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# Comparative insecticidal properties of palm oil mill effluent (POME) against *Selenothrips rubrocinctus* (Thysanoptera: Thripidae)

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**Abstract**
Palm Oil Mill Effluent (POME), (50% and 100%) were respectively tested for Insecticidal efficacy in the control of *Selenothrips rubrocinctus* (Thysanoptera: Thripidae) under field conditions in comparison to Chlorpyriphos 20% Ec (a synthetic Pyrethroid), The populations of *S. rubrocinctus* from forty Cashew plants on four experimental plots were recorded weekly for 12 months. Three plots had treatments while one plot contained untreated trees for control. The recorded monthly mean population of *S. rubrocinctus* was subjected to one-way analysis of variance. Results showed that the mean population per experimental plot was significantly highest ($p<0.05$) in the control plot and lowest in the plot treated with the synthetic Pyrethroid. However, there was no significant variations ($P>0.05$) in the Thrips population recorded for treatment plots of 50% POME, 100% POME and the synthetic Pyrethroid. There is supporting evidence from this study to indicate that POME might possess some insecticidal properties against *S. rubrocinctus* and appears suitable as an alternative to synthetic chemical insecticides. POME combines affordability with availability and most importantly, biodegradability.

**Keywords:** Insecticidal properties, palm oil mill effluent (POME), Thrips (*Selenothrips rubrocintus*), pyrethroid, chlorpyriphos, biodegradability

## Introduction
*Selenothrips rubrocintus* belongs to the the order Thysanoptera and family Thripidae. The name, which is Greek in origin, means ‘fringe-winged’. *Thysanos* – (fringe), *petron* (wing) [1]. The red banded thrips, *Selenothrips rubrocintus* (Giard) was first described in Guadeloupe, West Indies, where it was causing considerable damage to cacao. [2]. The family Thripidae includes the most important pest species [3]. Cashew has attained the status of a national crop because of its great economic potentials as a foreign exchange earner in Nigeria, where the economy of many traders and farmers are hinged on cashew production as an income supplement.All parts of the plant are of economic importance. But one factor militating against the maximum production of cashew in Nigeria is the problem of Thrips infestation as more than 50% of the cashew production is lost annually due to infestations and thus Thrips is one of its major insect pest [4, 5].

The control of pests so far by farmers has relied on the use of synthetic chemical insecticides which are not only expensive,but are non-biodegradable and therefore, produce serious negative impact on the ecosystem such as; residual contamination of plant and animal foods, contamination of water, air and soil, direct toxicity to non-target organisms, etc. Increased concern over such dangers to human health and the environment has necessitated a search for less harmful alternative insecticides, which combine safety with affordability, availabilty and effectiveness. One of such alternatives is palm oil and its products which has insecticidal properties and can protect wood against pest attacks. according to [6, 7], The use of edible palm oil as an insecticide cannot be encouraged for economic reasons, hence the need to shift attention to its by-products such as Palm Oil Mill Effluent (POME). Palm Oil Mill Effluent (POME) is generated as waste, resultant from palm oil extraction at the mill. [8]. Not less than 5-7.5 tonnes of water is required to process one tonne of crude oil and 50% end up as POME. [9]. POME is a brown slurry composed of 4-5% solids, mainly organic, 0.5-1% residual oil and about 95% water, in addition to a high concentration of organic nitrogen. [10] Untreated POME consists of complex vegetative matter and is a thick, brownish, colloidal slurry of water, unrecovered oil and solids, with an extremely high content of degradable organic matter due to the presence of unrecovered oil. [8]. POME is normally discarded as wastes into the environment. The possible use of POME as an insecticide, may hopefully serve as a safer, cheaper, biodegradable alternative to synthetic chemicals in the control of insect pests and at the same time, minimizing the risk of environmental pollution resulting from the disposal of POME into the environment.

Current concerted efforts of recycling wastes, investigated the use of POME as a liquid Nitrogen fertilizer and as a fermentation substrate in the production of fertilizer and animal feeds. [10]. However, there is scarcity of literature to indicate that POME has ever been tested for insecticidal properties.This study seeks to investigate the possible use of POME as an alternative to chemical insecticides against insect pests (Thrips).

## Materials and Methods

The study was conducted at Ochaja cashew plantations, located in Kogi East region of central Nigeria. The complete randomized block experimental design was used. A total of 40 cashew tree stands were selected and used, ten stands per plot. Plots 1, 2, and 3 were treated while plot 4 which served as a control contained untreated plants. The testing of POME was performed by applying POME at 50% and 100% concentration to plots 1and 2 of the experimental cashew plantations respectively, while plot 3 was treated with the conventional synthetic chemical insecticide (Chlorpyriphos) at a recommended dose of 3ml/l. The testing lasted for 12 months. Weekly population counts of thrips were recorded and the monthly average values subjected to statistical analysis using the one way analysis of variance (Anova) at 95% confidence interval and alpha 0.05.

## Results

Table 1and Fig. 1 below respectively show the mean monthly thrips population post treatment for 12 months (January to December). The results show that the highest monthly mean values (13.05, 13.05, and 9.00) were obtained in January, while the lowest mean values (9.00, 7.00, and 5.66) for plots 1, 2, &3 respectively were obtained in December. However, the untreated plot (4) had the highest mean value in December (17.00) and the lowest in January (15.06). Plot 3 demonstrated the highest decrease in Thrips population from 9.00 in January to 5.66 in December. Plot 2 also demonstrated the next highest decrease from 13.05 to 7.00 (Jan. – Dec.). Plot 1 had a more gradual decrease from 13.05 to 9.00. In Plot 4, there was no decrease in mean values, but rather an increase from 15.06 to 17.00.

**Table 1:** Total Monthly Mean Population Values Of Thrips

| | P1 (50% POME) | P2 (100% POME) | P3 (Synthetic Insecticide) | P4 (Control) | Total |
|---|---|---|---|---|---|
| January | 13.05 | 13.05 | 9.00 | 15.06 | 50.16 |
| February | 13.00 | 12.00 | 8.75 | 15.07 | 48.82 |
| March | 12.75 | 10.00 | 8.10 | 16.00 | 46.85 |
| April | 12.00 | 9.95 | 8.10 | 16.75 | 46.80 |
| May | 12.00 | 8.00 | 8.05 | 16.00 | 44.05 |
| June | 11.12 | 8.00 | 8.00 | 16.05 | 43.17 |
| July | 11.00 | 7.50 | 7.05 | 16.00 | 41.55 |
| August | 10.50 | 7.60 | 7.00 | 16.80 | 41.90 |
| September | 10.30 | 7.75 | 7.00 | 16.55 | 41.60 |
| October | 10.00 | 7.00 | 6.00 | 16.95 | 39.95 |
| November | 10.00 | 7.00 | 6.00 | 17.00 | 40.00 |
| December | 9.00 | 7.00 | 5.66 | 17.00 | 38.66 |
| Total | 134.72 | 104.85 | 88.71 | 195.23 | 523.51 |

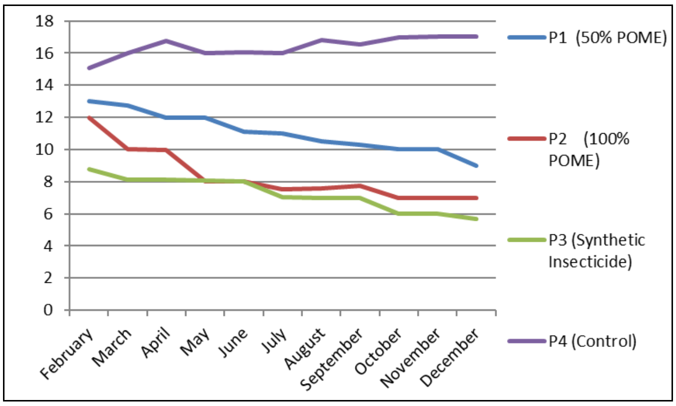


**Fig 1:** A graph showing the mean monthly population counts of Thrips on the X- axis and the duration of treatment with test agents on the Y-axis

## Discussion

The need for protection from Thrips infestations and consequently maximize food security cannot be over emphasized. The need to also shift attention from chemical and non bio-degradable insecticides to bio-degradable alternatives is also paramount.

Hence the need for this research which set out to investigate the possible use of palm oil mill effluent (POME) as an insecticide against *Selenothrips rubrocinctus (*Thysanoptera: Thripidae***)***. All tested treatments exhibited insecticidal effects against the Thrips as they all produced effects that were not significantly different from each other.

Thrips population was greatly reduced in plots with treatments compared to the control plot which had no treatment. The lowest mean (5.66) resulted from the plot treated with synthetic insecticide followed by POME 100% (7.00), POME 50% (9.00). This may be due to the fact that POME, as by - product of palm oil contains 1% unrecovered, residual oil combined with organic solids. [10]. Secondly, in view of POME's proven value in organic matter and plant nutrients, majority of POME produced by palm oil mill is fully recycled as manure proving its biodegradability. [11, 12]. Because, the direct discharge of POME into the environment as waste is highly undesirable and harmful, research into its reuse and treatment is advocated. [13, 14]. The choice of POME for testing as a possible insecticide and alternative to harmful chemicals, is therefore hinged on reasons such as; its environmental biodegradability and safety, coupled with its availability and affordability, amongst others.

## Conclusion and Recommendation

POME has shown in this research, an evidence of possessing insecticidal properties against Thrips. It can therefore be safely concluded that POME at both 100% and 50% concentrations possess significant insecticidal properties against Thrips.

POME is an undesirable waste product from oil mills, and so, the recycling and reuse as possible insecticide will be of great advantage as it may hopefully serve as a safer, cheaper, biodegradable alternative to synthetic chemicals and at the same time, minimizing the risk of environmental pollution resulting from the disposal of POME into the environment.

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