Insecticidal Efficacy of Some Plant Aqueous Extracts Mixtures against Post Flowering Insect Pest of Cowpea

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Abstract
Field experiment was conducted to evaluate the efficacy of single and mixtures of Petivera alliaceae, Datura stramonium and Luffa cylindrica aqueous extracts against post flowering insect pest of cowpea. The study consists of application of seven treatments laid out in complete randomised block design and replicated three times. Data on insect population were taken prior to the commencement of treatment application, 3 and 7 days after spraying, number of damaged pods, undamaged pods, total number of harvested pods and seed weight. Results obtained shows that L. cylindrical plant extract sole application and its mixtures significantly reduced insect population, numbers of pods damaged and improve cowpea yield compared to single application of P. alliacea and D. stramonium extracts. Application of P. alliacea + L. cylindrical and L. cylindrica + D. stramonium aqueous extracts mixture by resource poor farmers is hereby advocated as potential alternative to synthetic insecticides.
Keyword: *Datura stramonium, insect population, Luffa cylindrical, Petivera alliaceae, pods damaged*

INTRODUCTION

Cowpea (*Vigna unguiculata* L.) Walp) Fabaceae is an important food grain legumes consumed to meet the daily dietary protein requirement by teeming human population in many parts of Nigeria. Despite cowpea nutritional qualities, its production and consumption is still limited owing to complex of insect pest infestation. The annual yield loss due to the insect pests has been estimated at about 30 per cent and complete crop failure may occur especially in situation where control measures are not applied. However, cowpea yield in Nigeria can be improved and raised to tenfold, when insects are controlled with insecticides (Booker, 1965). The major insect pests complex known to attack cowpea at pre-flowering, flowering and post flowering consist of *Seriesthrips occipitalis, Clavigralla tomentosicollis, Taeniothrips sjostedti, Maruca testulalis, Acythomyia horida, Riptortus dentipes* and *Anoplocnemis curoipes* (Singh et al 1997) causing damage from 50% (Raheja, 1976). The use of synthetic insecticides has been the most widely use control measure and its uses has led to numerous problems unforeseen at the time of their introduction and this has necessitated the search for alternative control measures that are eco-friendly and pose no health and environmental threat such as botanicals. The use of plants in insect pest management is not only useful for suppression of pest population but also helps to maintain the sound ecological balance. Therefore, the purpose of this study is to evaluate the efficacy of aqueous extracts of *Petivera alliaceae*, *Datura stramonium* and *Luffa cylindrica* and their mixtures for the control of post flowering insect pests of cowpea.

MATERIALS AND METHODS

The experiment was laid out in a Randomized Complete Block Design (RCBD) with seven (7) treatments and replicated thrice (3 times) on a total land area of 135m^2 well prepared at the Teaching, Research and Commercial Farms of Rufus Giwa Polytechnic, Owo, Ondo State. Each plot measured

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2.5m×1.5m (3.75m^2) with 0.5m alley between plots. Two seeds of 'Oloyin cultivar was planted per hole at spacing of 75cm along the rows and 25cm within the rows and later thinned to one stand per hole two weeks after planting.

One hundred (100) grams each of *P. alliaceae*, *D. stramonium* and *L. cylindrica* plants collected from different locations in Owo metropolis were washed to remove dirt, thereafter homogenized with mortar and pestle. The homogenized materials were soaked for 24 hours in 5 litres of water. The crude aqueous extracts were then filtered through a muslin cloth to obtain aqueous extract which was stored till use. The leaf extracts were applied thoroughly on the cowpea plant when it attained 50% flowering at the rate of 50% w/v, while the synthetic insecticide (use as check) was applied at a concentration of 50ml to 15 litres of water. The spraying was maintained till harvesting of the matured pods.

To determine the effect of aqueous plant extracts in suppressing insect infestation and damaged to cowpea, insect pests were visually counted during the early hour of 6a.m - 7a.m when most of the insect are inactive from the middle row of each plots. Insect count was also carried out at 3 and 7 days after each spray (DAS). Harvesting was done at 5 days interval when the pods show indices for maturity and the following data were collected: number of infested (damaged) pods, number of undamaged pods, number of harvested pods and grains weight. Data collected were subjected to Analysis of Variance (ANOVA) and significant treatment means were separated using Duncan's Multiple Range Test (DMRT) at 5% probability level.

RESULTS

The generality of insect population before spraying was not significantly different from each other in all treatment assessed (Table 1). However, plots assigned to be treated with *L. cylindrica* and Lambda-cyhatholin had the highest number of pest population (5.67) and (5.00) respectively while *D. stramonium* assigned plots had the least population of pest (3.00).

Results for the insect population after the fourth spraying with the sole aqueous plant extracts and their mixture were shown in Table 2. Data obtained shows that the treatments exhibited varying level of insect infestation suppression. Cowpea sprayed with synthetic insecticide recorded the lowest insect population. Among the sole aqueous plant extracts, *D. stramonium* recorded the lowest population of *O. mutabilis* (0.33), *L. cylindrical* (0.67) *A. acutums* and *O. mutabilis* respectively. Similar trend was observed for the mixture of *P. alliacea* + *L. cylindrical* and *L. cylindrica* + *D. stramonium.* Result presented in Table 2 clearly indicated that the insect population were put under check 3 DAS for all the treatments.

The result in Table 3 shows that yield obtained from plots treated with synthetic insecticide was significantly different from those treated with aqueous plant extracts in terms of seed weight, damaged pods, undamaged pods and total number of pods produced. The result also showed that cowpea plants treated with single aqueous plant extracts were not significantly different from each other but were significantly different from cowpea treated with mixture of the aqueous plant extracts.

DISCUSSION

The result presented in the study demonstrated the potential of aqueous plant extracts in reducing infestation and damage caused by pod sucking bugs (PSBs) and pod borers. Pesticides both synthetic and botanical no doubt markedly reduce pest infestations and increase seed yield of crops. The result shows that the

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application of extracts (*P. alliacea, L. cylindrica, D. stramonium*) on cowpea plant had a positive effect in the control of post flowering pest of cowpea as it visibly reduces insect pest of cowpea. The population suppression ability of the plant extracts suggested that the plant materials possess insecticidal properties and is in conformity with the works of Owolade et al. (2004) and Stoll (2001) who reported that there are many botanical extracts of crop that are known to be effective in controlling various insect of crops.

In this study spraying with synthetic pesticide controlled the insect pest and increased cowpea yield tremendously as compared to spraying with botanical insecticides. This result is in line with earlier works by Agona et al (2001, 2002) and Opolot et al. (2006) where synthetic pesticides were adjudged to be more effective than the botanical pesticides. (Adebayo and Olaifa, 2004). The instance where there are surge in the insect population, indicates that the extract slow acting mortality agent and easily degraded. Above all, the efficacy observed from the study supported Dzemo et al, (2010) who reported that aqueous plant extract significantly reduces the infestation of pod borers and pod sucking bugs (PSBs) on cowpea, thereby reducing pod and seed damage and increasing grain yield.

CONCLUSION

The study showed that mixture of tested plant extracts exhibited potent insecticidal activity in suppressing cowpea post flowering insect pests due to the synergetic influence of the phytochemicals present in the mixed extracts. Therefore, adoption mixture of *P. alliacea* + *L. cylindrical* and *L. cylindrica* + *D. stramonium* aqueous extracts by resource poor farmers is hereby advocated as potential alternative to synthetic insecticides.

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Table1: Insect population before spraying with botanical insecticides

Treatments	Insect population
Lambda-cyhatholin	5.00±2.64
P. alliaceae	3.33±0.88
L. cylindrica	5.67±1.76
D. stramonium	3.00±1.20
P. alliaceae + L. cylindrica	3.33±0.88
P. alliaceae + D. stramonium	3.67±1.33
L. cylindrica + D. stramonium	3.67±1.33

Table 2. Post flowering insect population of cowpea after fourth spraying with plant aqueous mixture

Treatments	*Nezera viridula*		*Acrostenum acutums*		*Cerotoma trifurcate*		*Oetheca mutabilis*	
	3 DAS	7DAS	3 DAS	7DAS	3 DAS	7DAS	3 DAS	7DAS
Control	0.33±0.33^{a}	1.00±0.58^{a}	0.0	1.33±0.67^{ab}	0.0	0.67±0.33^{a}	0.0	0.0
P. alliacea	2.67±0.67^{b}	3.67±0.88^{c}	1.33±0.67^{b}	2.67±1.67^{bc}	0.0	1.33±0.33^{b}	1.33±0.33^{b}	. 0±0.58^{b}
L. cylindrical	1.67±0.67^{ab}	2.0±0.58^{ab}	0.67±0.67^{a}	2.33±0.88^{b}	1.0±0.58^{ab}	2.67±1.45^{b}	0.76±0.33^{a}	1.33±0.33^{b}
D. stramonium	2.33±1.45^{b}	3.33±1.45^{c}	1.0±0.58^{ab}	3.00±1.00^{c}	0.0	1.33±0.33^{ab}	0.33±0.33^{a}	0.33±0.33^{a}
P. A. + L. C.	1.67±0.88^{ab}	2.67±0.67^{b}	0.0	0.33±0.33^{a}	0.67±0.67^{a}	2.33±0.88^{b}	0.33±0.33^{a}	1.67±0.67^{b}
P.A + D. S	2.0±0.58^{b}	3.0±0.58^{bc}	0.0	0.67±0.33^{a}	1.67±0.88^{b}	2.67±0.33^{b}	0.33±0.33^{a}	0.67±0.67^{a}
LC +DS	2.33±1.33^{b}	3.67±1.20^{c}	0.67±0.67^{a}	1.33±0.58^{ab}	0.0	1.33±0.33^{ab}	0.67±0.33^{a}	1.33±0.88^{ab}

Treatments with different alphabet in same column are significantly different using DMRT at 5% probability
P. A. = *Petivera alliaceae,* L. C. = *Luffa cylindrical,* D. S. = *Datura stramonium*

Table 3. Effects of aqueous plant extracts mixture on cowpea yield, pod damage and seed weight

Treatments	no of undamaged pods	no of damaged pods	total no of harvested pods	seed weight (kg)
Control	125.67±10.48^{a}	1.87±0.58^{a}	312.67±17.49^{a}	0.30±0.03^{a}
P. alliacea	42.33±18.10^{b}	38.67±17.75^{c}	81.00±17.93^{c}	0.07±0.03^{b}
L. cylindrical	57.67±29.41^{b}	50.00±19.86^{b}	107.67±24.64^{b}	0.09±0.04^{b}
D. stramonium	48.67±24.37^{b}	53.67±34.29^{b}	102.34±29.32^{b}	0.10±0.07^{b}
P. A. + L. C.	39.00±8.02^{b}	30.00±3.50^{c}	69.00±9.77^{c}	0.04±0.01^{c}
P.A + D. S	14.67±2.33^{c}	17.67±8.09^{d}	32.34±6.38^{c}	0.03±0.01^{c}
LC +DS	28.00±7.57^{d}	30.00±7.51^{c}	58.00±7.54^{c}	0.05±0.01^{c}

Treatments with different alphabet in same column are significantly different using DMRT at 5% probability
P. A. = *Petivera alliaceae,* L. C. = *Luffa cylindrical,* D. S. = *Datura stramonium*

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