

*Full Length Research Paper*

# Distribution and damage characteristics of an emerging insect pest of cashew, *Plocaederus ferrugineus* L. (Coleoptera: Cerambycidae) In Nigeria: A preliminary report

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Among the numerous insect pests infesting cashew in Nigeria, the cashew trunk and root borer, *Plocaederus ferrugineus* L. (Coleoptera: Cerambycidae) is fast becoming the most dreaded because its infestation results in the sudden death of the tree within weeks. Observations at Ochaja in 1999/2000 and at Ibadan in 2005 of "sudden death" of mature cashew trees within few weeks of infestation were indications of emergence of new pest of cashew in Nigeria, which needs urgent investigation. Frass and gum exudates were collected from the trunk base of dead plants before they were cut down and exhumed carefully from the soil. Soil samples were collected from beneath the excavated roots. The bored holes on the trunk and roots were excised to expose their frass and gum contents. Both the frass and gum exudates collected from the base of the cashew trunk and those from excised trunk and roots together with the soil samples from beneath the excavated roots were thinly spread out in the laboratory to search for the various life stages of the beetles. Brief description of the beetle's life stages and parts of the infested/dead stands were made. The rate of infestation of cashew trees at Ibadan was 18.13%, resulting in a death rate of 1.88% of trees, while the infestation rate at Ochaja was 13.3% with a death rate of 6.38%. The eggs were conspicuously absent at the time of this assessment as they had all emerged and developed into larvae, pupae and adults. The control of the pest at advanced stage of the larval development was very difficult; hence control measures were recommended to be initiated at early stage of infestation. Strict cultural practices gave desired results.

**Key words:** Infestation, beetles, borer, frass, exudates, larvae, pupae, adults.

## INTRODUCTION

Numerous insect pests infest the cashew tree at different stages of its growth (Eguagie, 1972; Pillai et al., 1976; Devasahayam and Nayar, 1986; Malipatil and Houston, 1990; Xianli and Van Der Geest, 1990). In Nigeria, the production of cashew is impaired mostly by problems associated with its insect pest complex. Cashew, like most tree crops, hosts a wide range of pests and diseases. Insect pests infest its various parts including roots, stems, twigs, branches, flowers and inflorescence and the pseudo-apple. Earliest work on cashew entomology at the Cocoa Research Institute of Nigeria

(CRIN), Ibadan involved the collection, identification and preservation of the insect pest complex of the cashew plant. Seven main orders including Lepidoptera, Coleoptera, Orthoptera, Hemiptera, Hymenoptera, Thysanoptera and Isoptera were reported in the research study. Out of the 46 families identified, insect species of economic importance were predominant in the families Pyralidae, Centonidae, Acrididae, Noctuidae, Apidae, Scarabidae, Thripidae and Formicidae. In 1971, seventy eight (78) insect species were identified, while further collections and identifications in the subsequent years revealed 286 insect species (Eguagie, 1972, 1973, 1974). It was noted that only a few of these insect species cause economic damage to this crop (Omole, 1972).

The occurrence of *Dysdercus supersticiosus* (cotton

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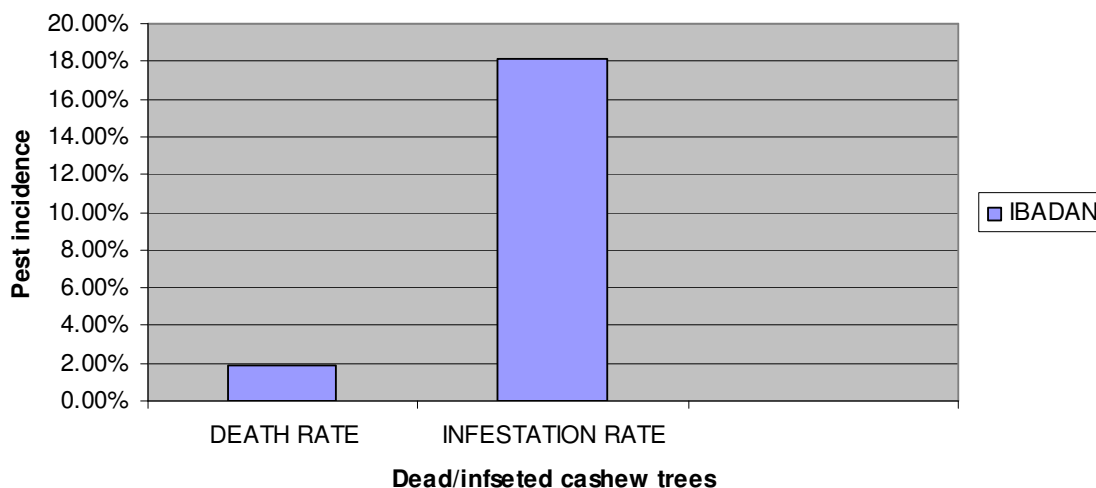


Figure 1. Mean infestation and death rates of *P. ferrugineus* at Ibadan.

stainer) and *Leptoglossus membranaceus* as new pests of cashew was observed in 1988 (Olunloyo, 1989), thus indicating an increase in the number and species of insects infesting cashew plantations with time. Observations of cashew plantations at Ochaja (Kogi State) in 1999/2000 and at CRIN headquarters, Ibadan in 2005 of “sudden death” of mature cashew trees within few weeks due to infestation by *Plocaederus ferrugineus*, showed the status of the insect as a new emerging pest of cashew in Nigeria, which needs an urgent investigation and control.

## MATERIALS AND METHODS

This research work was carried out at the Cashew Plantations and Entomology Laboratory of the Cocoa Research Institute of Nigeria (CRIN), Ibadan headquarters (Oyo State) and its substation at Ochaja (Kogi State).

Following the observations at Ochaja Cashew Plantations in 1999/2000 and Ibadan in 2005 of a “sudden death” syndrome of mature cashew trees, within few weeks of infestation, an investigation was initiated to unravel the cause of the problem. An assessment of eight cashew plots each, within CRIN headquarters and Ochaja substation was carried out to determine the infestation level. The number of dead stands in each plot was recorded, while those with signs of infestation were equally noted.

Three dead cashew stands each from both locations were carefully cut down with a motorized saw machine and their stump and roots carefully exhumed. Samples of the frass and gum exudates were collected from the trunk base, while soil sample (2 kg) was collected from beneath the excavated roots. The base of the cut trunk and the roots were taken back to the laboratory for a closer observation, followed by excision of the bored holes on them with a hand saw and chisel to expose their contents (frass and gum exudates), which were carefully collected in a tray. Both the frass and gum exudates collected from the base of the cashew trunk and those from excised trunk and roots, together with the soil samples from beneath the excavated roots were thinly spread out in the laboratory to search for the eggs, larvae, pupae or adults of the beetle. Photo documentation and brief description of the different

life stages of the insect collected were made using a digital camera.

The infested and dead cashew stands were closely observed in the field before and during the process of excavation and a detailed description of the damage symptoms on the leaves, flowers, stems, trunk and roots were recorded. Photo documentation of the various parts of the infested/dead stands was made using a digital camera.

## RESULTS AND DISCUSSION

Figure 1 shows the incidence of *Plocaederus ferrugineus* on cashew plots at the Cocoa Research Institute of Nigeria headquarters, Ibadan. Symptoms of infestation of the pest were observed on 18.13% of the total plant population. The death rate of tree population was 1.88%. At Ibadan, the death rate and infestation rate were observed in the N7/3, N8/1, N8/2, S/GP, S/AD and SW3/1 plots, with no death recorded for the S/IB and SW6/6 plots (Figure 2). The incidence of *P. ferrugineus* on cashew plots at Ochaja station in Kogi State was also high, with a death rate of 6.38% and an infestation rate of 13.13% (Figures 3 and 4). The pest ravaged all the plots at the Ochaja station.

The various life stages of the pest (egg, larvae, pupae and adults) were not found in the collected soil samples from the excavated portion and on the frass/exudates from the trunk base. However, larvae, pupae and adults were found on the frass/exudates chiseled out from the trunk and roots at both locations (Figure 5). The number of larvae found at both locations was as high as 19 and 22 for Ibadan and Ochaja, respectively. The number of pupae collected was 11 from Ibadan and 9 from Ochaja, while a very low number of 3 and 2 adults were recorded for Ibadan and Ochaja, respectively. The eggs were conspicuously absent at the time of this assessment as they have all hatched and progressed to other life stages (larvae, pupae and adults).

Figure 6 shows the larva (grub) of *P. ferrugineus*, which

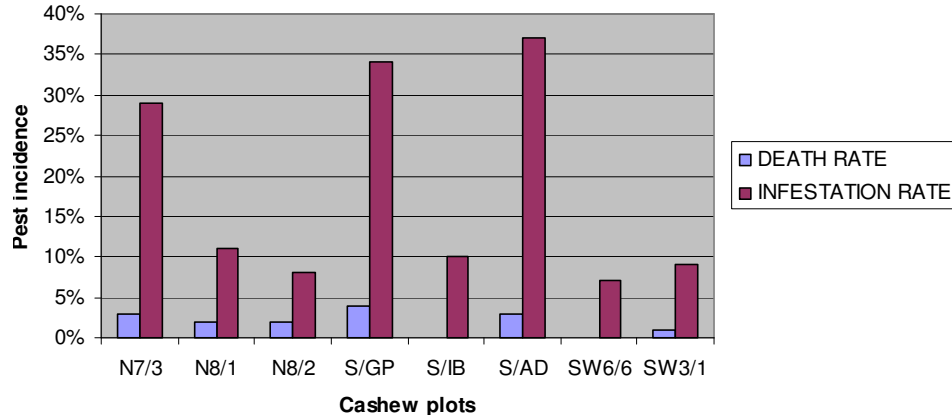


Figure 2. Incidence of *P. ferrugineus* on cashew plots at Ibadan.

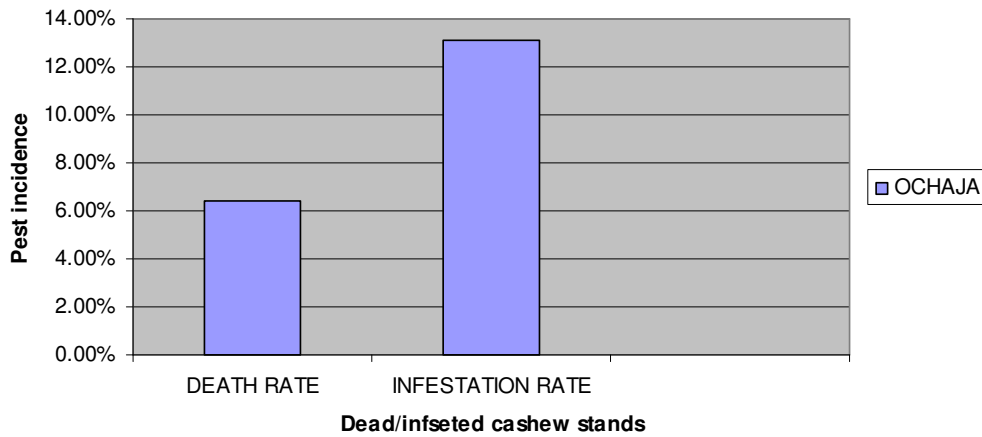


Figure 3. Mean infestation and death rate of *P. ferrugineus* at Ochaja.

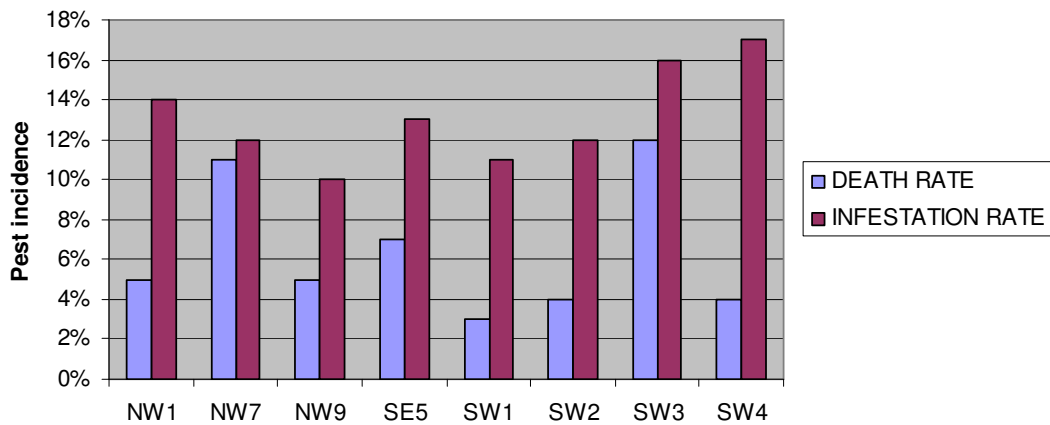
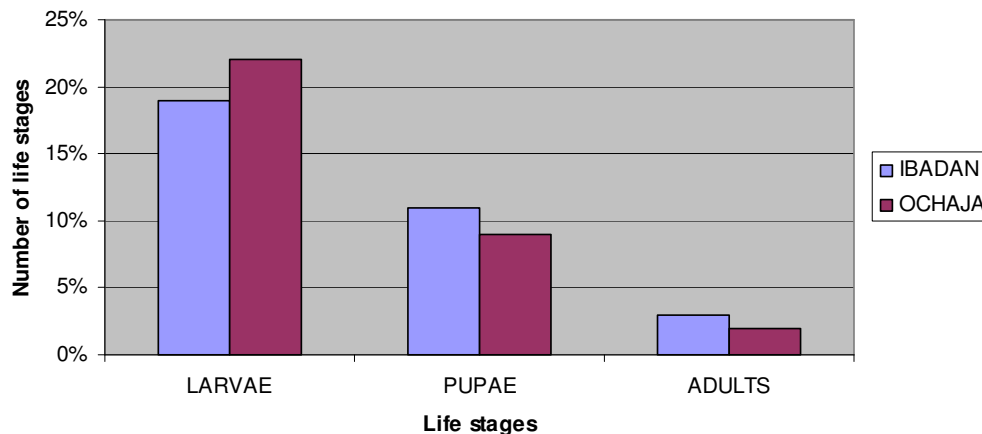


Figure 4. Incidence of *P. ferrugineus* on cashew plots at Ochaja.

has a curled whitish body with wrinkled skin and dark brown head capsule. The grub finally pupated in a calcareous cocoon buried in the frass and soft wood

tissue of the trunk/roots (Figure 7). The adult borer is a medium sized ( $2.91 \pm 0.08$  cm) dark grey beetle (Asogwa et al., 2008). The head, thorax and the elytra are dark



**Figure 5.** Mean infestation rate of *P. ferrugineus* life stages on cashew plots.



**Figure 6.** A larva (grub) of *P. ferrugineus*.



**Figure 8.** An adult of *P. ferrugineus*.



**Figure 7.** Pupae of *P. ferrugineus*.

brown to almost black (Figure 8).

*P. ferrugineus* is a serious insect pest of *Anacardium occidentale*, which kills the tree completely within few weeks of infestation. The adult female lays eggs in crevices of loose bark in the trunk or the exposed portion of the roots. The young white grubs bore into the fresh tissues of the bark of the trunk and roots and feed on the subsequent sub-epidermal tissues and make tunnels in irregular directions. Their feeding activities damage the vascular tissues, arrests the sap flow and weaken the stem thereby resulting in yellowing and shedding of leaves, drying of twigs and death of the tree (Figure 9). Their attack could easily be recognized by the presence of small holes in the collar regions of the tree trunk, gummosis, extrusion of chewed up fibres and excreta near the base of trunks as the grub expels them out (Figures 10 and 11). The grub cause extensive damage to both old and young cashew plantations. They make



**Figure 9.** A cashew tree killed by *P. ferrugineus* attack at CRIN headquarters, Ibadan.



**Figure 11.** Gummosis and extrusion of chewed up cashew trunk fibres by *P. ferrugineus*



**Figure 10.** Holes and cracks on cashew trunk caused by *P. ferrugineus* infestation.

irregular tunnels inside the trunk and cause extensive gum leakage, which will eventually kill the tree. The activities of this pest have been reported in most important cashew growing states of India (Andhra Pradesh, Goa, Karnataka, Kerala, Maharashtra, Orissa and Tamil Nadu) (Bhaskara, 1998; Kerala Agricultural University,

2002).

### Recommendation

A systematic plant protection schedule should be followed in cashew production in order to get maximum and steady returns. Cashew trunk and root borer is yet another pest responsible for sudden death of productive cashew trees in Nigeria. Early works observed that it is very difficult to control the pest in the advanced stage; hence control measures should be taken up at the early stage of infestation. A prophylactic treatment of swabbing the trunk up to one meter height with coal tar and kerosene in the ratio of 1:2 twice a year during March and November achieved desired results in India (Bhaskara, 1998). Other effective control measures involve removal of immature stages of the pest, swabbing the trunk and exposed roots with 0.2% Carbaryl or 5% neem oil and application of Sevidol 8G (75 g/tree) into the basin around the tree (Bhaskara, 1998). In areas of high borer infestation, cultural control is usually recommended, whereby a flexible wire or a bicycle spoke is pushed into the tunnels to kill the larvae or adults. Cotton wool attached on a flexible wire or a bicycle spoke end and soaked in insecticide could also be pushed into the holes to kill the insects. According to Topper (2002) damages by borers generally are usually restricted to small number of trees, and with vigilance and appropriate cultural control knowledge, it can be kept under control quite easily. The dead trees should also be cut down with their root extension exhumed and burnt to prevent further spread of this highly vulnerable pest of cashew. Finally, further studies will be carried out to identify the seasonal incidence, alternate host plants and probably control measures of this new emerging insect pest of cashew in Nigeria.

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