cultivation methods. The hills, have also been exposed to erosion resulting in a significant loss of the soil layer suitable for agriculture.

Land preparation is minimal in this area due in great part to the large number of rocks in the fields. Some chemical herbicides may be used but weed control is usually accomplished by manual methods. On the plains, most of the farmers use ox-pulled plows or rent tractors for land preparation. Insecticides are used more frequently on the plains, particularly for control of cutworms and armyworms. Farmers in the hills use less insecticide than farmers on the plains, mainly because they do not have the money to buy the chemicals or a sprayer for application. If money is available to rent a sprayer there may not be enough sprayers available when needed because they are in use by neighboring farmers. On the plains, there is a large population of cattle which is commonly used for land preparation, cultivation and general transportation needs. This allows farmers on the plains to cultivate larger fields.

THE INSECT PEST PROBLEM

Identification of the problem insect pests on sorghum and maize in southern Honduras during the first growing season (primera) is important in understanding the complex of insect pests attacking the crops, as well as developing control measures for these insects. Previous literature (e.g. DeWalt and DeWalt, 1982, p. 43) indicates that the *langosta* is a principal insect pest on sorghum and maize in Honduras, but no identification is given to describe the *langosta*. The farmers refer to the *langosta* when discussing the insects that attack sorghum and maize crops during the first and second growing seasons..

Although they anxiously wait for the onset of the rains in late April-early May for planting, some farmers may delay planting to escape the damage caused by the large *langosta* population that attacks the young sorghum and maize plants during the early part of the *primera*.

The feeding by a large number of lepidopterous larvae would be expected to cause extensive damage by defoliation and possibly crop destruction. Farmers apparently associate damage caused by the larvae with that of large locust populations which historically have devastated crops in the Region, thus the name *langosta*, which in Spanish means locust.

1986 Observations

In the hills area at La Coyota, two armyworm species, the fall armyworm and southern armyworm [*S. eridania* (Cramer)] and a third noctuid, *Metaponpneumata rogenhoferi* Möschler, destroyed many fields planted with sorghum and maize during late April and May in 1986. These larvae were observed on grasses and legume weed plants in and around the production fields, as well as on the damaged sorghum and maize plants. A measuring worm (Geometridae, unidentified) referred to by the farmers as *gusano medidor* was observed to cause extensive defoliation to the nacasclo trees [*Caesalpinia coriaria* (Jacq.) Willd.] (a legume) which are prevalent in the area. This measuring worm was present in extremely high numbers on the trees in late April and early May following the initiation of rains and the onset of new growth of leaves on the trees. No armyworms were observed contributing to this damage to the trees. The geometrids could be found in production fields because the worms defoliated the trees and were moving around in search of suitable host plant feeding material.

Farmers usually recognize this large geometrid primarily by its manner of crawling (looping movements), but they often become confused in separating this species from armyworms in different color phases but in similar stages of development. They also identified this measuring worm a *Mocis*, a related geometrid and a pest of plants in the grass family, but not a pest of the nacasclo tree. *Mocis latipes* (Guenée), the grass looper, was only occasionally encountered in or around the production fields

in southern Honduras in 1986 (as well as in 1987). The insect can be extremely destructive to sorghum and maize. The sporadic nature of large infestations of the grass looper in production areas would suggest that this insect could be involved as part of the *langosta* complex in some years.

1987 Observations

Fields heavily infested with larvae in 1986 were examined in late April in 1987 for armyworms and other defoliator species on vegetation or in resting stages (e. g. pupae) in or on the soil and in debris. No larvae in any stage were found. Fields in southern Honduras had not been planted because the rainy season had not begun. However, farmers explained that following a rain in March, large numbers of larvae, identified as *gusano medidor*, had defoliated the nacascolo trees. However, no measuring worms were observed in and around unplanted fields in late April in the hills. The insects had either completed development on the trees and relocated on other vegetation or had died before maturity.

Green vegetation, mostly grasses, growing in and along irrigation ditches in southern Honduras were found to be infested with fall armyworm larvae in all stages of development in late April. Larvae and pupae were collected under the grasses and identified. Moths were observed to be active in the areas where irrigation water, applied earlier, allowed the vegetation to remain attractive to the armyworms during the dry season. The fall armyworm can obviously survive in large numbers at these locations and these areas serve as the source of insects infesting crops in Southern Honduras when the fields are planted following the onset of the rainy season.

Additional observations after crop planting in the *primera* revealed that the lepidopterous complex consisting of the fall armyworm, southern armyworm and *M. rogenhoferi* caused severe damage to sorghum and maize seedlings in fields in the hills. Non-crop vegetation in and around the production fields served as host plants for these insect pests prior to crop planting. The pests attacked and destroyed the sorghum and maize as soon as the plants emerged, resulting in replanting of many fields.

THE LANGOSTA: A WORM COMPLEX

The lepidopterous larvae observed to ravage sorghum and maize during the early part (May to June) of the first crop growing season in Honduras and other areas in Central America, have been referred to by the farmers in these areas as *langosta*. (DeWalt and DeWalt 1982). The pest complex in southern Honduras in 1986 and 1987 consisted of four noctuid species (identified above). However, the fall armyworm and *M. rogenhoferi* were the principal pest species in this complex; the fall armyworm was the most important of the four species. The complex of larvae destroyed most of the sorghum and maize plants in many fields. Vegetation was prevalent in and around fields in early May to serve as host plants for the larvae. These host plants, mostly grasses but some legumes including sicklepod (two unidentified species), emerged soon after the rains, and were attacked by the foliage feeding lepidoptera. The sorghum and maize is often planted after the non-crop host vegetation has emerged. Once the grasses and legumes were defoliated, the large larvae moved to the sorghum and maize, where they seriously damaged these crops. Replanting was necessary in many fields in the hills. Sorghum and maize in fields on the plains with little non-crop vegetation were not seriously damaged by the larvae during the early part of the first growing season.

FEEDING ACTIVITIES AND DYNAMICS

Although armyworms are generally associated with defoliation, "dead heart" (bud damage and plant death) and panicle or ear feeding, they also act as cutworms. The fall armyworm has been reported to reduce maize stands by 30 percent in Panama (Shannon and Navarro, 1983) and 60 percent in the Sonora area of Mexico (Leon, 1978).

Following harvest of the maicillo criollos in December until it rains in early May there is no sorghum or maize host plants for the worm complex in southern Honduras. This does not preclude the use of other native grasses by the armyworms to survive periods when the crop plants are not available. The non-crop grasses and other vegetation around production fields serve as hosts for these insects prior to their occurrence on sorghum

and maize, preferred host plants (Pitre et al., 1983). Passoa (1983, p. 65) collected fall armyworm during every month in Honduras, suggesting no period of inactivity (diapause) during the dry season.

The feeding activities of the fall armyworm, southern armyworm and *M. rogenhoferi* larvae on grasses and legumes growing in and around fields during April before sorghum and maize is planted and during May when the crop plants in intercropping systems are in the seedling and early whorl stages has been discussed above. However, the circumstances leading to the infestation of sorghum and maize may be different for the species.

Biological and ecological investigations with each species are needed to fully elucidate these circumstances. The fall armyworm is active and survives throughout the year in southern Honduras, and attacks the grain crops as soon as they emerge. Populations of this pest would be expected to increase in an area during the growing season, particularly, where maize, the preferred host to sorghum (Sifuentes, 1967; van Huis, 1981), is grown intercropped with sorghum. Little information is available for the other insects in the complex in the area of southern Honduras to explain the ecological events associated with damaging infestations on sorghum and maize.

Damage to sorghum and maize by *S. eridania* occurred only on seedlings. Preliminary laboratory studies (M. Castro, 1987, personnel communication) revealed that the larvae had difficulty developing to adulthood on older sorghum plant foliage. This suggests limited population build-up of this pest during the first crop growing season. The occasional occurrence of this pest on the crops during mid-to late year provides further evidence of this biological effect. This insect was damaging in 1986, but was of little importance in 1987.

Since infestations of *S. frugiperda*, *S. eridania* and *M. rogenhoferi* on intercropped sorghum and maize appear to be related to the availability of non-crop grasses and legumes in and around planted fields, the removal of these host plants from the immediate areas planted with sorghum and maize could reduce the infestations of the defoliator insect species on the crop plants.

This cultural control tactic could be performed by the low income farmers, either by chemical or mechanical (including and weeding) removal of the non-crop vegetation.

The sorghum and maize crops attacked by large numbers of lepidopterous caterpillars during the first growing season in southern Honduras may be destroyed or plant stands sufficiently reduced, requiring replanting. Replanting results in delay of crop maturity, thus the plants are often exposed to increasingly large numbers of insect pests as the crop develops during the season. Additionally, the crop may mature during the *canicula* or dry period, further reducing yields. The cost of additional seed and replanting is considerable and possibly prohibitive for the subsistence farmer. The constraint of early season insect pests in sorghum-maize intercropping should be eliminated as an instability factor in this production system.

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