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The Toxicity of Mahogany Seed Oil Against Callosobruchus Maculates In Storage of Cowpea (Vigna Unguiculata) in Hong District Adamawa State. Nigeria

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ABSTRACT: *The toxicity of the different dosage of mahogany seed oil against Callosobruchus maculatus in a stored grain cowpea (vigna unguiculata) was evaluated in the department of biological sciences laboratory, Adamawa state College of Education, Hong. The experiment was conducted on cowpea seed (Vigna unguiculata) by treating them with the following dose rate of: 0.0,0.5,1.0,1.5 and 2.0ml/20g of cowpea seed at prevailing temperature and relative humidity respectively. Callosobruchus maculatus was introduced to the bottles containing the cowpea grain. The insect mortality was recorded 3 and 5 days after treatment. However,this study reveals that except at control (0.0ml/20g) the rest of the doses 0.5,1.0,1.5 and2.0ml were effective in reducing adult emergence, oviposition and cause significant mortality in the number of Callosobruchus maculatus.*

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I. INTRODUCTION

Cowpea seed(Vigna unguiculata) is a good source of diet protein and other essential nutrient in the human diet as well as nutritious livestock feed. The nutrient content of cowpea seed are: protein =24.8%, fats= 1.9%, fibre= 6.3%, riboflavin =0.00042%, carbohydrate =63.6%, niacin =0.00028%, thiamine= 0.00074%. (Cope et..al 2003). Cowpea (Vigna unguiculata) has high protein content, its adaptability to different type of soil and intercropping system, its resistance to drought, its ability to improve soil fertility and prevent erosion makes it an important economic crop in many developing region including Nigeria (Eduardsson and Tregenza 2005).
The sale of the stem and leaves as animal feeds during the dry season also provide a vital income for the farmers. It also yields important fodder, green manures and forage and many others (Tanzubil 1991).
Cowpea is called the "hungry- season crop" because it is the first crop to be harvested before the cereal crops (Murdock L. L, et..al, 2014). It grows in savannah vegetation at temperature ranging from 25^0_C to 35^0c and in area where annual rainfall ranges from 750mm to 1100mm. (Ahmed, 2005).Cowpea (Vigna unguiculata) is tolerant of shading and can be combined with tall cereal plant such as sorghum and maize (Aslamet..al, 2002). Callosobruchus maculata is considered pest of stored cowpea grain (vigna unguiculata) and is one of the important storage pest, because when present in grain it contribute to contermination and depreciation of the commercial value of the flour from the levels they cause heavy losses in quality and quantity of stored cowpea (Vignaunguiculata) (Soudarajan et…al, 2012).

According to Oparacke et…al (2000), loss in cowpea (Vigna unguiculata) due to insect pest (Callosobruchus maculata) in Nigeria was estimated to be above 80%. This losses could be reduction in weight, quality, nutritive value of the product and seed viability may be retarded. In Nigeria harvested cowpea (Vigna unguiculata) are sometime stored locally in mud silos. Ashes are used also as preservatives (Golob and Webly, 1980). Currently, Nigerian farmers utilizes local plant product to store product (Lale and Mustapha, 2001). Powdered seed of Azaradictaindica locally known as DogonYaro in the Northern part of Nigeria among others are used to control insect pest of cowpea(Vignaunguiculata) Callosobruchus maculatus. Some plant product acts as antifeedant, some as repellant, some as insecticides, homicidal and growth inhibiting factor against many species of insect pest (Soudajareet…al, 2012).

II. MATERIALS AND METHOD

The experiment was carried out in the Biology Department Laboratory in Adamawa State College of Education, Hong. The insect culture of Callosobruchus maculatus used was obtained from batches of infested cowpea (Vigna unguiculata) purchased at Hong market. Beetle were reared subsequently by replacement of devoured and infested seed in sixteen (16)litre plastic rubber bucket covered with muslin net to allow air circulation and held tightly with rubber band. The insect was reared at an ambient temperature and relative humidity.

Source Of Uninfested Cowpea (Vigna Unguiculata)

Clean uninfected and untreated cowpea seed (Vigna unguiculata) were obtained from farmers at a near by villages.

Sources Of Mahogany Seed Oil

Mahogany seed oil was also sourced locally from Hong market, Hong Local Government Of Adamawa State. The application of the oil the experimentation, the clean uninfected cowpea seed (20g) was measured separately with electronic precision balance model TL5000 in to five (5) different transparent bottles. Each bottle was treated with mahogany seed oil at dosage rate: 0.5, 1.0, 1.5 and 2.0ml/20g of the cowpea seed (Vignaunguiculata) respectively the untreated seeds were the control. Each dose rate including the control was a replicated of three (3) times. Mortality count was observed three (3) days and five (5) days after the treatment, egg count at fourteen (14) days after treatment and adult emerges at 28-30 days after treatment respectively.

III. DATA ANALYSIS

The data obtained were subjected to stat direct statistical software for probit analysis to assess mortality (Statdirect, 2013). One way analysis of variance using excel statistical package Turkey Kramer multiple range test p=0.5 (Graphad stat, 2000) weight loss % and inhibition rate % was also calculated using a formula: Wt % = iwt – fwt/iwt x 100.

Where wt%= weight loss percent, iwt = initial weight and fwt= final weight.

IV. THE RESULTS

Table 1: the result of mahogany seed oil on Adult Callosobruchus maculatus mortality at 30 days after infestation is shown.

ASSESSMENT	DAYS AFTER TREATMENT (D.A.T)	
	3	5
LC 50	0.36ml/20g	0.22ml/20g
95% confidence interval	0.13-0.53	0.003-0.41
LC 90	1.13ml/20g	0.7ml/20g
95% confidence interval	0.86-1.84	0.33-1.19

Each data is mean value of 3 replicates.

The result at three (3) days after infestation indicate that dose that kill 50% adult Callosobrochusmaculatus was 0.36ml/20g of cowpea seed and at 5 days after infestation was 0.22ml/20g of cowpea seeds. The 90% mortality is obtained with 1.13ml/20g of cowpea seed at 3 days and at 5 days after infestation was 0.71ml/20g of cowpea seed.

Table 2: shows the result of mahogany seed oil on Oviposition of Callosobruchus maculatus at 14 days after infestation.

Treatment	Mean	+/- S. E. D
0.0ml/20g	19.667a	0.5774
0.5ml/20g	20.667a	1.528
1.0ml/20g	9.000be	3.000
1.5ml/20g	8.667ce	5.132
2.0ml/20g	7.667de	5.132.

Each data is mean value of 3 replicates Mean number bearing the same letter are not significantly different using the Turkey Kramer multiple test at p=0.5The result of oviposition study indicate that there is no significance difference (p=0.05) between un-infected cowpea(0.0ml/20g and 0.5ml/20g). However there is significant different (p=0.05 between 0.5ml/20g, 1.0ml/20g, 1.5ml/20g and 2.0ml/20g of cowpea seeds. There is high significant different (p=0.05) between 0.5ml/20g and 2.0ml/20g of cowpea seeds.

Table 3: The effect of mahogany seed oil on the Callosobruchus maculatus progeny emergence.

Dose ml/20g	Mean number of progeny	% inhibition rate (I.R%)
0.0	25.7	87%
0.5	0	0%
1.0	0	0%
1.5	0	0%
2.0	0	0%

The result indicates that percentage progeny obtained within 0.5, 1.0, 1.5, and 2.0 is 0% and at un-infested (0.0)is 87%.

WEIGHT LOSS

The result of weight loss is obtained via a formula.

Weight loss% = initial weight – final weight

initial weight x 100.

As shown in the table 4 below

Percentage (%) weight loss of cowpea grain (Vignaunguiculata) infested with Callosobruchus maculatus.

Treatment	Mean of weight	Percentage loss in weight
0.0ml/20g	19.47	2.7%
0.5ml/20g	19.9	0.5%
1.0ml/20g	19.8	1%
1.5ml/20g	20	0%
2.0ml/20g	20	0%

Data mean value of three (3) replicates

The result indicates that there is lost in weight at 0.0, 0.5, and 1.0 with 2.7%, 0.5% and 1% respectively.

V. DISCUSSION

The result of adult mortality at LC50 was 0.36ml/20g 3 days after infestation and 0.22ml/20g 5 days after infestation. At LC90 3days after infestation was 1.13ml/20g and 5 days after infestation was 0.71ml/20g.Ovipositional studies indicate that there is no significant difference (p =0.05) between un –infested being the control and the lower treatment (0.5ml).there is also high significant different (p =0.05) between 0.5 and 2.0ml/20g of seeds. This study is similar to the work of Lele and Mustapha(2002) where they found no significant on the efficacy of Neem seed oil and primiphos methyl in reducing the oviposition of Callosobruchus maculatus, adult emergence and adult mortality rate in cowpea treatment which are also in agreement with the present day study. Also is similar to the work of (Ahmedet..al, 1999) on the oviposition, mortality, and adult emergence which there is no significant difference was found. However, the present result contradict the work of (malatu and Gebremedlin,2002) showed that there is significant variation among higher dosage used against Callosobruchus maculatus.

VI. SUMMARY

The result of the present work will be summarized as:

1. LC50 and LC90 values of mahogany seed oil against Callosobruchus maculatus at 3 and 5 days after treatment are 0.36ml/20g, 0.22ml/20g and 1.13ml/20g, 0.71ml/20g respectively.
2. The result of experimental studies indicate no significant (p =0.05) at control and lower treatment (0.5ml). However, there is significant different (p =0.05) at 0.5, 1.5, and 2.0 respectively

3. The effect of mahogany seed oil on progeny emergence (p =0.05) for all the treatment 0% except un-infested which is the control that produces 87% emergent.
4. There is also a little difference in weight which indicate loss with 0.5=1%, 1.0 =0.5%, 1.0 =1% and 0.0 which is the control with 2.7 % respectively.

VII. RECOMMENDATION

The following recommendation should be made for the present findings

1. Lower quantity of mahogany seed oil (0.22ml/20g) could be utilized for protection of longer period above 5 days.
2. Higher concentration of mahogany seed oil 0.36ml/20g could be used in protection of cowpea against Callosobruchus maculatus for short period less than 3 days
3. To achieve zero of oviposition suppression higher quantity of mahogany seed oil should be used.

VIII. CONCLUSION

This research work can be concluded as:

1. Mahogany seed oil is lethal to Callosobruchus maculatus
2. Higher concentration of mahogany seed oil suppresses the oviposit ion of Callosobruchus maculatus
3. Mahogany seed oil inhibits progeny emergence.

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