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COMPARATIVE EFFICACY OF FIVE INSECTICIDES ON THE PESTS OF WEST AFRICA OKRA *AAbelmoschus caillei)*

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ABSTRACT

A study was carried out on the comparative efficacy of five insecticides on associated insect pest of Abeokuta 03 variety of West Africa Okra *(Abelmosehus caillei)* at the University of Agriculture Abeokuta. Increase in the number of insect pests on the Okra was also studied before and after the application of insecticides. The insecticides used were Monocrotophos, Primiphos-methyl, Carbaryl (Servin 85), Dichlorous and Endosulfan. The studied insect pests were Zonocreus *variegatus* (Orthoptera) *Podagrica uniforma* (Coleoptera), *(Dyserdercus supertitious* (Hemiptera), Oxycarenus species (Hemiptera), and (Bemisa species (Homoptera), Platyedra gossypiella (Lepidoptera) and Taemothrips sjostedti (Thysanoptera) Increase in population number of the insect pests before the application of the insecticides was observed to be rapid and high with the mean of the population number (3.33, 9.80, 13.33, 4.50. 4.67 and 15.50) respectively for each plot. However, after the application of the insecticides, there was a decrease in the population mean number (4.00, 9.33, 1.33, 3.17, 18.17, and 1.67) respectively for each plot. Monocrotophos and carbaryl (Servin 85) were observed to be more effective than other insecticides applied for the control of the insect pests of West Africa Okra.

Key words: Efficacy. insecticides, pests, okra.

INTRODUCTION

Okra also known and called Lady's finger, Ocho, and Gumbo (English) Gombo (French), Bendi (Malaysia), Ila (Yoruba), is an important vegetable crop in the tropical, sub-tropical and Mediterranean climate zones of the world (Tindall, 1986). It is a member of the family *Malvaceae* and genus Abelmoschus. Cultivated Okra is of two types, the conventional *A esculentus* which is a native of Asia and the unconventional A *caillei* which is a native of West Africa Martin *et al.,* (1981). Dried seeds okra is reported to contain 20% or more crude protein and 14% or more oil according to Martin *et al.,* (1981). It is also a good source of iodine, which is useful in the treatment of simple goitre and a source of other medicinally useful compounds, like vanillins Moaward *et al.,* (1984). Potentials of Okra plant as an industrial crop are enormous. The foliage can be for biomass, while the dry stem and mature pods produce
fibre which is used for paper pulp, textiles or as fuel Martin, (1982). Mucilage obtained from Okra is used for clearing sugar cane juice during jugglery manufacture in India and for sizing paper in China Kochan, (1986). The growth of A *caillei* can be classified into three distinct phases viz-vegetative, flowering and fruiting Kehinde, (1999). The vegetative being the longest that span between 18 and 20 days after flower bud initiation. A *caillei* occurs around homes and along roads side which make it relatively tolerant to insect pests and diseases Ariyo, (1993). The crop shares the same broad pest spectrum with cotton and hibiscus generally Hill and Waller (1988). Although, a very large number of insects from many different taxonomic groups can be found feeding on the plants, only a small number of species are regularly found and regarded as serious pests Hill and Waller (1988). Insecticides often afford the only practicable and quick control method where

pest populations are approaching economic thresholds David (1991) from initial population numbers. The insecticides may be applied in a wide variety of forms such as, smokes, aerosol. spray, dust and granules. Most modern insecticide work as contact poisons, whereas older arsenic derivative were stomach poisons. They can he divided into fumigant repellents (which are useful against vectors) and systemic (which operate via the plant saps). Stilling (1985). Hills and Waller (1988) reported that, large population of insect from different taxonomic groups can be found feeding on the Okra but few can be regarded as serious pests, this varying from region to region. Okra which share spectrum of pest with cotton, range from Lepidoptera, Homoptera, Coleptera, Orthoptera to Thysanoptera. Different orders of insect pests associated with Okra attack different parts of the plant at different stages of plant development Akinlosotu (1977). Lepidoptera with family Noctulidae, Aretilidae, Pyralidae and Gelechidae attack leaves, fruits and stem. They are found throughout the stages of development of the Okra with their larvae causing most of the damage. Good examples are *Anomis flava (F). Spilosoma maculosa (Cr), Lepta derogata (F)* and *Platydra gossypiella* (Saund) Akinlosotu, (1977). Homoptera, with family Jassidae. Arphididae, Aleyrodidae and Cerocopidae in which both the adults and nymphs cause damage to the plant leaves, stem and seeds. Examples includes *Empoasca fascialis (jac), Aphis gossypii* (Glov), *Bemisa species and Locris species* Akinlosotu, (1977). The beetles cause extensive holing of the leaves at the seeding stages with attendant growth retardation Kogbe (1988). The variegated grasshopper *(Zonocerus variegatus L)* is the best known pest causing extensive defoliation Kogbe. (1988). Thysanoptera are insects order that attack Okra during the flowering stage of development Akinlosotu (1977).

The main objectives of this study are to evaluate the populations build up of insect pests of West Africa Okra at different stages of development of the plant and to compare the effectiveness of five insecticides often used for controlling population build up of the insect pests.

MATERIALS AND METHODS

The study on the comparative efficacy of five insecticides on the insect pests of A *caillei* was carried out at the University of Agriculture, Alabata, Abeokuta, Nigeria during the late planting season of year 2001. A variety of the West Africa Okra (A *caillei)* Abeokuta 03 collected from the Department of Plant Breeding and Seed Technology of the University was used for the experiment. After the preparation of the land and mapping of the soil, the land was divided into six plots. The size of each plot was 1.62 m x 1.37 m (2.2194 m^2) with each plot consisting of 15 stands of the crop 0.2m apart. Weeding was done manually every fortnight from November to December 2001. The plots were watered twice daily until the establishment of the crops.

Insecticide application

Five insecticides listed below were applied after 58 days of punting when the crop began to initiate flower buds. After 58 days of planting; the crop began to initiate flower buds. Then, the following insecticides were applied: Monocrotophos 40% L.C (DIZENGOF) Monocrotophos. .Acetellic 25 EC (ZENEGA) Primiphos-

methyl, Carbaryl (servin 85), Vapit 100 EC (AGRIPHAR) Dichlorous and *Endocap 625 (CA UDEL) Endosulfan.*

These chemicals were purchased from Olatex Agroallied Centre an agrochemical shop at Asero Abeokuta Ogun State of Nigeria. The Knapsack sprayer was used to apply the insecticides. All the emulsifable concentrate were used at 50 ml per 10 litre of water. The insecticides were applied in following orders: Primiphos-methyl (Plot A), Dichlorous (Plot B), Endosultan (Plot C), Carbayl (Plot F and Plot E served as control with no insecticide. Visual observation method was used. The population counts of the insect pests on each standing crop were carried out between 7.00 and 8.00 am, when the temperature was very low.

The data collections were made in two categories which include:

The populations count before the application of the insecticide which was the period of emergence of the plant from the ground to flower bud initiation. This was done fortnight and the population density was taken three times.

The populations count after the application of the insecticides and the population growth was observed for two weeks. The data were taken every other day for seven times. The d a t a obtained from the two population study (before and after the application of the insecticides) were used to determine the mean, range, standard deviation, standard error, coefficient of variation, correlation coefficient. Analysis of variance (ANOVA) and test for significant difference between the means of the insect pests' population.

Table 1. Population of insect pests of *Abelmoschus caillei* before Insecticide application. (A) Species of insect pests on okra

(B) Species of insect pests on okra

Plot used	*Platyedra*	*Dysdercus*	*Bemisa*	*uniforma*	*varie atus*	*sjostedti*
	mom vniella	St -stitious	species	0		
I PLOT A		o	i0	0	~ 12	0
l PLOT B	0	l	0		0	
/ PLOT C	3					
PLOT D	0					
PLOT E	0		0			
PLOT F	; 0					

Plot used !	*Pla t y e*	*d r a*	*Dyaerdercus*	*Taemothrips*
	Podagrica I Zonocerus			
	t	*gooosypiella*	*superstitious*	
	A	0	0	0
	0	16	0	0
	B			
	0	(1	0	
	C		0	1 15 22
	0	3	0	0 1 3
0	0	0	4	0 1 3
	F	1	0 0	3 25

Bemisa species	*Podagrica uniforma*	*Zonocerus variegate*	*Taemothrips ·ostedti*
	i 1 t 12		0
	17	2	0

(C) Species of insect pests on okra

Plot	*Platyedra goosypiella*	*Dyaerdercus superstitious*	*Bemisa I*	*Podagrica uniforma*	*Zonocerus ? variegatus*	*Taemothrips sjostedti*
A	0	0	0	3	2	0
B	1	0	8	18	4	0
C	0	0	3	32	3	0
D	1	0	2	0	11	0
E	1	0	10	7	2	0
F	0	0	8	32	20	0

RESULTS AND DISCUSSION

The population counts of insect pests before and after the application of the insecticides are as presented in Table I and 2 respectively. On the evaluated population growth of the insect pests before the application of the insecticides, Orthpotera had the highest percentage of 43.46, Coleopthera (42.81%), Homoptera (10.46%) Lepidoptera (2.61%). Hemiptera (0.65%) and Thysanoptera (0%). (Figure 1). The evaluated values after the application of the insecticides. Coleopthera had the highest percentage of 37.34, Lepidoptera (30.47%), Orthpotera (21.89%), Homoptera (6.87%), Hemiptera (3.43%) and Thysoptera (0%). (Figure 2). Estimated means, standard error, range and coefficient of variation of the insect pests population before the application of the insecticides, indicated that the population growth was rapid with highest range of the population number observed to be (0 - 49) and the lowest range (0-10). The least populated plot had the highest variation in the building up of the insect pest population (Table 3). The mean, standard deviation, standard error, range and coefficient of variation of the insect

Plot A (Primiphos)

Plot B (Endosulfan)

Table 2. Population of insect pest of *Ablemoschus caillei* after application of insecticide

Platyedra goosypiella				0				0	
ii Dysdercus superstitious		_		0	_	0	(0	0	0 0 0
iii Bemisia I Species	1			0; 2 0	I0	j		-- 0	
iv Podagrica uniforma						1 0	1		0
v Zonocerus variegatus			1 2	2 '		1		0	

vi	*Taeniothrips sjostedti*					*; 0*	*0*	*0*	*0*	

Figure 1: Occurrence of insect pests before application of insecticides

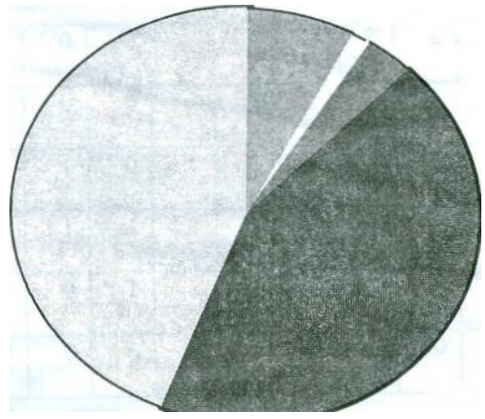
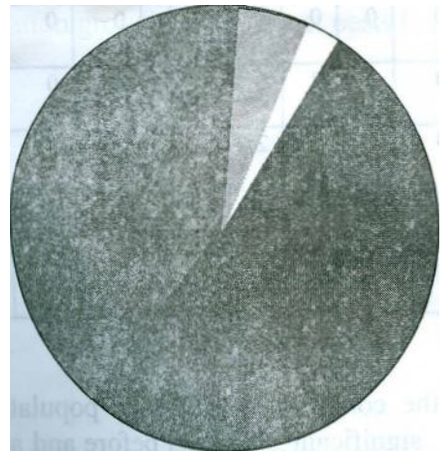


Figure 2. Occurrence of insect pests after application of insecticides



LEGEND

Platyedra goosypiella

Dysaerdercus superstitious

Bemisia species

Podagrica uniforma

pests' population after the application of the insecticides showed that the highest range of the population number was on the plot that was not sprayed (0 - 41) while the least was on the plot sprayed with carbaryl (0 - 5). The variation in the population build up was so close (Table 4). Primiphos-methyl exhibited high negative significant relationship with the Dichlorous and positive significant relationship with

		Plot C (Dichlorovs)						Plot D (Control)							
i ii	*Platyedra 1 goosypiella Dysdercus -- superstitious*	10		3	5							1			
							2					~~			
	Bemisia Species											0		1	
iv	*Podagrtca uniforma*														
	Zonocerus variegatus			0	2							5	9	1	0

		Plot E (Monocrolophos)								Plot F Carbaryl (Serving 85)							
vi	*Taeniothrips sjostedti*									0	0	0					
i	*Platyedra goosypiella*										0						
ii	*Dysdercus sup erstitious*																2
	Bemisia Species	0	0			0	0					0		0			
	Podagrica uniforma	I			1		1		1	0	0		0				
	Zonocerus atus												I				
vi	*Taeniothrips s ostedti*	0		0		0											

Monocrotophos, Carbaryl and the control. There was high positive significant relationship with endosulfan. Monocrotophos exhibited a high positive significant relationship with the control and carbaryl. Also there was significant relationship between the controls (Table 5). The significant effects of the insecticides used on the population increase when tested statistical at $P > 0.05$ and showed that all the five insecticides used were effective on plot C and F. Plot E which was not sprayed also showed a significant difference between the population means before and after the application of the insecticides (Table 6). The graphical representation of

means of population growth of the insect pests before and after the application of the insecticides showed the variation and dynamics of the population build up of the insect pests on each plot and the effect of the chemical used (Figure 3).

CONCLUSION

The occurrence of the insect pests before the application of the insecticides was high,

when compared to the insect pests after the application of the insecticides. The rate of population growth of the insect pest was high before the application of the

Table 3. Variation of insect pests population before the application of insecticides

Plot used	Mean - S E	Sd	Range	o - variation % o
A	3.33±26?	6.41	0-16	192.49
B	9.50- 5.62	13.37	0-35	140.74
C	13.33 -t- 7.84	19.20	0-47	144.04
D	4.50+3.52	8.62	0-22	191.56
E	4.67+ 1.82	4.46	0-10	95.56

Table 4 Variation of insect pests' population after the application of insecticides.

F	15.50+8.66	21.21	0-49	136.84

			Range	Co - Variation
A	4.00± 2.02	4.94	- 12	123.50
B	9.33 + 4.44	10.38	0-28	116.61
C	1.33 +0.96	2.34	0-6	175.94
D	3.17+_2.03	4.96	0 - 13	156.47
E	18.17+8.20	20.09	0-43	110.57
F	1.67 + 0.82	2.02	0-5	120.96

Figure 3. % Mean population growth of the insect pests before and after the application of the insecticides.

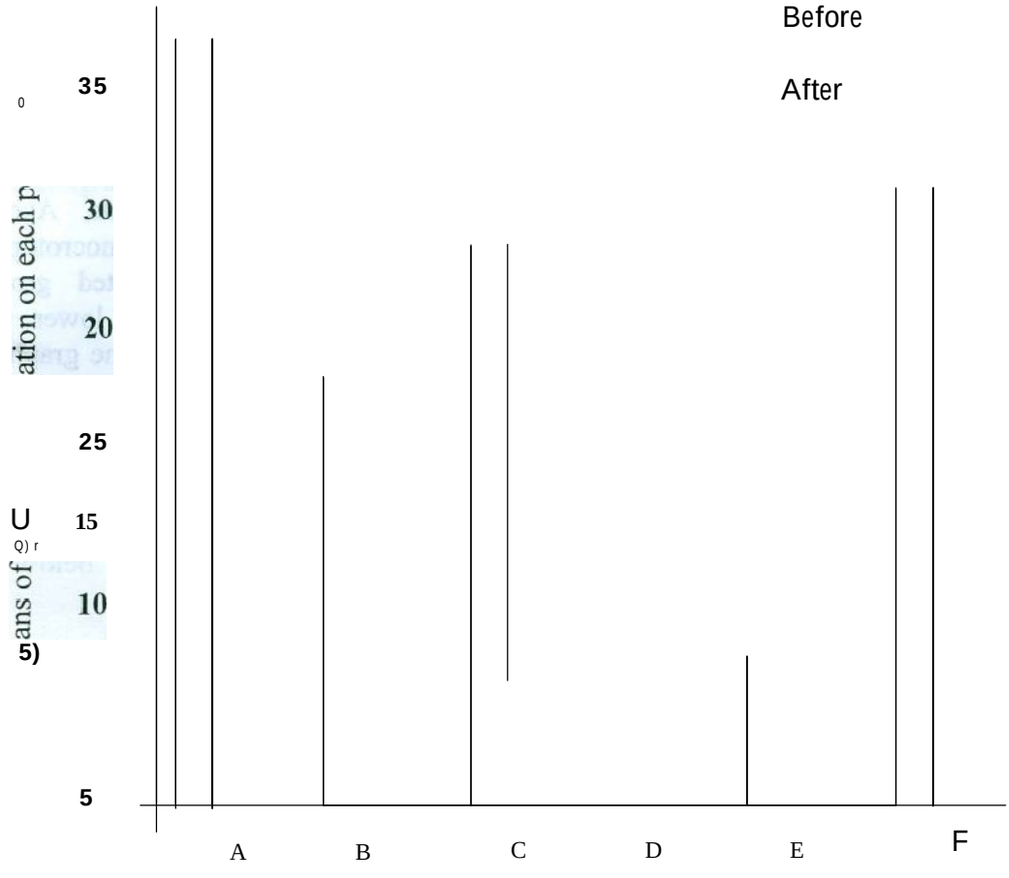


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Table 5. Correlation analysis between the insecticides used for the control of the insect pests of okro

	Primiphos methyl	Dischlorohos	Monocrotophos	Endosulfan	Control
Dischlorohos	-0.156				
Monocroto-phos	0.381	0.278			
Endosulfan	0.890*	-0.291	0.12		
Control	0.224	0.908*	0.535*	0.002	
Carbaryl (Servin 85)	0.372	0.104	0.897*	0.143	0.200

* Strong relationship

'Table 6. Comparative difference of means of the population of the insect pests before and after the application

0.487	0.085	6.333*	0.884	6.673	7.043*

of the insecticides. Significant effect (P > 0.05 AND 0.01)

insecticides. Gomez and Gomez (1976) emphasized that the greater the magnitude of correlation coefficient the stronger the association. Therefore, the relationship between the different insecticides used, indicated that some of these chemicals have action that are complementary. Some can prevent the insect pests while some cannot. Those with negative relationship have complementary action on each other. These can be explained by the low range of insect pests population observed on the control plot which was between the sprayed plots. The effect of some of the insecticides used on the population increase of the insect pests was not apparent on some of the plot when tested statistically (P > 0.05 and 0.01). These can be attributed to no significant different between the means of the population number, before and after the application of the insecticides. But the plot sprayed with monocrotophos and carbaryl (servin 85) showed that there was a significant effect of the insecticides on the population of the insect pests. Ayoade (1977) reiterated that monocrotophos application to all the selected growth phases of plants resulted in lower pest infestation and higher yield. The graphical representation showed that there was significant effect of the insecticides used on the population of the insect pests except for the plot which showed a contrary result. Conclusively, it indicates, that the insecticides used have been able to keep the population of the insect pests below the economic threshold level.

Finally the result showed that the insecticides used had effects on the population growth of the insect pests of the West Africa Okra (Abelmoshus caillei). It was also evident that Monocrotophos and Carbaryl (Servin 85) had more effects on

the pest population than all other chemicals used though their action was complementary.

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