Assessing the effectiveness of botanical powder of *Piper guineense* and *Eugenia aromaticum* for a control of *Callosobrunchus maculatus* in stored *Vigna unguiculata*

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Introduction
Vigna unguiculata (Cowpea) is a very popular leguminous crop cultivated mainly in Africa, cowpea is nutritionally fortified with high protein content and very low fat. *Callosobruchus maculatus* a beetle-like pest of cowpea has caused severe qualitative and quantitative postharvest losses of up to 30-70 percent of stored cowpea grains. Chemical control which has proven effective over time has also contributed negatively to human health and causing serious damage in the eco-system. Therefore, a need for safe and cheap method is of great need in order to aid sustainable ecology and promote human health. This paper hence considers the effectiveness of the botanical powder of *Piper guineense* and *Eugenia aromaticum* for the control of *Callosobrunchus maculatus* in stored *Vigna unguiculata.*

Materials and Methods
This experiment was carried out at the Research Laboratory of the Department of Crop, Soil and Pest Management of The Federal University of Technology, Akure, Ondo – State. Ife-brown Cowpea variety was seeds, 20g was placed in experimental plastics, covered with tight mesh and treated with two types of botanical powder (***Piper guineense* and *Eugenia aromaticum***) and two different levels of particle sizes (150µm & 300µm) applied at equal rate of 0.4g to each 20g of cowpea and Shaked thoroughly to ensure even distribution of the treatment, these was replicated 4 times and untreated cowpea was used as the control alongside. 0,1,5,8 and 10 pairs of newly emerged adults *Callosobruchus maculatus* were released to the treated and untreated seeds. One highly susceptible local Nigeria variety of cowpea (Ife Brown), two types of botanical powder (*Piper guineense* and *Eugenia aromaticum*), two sizes of botanical powder (150µm & 300µm) and 5 pairs of weevils (0,1,3,8,10) resulting in 20 treatment combination, Hence, 2x2x5 factorial experiment in Completely Randomized design was used. Data were collected based on the number of eggs laid, number of emerged adults and cowpea weight loss, then subjected to analysis of variance (ANOVA) and mean separated using Duncan multiple range test.

Results and Discussion
Weight loss increased with weevil pairs, peaking at 8.7% for 5 pairs, indicating severe damage from feeding and infestation. *Piper guineense* (150µm) showed moderate weight loss (up to 4.6%), while the 300µm size prevented weight loss entirely (0.0% across all pairs). *Eugenia aromaticum* (150µm) had higher weight loss than *Piper guineense* (up to 5.6%), but its 300µm dose was highly effective (0.0% for most weevil pairs, except 2.6% at 10 pairs). The 300µm doses were statistically similar and significantly better than the control, while 150µm size was less effective.

Conclusion
The study revealed that both botanical powders are viable alternatives to synthetic pesticides for protecting stored cowpeas, especially at higher Particle size (300µm). *Eugenia aromaticum* may be preferred for immediate oviposition deterrence, while *Piper guineense* could be better for long-term protection against larval development.

Keywords: Botanical Powder, *Piper guineense*, *Eugenia aromaticum, Callosobrunchus maculatus*, *Vigna unguiculata*