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Full Length Research Paper

Host location and ovipositional preference of *Elaeidobius kamerunicus* on four host palm species

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The response of the oil palm pollinating weevil *Elaeidobius kamerunicus* Faust (Coleoptera: Cucurlionidae) to the inflorescence of different palm species was tested in a choice, non- choice and a four arm- olfactometer bioassay. Weevils preferred significantly the inflorescence of oil palm (*E. guineensis* Jacq) for oviposition. In both choice and non-choice tests using mated adult females, significantly more eggs were laid on oil palm than coconut, livingstona and royal palms. *E. kamerunicus* is able to locate its host plant by olfactory stimuli. These experiments support the hypothesis that pollen–seeking insects use pollen odour cues to locate its oviposition site.

Key words: *Elaeidobius kamerunicus*, *Elaeis guineensis*, *host* preference, oviposition, olfactometer.

INTRODUCTION

Herbivore-host plant interactions can have an important influence on the dynamics and management of insect populations. The relationship between ovipositional preference and host suitability has been a central problem in theories on the evolution of host associations between phytophagous insects and plants (Thompson, 1988). Host preference is associated with higher oviposition rates, increased female longevity, shorter developmental time and higher survival in all life stages (Lenteren and Noldus, 1990). The oil palm, *Elaeis guineensis* Jacq, belonging to the family Arecaceae is an entomophilous crop. In West Africa, approximately ten species of insects were identified as being responsible for oil palm pollination (Syed, 1981). These species included *Elaeidobius kamerunicus* F., *E. singularis* F., *E. subvittatus* F. (Coleoptera: cucurlionidae), *Mystrops costaricensis* Gillogly (Coleoptera; Nitidulidae), *Thrips lawaiilensis* Morgan (Thysanoptera: Thripidae) and bees (*Apis* spp.) (Corrado, 1985; Genty et al., 1986; Mariau and Genty, 1988). Among these, *E. kamerunicus* is the most efficient pollinator (Syed, 1979, 1981). *E. kamerunicus* feed on the anther filaments and oviposit on them during feeding. The hatching larvae feed on the anther of the post-anthesized male inflorescence until pupation in 9 to 11 days and the total developmental period from egg hatching to adult emergence range from 10 to 13 days. The emerged adult upon visiting the anthesizing male inflorescence for feeding and oviposition, carries some pollen load which are deposited on the female inflorescence when visited, thereby achieving pollination.

The host association status of *E. kamerunicus* population is still unknown. The objectives of the present study are:

1) To determine ovipositional preference of adult female *E. kamerunicus* when provided a simultaneous choice of four palm species;
2) To determine the ability of *E. kamerunicus* to locate suitable host by olfactory response.

MATERIALS AND METHODS

Oviposition preference

This study was conducted using 'choice' and 'no choice' experiments to determine the oviposition preference on the test palm species.

Choice preference test for oviposition

Four economically important palm species were selected including *E. guineensis* (oil palm), *Cocos nucifera* (coconut), *Livingstona*

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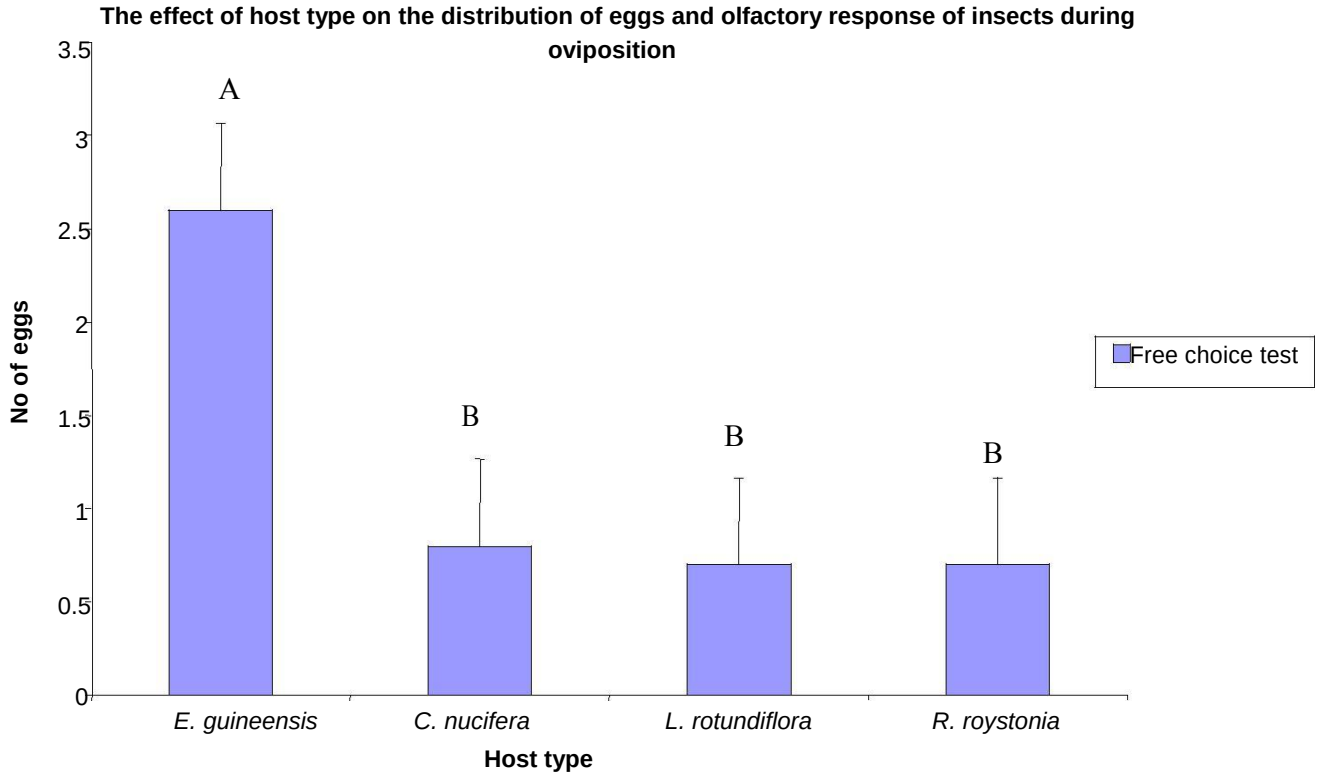

Figure 1. Mean number of eggs on different palm species (free choice test).

rotundiflora (livingstona) and *Roystonia olerecea* (royal palm). Excised inflorescence at anthesis from all host plants were kept in a refrigerator for 48 h to ensure plants were free of both pollinating weevil and other insects prior to experiment. Each inflorescence, spaced 5 cm apart, was placed at the base of a plastic bowl measuring 44 cm in diameter and 15 cm deep. Ten mated *E. kamerunicus* females were added to the bowl and the opening covered with a Nylon mesh held in place with an elastic band. The exposed females were left to oviposit for 24 h only and thereafter the inflorescence was removed from the oviposition chamber and the number of eggs laid on each inflorescence was counted under stereomicroscope.

No choice preference test for oviposition

Each palm inflorescence used earlier was placed in an individual aerated polythene bag in ten replicates. Ten mated *E. kamerunicus* females were then released into each polythene bag. The females were allowed to oviposit for 24 h, thereafter the inflorescence was removed from the oviposition chamber and the numbers of eggs laid on each inflorescence was counted under the microscope.

Olfactory response of *E. kamerunicus* to the odour of different palm species

The culture of *E. kamerunicus* was initiated from individuals collected from the field. The weevils were reared at laboratory temperature between 26.5 to 28.9°C, 69 to 92% R.H, and L12:D12 photoperiod on male “oil palm” inflorescence. Adult females were collected and used within 48 h of adult emergences. Weevils were starved for 24 h before experiments to increase their motivation to search for food. Four anthesizing inflorescences of different palm comprising oil palm, coconut, livingstona and royal palms were placed in transparent polythene bag (17.5 x 12.6 cm). The olfactometer consisted of plastic pipes, each measuring 12.4 cm long and 0.4 cm in diameter. The pipes were fixed to a transparent plastic container of 11 cm in diameter and 4.5 cm deep and were vertically secured 6.5 cm from each other. The free ends of the plastic pipes were now inserted through the opening of the polythene and tied with twine. Cotton wool was placed round the tube before tying to ensure no weevil escaped. Ten adult *E. kamerunicus* were introduced into the plastic container. Weevil left the container climbing through the pipes to meet the host of their choice.

The number of females trapped within each plant species through each plastic pipe was recorded. The experimental design was a “completely randomized design” with six replicates.

RESULTS AND DISCUSSION

Ovipositional preference

In the free-choice test, weevils laid significantly higher eggs ($P < 0.001$) on oil palm than on other palms (Figure 1).

No – choice

There were significant differences in eggs oviposited on

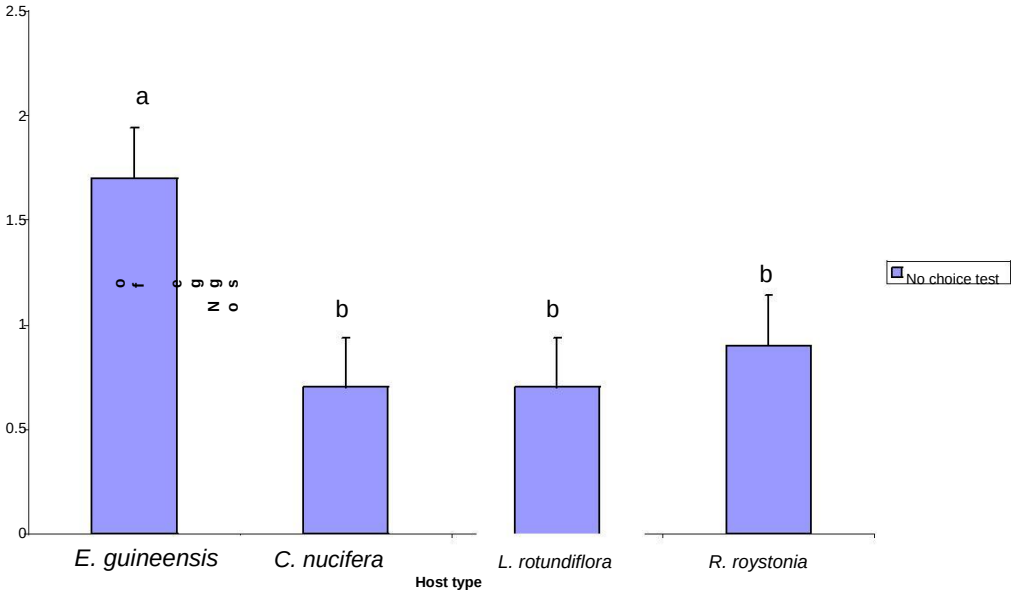

Figure 2. Mean number of eggs on different palm species (no-choice test).

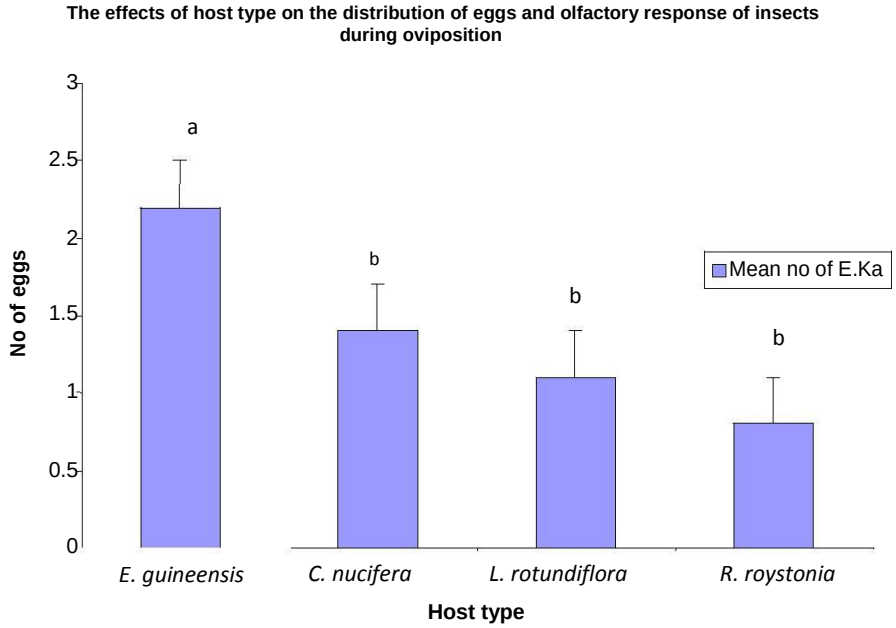

Figure 3. Response of *E. kamerunicus* to odour emitted from inflorescence of different palm species in 4-arm bioassay.

the different host plant species ($P < 0.001$) (Figure 2), when the palm species were tested in the no-choice laboratory test. These results corroborate those of the free-choice test.

Olfactory response of *E. kamerunicus* to inflorescence of different palm species

The weevils preferred the plant odour emitted by their main host plant significantly to the odours of the three non-host plants; however, the odour from the non-hosts palms also attracted the beetles (Figure 3). Data obtained in this study shows *E. kamerunicus* reared in the laboratory preferred oil palm inflorescence for ovisposition compared to other palm species. This result confirms the report that *E. guineensis* is a more suitable host for *E. kamerunicus* (Syed et al., 1982). It also suggests that *E. kamerunicus* were able to distinguish

host and non-host species through olfactory response.

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