Journal of Entomology

ISSN 1812-5670

Academic Journals Inc.

www.academicjournals.com

Journal of Entomology 4 (5): 393-396, 2007
ISSN 1812-5670

Effect of Palm Oil in Protecting Stored Grains from *Sitophilus zeamais* and *Callosobruchus maculatus*

[1]F.O. Abulude, [1]M.O. Ogunkoya1, [2]R.F. Ogunleye, [1]A.O. Akinola and [3]A.O. Adeyemi
[1]Department of General Studies, Federal College of Agriculture,
Akure 340001, Ondo State, Nigeria
[2]Department of Zoology, Faculty of Science, University of Ado Ekiti, Ekiti State, Nigeria
[3]Department of Crop Production, Federal University of Technology,
Akure 340001, Ondo State, Nigeria

Abstract: The effect of palm oil for the control of *Sitophilus zeamais* and *Callosobruchus maculatus* in stored grains was investigated using standard methods of analyses. The experiment was conducted between May and October 2006 in Chemistry laboratory of the Department of General Studies, Federal College of Agriculture, Akure, Nigeria. The quantity of oil used for the storage of 25 g of *Zea mays*, *Cajanus cajan* and *Vigna unguiculata* was 0.1, 0.2, 0.3 and 0.4 mL each. The results showed that the rate of mortality of *S. zeamais* and *C. maculatus* was high using 0.3 and 0.4 mL of palm oil. There was no sign of oviposition during the storage except in the control. The result also showed that the higher the quantity of oil, the lower the number of exit holes. Seed viability in the test was high compared to the control which did not show any sign of viability i.e., seed viability was not affected by the oil treatment. The application of the oil on the stored grains was simple and the results were encouraging. Efforts should be made to encourage its use in pest management.

Key words: Palm oil, stored grains, *Sitophilus zeamais*, *Callosobruchus maculatus*, environment

INTRODUCTION

Cajanus Cajan, *Zea mays* and *Vigna unguiculata* are grains which are staple food crops for man and animals. They have high nutritive values and are used as weaning foods. These grains are harvested and ready for sale between the months of May and October. Excess harvests are stored to produce a food reserve as well as seed for planting (Udo *et al*., 2004). Stored grains are damaged when attacked by different species of insect leading to loss in weight and seed quality. The most devastating storage pests of maize is the maize weevil *S. zeamais*, while for pigeon pea and cowpea it is *C. maculatus*.

C. maculatus and *S. zeamais* are destructive pests and they cause serious management problem facing agriculture in developing countries. Attempts have been made to reduce their population or wipe them totally. Amongst the methods used are chemical methods- the use of insecticides. They have many advantages in the control of these pests. Their shortcomings ranged thus: High level of persistence in the environment, residual effect of synthetic, high maintain toxicity and pest resistance to mention just a few (Ashamo, 2004).

Many research works have been carried out to reduce the adverse effects of storage pests. Local plant extracts, vegetable oils and other methods have been employed to serve as alternatives to conventional chemical control (Oparaeke *et al*., 1998; Odeyemi, 1998; Adedire and Lajide, 2000;

Corresponding Author: F.O. Abulude, Department of General Studies, Federal College of Agriculture, Akure 340001, Ondo State, Nigeria Tel: +2348034458674

Ogunleye, 2004; Onolemhemhen, 2001; Ohazurike *et al*., 2003). In continuation of the research, It has investigated the effect of palm oil for the control of *S. zeamais* and *C. maculatus* in stored maize, *C. cajan* and *V. unguiculata* grains.

MATERIALS AND METHODS

Insect Species

The insects (*S. zeamais* and *C. maculatus*) used for this analysis were collected from infested stock of grains (*Z. mays*, *C. cajan* and *V. unguiculata*) respectively stored at Federal College of Agriculture Akure, Nigeria (28±3°C, 66% relative humidity).

Grains and Palm Oil Samples

Grains and oil samples were obtained from a local market in Akure, Nigeria. The grains were picked to separate impurities from good ones. The palm oil was filtered to remove impurities. The experiment was performed in the Chemistry laboratory of Federal College of Agriculture, Akure, between May and October 2006. Twenty-five grams of the grain samples were placed into 45 plastic containers. Fifteen containers were assigned for each grain.

Treatment

Each of the grains in the containers were treated with palm oil, mixed thoroughly to ensure adequate contact and labeled thus: T_0 = 0.0 mL (control) T_1 = 0.1 mL, T_2 = 0.2 mL, T_3 = 0.3 mL, T_4 = 0.4 mL. Ten (5 males and 5 females) of the insect species were introduced into each of the containers, covered with net and held tightly together with rubber band. The control grains were devoid of palm oil. Treatments were in fives and three replicates.

Experiment and Data Analyses

Analyses performed on the design were damage assessment, mortality (Udo *et al*., 2004), grain viability and oviposition rate (Ohazurike *et al*., 2003). Statistical analyses were performed with the use of an SPSS for windows 10.0.

RESULTS AND DISCUSSION

The results of the effect of palm oil on the mortality of *S. zeamais* and *C. maculatus* on *Z. mays* and *C. cajan* and *V. unguiculata*, respectively are depicted in Table 1-3. Only the control experiment had no mortality, instead the insects increased in number during the storage period. The reason for this is obvious-oviposition of the insects. From observation, the treatments of 0.1 and 0.2 mL caused the death of the insects, but that of 0.3 and 0.4 mL were the most potent inducing 100% mortality between 12 and 24 h. There was significant difference between the mortality of pests by low quantities

Table 1: Effect of palm oil on mortality of *S. zeamais* at different time intervals (*Zea mays*)

	Time intervals (h)					
Quantity (mL)	12	24	36	48	60	72
0.0 (control)	0	0	0	0	0	0
0.1	4	6	6	8	10	10
0.2	4	7	9	10	10	10
0.3	6	8	10	10	10	10
0.4	8	10	10	10	10	10
Mean	4.4	6.2	7.0	7.6	8.0	8.0
SEM	3.0	3.8	4.3	4.4	4.5	4.5

SEM: Standard error of mean

Table 2: Effect of palm oil on mortality of *C. maculatus* at different time intervals (*Vigna unguiculata*)

	Time intervals (h)					
Quantity (mL)	12	24	36	48	60	72
0.0 (control)	0	0	0	0	0	0
0.1	4	6	8	10	10	10
0.2	6	7	8	10	10	10
0.3	7	9	10	10	10	10
0.4	9	9	10	10	10	10
Mean	5.2	6.2	7.2	8.0	8.0	8.0
SEM	3.4	3.7	4.2	4.5	4.5	4.5

Table 3: Effect of palm oil on mortality of *C. maculatus* at various time interval (*Cajanus cajan*)

	Time intervals (h)					
Quantity (mL)	12	24	36	48	60	72
0.0 control	0	0	0	0	0	0
0.1	4	7	10	10	10	10
0.2	6	9	10	10	10	10
0.3	9	10	10	10	10	10
0.4	10	10	10	10	10	10
Mean	5.8	7.2	8.0	8.0	8.0	8.0
SEM	4.0	4.2	4.5	4.5	4.5	4.5

Table 4: No. of exit holes (seed damaged) caused by storage pests on the stored seeds after 6 mouth of treatment

	Mean No. of grains with exit holes		
	S. zeamais	*C. maculatus*	*C. maculatus*
Quantity (mL)	*Z. mays*	*C. cajan*	*V.unguiculata*
0.0 (Control)	Many holes	Many holes	Many holes
0.1	27	18	16
0.2	20	13	10
0.3	12	9	6
0.4	10	7	6

(0.1 and 0.2 mL) and that of relative high quantities (0.3 and 0.4 mL). Present results were in agreement with the observations made by Ohazurike *et al*. (2003) and Udo *et al*. (2004) that employed the use of extracts of *J. curcas* and candlewood respectively for the control and *S. zeamais* and *C. maculatus*. Mixing of palm oil with *Z. mays, C. cajan* and *V. unguiculata*, probably resulted in thin smooth oil coating on the treated grains, which limited contact between the grains and the weevils. Death of the weevils may have resulted from the interference with normal respiratory mechanizing and starvation. There were no signs of oviposition of the storage pests in all the different concentration levels during observation for 30 days, but there were in the control experiments this was in agreement with results of Onolemhemhen (2001). Reason for this could be attributed to the fact that all the insects died after 48 h of treatment and so oviposition was not possible. Onolemhemhen (2001) also reported that plant oil do not cause mortality of grain weevils, but also impair oviposition and progeny emergence.

The control had the highest number of holes manifesting on the grains (Table 4). The reason was due to the existence of the pests which fed on them. Other results showed that the higher the quantity of palm oil, the lower the number of exit holes. There were limited contacts between the insects and the grains.

Control sample did not show any sign of viability since the embryo used for germination was destroyed by the pests, but there were signs of germination in the test experiments (Fig. 1). This observation showed that the use of palm oil in the storage of *Z. mays*, *C. cajan* and *V. unguiculata* against *S. zeamais* and *C. maculatus* does not affect the viability of seeds. The indication is that the oil can be used to preserve and protect grains in storage. This will ensure that undamaged and viable seeds are available for human and animal consumption, planting and distribution at periods of peak demand (Onolemhemhen, 2001).

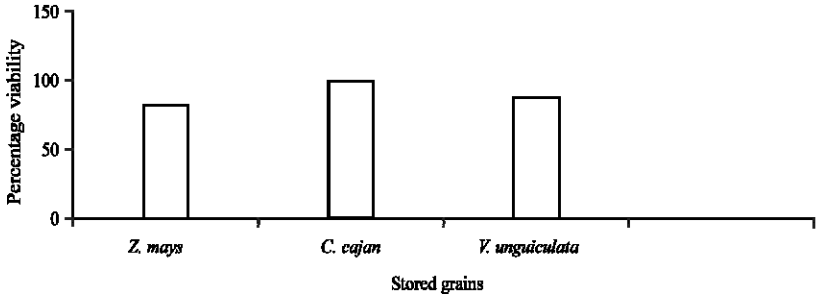

Fig. 1: Percentage viability of the stored grains

CONCLUSION

From the results obtained in this study, it could be concluded that the use of palm oil in pest management is safe to the environment, grain and animal, but not to pests. It is therefore necessary to make use of it as an alternative to chemical method of preservation of grains.

REFERENCES

Adedire, C.O. and L. Lajide, 2000. Toxicity and oviposition deference activities of powders and extracts of pepper fruit, *Dennettia tripetala* baker to the pulse beetle, *Callosobruchus maculatus* (F.), (Coleoptera: Bruchidae). In: Proceedings of 30th Annual Conference of the Entomological Society of Nigeria held between 4-7 in Kano, Nigeria.

Ashamo, M.O., 2004. Effects of some plant powders on the yam moth, *Dasyses rugosella* stainton (Lepidoptera: Tineidae). BioSci. Res. Comm., 16: 41-46.

Odeyemi, O.O., 1998. Feeding and oviposition inhibiting action of powdered extract of *Dennettia tripetale* and *Aframomum melegueta* on *Corcyra cephalonica* (stainton) and *Esphestia cantella*. West Afr. J. Sci., 2: 32-44.

Ogunleye, R.F., 2004. Effects of zanthoxylum dusts and extract on the fecundity, fertility and developmental periods of *Callosobruchus maculatus* (F.) Coleoptera: Bruchidae. Biosci. Res. Comm., 16: 53-57.

Ohazurike, N.C., M.O. Onuh and E.O. Emeribe, 2003. The use of seed extracts of the physic nut (*Jatropha curcas* L.) in the control of maize Weevil (*Sitophilus zeamais* M.) in stored maize grains (*Zea mays* L). Global J. Agric. Sci., 2: 86-88.

Oparaeke, A.M., M.C. Dike and I. Onu, 1998. Evaluation of seed and leaf powders of neem, *Azadirachta indica* A. Juss and pirimiphos-methyl for control of *Callosobruchus maculatus* F. in stored cowpea. ESN Occasional Publication, 3: 237-242.

Onolemhemhen, P.O., 2001. Evaluation of rubber seed oil for the control of the rice weevil, *Sitophilus oryzea* L. J. Agric., For. Fish., 2: 23-26.

Udo, I.O., E.O. Owusu and D. Obeng-Ofori, 2004. Efficacy of candlewood *Zanthoxylum xanthoxyloides* (Lam) for the control of *Sitophilus zeamais* (mots) (*Coleoptera curculionidare*) and *Callosobruchus maculatus* F. (Coleoptera Bruchidae). Global J. Agric. Sci., 3: 19-23.