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INSECTICIDAL EFFECTS OF STEM BARK POWDER OF AZADIRACHTA INDICA AND LEAF POWDER OF EUCALYPTUS CAMALDULENSIS ON WEEVILS OF STORED MAIZE GRAINS

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Abstract

The insecticidal effects of stem bark powder of Azadirachta indica and leaf powder of Eucalyptus camaldulensis on weevils of stored maize grains was carried out. Four levels: 5.0g, 10.0g, 15.0g and 20.0g of each of the vegetative parts (as treatments) and 0.0g as control were replicated four (4) times, making 36 plots (bottles). These were represented as 36 bottles (kilner jars) each containing 100g of maize, arranged in two separate sets of 16 bottles for each of the vegetative parts. The remaining 4 served as the control, at 0.0g levels. Stem bark powder of Azadirachta indica 5.0, 10.0, 15.0 and 20.0g were introduced into the first set. While the leaf powder of Eucalyptus at 5.0, 10.0, 15.0 and 20.0g were introduced into the second set, followed by vigorous shaking. 30 young adult maize weevils were carefully introduced into each of the bottles and covered with a perforated lid lined with muslin mesh (1.0mm). The bottles and its contents were arranged in a Completely Randomize Design (CRD) for 336 hours (14 days) and 432 hours (18 days) for Eucalyptus and Neem respectively. 10 healthy grains per replicate were sown into polythene pots containing uniform potting mixture of top soil, river sand and cow dung in a ratio of 1:1:1 at the end of the trail. Parameters assessed include mortality, % mortality weight loss, perforation and perforation index (for the insecticidal experiment) and % germination, for the post trail experiments. Result obtained showed a progressive increase in mortality and % mortality, with analysis of variance (ANOVA) not significantly different ($P>0.05$) at 48 hours after treatment (HAT), but significant ($P<0.05$) between 96 and 432 HAT. Weight loss, perforation and perforation index were inversely related to the concentrations of the two powder sources, in which cases, the ANOVA of these parameters showed significant different ($P<0.05$). The % germination obtained did not show much variation despite the significant difference indicated by the ANOVA, thus revealing the preservation potentials of the plant powders.

Keywords: Insecticidal; Azadirachta Indica; Eucalyptus Camaldulensis.

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1. Introduction

Neem is a fast-growing tree that can reach a height of 15-20 meters (49-66ft), and rarely 35-40meters (115-131ft) it is evergreen, but in severe drought it may shed most or nearly all of its leaves. the branches are wide and spreading, the fairly dense crown is roundish and may reach a diameter of 20-25 meters (66-82ft). the Neem tree is very similar in appearance to its relative, the chinaberry (Melia azedarach). The opposite, pinnate leaves are 20-40 centimeters (7.9-15.7 in) long, with 20 to 30 medium to dark green leaflets about 3-8 centimeters (1.2-3.1 in)long. The terminal leaflets often are missing. The petioles are short. The (white and fragrant) flowers are arranged in more-or less dropping auxiliary panicles which made up to 25 centimeters (9.8 in) long. The inflorescences, which branch up to the third degree, bear from 2500 to 300 flowers. An individual flower is 5-6milimeters (0.20-0.24 in) long and 8-11 millimeters (0.31-0.43in) wide. Protandrous, bisexual flowers and male flowers exist on the same individual tree. Eucalyptus camaldulensis (River Red Gum) is a tree of the genus Eucalyptus. It is familiar and usually seen along water courses right across inland Australia. The tree produces welcomed shade in the extreme temperature and plays an important role in stabilizing river banks. Maize (Zea mays) is one of the major cereal crop produced worldwide. It is a staple food in many countries throughout Africa, Latin America and Asia. Onuk, et al, (2010), noted that maize is one of the most abundant food crops in Nigeria; about 80% is consumed by man and animals while 20% is utilized in variety of industrial processes for production of starch, oil, high fructose, corn sweetener, ethanol, cereal and alkaline, consisting of 71% starch, 9% protein and 4% oil on a dry weight basis. On the same note, Gupta (2011) noted that maize has immense potential to meet food requirement of human population because it has a great significance as human food, animal feed and diversified uses in a large number of industrial products, also that the adoption of improved and sustainable maize technologies holds the key to ensure both sustainability and increased maize production. Despite the importance and uses of maize in Nigeria, it is attacked by various field and storage pest. Maize weevil (Sitophiluszeamays) is a major pest that attack stored maize grains in tropics and temperate regions of the world (Sagheeret al., 2013; Adedire 2001). According to Radha, (2014) the attack of maize weevils may start in the mature crop when the moisture content (MC) of the grain had fallen to 18-20%. Subsequently, infestations in store result from the transfer of infested grain into store or from the pest flying into storage facilities, probably attracted by the odour of the stored grain. In stored maize, heavy infestation of this pest may cause weight losses of as much as 30-40% (Radha, 2014; Ogunsina et al., 2011). Therefore, the objective of this work is to examine the insecticidal effects of stem bark powder of Azadirachta indica and leaf powder of Eucalyptus camaldulensis on weevils of stored maize grains.

2. Materials and Methods

Study Site

The study was carried out in the chemistry laboratory of Binyamin usman polytechnic Hadejia, Jigawa State. It is located 12.45 latitude and 10.4 longitudes and it is situated at elevation 359 meters above sea level in Sudan savannah zone.

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Materials

The materials used for the study include maize grains, maize weevils (Sitophiluszeamays), stem bark of Azadirachta indica, leaves of Eucalyptus camaldulensis.

Collection and Preparation of Plant Materials

After collecting both the stem bark of Azadirachta indica and leaves of Eucalyptus camaldulensis in they were shade-dried under free to air for 5 days and were pulverized into fine powder using mortar and pestle, sieved and stored in polythene bags until use.

The fine powder of both plant materials were thoroughly mixed together per 100g of maize grain at different doses of 5.0g, 10.0g, 15.0g and 20.0g while 0.0g/100g served as the control.

Experimental Design and Layout

The experimental design adopted for this research work using both the stem bark powder of Azadirachta indica and leaf powder of Eucalyptus camaldulensis was completely randomized design consisting of five treatments (0.0g, 5.0g, 10.0g, 15.0g and 20.0g) and replicated four times (Table 1).

Table 1: Experimental Layout

	R_1	**R_2**	**R_3**	**R_4**
T_A	T_AR_1	T_ER_5	T_BR_2	T_CR_3
T_B	T_BR_2	T_CR_3	T_AR_1	T_ER_5
T_C	T_CR_3	T_DR_4	T_ER_5	T_DR_4
T_D	T_DR_4	T_BR_2	T_CR_3	T_AR_1
T_E	T_ER_5	T_AR_1	T_DR_4	T_BR_2

Where= R_1, R_2, R_3, R_4 are replicates; T_A, T_B, T_C, T_D, T_E are treatments.

Experiment using Stem Bark and Leave Powder of Azadirachta indica and Eucalyptus camaldulensis.

100g of clean and sterilized maize grains were poured into different experimental jars. 5.0g, 10.0g, 15.0g, 20.0g and 0.0g (control) each of both stem bark powder of Azadirachta indica and leaf powder of Eucalyptus camaldulensis were added into each jar and vigorously shaken to ensure thorough mixture of the grains with the plant materials. It was then allowed to settle for 30 minute, after which 30 live adult maize weevils (Sitophiluszeamais) were carefully introduced into each jars. The jars were then covered with perforated lids, lined with muslin mesh of 1.0mm (Chomini, et al. 2006) after which each jar containing the materials were set up in four replicates in a completely randomized design (CRD) in Bupoly chemistry laboratory.

Experimental Duration and Parameters Assessed

The experiment was conducted from 1st – 15th August, 2019 for Eucalyptus and 1st – 19th August for Neem. And the parameters assessed include:

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Percentage mortality of weevil

$$\% \text{ mortality} = \frac{\text{No of dead weevils}}{\text{Total No of weevils}} \times \frac{100}{1}$$

Grain perforation and Weevil perforation index

$$\text{WPI} = \frac{\% \text{ perforation of treated grains}}{\% \text{ perforation of control grains}} \times \frac{100}{1}$$

(Fatope et al, 1995; Chomini et al, 2006)

Weight loss

$$\% \text{ weight loss} = \frac{\text{weight at the trail}}{\text{Initial weight}} \times \frac{100}{1}$$

Percentage germination

$$\% \text{ germination} = \frac{\text{Number of grains germinated}}{\text{Total number of grains sown}} \text{ x } \frac{100}{1}$$

(Chomini et al, 2010)

Statistical Analysis

The data collected on mortality, percentage mortality, weight loss, perforation and percentage germination were subjected to analysis of variance (ANOVA) to determine their significant.

3. Results and Discussion

Results

Table 2: Mortality and % Mortality of Sitophiluszeamais under Eucalyptus Leaf and Neem Stem Bark Powder at 48 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	T/R	TA	TB	TC	TD	TE
Eucalyptus Leaf Powder	1	8	8	10	10	0
	2	4	5	12	11	0
	3	5	5	9	13	0
	4	8	7	8	10	0
	Total	23	25	39	44	00
	Average	5.75	6.25	9.75	11	0.0
	%	19.16	20.83	32.5	36.66	0.0
Neem Stem Bark Powder	1	4	6	2	3	0
	2	2	2	4	6	0
	3	3	2	4	4	0
	4	2	4	3	3	0
	Total	11	14	13	16	0
	Average	2.7	3.5	3.2	4.0	0.0
	%	9.00	11.6	10.6	13.3	0.0

Eucalyptus: $F_{cal}= 2.04 F_{tab} = 3.06$ Neem: $F_{cal}=0.86 F_{tab} = 3.06$

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Table 3: Mortality and % Mortality of Sitophiluszeamais under Eucalyptus Leaf and Neem Stem Bark Powder at 96 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	T/R	TA	TB	TC	TD	TE
Eucalyptus Leaf Powder	1	10	14	15	26	0
	2	8	10	17	16	0
	3	9	11	13	18	0
	4	13	12	12	15	0
	Total	40	47	57	65	0
	Average	10	11.75	14.25	16.25	0.0
	Percentage	33.33	39.16	47.5	54.16	0.0
Neem Stem Bark Powder	1	6	11	5	6	0
	2	5	5	8	10	0
	3	4	4	8	17	0
	4	6	6	5	6	0
	Total	21	26	26	26	0
	Average	5.25	6.5	6.5	6.5	0.0
	Percentage	17.5	21.6	21.6	21.6	0.0

Eucalyptus: $F_{cal} = 73.3 F_{tab} = 3.06$ Neem: $F_{cal} = 10.37 F_{tab} = 3.06$

Table 4: Mortality and % Mortality of Sitophiluszeamais under Eucalyptus Leaf and Neem Stem Bark Powder at 144 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	T/R	TA	TB	TC	TD	TE
Eucalyptus Leaf Powder	1	14	18	20	21	0
	2	12	15	20	19	0
	3	13	17	16	21	0
	4	17	19	17	20	0
	Total	56	69	73	81	0
	Average	14	17.25	18.25	20.25	0.0
	Percentage	46.66	57.5	60.83	67.50	0.0
Neem Stem Bark Powder	1	7	12	5	6	0
	2	6	6	8	10	0
	3	5	5	9	21	0
	4	7	6	6	7	0
	Total	25	29	28	29	0
	Average	6.25	7.25	7.0	7.25	0.0
	Percentage	20.8	24.1	23.3	24.1	0.0

Eucalyptus: $F_{cal} = 30.48 F_{tab} = 3.06$ Neem: $F_{cal} = 8.81 F_{tab} = 3.06$

Table 5: Mortality and % Mortality of Sitophiluszeamais under Eucalyptus Leaf and Neem Stem Bark Powder at 192 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	T/R	TA	TB	TC	TD	TE
Eucalyptus Leaf Powder	1	18	24	25	26	0
	2	17	20	23	23	0
	3	18	20	20	25	0
	4	22	23	22	23	0
	Total	75	87	90	97	0

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	Average	18.75	21.75	22.50	24.25	0.0
	Percentage	62.50	72.50	75.00	80.83	0.0
Neem Stem Bark Powder	1	9	13	8	8	0
	2	7	8	9	12	0
	3	7	6	11	6	0
	4	9	8	8	8	0
	Total	32	35	36	34	0
	Average	8	8.7	9	8.5	0.0
	Percentage	26.6	29.0	30.0	28.3	0.0

Eucalyptus: $F_{cal} = 24.30 F_{tab} = 3.06$ Neem: $F_{cal} = 76.1 F_{tab} = 3.06$

Table 6: Mortality and % Mortality of Sitophiluszeamais under Eucalyptus Leaf and Neem Stem Bark Powder at 240 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	T/R	TA	TB	TC	TD	TE
Eucalyptus Leaf Powder	1	24	30	30	30	0
	2	24	26	28	28	0
	3	26	27	25	27	0
	4	27	28	27	28	0
	Total	101	111	110	113	0
	Average	25.25	27.75	27.5	28.25	0.0
	Percentage	84.16	92.50	91.66	94.16	0.0
Neem Stem Bark Powder	1	10	14	7	8	0
	2	7	8	9	12	0
	3	7	6	10	6	0
	4	8	7	7	9	0
	Total	32	35	33	35	0
	Average	8	8.7	8.25	8.7	0.0
	Percentage	26.6	29.0	27.5	29.0	0.0

Eucalyptus: $F_{cal} = 20.23 F_{tab} = 3.06$ Neem: $F_{cal} = 52.5 F_{tab} = 3.06$

Table 7: Mortality and % Mortality of Sitophiluszeamais under Eucalyptus Leaf and Neem Stem Bark Powder at 288 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	T/R	TA	TB	TC	TD	TE
Eucalyptus Leaf Powder	1	27	30	30	30	0
	2	28	30	30	30	0
	3	29	28	28	29	0
	4	30	29	30	30	0
	Total	114	117	118	119	0
	Average	28.5	29.25	29.5	29.75	0.0
	Percentage	95.0	97.50	98.33	99.16	0.0
Neem Stem Bark Powder	1	12	16	9	10	0
	2	10	10	11	13	0
	3	10	8	12	8	0
	4	9	10	9	12	0
	Total	41	44	41	43	0
	Average	10.25	11.0	10.25	10.75	0.0

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	Percentage	31.1	36.6	34.1	35.8	0.0

Eucalyptus: F_{cal}= 19.08F_{tab} = 3.06 Neem: F_{cal} = 0.30F_{tab} = 3.06

Table 8: Mortality and % Mortality of Sitophiluszeamais under Eucalyptus Leaf and Neem Stem Bark Powder at 336 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	T/R	TA	TB	TC	TD	TE
Eucalyptus Leaf Powder	1	30	30	30	30	0
	2	30	30	30	30	0
	3	30	30	30	30	0
	4	30	30	30	30	0
	Total	120	120	120	120	0
	Average	30	30	30	30	0.0
	Percentage	100	100	100	100	0.0
Neem Stem Bark Powder	1	22	26	19	19	0
	2	19	18	23	22	0
	3	18	15	26	16	0
	4	20	20	20	22	0
	Total	79	79	88	79	0
	Average	19.75	19.75	22.0	19.75	0.0
	Percentage	65.8	65.8	73.3	65.8	0.0

Eucalyptus: F_{cal}= 18.75F_{tab} = 3.06 Neem: F_{cal} = 27.59F_{tab} = 3.06

Table 9: Mortality and % Mortality of Sitophiluszeamais under Neem Stem Bark Powder at 384 and 432 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	T/R	TA	TB	TC	TD	TE
Bombax Stem Bark Powder at 384 HAT	1	30	30	24	25	0
	2	26	25	30	30	0
	3	26	23	30	23	0
	4	30	27	27	30	0
	Total	112	105	111	108	0
	Average	28.0	26.25	27.75	27.0	0.0
	Percentage	93.33	87.50	92.5	90.0	0.0
Neem Stem Bark Powder at 432 HAT	1	30	30	30	30	0
	2	30	30	30	30	0
	3	30	30	30	30	0
	4	30	30	30	30	0
	Total	120	120	120	120	0
	Average	30	30	30	30	0.0
	Percentage	100	100	100	100	0.0

Bombax at 384 HAT: F_{cal} = 22.07F_{tab} = 3.06 Neem at 432 HAT: F_{cal} = 18.75F_{tab} = 3.06

Table 10: Average Weight Loss of Grain Treated with Eucalyptus Leaf Powder at 336 HAT and Neem Stem Bark Powder at 432 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT		A	B	C	D	E
Eucalyptus leaf Powder at 336 HAT	1	66.3	69.2	80.3	88.2	41.2
	2	65.7	75.3	85.5	92.5	35.3

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	3	68.1	77.4	89.4	94.1	36.1
	4	62.3	73.3	84.1	92.5	43.4
	Total	262.4	295.2	339.3	367.3	156
	Average	65.6	73.8	84.8	91.8	39.0
Neem Stem Bark Powder at 432 HAT	1	55.4	67.5	79.5	91.3	41.2
	2	65.7	66.6	76.7	85.6	35.3
	3	56.1	69.9	83.4	87.5	36.1
	4	52.2	72.3	88.6	78.4	43.4
	Total	229.4	276.3	328.2	342.8	156
	Average	57.35	69.07	82.05	85.7	39.0

Eucalyptus: $F_{cal} = 5.04 F_{tab} = 3.06$ Neem: $F_{cal} = 5.06 F_{tab} = 3.06$

Table 11: Average Perforation of Grain Treated with Eucalyptus Leaf Powder at 336 HAT and Neem Stem Bark Powder at 432 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT		**A**	**B**	**C**	**D**	**E**
Eucalyptus leaf Powder at 336 HAT	1	62	53	46	21	74
	2	50	49	43	29	85
	3	47	38	32	31	96
	4	44	40	34	25	87
	Total	203	180	155	112	346
	Average	50.75	45.00	38.75	28.00	86.50
Neem Stem Bark Powder at 432 HAT	1	69	51	48	31	80
	2	45	42	37	33	95
	3	47	40	39	30	90
	4	40	39	25	28	92
	Total	201	172	149	122	357
	Average	50.25	43.00	37.25	30.50	89.25

Eucalyptus: $F_{cal} = 8.90 F_{tab} = 3.06$ Neem: $F_{cal} = 10.38 F_{tab} = 3.06$

Table 12: Weevil Perforation Index under Eucalyptus Leaf Powder at 336 HAT and Neem Stem Bark Powder at 432 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	**TREATMENT**	**WPI**
Eucalyptus Leaf Powder at 336 HAT	**A**	$\frac{50.75}{86.50} \times \frac{100}{1} = 58.6$
	B	$\frac{45.00}{86.50} \times \frac{100}{1} = 52.0$
	C	$\frac{38.75}{86.50} \times \frac{100}{1} = 44.8$
	D	$\frac{28.00}{86.50} \times \frac{100}{1} = 32.4$
	E	$\frac{100}{2} \times \frac{100}{1} = 50$
Neem Stem Bark Powder at 432 HAT	**A**	$\frac{50.25}{89.25} \times \frac{100}{1} = 56.3$
	B	$\frac{43.00}{89.25} \times \frac{100}{1} = 48.1$

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	C	37.25 x 100 = 41.7 89.25 1
	D	30.50 x 100 = 34.1 89.25 1
	E	100 x 100 = 50 2 1

Table 13: Percentage Germination of Grains Treated with Eucalyptus Leaf at 336 HAT and Neem Stem Bark Powder at 432 Hours after Treatment (Source: Field Survey, 2019).

PLANT EXTRACT	**T/R**	**TA**	**TB**	**TC**	**TD**	**TE**
Eucalyptus Leaf Powder at 336 HAT	1	6	8	6	7	8
	2	5	6	6	7	8
	3	7	6	7	7	6
	4	7	7	8	8	7
	Total	25	27	27	29	29
	Average	6.25	6.75	6.75	7.25	7.25
	Percentage	62.5	67.5	67.5	72.5	72.5
Neem Stem Bark Powder at 432 HAT	1	5	4	6	7	8
	2	7	6	5	6	7
	3	5	6	6	5	6
	4	6	6	6	6	6
	Total	23	22	23	24	27
	Average	5.75	5.5	5.75	6	6.75
	Percentage	57.5	55.0	57.5	60.0	67.5

Eucalyptus: $F_{cal} = 3.90 F_{tab} = 3.06$ Neem: $F_{cal} = 4.08 F_{tab} = 3.06$

4. Discussion

Mortality and Percentage Mortality

The result revealed an increase in effects with the levels of both the leaf and the stem bark powder of Eucalyptus and Neem respectively, on the mortality and % mortality of the maize weevils. This pattern of observation was a consistent trend up to 336 hours after treatment, HAT (14 days) of the trails. The analysis of variance (ANOVA) indicated no significant difference (P>0.05) at 48 HAT and significant different from 96 HAT to the end of the trails for both plant powders. The results agrees with the pattern of mortality of storage pest recorded by Chomini et al. (2006), Mortine and Peter (2000), who observed increase in mortality of weevil with both the time of exposure as well as concentration of different plant parts used in their studies. Beyond 336 HAT, there were slight variations in the effect of concentration of the stem bark with time on these parameters.

Perforation and Perforation Index

The ability of the weevils to perforate the treated grains is an indication of the protective potential of the plant materials. Thus, the concentrations with the lowest damage confer or reveal the strength. The trails have indicated an inverse relationship between the levels of the powder and the grain damage. Higher levels of the Eucalyptus leaf powder tend to show lower values of grain damage. This is reflected in the analysis of variance (ANOVA) which indicated significant

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difference (P<0.05). This observation is in line with the work of Chomini, et al. (2006), as an indication of the protective ability of the vegetative parts as concentration increases.

Thus, at 20/100g as shown by the weevil perforation index (WPI) better grain protection was observed in this trail.

The same pattern is noticed for perforation index of the different levels of the stem bark powder of Azadirachta indica, thereby indicating a significant difference.

Weight Loss

There was a progressive decrease in weight loss with increase in concentration of powder of the vegetative parts of both plants which therefore indicates a significant difference (P<0.05). The observation is similar to the findings of Chomini et al, (2010) where the decrease in weight loss of treated grains with increase in levels of Neem and mahogany bark extracts and dried powder of Xylopia fruit.

This thus reveals anti-feed ant potential of both the stem bark and leaf powder of the test plants. Pornpun, et al, (2009), explained and adduced the tendency of grain protection to presence of phytochemical composition in vegetation part of test plants. Six phytochemical compounds have been identified from the leaf of Eucalyptus. These includey-terpinene, p-cymene, 1,8-cineole, terpinen-4-ol (Ponpun, et al, 2009). These compounds have been found to have termiticidal effect against subterranean termite, Copototerrmespormosanus Shiraki. Akuodor, et al. (2012), have extracted phytochemicals such as alkaloids, flavonoids, tannins, saponins, terpenoids, steroids, phlobatannins, anthraquinones from roots and leaves of Neen. These have been reported to antibacterial, antifungal, and antioxidant properties.

Percentage Germination

The effects of the powder of vegetative parts of the test plants did not adversely affect the germination of the treated grains and are therefore significant (P<0.05), the average % germination were 67.5%, 60.0% and 57.5% at 0.0g, 20.0g and 5.0g levels respectively for leaf powder of Eucalyptus and 72.5%, 72.5% and 62.5% at 0.0g, 20.0g and 5.0g levels respectively for stem bark of Neem. This observation is in line with the findings of Chomini, et al. (2010). Their observations showed that treatments of grains with Neem, mahogany bark extract and dried powder of Xylopia fruit did not affect the germination potential of the treated grains. Thus suggesting that the treatments have the potential of preserving the viability integrity of the treated grains.

5. Conclusion

Following the observations made, it can be concluded that mortality and percentage mortality of maize weevil increase with the levels of plants extracts as well as time of exposure. The perforation and perforation index of the grain were affected by concentrations of vegetative parts of the test plants. This also has influence on the weight loss pattern.

The percentage germination of grain at the end of the trail also showed no effect of the extracts on the germination capacity of the grain.

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References

[1] Adedire, C. O., (2001): Biology, Ecology and Control of Insect Pests of Stored Grains. In: Pest of stored cereals and pulses in Nigeria, Ofuya, T.I and N.E.S. Lale (Eds). Dave Collins Publications, Nigeria, pp: 59-94

[2] Akuodor, G. C., Essien, A. D., Ibrahim, J. A., Bassey, A., Akpan, J. L., Ikoro, N. C. and Onyewenjo, S. C. (2012): Phytochemical and Antimicrobial properties of the Methanolic extract of BombaxbuonopozenseLeaf and Root. Asian Journal of Medical Science. 2(3) 190-194.

[3] Chomini, M. S., L. O Okoiyele, A. E. Chomini and J. D James (2010): Federal College of Forestry, Jos. Nigerian Journal of Botany, Volume 23(2), 234 – 244.

[4] Chomini, M.S., M. E. Akalusi, Okoiyele, L. O., Nwakuwoche, K. N. and Karma, I. E. (2006): Insecticide effects of leaf,stem bark and seed kernel powdered extracts of neem (Azadirachtaindica A. Juss) against maize weevil (Sitophiluszeamaismotchulsku). Nig. Journal of Botany 19 (2) 348-352.

[5] Gupta S (2011): Sustainability of Scientific maize Cultivation practices in Utter Pradesh, India. J. of Biology, Agriculture and Healthcare 1(4)14-18

[6] Mortine and Peter, (2000): Effect of growing medium on early growth and survival of crop plant Muell Arg. and seedling in Malawi Afr. J. Ecol. 82, 249-258.

[7] Ogunsina, O.O., M.O. Oladimeji and L. Lajide, (2011): Insecticidal action of hexane extracts of three plants against bean weevil, Callosobruchusmaculatus (F.) and maize weevil, Sitophiluszeamaysmotsch. J. Ecol. Nat. Environ., 3: 23-28

[8] Olowolafe, E.A. (2002): Soil parent materials and soil properties in two separate catchment areas on the Jos Plateau, Nigeria. Geo-Journal 56: 201-212.

[9] Onuk E. G., Ogara I. M, Yahaya, H., &Nannim N (2010): Economic Analysis of Maize Production in Mangu Local Government Area of Plateau State, Nigeria. Journal of production, agriculture and technology. 6(1):1-11

[10] Pornpun, S., Ohtani, Y. and Ichiura, H. (2009): Biological performance of Eucalyptus camaldulensis leaf oils from Thailand against the Subterranean termite CopototermesformosanusShiraki. Journal of wood science 55 (1): 41-46.

[11] Radha, R., (2014): Toxicity of three plant extracts against bean weevil, Callosobruchusmaculatus (F.) and maize weevil, Sitophiluszeamaysmotsch. Int. J. Curr. Res., 6: 6105-6109

[12] Sagheer, M., A. Khaliq, F.Z.A. Khan, H.T. Gul and K. Ahmad (2013): Assessment of relative resistance in advanced rice genotypes in response to variation in abiotic factors and development of Triboliumcastaneum (Herbst) (Coleoptera: Tenebrionidae). Int. J. Biosci., 3: 33-38

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