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Bioassay of Powdery Plant Extract of Hyptis Suaveolens in the Control of Insect Pest of Cowpea, *Callosobruchus maculatus*

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***Abstract* – The use of powdery extract of *Hyptis suaveolens* in the control of storage pest of cowpea *Callosobruchus maculatus* was studied. The experiment was conducted under laboratory conditions for 16 days for 3 consecutive times during which mortality of insect and the infestation were determined. The insecticidal activities of *H. suaveolens* was observed having about 60% of the insect mortality within 8 days and prevented uninfected cowpea from *C. maculatus* throughout the period of the experiment.**

***Keywords* – Plant Extract, *Hyptis Suaveolens*, Pest Management, Cowpea, Akungba-Akoko.**

I. INTRODUCTION

Cowpea (*Vigna unguiculata*) originated in Africa, Southern and Eastern Africa is the primary center of diversity for the wild forms. According to the studies published to date, cultivated cowpea is an herbaceous annual belonging to the sub-tribe phaseolinae, the tribe phaseoleae the family of papilionaceae (or fabaceae), and the order Leguminosales (or fibales), Genus, *vigna* and the species *V. unguiculata*). Cowpea is a relatively cheap source of proteins and provides an adequate complement to a cereal-based diet. Cowpea is a great source of income to the peasant farmer. In Nigeria, the rate of consumption of cowpea is tremendously high. This is a food item that can be consumed in different forms. Cowpea can be prepared as either the major meal or mixed with other food items like rice, maize, plantain, cassava flakes or other cereals. In some instances, cowpeas can be pulverized and either fried or cooked. In different homes, the period of consumption of cowpea varies where most consumers detest its consumption as dinner basically because of its slow digestion rate. Despite the high rate of consumption of cowpea, statistics show that less than 25% of farmers engage in cowpea production. Consequently, the minority that deals in cowpea production are beset with series of challenges ranging from soil requirement and environmental to pest infestation. Although there are efforts to combat these attendant problems but the desired goals had not been met. Infestation is perceived to be the most significant of all the challenges. [9]Raja *et al.,* 2007 reported that *Callosobruchus maculatus* is one of the major pests of stored cowpea in the tropics corroborating the report of [2]Adugna, 2006 that several insect species attack cereals and pulses store and cause a loss of 10-15% with a germination loss ranging from 50-90%. Meanwhile, [1]Adugna *et al.,* 2003 and [3]Doharey, 1990 had also given a statistic of germination loss due to the attack of storage pests on cereals and pulse grains to range from 3 - 37% and 4 - 88% respectively.

In the control of the insect pests of cowpea, several methods have been adopted. The primary approach had centred on the use of synthetic insecticides but these were observed to be associated with several problems. Consequently, the synthetic insecticides are generally perceived not to be cost-effective and environmentally friendly. The option of adoption of botanicals is a panacea to the attendant problems of use of synthetics. Similarly, the perception of many farmers is that botanicals are cheap, available and thought to be safer than conventional pesticides. The use of powdery forms of plant extract in pest control had also been reported. Review showed that [8]Raja *et al.,* 2000, reported that when jute bags treated with different plant leaf extracts of *Azadirachta indica, Vitex negmado* and then used for cowpea seed storage, the egg lying rates by the *C. maculatus,* adult emergence and seed damage were reduced while [5]Lale, 2001 also suggested the use of powdery extract of plants in controlling storage insect and that there are more plant powder extract discovered that are effective in controlling *C. maculatus*. This research work was there focused on the use of the powdery extract of *H. suaveolens* in the control of *C. maculatus*, a storage pest of cowpea.

II. MATERIALS AND METHODS

A. Study Site

Laboratory experiment was conducted at the Department of Plant Science and Biotechnology, Adekunle Ajasin University, Akungba-Akoko, to determine the use of *H. suaveolens* powdery extract to control the storage pest of cowpea (*Callosobruchus maculatus*).

B. Collection Of Samples

The three varieties of cowpea (*V. unguiculata (L) Walp*) viz Ife brown, IT81^{D}-994, IT89K^{D}-288 were collected from International Institute of Tropical Agriculture Ibadan (IITA) while the leaves of *H. suaveolens* were collected from an undeveloped site at Akungba-Akoko, Ondo State, Nigeria.

C. Apparatus Used For The Experiment

Apparatus used for the experiment were grinder, glenammer sieves, spatula and rubber bowl.

D. Culturing Of C. Maculatus

C. maculatus was obtained from infected cowpeas. The culture was maintained in a glass jar in the laboratory.

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E. Preparation Of Hyptis Powder

The leaves of *H. suaveolens* obtained from the field were sun-dried for 5 days, after which the leaves were grinded using laboratory grinder into powder. The powder was sieved with Glenammer sieves, Ayrshirs, Scotland Mesh mat system with Aperture 212µm, B.S. 410 serial mat NO: 006603. This sieve enabled the production of fine powder.

F. Culturing Method

10grams each of the uninfected species of cowpea varieties obtained from IITA, Ibadan were weighed into three different Petri dishes, with three replicate and a control each. 10 each of male and female *C. maculatus* were introduced into the Petri dishes of cowpea. 1g of pulverized *H. suaveolens* powdery extract was mixed with the cowpea in the Petri dish except the control. The experiment was monitored for 16days and repeated 3 times.

Data collection was based on lethal effect of the spray treatment and data subjected to analysis of variance using the Tukey's Honestly Significant Test and counts normalized using arcsine transformation.

III. Results and Discussion

A. Ovicidal and Insecticidal properties of H. suaveolens Powdery Extract against C. maculatus.

The powder had a high lethal effect on all the insect pests introduced into the petri dishes containing the different cowpea varieties in the 1st day of application. There was no significant difference (P>0.05) among the cowpea varieties. When compared with the control there was a significant difference as shown in Table 1

Table 1: Cumulative mortality of *C. maculatus* after powdery application of *H. suaveolens*

	Cowpea types			
Day	**Ife Brown**	**IT81D-994**	**IT89KD-288**	**Control**
1	14±0a	14±0a	14±0a	14±0a
2	13±0.5b	14±0a	13±0b	14±0a
3	13±0.5b	13±0.5b	13±0b	14±0a
4	12.5±0.5b	12±0b	12.5±1b	14±0a
5	12.5±1.5ab	12±0b	12.5±1.5ab	14±0a
6	11±1b	11±0b	11±1b	14±0a
7	10±1b	10.5±0.5b	10±1b	14±0a
8	9±1b	9±1b	9±1b	14±0a
9	8±1b	7.5±1.5b	8±0b	14±0a
10	7±1b	6±1b	7±1b	14±0a
11	6±1b	3.5±0.5c	5.5±0.5b	14±0a
12	4.5±1b	2±0c	4.5±0.5b	14±0a
13	2±0b	1±0c	3.5±0.5a	14±0a
14	1±0c	0±0d	2.5±0.5b	14±0a
15	0±0c	0±0c	1.5±0.5b	14±0a
16	0±0c	0±0c	0.5±0.5b	14±0a

Means in each row bearing the same letter are not significantly different at the 5 % level of probability by Tukey's test.

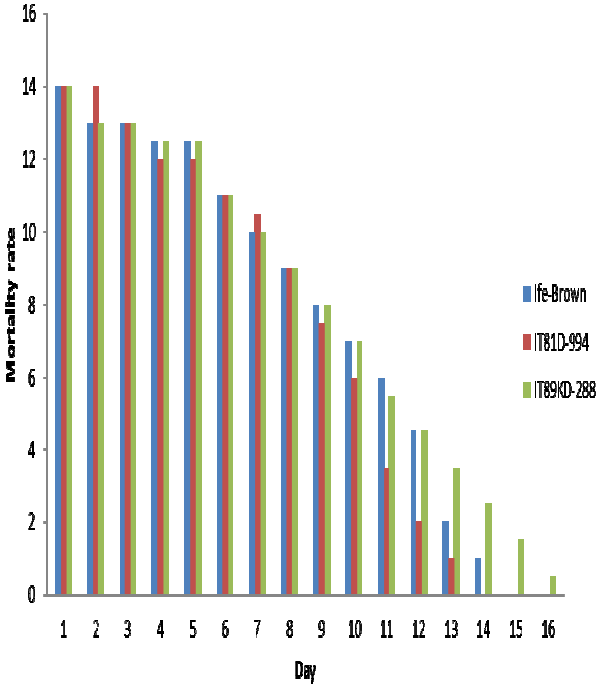

Fig.1. Cumulative mortality of *C. maculatus* after powdery application of *H. suaveolens*

Figure 1 is a representation of the absolute relationship among the different varieties of cowpea under the treatment application of powdery *H. suaveolens* within the experimental period. The insignificant difference observed in the mortality rate among the varieties study is an indication of the potency of *H.suaveolens* in pest control irrespective of the crop variety. This observation on the efficacy of H. suaveolens as an effective botanical corroborates other documentations on other similarly effective plant parts. The use of eucalyptus seed powder had been reported by [6]Mulatu and Gebremedhin (2002) to have mortality of *Callosobruchus chinensis*. Similarly, [10]Tapondjou *et al*., (2002) showed that the dry ground leaf of *Chenopodium ambrosioides* inhibited F_1 progeny production and adult emergence of the *Callosobruchus chinensis* and *C. maculatus*. In the same vein, [4]Keita *et al*., (2001) reported and also established the efficacy of powder made from essential oil of different basils in the protection of storage crops against *C. maculatus* while no significant effect on seed germination rate was observed. The use of *H. suaveolens* had gained more attention over time. Research documentation had shown that its adoptive use transcends treatments of storage crops but has now been adopted in direct field applications where also the fumes of the fresh leaves have been confirmed effective in repelling mosquitoes.

Consequently, the adoptive use of *H. suaveolens* in pest management had earlier been reported by [7]Olotuah, 2013.

It is evident that there is a need for this highly valued grain to be protected against insect pest during storage. The use of plant extracts as insecticides began in the 1850's with the introduction of nicotine from *Nicotina*

tabacum, rotenone from *Lonchocarpus spp.* The use of plant extracts is now gaining acceptance and popularity as a result of its noticed effectiveness and its less risk to the environment. Adequate protection of stored food commodities from insect infestation and damage is paramount importance in achieving and maintaining food sufficiency in the world. This research work has again confirmed the efficacy and rate of lethality of *H. suaveolens* in pest control.

IV. Conclusion

H. suaveolens had proven to be an effective botanical in pest management, At all levels of application; *H. suaveolens* had been reported to be very effective either as fumigant or toxic extract. Although the adoptive use of *H. suaveolens* in pest management had been consolidated, further research works involving formulations could still be conducted for a better performance.

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He is the Head, Department of Plant Science and Biotechnology, Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria. He was a classroom teacher for nine years between 1992 and 2001 and later joined the University as an Assistant Lecturer in 2001. Since his appointment, his schedule of duty had covered teaching, research, conduct of laboratory and field practical works and general administration. He was promoted to the position of a Senior Lecturer in October, 2010.Some of his research works include:

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2. O.F. Olotuah, Bio-efficacy of oil extract of *Eugenia aromatica* in the control of storage insect pests, *International Journal of Geology, Agriculture and Environmental Sciences 2 (4),* (2014), pp 4-10
3. O.F. Olotuah, Laboratory evaluation of use of oils in the control of rice weevils, *Sitophilus oryzae*. *International Journal of Research in Agriculture and Food Sciences 2 (3),* (2014), *7-12*

He research focus is on the provision of more ecologically tolerable control measures of crop/pest management using formulated plants extracts and as such promote the importance of intensified plant protection programs as a means of increasing productivity to feed the world's growing population. He had also contributed through his research findings to the control of mosquitoes with the use of plant extract.

Dr. Olotuah, belongs to both local and International Associations which include: Entomological Society of Nigeria (ESN), Nigeria, International Association of Plant Protection Sciences (IAPPS) and American Phytopathological Society (APS). He had also attended several International conferences where he presented papers on control of both field and storage pests. Some of his works presented at International conferences include:

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