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EVALUATION OF THE EFFICACY OF DIFFERENT CONCENTRATIONS OF MIXED LEAF POWDERS OF *VITTALLARIA PARADOXA* AND *CASSIA OCCIDENTALIS* AGAINST *CALLOSOBRUCHUS MACULATUS* (F.) (COLEOPTERA: BRUCHIDAE) ON STORED COWPEA SEEDS

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ABSTRACT
The possibility of controlling cowpea bruchid, C. maculatus with mixture of Cassia Occidentalis(Coffee senna) and Vittallaria paradoxa (Shea butter) leaf powders in the ratios of 50%:50%, was evaluated under ambient condition of temperature and relative humidity laboratory conditions. The mixtures of the leaf powders in the ratios of 1:1 were applied the rate of 2.5.5.0, 7.5 and 10.0w/w into 20g of cowpea seed in 9cm petri dishes. Mortality of adult of the bruchid on treated seeds was assessed at 24hours interval after treatment and was compared with the control treatment. All the treatments recorded higher adult mortality when compared with that recorded on the control treatment and the differences was significant (p<0.005).

Keywords: Callasobruchus maculatus (F.) Cassia Occidentalis, Vittallaria paradoxa, leaf powders

INTRODUCTION

Cowpea,*Vigna Unguiculata* (L)walpers, is an important legume of world wide importance(Singh and Van Embden,1979; Jackai and Daoust,1986). It provides more than half of the plants protein consumed by many poor people in the tropics, and added to that serves as a major source of income(Labeyrie,1981;Rachie,1985).However, like many other food crops a wide spectrum of insect pest attack cowpea both in the field and in the storage among them is a Cowpea beetle *Callasobruchus maculatus* (F) which is a cosmopolitan and most important storage insect pest of cowpea Linnaeus (Walpers) (Southgate,1979.,Jackai and Daoust,1986:Deborah *et al* ;2003) that can render the unprotected grain unsuitable for food or seed in 4-6month(Sec *et al* 1991).

Bruchids are also important pests of pulse crops in Asia and Africa under storage conditions (Ogunwolu and Idowu 1994; Okonkwo and Okoye 1996; Raja *et al* 2000; Tapondjou *et al.,* 2002). The insect is a field- to- store pest as its infestation begins in the field as the matured pods dry (Haine,1991:Huignard *et al*:1985).The level of infestation of the insect in the field is a major factor that influence the bionomics of the bruchid under storage. *C. maculatus* multiplies very rapidly in storage where it causes very high losses, Pulse beetle was estimated to caused quantitative losses of up to 90% in stored grain (Khaire and Johari, 1984; Ouedraogo *et al*., 1996).The beetle caused problems across many region of sub-Saharan West Africa where much of the population rely on cowpea as the most important legume crop (Caudert, 1984: Greenhalgh, 2000).

Over the years, different methods of controlling this bruchid have been employed, which range from treating grains with synthetic insecticides (Caswell and Akibu, 1980) Many of the organic-insecticides that are used for protecting cowpea are very expensive for low resource farmers; in addition to that they can cause food contamination as well as environmental pollution. Beside that, repeated application of these chemicals can result into pest resistance and outbreak (Georgiou, 1991). There is therefore the need for developing insecticides from the botanical products. Botanical products are more readily biodegradable. Some are less toxic to mammals, may be more selective in action, and may retard the development of resistance (Rahman and Talukder 2002). The main advantage is that they may be easily and chiefly produced by farmers in small scale industries in crude or partially purified extract. *Vittallaria paradoxa* and *Cassia Occidentalis* are most commonly found in savannah areas of Africa is utilized for various purposes The Leaves of these plants are used for various disease treatments as well as in the control of some stored product insects especially in many part of Africa(Tona *et al*., 1999). The present study was undertaken to evaluate the insecticidal efficacy of different doses of mixed leaf powders of *C. Occidentalis* and *V. paradoxa* against the adult *C. maculatus* on cowpea grains. The plants were traditionally used in some rural areas for protection of cowpeas against *C. maculatus* infestation based on that the plants were chosen for the study.

MATERIALS AND METHOD

Study area

The study was conducted between May- August, 2010 in Kano State of Nigeria at the Department of Biological Sciences Bayero University Kano under ambient conditions of temperature and relative humidity. Kano State lies in latitude11°59¹N and longitude 8°34¹E, with altitude of 486.5(159ft).

Plant materials

V. paradoxa and *C. Occidentalis* Leaves was collected from DanMadanho, and Bela, Ungoggo Local Government in Kano State. These were washed and air dried in the shade (Boateng and Kusi, 2008; Bamaiyi *et al*., 2007).

Insect culture

A small population of *C.maculatus* beetle was obtained from IITA in Kano State of Nigeria, along with infested cowpea. These were identified as described by (Utida, 1972).The beetle were reared in the Biological Sciences laboratory and were differentiated into males and females based on their morphological characters (Southgate, 1979).

Maintenance of cowpea

A local cowpea variety called Danila was collected from IITA, Kano. Mechanically/physically damage seeds were sorted out leaving on whole seed for the conduct of the experiment. Checked seeds were placed in plastic bags and kept in the freezer overnight to eliminate any possible *C.maculatus* infestation coming from field (Marcileyne *et al.,* 2004) the seed were removed from the freezer and kept at room temperature and relative humidity for some hours to equilibrate and the moisture content of the seed were measured before the experiment (Jackai and Asante, 2001)

Preparation of leaf powders

Leaf Powders from *C. Occidentalis* and *V. paradoxa* were separately made by grinding the leaves of each of the plants separately using pestle and mortar (Lale 2002, Rahman and Talukder, 2002)

Bioassay

Ground leaf powders of *C. Occidentalis* and *V. paradoxa* were mixed in the ratios of 1:1 and *was* prepared into four different concentrations (0.5 1.0, 1.5 and2.0 g). These were mixed separately with twenty grams (20g) of disinfested cowpea in separate Petri dishes (Talukder and Howse, 1994) which correspond to(2.5, 5.0,7.5, and 10.0%W/W).Each Petri dish was shaken to ensure proper mixing .Actellic dust at varying amounts was set up. Untreated control was also Set along (which has neither leaf powders nor chemical insecticides) ten adult pairs of the beetle, *C. maculatus* which are freshly emerged were released into each treatments, These were covered with a muslin cloth to facilitate proper aeration and prevent entry and exit of insects. The experimental set up was laid out in completely randomized design (CRD) with each treatment replicated three times and then left on the laboratory bench for daily observation (Oparaeke, 1996).Adult mortality was observed at 24 hours interval.

RESULTS AND DISCUSSION

Highest mortality (100%) of *C.maculatus* adult was observed on seed treated with the combination of the leaf powders applied at the concentration of 7.5 and 10.0%w/w after 24hours of treatment and this was found to be similar with that recorded on seed treated with the chemical pesticide(Actellic dust) with the higher concentration of the mixed leaf powders(Table1).The lowest mortality of the insect was noted on the seeds treated with lower application level of the combination of the leaf powders(2.5%w/w and 5.0%w/w) which recorded 100%mortality after 120 hours of treatment and this was found to be better than the mortality recorded on the untreated control seeds 100% mortality after 216 hours of treatment and the mortality recorded on the control treatment has indicated that the insect has a very short longevity(Table1).Earlier report have shown that product of plants materials have been used in the control of Stored product pest(Lale,1992.,Ajayi and Lale,2001).The effectiveness of this leaf powder may be attributed to the presence of different bioactive agents such as steroid, flavonoid, anthraquinone e.t.c in the extracts of the powders. Ogunwolu and Idowu (1994) showed that 2.5% powdered seed of *A. indica* were toxic to *C. maculates* which was similar to the finding in this study. Similarly Mulatu and Gebremedhin (2000) reported that eucalyptus seed powder treatment caused the death of emerging adult of *Callosobruchus*. The results of this study are in agreement with many other works on the use of plant products against stored products insects. Olaifa and Erhun (1988); Fasakin and Aberejo (2002) found out that *p. guineense* powder prevented oviposition on *C. maculatus* and *Dermestes maculatus* respectively. Similarly Okonkwo and Okoye (1996) noted that both the powder and extract of *P. guineense* and *D. tripetela* inhibited adult emergence of *C. maculatus* and *Sitophilus. zeamaiz* completely. Furthermore Amusan and Okorie (2002) found that *P. guineense* extract to be effective in the prevention of growth and development D. *maculatus*.The result obtained in the study has demonstrated the insecticidal activity of the combined formulation of *C. occidentalis* and *V. paradoxa* leaf powder against *C. maculatus*

Table 1: Mortality among adult *Callasobruchus Maculatus* (In Hours) reared on Cowpea grains treated with combination of plants leaf powders.

(Each observation is based on three replicates)

(Each observation is based on three replicates) Combined leaf powder	Amount applied/20g (Conc. In %)	Mortality after infestation(in hours) 24	48	72	96	120	144	168	192	216
Cass+Vitt	0.5(2.5)	53.33	55.00	60.00	76.66	100	-	-	-	-
(50:50)	1.0(5.0)	60.00	61.66	65.00	78.33	100	-	-	-	-
	1.5(7.5)	100	-	-	-	-	-	-	-	-
	2.0(10.0)	100	-	-	-	-	-	-	-	-
Control (untreated)		0	0	0	0	0	0	0	0	100
Cowpea treated with	0.5(2.5)	100	-	-	-	-	-	-	-	-
Actellic dust	1.0(5.0)	100	-	-	-	-	-	-	-	-
	1.5(7.5)	100	-	-	-	-	-	-	-	-
	2.0(10.0)	100	-	-	-	-	-	-	-	-

Key: *Cass=Cassia occidentalis* leaf powder, *Vitt=Vittallaria paradoxa* leaf powder

Conclusion and recommendation

In conclusion, that the use of botanical product in controlling cowpea bruchid *C. maculatus* is a promising one. The use of mixed powders of leaves of *C.occidentalis* and *V. paradoxa* was found to be effective in killing the bruchid (*C. maculatus)* and these powders were found to be better when compared to the untreated control. The plants are available throughout the country and the farmers may use this plant in their storage structure for the management of the pest.

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