

Incidence, yield loss and economic injury levels of key insect pests of hot pepper (scotch bonnet)
in major growing Districts of Uganda

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ABSTRACT

Hot pepper, scotch bonnet is considered among the high valued nontraditional cash crops grown by farmers in Uganda. Its production however is constrained by insect pests, diseases coupled with poor agronomic practices. Limited information exists regarding the level of occurrence of insect pests and their effects on hot pepper yield in Uganda. This is important for developing sound, environmentally friendly and cost effective management practices. This study was therefore conducted to (1) determine the occurrence and distribution of insect pests of hot pepper in major growing districts of Uganda, (2) Establish the relationship between infestation/damage levels of insect pests and fruit yield of hot pepper, and (3) determine the action threshold and economic injury levels of the two most prevalent insect pests of hot pepper.

Biological monitoring surveys were conducted to establish the occurrence of insect pests in 6 major hot pepper growing districts of Uganda. The districts are Mukono, Wakiso, Kiboga, Hoima, Luwero and Mpigi. A total of 82 farmers were visited during the study. Data was collected by throwing four 2x2m quadrats; 3 along a diagonal transect and the other at the furthest point from the diagonal. All the enclosed plants were inspected for possible life stages of the insects or their damage. Results of the surveys indicated that fruit flies (*Ceratitits capitata*), aphids (*Aphis gossypii*), whiteflies (*Bemisia tabaci*), bollworm (*Helicoverpa armigera* and *Spodoptera littoralis*) and thrips are the most abundant and prevalent insect pests of hot pepper. They occurred in all the visited districts. Fruit flies had the highest incidence (37.1%), followed by aphids (26.1%), whiteflies (23.7%), and bollworm (3%). Thrips had the lowest occurrence (1.7%). The effects of location and cropping system on insect pest occurrence were significant ($P < 0.05$). The occurrence of insect pests (majorly sucking pests) was lower in mixed cropping system compared with monocropping.

To compare infestation levels/damage and yield losses caused by the pests, a repeated on station trial was conducted. Five different spray schedules were used to create variable pest levels. The trial was laid out in a Randomized complete block design (RCBD) with three replications. The five spray schedules included; 1) application of insecticide once a week to 50% bud initiation; 2) Weekly sprays from bud initiation to 50% fruit initiation; 3) weekly sprays from 50% fruit

initiation to first harvesting; 4) Weekly sprays throughout the growing period of the crop, and 5) untreated control. The population dynamics and damage of the insect pests were recorded over the growing period. Fruit yield was also recorded at first harvest. Results indicated that on average, insect pests significantly reduced yield by 63% if compared to treated plots. Fruit damaging insect pests caused the highest amount of yield losses (55%). Spraying starting at fruit initiation was as effective in reducing yield loss as spraying weekly throughout the growing season. In fact, the study revealed that chemical control was more profitable when initiated at fruit initiation to target the fruit damaging pests than when used throughout the growing period.

To determine the economic injury levels, aphid colonies of the pest were raised on hot pepper plants in a screen house at Makerere University Agricultural Research Institute Kabanyoro (MUARIK), to generate individuals that were later introduced in known incremental numbers to hot pepper plants in exclusion cages. Yield loss data associated with specific initial pest densities were recorded. Results revealed that the yield loss caused by aphids increased with increase in infestation levels. The density of 2aphids/plant was found to be economically damaging and pesticide application should be initiated at a density of 1.5 aphids/plant to stop the increasing aphid density from reaching economic injury levels.

From the study, it can be concluded that the fruit attacking pests in particular the fruit fly are the most damaging and so to ensure judicious use of pesticides, sprays should be initiated at fruiting stage; direct aphid damage can cause economic loss; and mixed cropping can be exploited in controlling aphids, thrips and whiteflies.