

EFFECT OF FOUR PLANT EXTRACTS ON THE INFESTATION OF COWPEA (*VIGNA UNGUICULATA* (L.) WALP) BY *MEGALUROTHRIPS SJOSTEDTI* (TRYBOM) AND *MYLABRIS PUSTULATA* (THUNBERG)

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(Received 8 September, 2004; Revision Accepted 4 July, 2005)

ABSTRACT

Field studies were conducted on cowpea variety 87-9TDC, planted at 60 x 30cm spacing at the Teaching and Research farm of College of Crop and Sciences, Michael Okpara University of Agriculture, Umudike, in the rain forest ecological zone of Nigeria during the 2001 cropping season. The experimental design was a randomized complete block design (RCBD) with four replications. Hot water extracts from the milled leaves of *Ocimum grattissimum*, *Vernonia amygdalina*, *Azadirachta indica* and *Chromolaena odorata* controlled the cowpea field pests investigated. Two grammes per litre concentration of the crude plant extracts reduced the insects infestation and significantly ($P < 0.05$) increased yield. *Azadirachta indica* and *Ocimum grattissimum* were the most effective of the plant materials used.

KEYWORDS: Plant extracts, Cowpea, *Megalurothrips sjostedti*, *Mylabris pustulata*, control.

INTRODUCTION

Grain legumes are important sources of human dietary protein and calories in many parts of the world (Okigbo, 1978). Their high protein and lysine content make them a natural supplement to staple diets of cereals, roots, tubers and fruits. (Onwueme and Sinha, 1999). The cowpea, *Vigna unguiculata* (L.) Walp., is a principal grain legume of West Africa (Onwueme and Sinha, 1999). The economic and nutritional value of cowpea has been recognized in Africa particularly as a subsistence crop to be relied on, before other crops mature. However, one of the major factors limiting cowpea production in most developing countries is the infestation by cowpea field pests (Ezueh, 1978; Singh, 1977).

Chemical substances known as insecticides have been used for insect pest control in order to maintain their populations at levels where they do not cause economic damage. However, the continuous and heavy usage of these synthetic insecticides has created severe environmental problems like toxicity to non-target organisms such as predators, pollinators, fish and man. (Emosairue and Ukeh 1996; Lale, 2002), insecticide resistance, high persistence in the environment and expensive for our resource poor farmers (Pitan and Odebiyi 2002).

Recently, there have been increased efforts by researchers in developing countries towards the search for alternative sustainable crop protection strategies/technologies that will prevent the obvious pollution problems in the environment and as well avoid toxic effects on non target organisms (Stoll, 1988). The objective of this study is to assess the effectiveness of *Ocimum grattissimum*, *Vernonia amygdalina*, *Azadirachta indica* and *Chromolaena odorata* against *Megalurothrips sjostedti* (Trybom) and *Mylabris pustulata* (Thunberg) on cowpea.

MATERIALS AND METHODS

This study was conducted at the Teaching and Research farm of the College of Crop and Soil Sciences, Michael Okpara University of Agriculture within the rain forest ecological zone of Nigeria. (Lat. 05° 29'N; Long. 07° 33'E and altitude 122M) above sea level with an annual rainfall of 2177mm.

The experimental site was prepared by ploughing and harrowing once, while planting was on the flat. The treatments were arranged in a randomized complete block design with four replications. Each plot size measured 5m x 3m (15m²)

with one metre pathway between each plot and replication, while the total experiment area was 25 x 13m.

The seeds of cowpea variety 89-7TDC were sown at the rate of three seeds per hole, at a depth of 2.5 – 3.0cm, and 60cm x 30cm spacing. It was later thinned to one plant per stand.

Extraction Procedure of Plant Materials: -

The sun-dried plant leaves used for the study were collected from Umudike Nigeria. They were leaves of *Ocimum grattissimum*, *Vernonia amygdalina*, *Azadirachta indica* and *Chromolaena odorata*. These plant materials were milled using Thomas Wiley milling machine Model ED-5 with a 1mm-mesh size. A 100g sample of each milled plant material was soaked in 200ml hot water that boiled to 100°C and then allowed to stand overnight. Each suspension was vigorously shaken and the extracts were then filtered through a 45µm mesh, before applying in the field.

Hoe weeding was done twice in all cases at 3 and 6 weeks after planting (WAP) with random hand pulling occasionally. Spraying against insect pests was done two times starting from 3 weeks after planting (WAP) at fortnightly intervals. The crude plant extracts was sprayed at the rate of 2g per litre of water using a one-litre (Aldrich®) hand sprayer.

Assessment of the populations of the *M. sjostedti* and *Mylabris* sp started at 28 days after planting and the populations of their adults were estimated by visual counting on 10 randomly selected plants in the middle row of each plot. This was done by gently examining the selected plants and by carefully turning the flowers and leaves for the correct assessment of all the *M. sjostedti* and *Mylabris* sp present on each of the cowpea plants. Sampling was done at weekly intervals between 7.30 a.m and 9.30 a.m when the insects were relatively less active and easier to sp.

Percentage defoliation on leaves was calculated thus:

Percentage defoliation =

$$\frac{\text{Total number of leaves defoliated}}{\text{Total number of leaves in sample}} \times 100$$

Days to 50% flowering were recorded accordingly.

At harvest the pods were picked and uniformly dried. The pods collected from the two middle rows were weighed and later shelled. Measurement of the pod weight and seed weight were subsequently recorded and expressed as kilogram per hectare.

Data were collected on number of holes on leaves, days to 50% flowering, days to 50% podding, days to 95% maturity, and number of seeds/pod.

Statistical analysis

Only the plants from the 3 middle rows were used for analysis. Data on insect counts were transformed using square root transformation while those in percentages were arcsine transformed prior to data analysis.

Data obtained were subjected to analysis of variance (ANOVA) for a randomized complete block design. Significant differences between means were separated by Student - Newman-Keuls (SNK) test ($P = 0.05$) using the GLM procedure of SAS (SAS Institute Inc., 2000).

RESULTS AND DISCUSSION

The results obtained in the experiment are summarized and presented in Table 1. The plant extracts significantly reduced the incidence of the insects on cowpea ($P < 0.05$) than the control plots. This can be demonstrated with the higher incidence of insect pests in the control than in the treated cowpea (Table 1). The various plant extracts had significant ($P < 0.05$) effects on the insect population. Thus, *A. indica* resulted in significantly lower *M. sjostedti* and *Mylabris* sp. population of 2.12 and 1.01 respectively. *O. grattissimum* had 2.44 and 1.09; *V. amygdalina* had 3.05 and 1.47; *C. odorata* had 5.50 and 4.48 while the control recorded 11.75 and 10.45 respectively. The *Azadirachta indica* treatment recorded the least percentage pest incidence. The yield from the *Vernonia amygdalina* treated plot was not significantly higher ($P \geq 0.05$) than yield from *Chromolaena odorata*. The study revealed that all the treatments significantly ($P \leq 0.05$) reduced the days to 50% flowering, population and damage of the insects as well as influenced the crop yield when compared with the control. The percentage defoliation was significantly ($P < 0.05$) lower on *A. indica* and *O. grattissimum* than in *V. amygdalina* and *C. odorata*. The plant extracts resulted in significantly lower percentage defoliation than the control plots. Comparatively, *A. Indica* treatment was more

potent than the other extracts in controlling the insect and their damage and consequently recorded a higher yield. This was followed by the treatment with *O. grattissimum*.

There were significantly higher yield in terms of pod ($P < 0.05$) in the various plant extracts when compared with the control as shown in Table 1. The *A. indica* treatment recorded the highest pod yield of 1048.46 kg per hectare. Grain yields of cowpea (Table 1) were significantly ($P < 0.05$) higher in the various plant extracts than the control. Significant differences were also obtained among the plant extracts. The highest grain yields were obtained from the *A. indica*, which gave 819.12 kg/ha while *O. grattissimum* gave 745.05 kg/ha. The *V. amygdalina* and *C. odorata* gave 321.08 kg/ha and 318.52 kg/ha respectively.

The results of this investigation are similar with the observations of Emosairue and Ukeh, (1996) who reported that 5% of neem seed kernel extracts significantly reduced the population and damage of okra flea beetles and also increased yield when compared with the control. Neem seed kernel oil at a concentration of 6% applied as a foliar spray is effective in reducing the infestation by maize stems and cobs by maize stem borers (Kolade, 2002). Jackai (1993) found that neem was effective against cowpea pest. Similar observations have been reported by several workers on the disruptive effect of various neem products on developmental stages of some insects such as Desert locust and Colorado potato beetles, with their adults having malformed wings and sterile females (Schmutterer, 1990; Radcliffe, 1992). The *A. indica* leaf extract as well as the other plant extracts are not hazardous to the environment (Schmutterer, 1990). A possible explanation for the reduction of damage by these plant extracts could be attributed to their insecticidal properties.

It can be concluded from this study that since pest management strategies aim at optimizing control and ensuring environmental-friendliness, the adoption of plant extracts of *A. indica*, *O. grattissimum*, *V. amygdalina* and *C. odorata* can be incorporated for the control of *Megalurothrips sjostedti* and *Mylabris pustulata* in cowpea fields in Umudike, Nigeria.

Table 1: Effect of different plant extracts on population (No /10 plants), damage (%), yield and yield related parameters in cowpea infested with *Megalurothrips sjostedti* and *Mylabris pustulata*.

Treatments	<i>M. sjostedti</i>	<i>Mylabris sp</i>	Defoliation	Days to 50% flowering	Pod weight (kg/ha)	Dry grain wt (kg/ha)
<i>A. indica</i>	2.12 ^a	1.01 ^a	18 ^a	42 ^a	1048.46 ^a	819.12 ^a
<i>O. grattissimum</i>	2.44 ^a	1.09 ^a	20.03 ^a	43 ^a	986.11 ^b	745.05 ^{ab}
<i>V. amygdalina</i>	3.05 ^a	1.47 ^a	27.80 ^b	51 ^b	589.12 ^c	321.08 ^c
<i>C. odorata</i>	5.50 ^b	4.48 ^b	29.42 ^b	54 ^b	576.92 ^c	318.52 ^c
Control	11.75 ^c	10.45 ^c	64.37 ^c	60 ^c	102.44 ^d	66.14 ^d

Means of treatment followed by the same letter are not significantly different $P > 0.05$ SNK test.

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