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# ASSESSMENT OF YAM BEETLE DAMAGE UNDER SCREEN HOUSE CONDITION

BY

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## ABSTRACT

A screen house experiment was conducted at Asaba Campus of the Delta State University to assess the effect of different populations of yam beetles (*Heteroligus meles* Billberger) on tuber damage. The experiment was laid out in a Completely Randomised Design (CRD) and the treatments were: 0 beetle/pot, 2 beetle/pot, 3 beetles/pot and 4 beetle/pot with three replications. Each pot was perforated measuring 28cm in diameter and 30cm deep, filled to three-quarter with sterilized sieved topsoil of approximately 8 kg in weight. Uninfested, pre-weighed freshly harvested yam tuber, *Discorea rotundata* (cv. Ekpe) was buried in each pot. The various populations of beetles were introduced and the tops of the pots covered by nylon mesh held tightly to the pots by rubber bands to prevent the escape of the beetles. The following data were collected: percentage weight loss, number of feeding holes, diameter of feeding holes and depth of feeding holes. The result showed that all the beetle population except 1 beetle/pot significantly reduced the weight of tubers ($p<0.05$) when compared with control. The percentage weight loss ranged from 0% in the control to 21.40% under the highest beetle population/pot. The number of feeding holes, diameter of feeding holes and depth of feeding holes were significantly higher than the control except the 1 and 2 beetles(s)/pot. Correlation analysis of beetle numbers and weight loss gave a high positive correlation ($r = +0.97$), indicating that weight loss increased as beetle population increased. The result suggests that the economic threshold may be lower than one beetle/yam heap in the field.

**Key Words: Yam, yam beetle damage.**

## INTRODUCTION

Yam (*Dioscorea spp*) is an important source of carbohydrate in the diet of most people in West Africa, the Caribbean, South pacific and parts of Asia, (Taylor, 1964, Umeozor, 1998). The bulk of yam in the World is produced in West Africa with the region accounting for 95% of the World yam production (FAO, 1994). The leading countries in yam production are Nigeria, Cote d' Ivoire, Benin Republic and Ghana, with Nigeria alone producing about 75% of world total (FAO, 1994).

One of the constraints in the production of yam is the menace and damage caused to the tubers by the dynastid beetles (Coleoptera: Dynastidae) with the following species identified in West Africa (*Heteroligus meles* Billberger, *H. appius* Burmeister, *Prionoryctes rufopiceus* Arrow and *P. canaliculus* Arrow (Taylor, 1964). *H. meles* is reported to be the most widely distributedand most important of all the yam beetles (Taylor, 1964}. The damage caused by yam beetles are characteristic hemispherical holes on the yam tubers. A yield loss of up to 42% has been reported in West Africa (Wood *et al.*, 1980). Damage by yam beetle predisposes yam tuber to microbial deterioration (Acholo *et al.*, 1997).

There is paucity of information on yam beetles' population dynamics, and control. This study was conducted to provide information on the level of damage caused by *H. meles* under different populations. This would help to determine the action

threshold in the control of this key pest of yam.

## MATERIALS AND METHODS

The study was conducted in a screen house at the Faculty of Agriculture, Delta State University, Asaba Campus, Asaba between July and August 2004. Pre-perforated plastic pots measuring approximately 28cm in diameter and 30 cm deep were used. The pots were filled to ¾ depth with 8 kg of sterilized topsoil. A pre-weighed freshly harvested yam, *D. rotundata* (cv. Ekpe) was buried in each experimented pot. *H. meles* used for the study were collected from light traps at Asaba campus in July 2004.

The experiment was arranged in Completely Randomised Design (CRD) with three replications and consisted of the following populations of *H. meles* per pot: 0 beetle/pot, 1 beetle/pot, 2 beetles/pot, 3 beetles/pot and 4 beetles/pot.

The choice of the beetle population was based on our sampling from farmers' farms in the area, and reports from farmers who claim they usually encountered up to four beetles per yam heap during harvest under high infestations.

Beetles were introduced by making a little hole on top of the soil in each pot and dropping the beetles in the hole, a method used by Umeozor (1998). The top of each pot was securely covered with a plastic mesh held with rubber band to prevent the escape of the beetles. The study was terminated after one month. At the termination of the experiment, the tubers were carefully removed, washed and allowed to dry under shade.

The final weight, number of feeding holes, diameter of feeding holes and depth of feeding holes were recorded while the percentage weight loss was computed.

All data collected were square root transformed and subjected to analysis of variance and means separated by Duncan's New Multiple Range Test (DMRT).

## RESULTS AND DISCUSSION

The percentage weight loss, number feeding holes per tuber, diameter of feeding holes and depth of feeding holes caused by the feeding of *H. meles* are presented in Table 1.

The results show that except the 1 beetle/pot treatment, all other beetle populations significantly reduced the weight of yam tubers ($P<0.05$) when compared with the control. However, the weight loss amongst the beetle populations was not significantly different. ($P>0.05$). The correlation analysis between beetle numbers and weight loss gave a correlation coefficient of ($r = + 0.97$). The numbers of feeding holes, diameter of feeding holes and depth of feeding holes were significantly higher than the control except the 1 beetle/pot and 2 beetles/pot.

A few studies on the control of yam beetles have been carried out (Taylor, 1969, Wood *et al.*, 1980, Umeozor, 1998), but studies on the threshold level of *H. meles* or any yam beetle species are unknown. This preliminary study has shown that weight loss under infestation of *H. meles* increases with increase in population ($r = + 0.97$).

The result obtained from this study could be used to predict the level of damage by this key pest of yam under natural infestation in the field. The weight loss inflicted by the pest within 4 weeks (one month), which ranged from 0% to 21.40% implicates *H. meles* as a key pest of the crop in the area.

Similarly, the result seems to suggest that the economic threshold would be lower than 1 beetle per yam heap in the field where a beetle may stay in the yam heap feeding from 3 to 4 months before

undertaking the breeding migration back to swampy lowland (Taylor, 1964). Field experimentation on the threshold study with *H. meles* would confirm the threshold level of this pest since the field situation is different from the screen house environment being more exposed to the vagaries of weather.

**Table 1. Yam damage under different populations of *H. meles* in the screen house condition.**

| Treatments | % wt. Loss per yam tuber | No. of Feeding Holes/tuber | Mean depth of feeding holes (in cm) | Mean diameter of Feeding Holes (in cm) |
|---|---|---|---|---|
| 0 beetles/pot | 0.17$^{a}$ (0.00) | 0.17$^{a}$ (0.00) | 0.17$^{a}$ (0.00) | 0.17$^{a}$ (0.00) |
| 1beetles/pot | 3.61$^{ab}$ (12.57) | 1.86$^{ab}$ (3.00) | 1.27$^{ab}$ (1.13) | 1.40$^{ab}$ (1.50) |
| 2 beetles/pot | 4.11$^{b}$ (16.53) | 2.59$^{ab}$ (6.33) | 1.35$^{ab}$ (1.33) | 1.46$^{ab}$ (1.67) |
| 3 beetles/pot | 4.17$^{b}$ (17.03) | 2.90$^{ab}$ (8.00) | 1.52$^{b}$ (1.80) | 1.63$^{b}$ (2.13) |
| 4 beetles/pot | 4.68$^{b}$ (21.40) | 4.12$^{b}$ (16.6) | 1.48$^{b}$ (1.70) | 1.60$^{b}$ (2.07) |
| S.E ± | 1.97 | 1.55 0.04 | | 0.47 |

Data transformed to square root transformed vx + 0.5
Values in parenthesis are untransformed actual values
Means in the same column with the same letter superscript are not significantly different (P>0.05).

## REFERENCES


Acholo, M., Morse, S., Macnamara, N., Flegg, L., Oliver, R.P. (1997). Aetiology of Yam (*Discorea rotundata*) tuber rots held in traditional stires in Nigeria: importance of *Fusarium* spp and yam beetle. *Microbiol. Res.* 152(3): 293-298.

FAO (1994). Production statistics. Food and Agriculture Organisation of the United Nations, Vol. 48, Rome, 265 pp.

Taylor, T.A. (1964). Studies on Nigerian Yam beetles II. Bionomics and control. *Journal of West African Science Association* 9:13-31.

Taylor, T.A. (1969). Insecticide residue in yams treated against yam beetle (*Heteroligus sp)* infestation in Nigeria. *Journal of West African Science Association* 13:139-145.

Umeozor, O. C. (1998). Evaluation of Furadan as a substitute for Aldrin in the control of Yam beetle, *Heteroligus meles* Bilb. And *H. appius* Burn. (Coleoptera: Dynastidae) *Nigerian Journal of Entomology,* 15:100-106.

Wood, T. G., R. W. Smoth, R. A. Johnson and P. O. Komolafe (1980). Termite damage and crop loss studies in Nigeria-pre-harvest losses to yam due to termite and other soil insects. *Tropical Pest Management* 26:355-370.