

A COMPARATIVE EVALUATION OF THE EFFECT OF THREE TYPES OF INSECTICIDES ON THE YIELD AND CONTROL OF COWPEA INSECT PESTS IN ENUGU AREA, SOUTH EASTERN NIGERIA

By

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Abstract.

Field experiments to evaluate the effect of three types of insecticides on the yield and control of cowpea insect pests were conducted in two agro-environments simultaneously in Enugu Area, South Eastern Nigeria in 2007. cropping season. Sherpa plus 280 EC (30g/litre cypermethrine + 250g/litre dimethoate) as water emulsifiable concentrate, furadan 10 G (carbofuran), neem emulsion (Azadiracta indica) as insecticide treatments and two cowpea varieties (Ife brown and potiskum as cowpea variety treatment were used in the experiments. The experimental design was a split plot in a randomized complete block (RCB) replicated three times. Sherpa plus 280 EC was more effective in controlling cowpea insect pests than furadan 10 G and neem emulsion and its effectiveness is not affected by variation in location. In Nsukka, potiskum yielded significantly higher than Ife brown, whereas in Enugu, there was no significant yield difference between the two varieties.

Introduction

Cowpea (*Vigna unguiculata* L, Walp) is a tropical legume crop of African origin. It constitutes the cheapest source of dietary protein and energy for poor people in the tropical world. It is usually eaten as green pods, dry grains, and its tender leaves are eaten as vegetables. The crop also serves as cover crop and fodder for livestock. The haulm is fed to cattle in

a number of countries (Jachai and Daoust, 2009 and Olawole 2008)

Cowpea also plays an important role in providing soil nitrogen to cereal crops grown after it (Moima 1991). Okelede and Ariyo (2000) stated that the production of this crop in Nigeria was low and has not matched the demand of consumers. The production of this important legume crop is limited by various yield

factors. Among those factors causing yield variabilities include;

- Location
- Crop varieties
- Incidence of insect pests and diseases.

Okelede and Ariyo (2000) noted that the shortfall in cowpea production is traceable to problem of poor yield resulting from multifarious pests and diseases affecting the crop at different stages of development as well as continuous use of low yielding varieties.

Traditional farmers apply little or no insecticide on cowpea and consequently obtain low yield. Variations among environments for cowpea grain yield were greater when no insecticide was applied than when it is used (Blade et al. 1992).

The general objectives are therefore;

- 1 To compare the effects of three types of insecticides on the yield and control of cowpea insect pests in Enugu State
- 2 To evaluate yield potentials of two cowpea varieties in Enugu State.

Materials and Methods:

Experimental Treatments:

The experimental treatments included;

- (i) Two cowpea varieties (Potiskum and Ife brown).
- (ii) Spray of Sherpa plus 280 EC. (30g/litre

cypermethrine plus 250g/litre dimethoate).

- (iii) Spray of neem emulsion (Natural/Plant insecticide).
- (iv) Soil treated with furadan 10 G (synthetic granular insecticide).
- (v) No insecticide treatment.

Sherpa plus 280 EC.

The rate of dilution was 4ml/ litre of water. Therefore 6 litres of water was used to dilute 24 ml of Sherpa plus for a single spray using manually operated knapsack sprayer.

Furadan 10 G

This was applied around each plant one week after germination at the rate 100 kg ha⁻¹.

Neem:

Neem emulsion was prepared by harvesting and air drying properly of neem leaves, which was also ground into powder. Water was added to the powder and left over night after which it was also filtered. Emulsion of the dose 1.15 kg of neem powder to 20.25 kg of water weight by weight (W/W) was prepared, and used as a single spray at 6 litres per spray. This was stored in refrigerator and used within two weeks. Spraying interval was weekly till harvest.

Experimental Design

The experimental design was a split plot in randomized complete block (RCB) with three replications and four treatments.

Field Layout and Treatment Combinations

The main plots contained 3 insecticidal treatments and a control whereas the subplots contained two cowpea varieties (Ife brown and Potiskum).

Method of Planting:

The crops were spaced 0.5 m within rows and 0.5 m between rows. Main plots were separated by 1m pathway, whereas subplots were separated by 0.5m. Each main plot measured 5.5m x 5m (27.5m²) and consisted 5 rows of cowpea plants at 1 seed per stand. Weed control was carried out manually with hoe at three weeks interval.

Results and Discussion

Effect of different types of insecticides on the number of Aphids per plant of two cowpea varieties in Nsukka and Enugu during the 2007 cropping season.

The result of the experiment in Nsukka Agro-environment in 2007 showed a highly significant treatment effect ($p = 0.01$) on the number of Aphids per plant of two cowpea varieties. Plots treated with sherpapulus had no Aphids per plant, showing a hundred percent (100%)

Aphid control. Mean number of aphid per plant in plots treated with sherpapulus differed significantly from the other treatment means. There was no significant difference between plots treated with Furadan and Neem..

In Enugu Agro-environment during the 2007 cropping season, analysis of variance showed a significant insecticide treatment effect ($p=0.05$) with plot treated with sherpapulus recording no Aphids per plant, followed by Neem with mean number of 11.71 Aphids and lastly no insecticide plots with a mean number of 19.64 Aphids per plant.

Table 1. Effect of different types of insecticides on the number of Aphids per plant of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Location	Insecticides	Cowpea varieties		
		Ife brown	potiskum	Mean
Nsukka	Furadan	34.07	43.99	13.01
	Sherpaplus	0.00	0.00	0.00
	Neem	31.99	46.52	13.09
	No insecticide	72.20	75.42	24.60
	Mean	11.52	13.83	
Enugu	Furadan	32.73	39.66	12.07
	Sherpaplus	0.00	0.00	0.00
	Neem	33.46	36.77	11.71
	No insecticide	55.56	26.26	19.64
	Mean	10.15	11.56	

Nsukka 2007

	Insecticides	Cowpea varieties
F-LSD0.05	2.24	0.60

Enugu 2007

	Insecticides	Cowpea varieties
F-LSD0.05	4.43	1.18

Effect of different types of insecticides on the percentage leaves damaged by leaf beetles of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Result of the experiment in Nsukka agro-environment during the 2007 cropping season showed a high insecticide treatment effect on the percentage number of damaged leaves by leaf beetles, with plots treated with sherpa plus recording the least percentage damage of 2.91, followed by Neem with 4.00 percent, and lastly plots treated with no

insecticide recording 5.69 percent. Mean effect of plots treated with sherpa plus differed significantly from the mean effects of other treatments, whereas the mean effects of plots treated with furadam and Neem were the same. There was no interaction between insecticide and cowpea varieties treatments on the percentage number of leaves damaged by leaf beetles.

In Enugu agro-environments during the 2007 cropping seasons, result of the experiment showed a high significant insecticide treatments effect ($p=0.01$) with plots treated with

sherpa plus recording the least percentage damaged leaves of 4.14, followed by Furadan with 4.75 percent and lastly no insecticide with 6.11 percent. There was a significant mean difference between plot treated with sherpa plus and that of no insecticide, whereas the rest were statistically the same. There was no significant effect of cowpea varieties on the percentage number of damaged leaves.

Also there was no interaction

between insecticide and cowpea variety treatments on the percentage damaged leaves.

Table 2. Effect of different types of insecticides on the percentage number of leaves damaged by leaf beetles of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Cowpea varieties				
Location	Insecticides	Ife brown	Potiskum	Mean
Furadan		12.59	8.45	4.12
Nsukka	Sherpaplus	8.65	8.79	2.91
	Neem	11.74	12.23	4.00
	No insecticide	17.15	16.96	5.69
	Mean	4.18	4.20	
Enugu	Furadan	13.68	14.82	4.75
	Sherpaplus	12.24	12.58	4.14
	Neem	14.32	13.79	4.69
	No insecticide	18.52	18.11	16.11
	Mean	4.90	4.94	

Nsukka 2007

	Insecticides	Cowpea varieties
F-LSD0.01	0.60	N.S.

Enugu 2007

	Insecticides	Cowpea varieties
F-LSD0.01	1.07	N.S.

Effect of different types of insecticides on the number of flowers produced per plant of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Results of the experiment conducted in Nsukka Agro-environment in 2007 showed a significant cowpea varieties effect on the number of flowers produced per plant with potiskum having the highest mean of 5.37 flowers per plant. There was no significant insecticide treatment effect on the number flowers per plant. There was also no interaction effect between insecticides and cowpea varieties on the number of flowers per plant.

The result of the experiment conducted in Enugu agro-environment during the 2007 cropping season showed a highly significant insecticide

treatments effect on the number of flowers produced per plant with plots treated with sherpa plus recording highest mean number of 11.45 flowers per plant, followed by Furadan with a mean number of 3.34 flowers per plant, and lastly, plots treated with no insecticides with a mean of 0.58 flowers per plant. All the insecticide treatment means are statistically the same except that of the sherpa plus. There was also a significant interaction effect between insecticides and cowpea varieties treatments on the number of flowers produced per plant.

Table 3. Effect of different types of insecticides on the number of flowers produced per plant of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Cowpea varieties				
Location	Insecticides	Ife brown	potiskum	Mean
Nsukka	Furadan	8.77	9.71	3.08
	Sherpa plus	6.06	16.13	3.70
	Neem	3.19	19.03	3.70
	No insecticide	7.82	19.56	4.56
	Mean	2.15	5.37	
Enugu	Furadan	4.57	15.47	3.34b
	Sherpa plus	27.90	40.82	11.45a
	Neem	2.55	4.39	1.16b
	No insecticide	1.07	2.39	0.58b
	Mean	3.01	5.26	

Nsukka 2007

	Insecticides	Cowpea varieties
F-LSD0.05	N.S.	2.26

Enugu 2007

	Insecticides	Cowpea varieties
F-LSD0.01	5.00	0.46

Effect of different types of insecticides on the number of pods produced per plant of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Result of the experiment conducted in Nsukka Agro-environment during the 2007 cropping season showed a highly significant cowpea varieties treatment effect on the number of pods produced per plant with potiskum ranking highest with a mean of 3.68 pods per plant. This result supports Kwapata (1990) who observed that cowpea yields depend on the variety grown, the prevailing climatic condition and agronomic practices used. There was a non significant insecticide treatment effect on the number of pods produced per plant. There was also a non significant interaction effect between insecticide and cowpea

varieties treatments on the number of pods per plants.

In Enugu agro-environment during the 2007 cropping season, the result of the experiment showed a highly significant insecticide treatment effect on the number of pods produced per plant with sherpa plus ranking higher with 1.12 pods per plant. There was also a non significant cowpea varieties treatment effect on the number of pods per plant. However, potiskum ranked higher with a mean number of 0.58 pod per plant, whereas lfe brown had the least mean number of 0.33 pod per plant (Table 4).

Table 4. Effect of different types of insecticides on the number of pods produced per plant of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Cowpea varieties				
Location	Insecticides	lfe brown	Potiskum	Mean
Nsukka	Furadan	2.89	5.21	1.35
	Sherpa plus	3.99	14.97	3.16
	Neem	2.23	8.56	1.80
	No insecticide	4.94	15.41	3.39
	Mean	1.17	3.68	
Enugu	Furadan	0.65	1.33	0.33
	Sherpa plus	2.49	4.20	1.12
	Neem	0.41	0.93	0.22
	No insecticide	0.42	0.47	0.15
	Mean	0.33	0.58	

Nsukka 2007

F-LSD0.05	Insecticides	Cowpea varieties
	N.S	1.95

Enugu 2007

F-LSD0.05	Insecticides	Cowpea varieties
	0.47	N.S.

Effect of different types of insecticides on the pod yield (tonha^{-1}) of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Result of the experiment conducted in Nsukka agro-environment during the 2007 cropping season indicated a significant cowpea varieties effect ($p=0.05$) on the pod yield (tonha^{-1}).

During the 2007 cropping season in Enugu agro-environment, result of the experiment, carried out showed a significant insecticide treatment effect ($p=0.05$) on pod yield (tonha^{-1}) of two cowpea varieties. potiskum yielded higher with a

mean of 0.07 tonha^{-1} , whereas lfe brown yielded lower with a mean of 0.02 tonha^{-1} . Plots treated with sherpa plus yielded higher with a mean of 0.09 tonha^{-1} followed by Furadan and Neem with means of 0.03 tonha^{-1} each and lastly plots treated with no insecticide with a mean of 0.02 tonha^{-1} . This result agreed with Blade et al (1992), who observed significant differences in response of cowpea in four management systems of sole crop + insecticides, sole crop and no insecticides, maize intercrop + insecticides, maize intercrop + no insecticide in West African Savanna.

Table 5
 . Effect of different types of insecticide on the pod yield (tonha⁻¹) of two cowpea varieties in Nsukka and Enugu agro-environments during the 2007 cropping season.

Cowpea varieties				
Location	Insecticides	Ife brown	Potiskum	Mean
Nsukka	Furadan	0.00	0.36	0.24
	Sherpa plus	0.69	0.77	0.24
	Neem	0.34	0.39	0.12
	No insecticide	0.09	0.63	0.12
	Mean	0.9	1.18	
Enugu	Furadan	0.041	0.159	0.03
	Sherpa plus	0.170	0.40	0.09
	Neem	0.048	0.14	0.03
	No insecticide	0.035	0.82	0.02
	Mean	0.02	0.07	

Nsukka 2007

	Insecticides	Cowpea varieties
F-LSD0.05	N.S	0.08

Enugu 2007

	Insecticides	Cowpea varieties
F-LSD0.05	0.046	N.S.

Conclusion

In Nsukka and Enugu agro-environments, insecticide treatments, had significant effect on the number of aphids per plant and percentage leaf damage by leaf beetles. There was no cowpea variety treatment effect on the number of aphids per plant, percentage leaf damage by leaf beetles, number of flowers produced, per plant.

There was no interaction effect between insecticides and cowpea

variety treatments on the percentage leaf damage by leaf beetles, number of flowers per plant, and number of pods per plant. Cowpea pod yield (tonha⁻¹) was higher in Nsukka than in Enugu agro-environment. Potiskum yielded higher than Ife brown in both locations. This result agrees with Kwapata (1990), who stated that cowpea yields depend on the variety grown, the prevailing climate condition and location.

Recommendation

Based on the result of this research work, the researcher recommends the following to farmers in Enugu Area, South Eastern Nigeria.

- For adequate protection of cowpea in the field against insect pests, conventional insecticides like Sherpa plus 280 EC which proved more effective in controlling insect pests of cowpea than furadan and neem should be applied.
- In Nsukka agro-environment, potistum that yielded significantly higher than Ife brown should be cultivated, whereas in Enugu, both of them could be cultivated because there was no significant yield difference between the two varieties.

Kwapata, M.B., (1999) *Evaluation of contrasting cowpea genotypes at different dates of planting under rainfall condition*. SADC/11TA cowpea research project.

Moima, S.S.. (1991) *Trend in cowpea research project*; proceedings of cowpea research seminar, Harare zimbabwe p 25-26.

Okelede, K.A. & Ariyo, O.J., (2000) *Effect of strip intercropping and insecticide spray on the performance of cowpea Vigna unguiculata*

References

- Blade, S.F., (1997) *Cowpea on traditional cropping system*. Ibadan, International institute of tropical agricultural science (JIRCAS 11TA).
- Jachai, L.E.N.& Daoust, R.A., (2009) *Insect pests of cowpea; perspectives and overview*. Journal of pest science, P 132.