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EFFICACY OF XYLOPIA AETHIOPICA (DUNAL) A. AND AFRAMOMUM MELEGUETA (ROSC) K. SCHUM. FRUIT ON SITOPHULIUS ZEA

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ABSTRACT

The power of combined powder of dried fruits of Xylopia aethiopica(Dunal) A. and Aframomum melegueta on the control of maize weevil Sitophulus zea were evaluated. The aim was to determine, their antifeedant potentials against the insect pests of stored maize. Oven dried fruits of X. aethiopica and A. melegueta was pulverized and mixed in equal proportion. Concentrations of 1,2,3,4,5,6,7,8,9,and10g were mixed with 100g of healthy grain, and incubated for 14 days with 20 weevils in each. Each treatment plus the control (0.0g) were replicated five times and laid out randomly. Results showed that mortality and % mortality of weevils increased progressively with the powder concentrations and the exposure period. Within the 14 days of exposure, mortality and % mortality were 4, 20% in the control and all, 100% in the test treatments. Reduction in seed damage increased significantly with the powder concentration ($P<0.05$). Weevil perforation index (WPI) showed that the combined powder had high protectant activity and therefore could serve as an alternative to the conventional chemical insect pesticides.

Key Words: Xylopia aethiopica, Aframomum melegueta, Sitophulus zea, combined powder.

INTRODUCTION

High biotic pressure, on agro-food crops such as maize in storage, is known to be responsible for post harvest loss, experienced by farmers. Biodetoriation of stored grains, both marginal and comprehensive, have been traced to the activities of insect pests such as the maize weevils. (Rahman, et al., 2001, Ewete and Alamu, 1999). Maize weevil Sitophilius zea (S.zeamals. Motschulsky). S. zea is a relatively small, brown, thick winged, snouty beetle, belonging to the sub family Dryophthorinae, in the family, Curculionidae, orders Coleoptera, of the insecta class and phylum Arthropoda. This pest had been known to attack maize, both in the field and in storage. Maize is binomially known as Zea mays L. and is commonly called Corn. They belong to the grass family Poaceae formerly Gramineae. Of the monocotyledonous class, they are annuals, produce edible grains born on a woody cob. The cob is the axis of the spike flowers of the female inflorescence, born on axil of the isobilateral leaf. The mail inflorescence is terminal. The Spikelets, are pairs of two flowers, one sessile one Pedicelled. (Nyananyo, 2006). Corn is a staple food, and forms the bulk of cereal food for both children and adults. It is grown commercially and stored in Granaries and

Silos.Unfortunately, due to the bio activities of weevils, farmers and corn dealers do suffer losses from time to time and from season to season. (Rahman et al., 2001). In other to address these losses, farmers had resorted to the use of chemical insecticidal pesticides. (El-Atta and Ahmed, 2002). However, these chemicals have attendant hazards like low affordability,,resistance,,environmental pollution, and other bio- hazards (UNEP,2002a, 2002b, Ayinde et al.,2006) The application of botanicals, as alternative substitutes to the conventional chemical agents has been reported by many researchers like Akueshi,et al.,2002, Ogbonna et al.,2003,and Chomini et al.,(2010).

This study therefore is aimed at determining the antifeedant potentials of combined powder of the fruits and seeds of Xylopia aethiopica and Afromomum melegueta **.**

MATERIALS AND METHODS

Fruits of the test plants Afromomum melegueta and Xylopia aethiopica were collected from the relief market owerri.The maize grains were collected from dealers' from the same market. The weevils were isolated from bags of weevil infested grains from old stock, of maize in storage or in ware houses adjacent to the free zone area of the market. The specimen was taken to the Department of Biological Sciences of the Federal University of Technology, Owerri where the study was conducted. The weevils were then identified as Sitophilius zea.

Owerri is the capital city of Imo State, South Eastern Nigeria. It is located within latitudes 40 45- N and 7^0 05-N and longitude 6^0 50-E and 7^0 25-E in the rain forest belt of Nigeria. The study was conducted between the months of April to September 2013. The test fruits were oven dried to a constant weight at a temperature of $40^{0C.,}$ Pulverized and kept dried and sterile. The maize grains were refrigerated for 72 hours, following, methods of Chomini et al.,(2006). The two powder were mixed in equal proportions and dispersed in concentrations of 0.0g, 1, 2, 3, 4, 5, 6 ,7, 8, 9, and 10g into Kilner jars , into which 100g of the disinfected grains had been dispensed. The powder and the seeds were thoroughly mixed through manual agitation for 5mins and allowed to stand for 60 minutes. 20 weevils were then introduced into the jars. The jars were then lined with muslin cloth.

Each treatment was replicated five times, and arranged randomly. Weevil mortality and % mortality were determined from the number of death at every 2 days, for 14 days after treatment. Seed damage at 14 days after treatment were determined using the relation,

$$WPI = \frac{\%\ \text{treated seed perforated}}{\%\ \text{control seed perforated}} \times \frac{100}{1}$$

Where WPI = weevil perforated index. (Fatope, et al., 1995)

Data was subjected to analysis of variance, using standard procedure (Kelly and Onyeka, 1992). Means were segregated using least significant difference (LSD) at 5%.

RESULTS AND DISCUSSIONS

Table 1: Mean and Mean % Mortality of Sitophilius zea treated with the combined fruit powder of X. aethiopica and A. melegueta.

DAYS AFTER TREATMENT

MM mean mortality

Powder Conc.(g)	2	4	6	8	10	12	14
0.00	0.00	1.0	2.00	2	2	4	4
1.00	4	6	10..2	12	16	17	20
2.00	**9**	**13**	**14.2**	**16**	**18**	**20**	**20**
3.00	**10**	**18.2**	**20**	**20**	**20**	**20**	**20**
4.00	**12**	**18.6**	**20**	**20**	**20**	**20**	**20**
5.00	**12.2**	**20**	**20**	**20**	**20**	**20**	**20**
6.00	13.0	20	20	20	20	20	20
7.00	14.6	20	20	20	20	20	20
8.00	16.0	20	20	20	20	20	20
9.00	16.2	20	20	20	20	20	20
10.00	17.4	20	20	20	20	20	20

M % Mortality

2	4	6	8	10	12	14
0.00	10	10	10	10	20	20
20	30	51	60	80	85	100
45	**65**	**71**	**80**	**90**	100	**100**
50	**91**	**100**	**100**	**100**	**100**	**100**
60	**93**	**100**	**100**	**100**	**100**	**100**
61	**100**	**100**	**100**	**100**	**100**	**100**
65	100	100	100	100	**100**	**100**
73	100	100	**100**	100	**100**	**100**
80	100	100	100	100	**100**	**100**
81	100	100	**100**	**100**	**100**	100
87	100	100	**100**	100	**100**	100

Table 2: Mean number and % of seed perforation by Sitophilius zea, 14days after treatment with combined powder of X. aethiopica and A. melegueta.

Powder Conc.	Seed Perforation(sp)	No of seed	%Sp	WPI
0.00	95	500	19	
1.00	35	500	7	36.80
2.00	13	500	2.6	13.68
3.00	6.0	500	1.2	6.31
4.00	6.0	500	1.2	6.31
5.00	00	500	00	0.00
6.00	00	500	00	0.00
7.00	00	500	00	0.00
8.00	00	500	00	0.00
9.00	00	500	00	0.00
10.00	00	500	00	0.00

The insecticidal effect of the combined powder of X. aethiopica and the A. melegueta, on the test weevil, is shown in Table 1. Mortality and % mortality, increased with increase in concentration and the exposure period, of 2-14days. At 14 days, after treatment, all the

weevils had died significantly -100% mortality, except the control which had 20% mortality. Mortality rate, increased significantly, from 0.0g/100g seed concentration to 10g/100g seed concentration. Starting from the 5th degree, concentration, and all the weevils died within 4 days after exposure. Weevil perforation activities, against the concentration gradient are shown in Table 2. At the 14th day after treatment, the concentration of 5g/100g (w/w) to 10g/100g weevil perforation activity seized. The perforation activities decreased from 36.8% in 1g /100g to 6.3% in 4g/100g (w/w).

DISCUSSION

The use of combined powder of X. aethiopica and A. melegueta in this study was informed by the application of the botanicals, in the local preservation of grain crops. The test results on the mortality and %s mortality of the weevil in (table 1), corroborated with the findings of Chomini, et al., (2010). This showed increase in mortality and % mortality rate of bean weevils, Callosobruchus maculatus, with increase in concentration of X. aethiopica fruit powder. The efficacy of this combined powder is justified by the relative decrease in the weevil perforation index (table 2). This is akin to the finding of Yusuf, et al.,(2006) working on Neem and Mahogany back extracts, against the bean beetle, C. maculatus. X. aethiopica is commonly called African pepper. It is a perennial tree, the fruits appear in clusters of numerous narrow carpel. The plant is a member of the Annonaceae family. A. melegueta, is commonly called "**Grain of paradise''** or alligator pepper. The fresh fruit is usually red with numerous brownish seeds embedded in whitish sugary pulp. Seed is usually chewed with kola nut, as spice. The plant belongs to Zingiberaceae family. Both fruits are sold in vegetable shops.

CONCLUSION:

To the extent of this study, it is evident that the combined powder of X. aethiopica and A. melegueta have high antifeedant activity against the test insects and therefore can be a good grain protectant, especially in storage.

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