

**Small holder farmers' perceptions, host plant suitability and natural
enemies of the groundnut leafminer, *Aproaerema modicella*
(Lepidoptera: Gelechiidae) in South Africa.**

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Abstract

The groundnut leafminer (GLM), *Protaetia modestella* (Lepidoptera: Gelechiidae), is a well known pest of groundnut and soybean in Asia. It has been reported in Southern Africa on groundnut since 2000. The groundnut leafminer causes a reduction in crop yield by tunneling in the leaves and thereby reducing the leaf area for photosynthesis. Larvae tunnel into the leaves where they feed between the upper and lower epidermis causing defoliation of groundnut crops. Last-instar larvae web two leaves together and pupate in between these leaves. Since GLM is a new pest in South Africa, no integrated management program for control of this insect exists. A survey was conducted among the small holder farmers at the Tshiombo irrigation scheme where GLM is an important pest in groundnut fields. Results showed that the majority of residents involved in farming activities were females aged between 41 and 60 years. It was also observed that groundnut is important as part of the daily diet and a cash crop in the surrounding villages and Thohoyandou, the nearest town. Farmers were familiar with the damage symptoms caused by GLM larvae, but they did not know the agent causing the damage to their groundnut fields. They regarded chemical control as the only pest control strategy capable of reducing crop losses caused by GLM. Since chemical control of GLM is not a sustainable strategy there is a need to carry out investigations likely to generate reliable GLM management strategies and this requires using live insects of known age and sex. One of the constraints encountered when conducting experimental studies on GLM moths was the fact that these moths are small, very agile and the sex of live moths cannot be easily identified. Male and female moths lack easily identifiable distinguishing characteristics. Another area of investigation was directed towards identifying cultivated and wild host plants that serve as either off-season or alternative hosts of GLM. When such plants are identified they can serve as trap crops in strategies designed to manipulate the groundnut crop environment in order to reduce crop damage due to GLM. With this objective in mind behavioral bioassays designed to compare the preferences of GLM for groundnut, soybean, lucern and cowpea were carried out. A Y-tube olfactometer bioassay was used to examine moth orientation to test plant odors. No-choice tests bioassays were used to examine moth oviposition responses, plant damage and GLM development on the test plants. Although moths oriented

positively to cowpea plants in the Y-tube bioassays, GLM larvae did not infest cowpea plants in the larval development bioassays. This may be due to lack of feeding stimulants for GLM in the cowpea plants. Comparatively speaking GLM larvae caused more damage on soybean than on groundnut. The mean number of lesions on soybean plants was higher than on groundnut. Results from these experiments also showed that the rate of larval development was much better on groundnut than on soybean and lucern. Within the groundnut fields nine wild host plant species of GLM were identified and the geographical distribution of those plants was established. In addition to these observations, ten species of natural enemies were reared from GLM larvae and pupae. High levels of larval (54.2%) and pupal (43.7%) parasitism were recorded. The impact of those natural enemies on GLM populations in the study area remains to be investigated in detail. The potential of using wild host plants to minimize GLM attacks on groundnuts also requires further investigations. This study shows that there are components that can be used to develop IPM strategies for managing GLM in South Africa but this will require a concerted effort of carrying out the necessary research and working closely with the farmers.

Key words: *Aproaerema modicella*, GLM, small holder farmers, host plants, IPM, natural enemies.