

Pesticidal effects of extracts of *Barbula indica* on *Callosobruchus maculatus* (Coleoptera Bruchidae)

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Abstract: A laboratory experiment was conducted to investigate the insecticidal potential of aqueous and ethanol extracts of *Barbula indica* (a moss plant) on the survival of *Callosobruchus maculatus* F. a major storage pest of cowpea in Nigeria. Air dried plant materials were sieved to remove sandcrete materials. They were then ground into powder and portions of 1g, 2g,3g,and 4g each of the powder was suspended in 100ml of cold distilled water and ethanol separately for 24 hours. Each of these was filtered using a clean muslin cloth and the filtrates were used for the experiment. The effects of the extracts were tested on cowpea weevils. Percentage mortality of the weevils at 24, 48 and 72hours of treatment were recorded for these extracts at different concentrations.The results obtained indicated that the extracts caused significant reduction in the number of the weevils through contact killing, when compared with the control. Highest mortality was recorded in ethanol extract of the plant at 4% concentration. The plant can be used as an effective bio pesticide.

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INTRODUCTION

It has been reported that insect pests are the single most important constraints to cowpea production in most parts of West Africa (Booker, 1965; Jackai and Daoust, 1986; Singh *et al*, 1990).This accounts for low annual harvest of the crop. Among insects of stored cowpea seeds, *Callosobruchus maculatus* F. is the most destructive. About 100% of seeds may be infested and damaged by *C. maculatus* after only 3-4 months of storage [Osman *et al*, 1991; Thomas and Gasper, 1994]. Farmers have been reported using banned and highly toxic chemical insecticides in their quest to protect their agricultural products, including stored cowpea seeds against insect pests. Some of the known side effects of using chemical insecticides include increased costs, handling hazards, residue problems and development of tolerance by treated insects [Banks *et al*, 1990]. These insecticides are also polluting and potentially dangerous to users. Recent revelations that synthetic insecticides penetrate into stored grains and may be toxic (Lalah and Wandiga, 1996; Elsheamy *et al*, 1988) is particularly worrisome. Therefore, the use of fumigants or residual insecticides to control storage insect pests should be discouraged (Van,Huis, 1991). Thus, the need for scientists to search for natural pesticides that are readily available, environmentally friendly, safe to man and other non-target organisms and have no adverse effect on the organoleptic and market quality of stored grains becomes inevitable.For now, the use of plant products appears to hold the greatest hope for increased cowpea production (Singh, 2011).

Cowpea is a protein rich staple food in many societies. It is used not only as human food but also as a fodder for livestock feeds.Owing to the economic importance of cowpea, the severity of damage caused by insect pests, particularly *C. maculatus* F. and the problems associated with the use of synthetic insecticides, this kind of study becomes imperative.

This study was intended to evaluate the effects of extracts of *Barbula indica* (a moss plant) on the survival of *C.maculatus* F.

MATERIALS AND METHOD**Preparation of the bioassays**

Infected cowpea seeds were purchased from Oja – Oba market, Ado-Ekiti and the weevils (*Callosobruchus maculatus*) were separated from the seeds. The stock culture of the weevils was preserved in an insect cage to which fresh cowpea seeds have been added. Freshly emerging adult weevils were obtained from this culture and these were used for the experiments.

Collection and identification of plant materials

Bryophyte species (*Barbula indica*) was scraped from the wall of Omolayo students` hostel, behind Ekiti State University, Ado Ekiti , Nigeria. Identification of plant was done at the herbarium unit, Department of Plant Science, Ekiti State University, Ado Ekiti. Voucher specimens were later deposited.

Preparation of extracts

The plant (*Barbula indica*) was air dried at room temperature after which they were sieved to

remove the substrates. They were later ground into powder using blender. Portions of 1g, 2g, 3g, and 4g each of the powdered plant was suspended in 100ml of cold distilled water and ethanol separately for 24 hours. Each of these was filtered through a clean muslin cloth and the filtrates were used for the experiments.

Test of the effects of the extracts

Distilled-water extracts test effect

Fifteen petri dishes were double – lined with Whatman No 1 filter paper. In each, 2ml of 1%, 2%, 3% and 4% extracts were used to moisten the filter papers. The filter papers were allowed to dry for five minutes and then ten weevils were introduced to each of them. Each treatment had three replicate assays. Control experiments with filter papers moistened with distilled water were set up. The percentage mortality of the weevils at 24 hours, 48 hours and 72 hours were recorded.

Ethanol extracts test effects

The same procedure above was repeated using ethanol extracts.

RESULTS

Results obtained from this study have shown clearly that both distilled water and ethanol extracts of *Barbula indica* powder affected the survival of cowpea weevils. Between 40.00-63.33% mortality rates were recorded after 72 hours of treatment with distilled water extracts, while 3.33% mortality rate was recorded in the untreated control (Table 1). However, with ethanol extracts, between 43.33 - 83.33% mortality rates were recorded after 72 hours of treatment, while 16.67% mortality rate was recorded in the untreated control (Table 2). Analysis of variance revealed a significant difference between treated and untreated samples ($p < 0.05$).

The most efficacious property of *B. indica* was recorded at 4% concentration of ethanol extracts and distilled water extracts with the values of 83.33% and 63.33% respectively after 72 hours of treatment.

Table 1: Percentage mortality of *C. maculatus* after treatments with distilled water extracts of *B. indica* powder at different concentrations.

Concentration %	% mortality after		
	24 hours	48 hours	72 hours
0	3.33c	3.33d	3.33b
1	16.67bc	23.33c	40.00a
2	30.00ab	30.00bc	53.33a
3	33.33ab	43.33ab	60.33a
4	43.33a	50.00a	63.33a

*Means with the same letter within column are not significantly different at 0.05 level of probability.

Table 2: Percentage mortality of *C. maculatus* after treatments with ethanol extracts of *B. indica* powder at different concentrations.

Concentration %	% mortality after		
	24 hours	48 hours	72 hours
0	0.00 b	16.67b	16.67c
1	23.33ab	36.67ab	43.33b
2	26.67ab	40.00ab	50.00b
3	33.33a	43.33ab	73.33ab
4	33.33a	66.67a	83.33a

*Means with the same letter within columns are not significantly different at 0.05 level of probability

DISCUSSION

Insecticidal effectiveness of some tropical plants extracts in controlling *C. maculatus* has been reported by several workers (Yahaya and Magaji, 1997; Golob et al, 1982; Delobel and Malonga, 1987; Dennis, 1990; Yahaya, 2002)

The present study showed that distilled water and ethanol extracts of *Barbula indica* powder have insecticidal properties against *C. maculatus*. This showed that *Barbula indica* could be successfully used for the control of *C.*

maculatus. The extracts of the test plant both aqueous and ethanol can serve as alternative to chemical control because of lack of residual effect and it can be applied cheaply.

REFERENCES

1. Banks, H.J., Annis P.C., Rigby G.R. (1990) Controlled atmosphere storage of grain: The known and the future. Page 695 – 706. In : Fleurat – L., Assard. F. and Ducom. P. (Eds). Proceedings of the 5th working

- conference on stored products protection. Bordeaux, France.
2. Booker, R.H. (1965). Pests of cowpea and their control in Northern. *Nigeria Bulletin of Entomological Research* 55: 663 – 672.
 3. Delobel, A., Malonga, P. (1987). Insecticidal properties of six plant materials against *Caryedon serratus* (OL) (Coleoptera Bruchidae). *J. Stored Prod. Res* 23 (3) 173-176
 4. Dennis, S.H.(1990). Pest of stored products and their control. Bethaven press.London. pp 219-220
 5. El Sheamy,M.K., Farag, A.A., Mohamed, Z.A., Salam, N.A. and Khairy, T.M. (1988) Duration profile and residual toxicity of meothrin during storage of maize grains. *Egyptian Journal of Food Science*. 16(1/2) : 97 - 104
 6. Golob, O. J., Mwumbola V., Mbhango, F. (1982). The use of locally available materials as potentials of maize grains against insects infestation during storage in Malawi. *J. Stored Prod Res*. 18:67- 74.
 7. Jackai, L.E.N., Daoust, R.A. (1986). Insect pests of cowpea: Perspectives and overview. *Annual Review of Entomology* 31:95 -119
 8. Lalah, J.O. and Wadinga, S.O. (1996). The persistence and fate of Malathion residues in stored beans and maize. *Pesticide Science*, 46 (3) : 215-220.
 9. Osman, N., Ibrahim, R. and Johari, A.B.A. (1991). Damage assessment on stored mungbean *Vigna radiate*(L) Wilczed and soyabean *Gycine max* L. Merr. infested with the common bean weevil *Callosobruchus maculatus* F.(Coleoptera: Bruchidae). *Pertanika* 14(1): 27-30
 10. Singh, S. R. (2011). Bioecological studied and control of pulse beetle *callosobruchus chinensis* (Coleoptera : Bruchidae) on cowpea seed. *Advances in Applied Science Reseach*. 2(2). 295-302
 11. Singh, S.R., Jackai, L.E.N., Dos Santos, J.H.R., And Adalla, C.B. (1990). Insect pests of cowpea. Pages 43-89. In : Singh, S.R. (ed). *Insect Pests of Tropical Food Legumes*. John Wiley and Sons Ltd Chichester. U.K.
 12. Thomos – Odjo, A.A. and Gasper, C. (1991). Biological control of *Callosobruchus maculatus* F. (Coleoptera: Bruchidae) using *Dinarmus basalis* Rond. (Hymenoptera: Pteromalidae). *Mededelingen Facultet Landbouwkundige-en-Toegepaste Biologische-Wetenschappen-Universiteit-Gent* (Belgium). 59(2a): 451-456.
 13. Van, A. Huis, (1991). Biological methods of bruchid control in the tropics: A review of *insect Science and its Application* 12 : 87-102
 14. Yahaya, M.A. (2002). Effects of Wood Ash and dry fruit powder of *Piper guineense* on *Callosobruchus maculatus* (Fabo). *The Bean Sokoto J.Pure Appl.Sci*. 6 (In Press).
 15. Yahaya, M.A. and Magaji, M.D. (1997). Insecticidal efficiency of some plant materials as protectants of cowpea *Vigna unguiculata* against cowpea weevil *Callosobruchus maculatus* during storage. A Paper Presented at the 20th Annual Int. Conf. of Chem.Sec. Of Nig.22nd – 26th Sept. 1997. Arewa House, Kaduna.

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