

**ASSESSMENT OF OCCUPATIONAL EXPOSURE HAZARDS ON  
FARMERS DUE TO INSECTICIDE CONTROL OF CACAO MIRIDS  
(INSECTA: HEMIPTERA) IN SOUTHWESTERN NIGERIA**

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## ABSTRACT

The study investigated the risks involved in applying selected insecticides to control mirids in cacao (*Theobroma cacao L.*) plantations in southwestern Nigeria.

A field survey was conducted in 15 major cacao-producing villages from which 150 farmers were randomly selected for interview. Structured questionnaires were administered to the respondents while oral interviews were also conducted. Five exposure duration periods were identified based on number of years of involvement in insecticide application as < 5 years, 5-9 years, 10-14 years, 15-19 years and  $\geq$  20 years. The blood erythrocyte acetylcholinesterase enzyme (AChE) activities, haematological profile, and insecticide residue analyses were carried out to determine the possibility of insecticide poisoning, establish any relationships between haematological profile and exposure, and detect the presence of residues in the blood, and the farmers' sources of drinking water.

The results showed that the cacao farmers used lindane formulated as Gamalin 20EC<sup>o</sup>; diazinon (Basudin 600 EC<sup>o</sup>); endosulfan (Sulfonex 35 EC<sup>o</sup>); and propoxur (Uden 20EC<sup>o</sup>) for mirid control. Sources of exposure identified included eating/chewing habits and drinking during application, non-adherence to the use of protective clothing, improper storage and disposal of used insecticide containers. Varying proportions of the farmers experienced the common symptoms that could be ascribed to insecticide exposure hazards.

The results from the baseline AChE activity measurement of 76 cacao farmers revealed that eight of them had a relatively low AChE activity ranging from 33% to 50% N which is indicative of chronic poisoning. The baseline and post-insecticide application AChE activities determined among 40 of these farmers, showed that 90% of them experienced AChE activity inhibition ranging from < 20% to 50%. The duration of exposure had no significant effect on the PCV and WBC of the farmers but their WBC differential counts (eosinophil, neutrophil and lymphocyte) differed; farmers in the 15-19 and above 20 years exposure periods showed a marked prevalence of abnormal counts. The farmers also generally showed significant decreases in haemoglobin values between the pre-(13.9g/dl) and post-(12.9g/dl) insecticide application periods.

The residue analyses revealed that 42 (53.3%) out of the 76 farmers had residues of diazinon, endosulfan, propoxur and lindane in their blood out of which 47.6% belonged in the  $\geq 20$  years exposure duration period. Nineteen percent of the farmers had diazinon in their blood, while 15% had endosulfan, 14% propoxur, and 8% lindane. Only 5% had no residues at all while 39% had unknown residues and possible metabolites of these insecticides in their blood. About 67% and 9% of the farmers that had diazinon and propoxur, respectively, in their blood exceeded the No Observable Effect Level (NOEL) of 0.02 ppm (diazinon) and 0.2 ppm (propoxur). The diazinon and propoxur detected in the farmers' sources of drinking water also exceeded the Acceptable Daily Intake (ADI) of 0.002 ppm and 0.02 ppm respectively.

It was concluded from the study that cacao farmers had been occupationally exposed due to insecticide application for mirid control; and the exposure was sometimes of such magnitude as to be hazardous to the farmers and their respective communities.