## SHORT COMMUNICATION

# The effects of some local plant extracts on the population of cowpea (*vigna unguiculata*) field insect pests

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### ABSTRACT

Three doses (3, 4 and 5%) of aqueous extracts of *Xylopia aethiopica* Dunal, *Piper guineense* Schum and Thonn, *Afromomum melegueta* K. Schum, *Azadirachta indica*. A- Juss, and *Syzygium aromaticum* (L) Merr and Perry, were tested for the control of major insect pests of cowpea using split plot fitted into a randomised complete block design and replicated 3 times in 2000. In this, the 5 plants and 2 synthetic Insecticides (dimethoate and deltamethrin) were tested in main plots while the rates of applications were assigned in sub plots. Results showed that all the plant extracts significantly ($P<0.05$) reduced the pest population on cowpea though not as effectively as the synthetic insecticides.

**Keys words:** Plant-Extracts, Population, Insect, Pests

### RESUME

Trois dosages (3, 4 et 5%) d'extraits aqueux de *Xylopia aethiopica* Dunal, *Piper guineense* Schum and Thonn, *Afromomum melegueta* K. Schum, *Azadirachta indica*. A- Juss, et *Syzygium aromaticum* (L) Merr et Perry ont été essayés pour le contrôle de pestes d'insecte majeures de cowpea utilisant le split plot ajusté dans un randomised complete block design la conception de bloc et replique 3 fois en 2000. Dans ce cas, les 5 plantes et 2 insecticides synthétiques (dimethoate et deltamethrin) ont été essayé dans les terrains principaux pendant que les taux d'applications ont été assignés dans les terrains secondaires. Les résultats ont montré que toute les extraits de plantes ($P<0.05$) a réduit significativement la population de peste sur cowpea bien que pas aussi efficace que les insecticides synthétiques.

**Mots clés:** extraits de plantes, population, insectes, pestes

## INTRODUCTION

Nigeria, Being the largest world producer of cowpea *vigna unguiculata* (L) Walp, is also one of the most inefficient producers, reaping approximately 900 000 tons of grains from approximately 4 x $10^6$ ha (Parh, 1983; Singh et al, 1983; Muleba and Ezumah, 1985 and IITA 1987/88). Cowpea growers' major problem is to control these insects, which damage the crop.

I.I.T.A 1983 reported some insect pests of cowpea to be of economic importance. These are flower thrips, *Megalurothrips sjostedti* (Trybom), the legume pod borer, *Maruca testulalis* (Geyer), *Anoplocnemis curvipes* (F), *Clavigralla shabadi* (Germ) *Clavigralla to mentosicollis* (Stal), *Riptortus dentipes* F; *Nezara viridula* (L.), *Mirperus jaculus* (Thnb). *Aspavia armigera* (F.) and *Acrosternum acutum* (Dallas).

Some of these Insects become pests when factors favour their abundance. Control of insects could be Mechanical, biological or chemical but complete control is seldom possible or practicable but the effectiveness of control measures is increased by carefully considering the problem.

The use of Insecticides is however the most widely used practice in pest control in cowpea (Raheja, 1986; Taylor, 1986). Some scientists have suggested the minimum use of insecticides for the control of insect pests in Agro-environments (Jackai et al 1985; Raheja, 1986). Since most environmentalist advocate for minimal use of synthetic insecticides in controlling pests, the objective of this study is to determine the effectiveness of some common local plants in controlling the population and type of pests found in a cowpea-growing environment.

## MATERIALS AND METHODS

The study was conducted in the University of Uyo, Teaching and Research Farm, Nigeria in the 2000 growing season. The research farm, located within latitude 4° 30' and 5° 30' N and longitude 7° 05' and 8° 20' E was prepared using conventional tillage methods after it was allowed to fallow for one year. Planting was done in September with 3 seeds per hole, which was later thinned to 2 plants per stand. Ife brown variety was used in the research. Planting was done on a spacing of 25 cm within rows and 75 cm between rows (Akobundu 1982) giving a plant population of 53. 33 plants per hectare. Three (3) weeding were done at 2, 4 and 6 weeks after planting. N.P.K. 20 :10 :10 compound inorganic fertilizer was applied at the rate of 200kg/ha as basal treatment. The experimental design was a split plot design laid out in a Randomised

**TABLE 1:**
**PEST POPULATION 2 WEEKS AFTER PLANTING**

| Pests | contrl. | *A. Melegueta* | *X aethiopica* | Deltamethrin | *A.indica* | *S.aromaticum* | *P.guineense* | Dimethoate |
|---|---|---|---|---|---|---|---|---|
| *Aphis Cracivora* (koch) | 3 | 2 | 2 | 0 | 1 | 1 | 1 | 0 |
| *Zonocerus Variegatus* L. | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| *Bemisia Tabaci* G. | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| Mean | 2.3 | 1.7 | 1.7 | 0.3 | 1.0 | 1.0 | 1.0 | 0.3 |
| SD | 0.6 | 0.6 | 0.6 | 0.4 | 0.0 | 0.0 | 0.0 | 0.4 |
| CV | 26.1 | 35.3 | 35.3 | 133.3 | 0.0 | 0.0 | 0.0 | 133.3 |
| SE± | 0.4 | 0.4 | 0.4 | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 |

**NB: SCORING CHART** 0 = No attack (zero insect present) 2 = 11 – 50 insects
1 = 1 – 10 insects 3 = >50 insects

complete block and replicated 3 times. Each block contained 24 subplots with a 3m path separating the subplots within rates and path of 2m separated plots between rates. The paths were to minimize the effects of nutrient and chemical drift.

There were 8 treatments namely: *Xylopia aethiopica*, *Piper guineense*, *Afromomum melegueta*, *Syzygium aromaticum*, *Azadirachta indica*, Dimethoate and Deltamethrin constituting the main plots while rates of 3, 4 and 5% concentration for the plants and 6, 8 and 10g a.i/ha for Deltamethrin and 192, 256, and 320g a.i/ha for Dimethoate constituted the subplots.

## PREPARATION OF EXTRACTS

Dried seeds of the plants used were crushed and solutions of the extracts Made by soaking 30, 40 and 50g of the ground substance in one litre of water and left for 12 hours before it was filtered.

After filtration 7g of starch was added to the extract to serve as adherence substance (Jackai 1993).

Spraying was done weekly from two weeks after planting.

## RESULTS AND DISCUSSIONS

Results (Table 1) showed that the number of pests present 2 WAP (weeks after planting), 4 WAP, 6 WAP, 8 WAP and 10 WAP show a variation in the number of pests in relation to plants/chemicals and rates of application.

Deltamethrin generally showed a lesser number of pest population than Dimethoate.
For the local plants used, there was a significant difference between them with *A. indica* generally having the least number of pests throughout the research followed by *P. guineense*, *S. aromaticum*, *X. aethiopica*, and *A. melegueta* respectively.

However all the plants showed a significant difference in pest population compared to the control treatment. Results also showed that as concentration/rate of application of the plant extract/chemicals increased from 3 – 5%, the population decreased.

**TABLE 2**
**PEST POPULATION 4 WEEKS AFTER PLANTING**

| Pests | contrl. | *A. Melegueta* | *X aethiopica* | Deltamethrin | *A.indica* | *S.aromaticum* | *P.guineense* | Dimethoate |
|---|---|---|---|---|---|---|---|---|
| *Aphis cracivor* (koch) | 3 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| *Zonocerus Variegatus* L. | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Bemisia Tabaci* G. | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Ootheca Mutabilis* S. | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Megalurothrips sjostedti* (Trybom) | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| Chielomenes Sulphurea | 3 | 2 | 2 | 1 | 1 | 2 | 1 | 1 |
| Mean | 2.3 | 1.2 | 1.2 | 0.5 | 0.8 | 1.0 | 0.8 | 0.7 |
| SD | 0.5 | 0.4 | 0.4 | 0.5 | 0.4 | 0.6 | 0.4 | 0.5 |
| CV | 21.7 | 33.3 | 33.3 | 100.0 | 50.0 | 60.0 | 50.0 | 71.0 |
| SE± | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 |

**NB: SCORING CHART** 0 = No attack (zero insect present) 1 = 1 – 10 insects 2 = 11 – 50 insects 3 = >50 insects

**TABLE 3**
**PEST POPULATION 6 WEEKS AFTER PLANTING**

| Pests | contrl. | *A. Melegueta* | *X aethiopica* | Deltamethrin | *A.indica* | *S.aromaticum* | *P.guineense* | Dimethoate |
|---|---|---|---|---|---|---|---|---|
| *Aphis cracivora* (koch) | 3 | 2 | 1 | 0 | 1 | 1 | 1 | 0 |
| *Zonocerus Variegatus* L. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Bemisia Tabaci* G. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ootheca Mutabilis* S. | 2 | 1 | 1 | 0 | 1 | 2 | 2 | 0 |
| *Acrida* bicolor | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chielomenes Sulphurea | 3 | 2 | 2 | 1 | 1 | 2 | 1 | 1 |
| *Maruca testulalis* | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Pachnoda marginata* | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Riptortus Dentipes* | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Nezara Viridula* L. | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Chnootriba similis* | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| *Megalurothrips Sjostedti* | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Mean | 2.08 | 0.83 | 0.66 | 0.25 | 0.41 | 0.66 | 0.66 | 0.33 |
| SD | 0.8 | 0.71 | 0.65 | 0.45 | 0.51 | 0.78 | 0.65 | 0.49 |
| CV | 38.4 | 85.5 | 98.4 | 180.0 | 124.3 | 118.1 | 98.4 | 148.4 |
| SE± | 0.23 | 0.2 | 0.18 | 0.13 | 0.14 | 0.22 | 0.18 | 0.14 |

**NB: SCORING CHART** 0 = No attack (zero insect present) 2 = 11 – 50 insects
1 = 1 – 10 insects 3 = >50 insects

## TABLE 4
## PEST POPULATION 8 WEEKS AFTER PLANTING

| Pests | contrl. | *A. Melegueta* | *X aethiopica* | Deltamethrin | *A.indica* | *S.aromaticum* | *P.guineense* | Dimethoate |
|---|---|---|---|---|---|---|---|---|
| *Aphis cracivora* (koch) | 3 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| *Ootheca Mutabilis* S. | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 |
| *Chrysolagria cuprina* | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 1 |
| Chielomenes Sulphurea | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| *Maruca testulalis* | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Clavigralla tomentosicolis* | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 |
| *Riptortus Dentipes* | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Locris erythromela* | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 1 |
| *Chnootriba similis (Thumber)* | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 0 |
| *Lagria villosa* Labricius | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Mean | 2.3 | 1.2 | 1.2 | 0.4 | 0.9 | 0.8 | 0.7 | 0.4 |
| SD | 0.48 | 0.78 | 0.78 | 0.51 | 0.87 | 0.78 | 0.67 | 0.51 |
| CV | 20.86 | 65.0 | 65.0 | 127.5 | 96.6 | 97.5 | 95.7 | 127.5 |
| SE± | 0.15 | 0.24 | 0.24 | 0.16 | 0.27 | 0.24 | 0.21 | 0.16 |

**NB: SCORING CHART** 0 = No attack (zero insect present) 2 = 11 – 50 insects
1 = 1 – 10 insects 3 = >50 insects

**TABLE 5**
**PEST POPULATION 10 WEEKS AFTER PLANTING**

| Pests | contrl. | *A. Melegueta* | *X aethiopica* | Deltamethrin | *A.indica* | *S.aromaticum* | *P.guineense* | Dimethoate |
|---|---|---|---|---|---|---|---|---|
| *Aphis cracivora* (koch) | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| *Ootheca Mutabilis* S. | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Chrysolagria cuprina* | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| Chielomenes Sulphurea | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| *Maruca testulalis* | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Clavigralla tomentosicolis* | 3 | 1 | 2 | 1 | 2 | 2 | 2 | 1 |
| *Riptortus dentipes* | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Locris erythromela* | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Chnootriba similis (Thumber)* | 3 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| *Lagria villosa* (Labricius) | 3 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| *Callosobrochus maculates* (Fabricius) | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Mean | 2.45 | 1.00 | 0.90 | 0.36 | 0.81 | 0.63 | 0.72 | 0.45 |
| SD | 0.52 | 0.77 | 0.70 | 0.50 | 0.75 | 0.67 | 0.64 | 0.52 |
| CV | 21.2 | 77.0 | 78.5 | 138.8 | 92.5 | 106.3 | 88.8 | 115.5 |
| SE± | 0.15 | 0.23 | 0.21 | 0.15 | 0.22 | 0.20 | 0.19 | 0.15 |

**NB: SCORING CHART**

0 = No attack (zero insect present)
1 = 1 – 10 insects
2 = 11 – 50 insects
3 = >50 insects

TABLE 6

**Effect of aqueous extracts of local plants and synthetic insecticides for the control of insect pests and pest population at various stages of growing of the crop**

| Treatments | | Pest N° 2 WAP | Pest N° 4 WAP | Pest N° 6 WAP | Pest N° 8 WAP | Pest N° 10 WAP |
|---|---|---|---|---|---|---|
| | | | | | | |
| *Xylopia aethiopica* | aq.3% | 3.0 | 5.0 | 6.7 | 7.7 | 8.0 |
| *X. aethiopica* | aq.4% | 2.6 | 5.3 | 6.0 | 7.0 | 7.0 |
| *X. aethiopica* | aq.5% | 2.3 | 4.3 | 5.7 | 6.7 | 7.0 |
| | | | | | | |
| *Azadirachta indica* | aq.3% | 2.6 | 5.0 | 5.0 | 5.7 | 7.0 |
| *A. indica* | aq.4% | 2.3 | 4.0 | 5.0 | 5.3 | 7.0 |
| *A. indica* | aq.5% | 1.0 | 3.0 | 4.0 | 5.3 | 6.0 |
| | | | | | | |
| *Syzygium aromaticum* | aq.3% | 3.0 | 5.0 | 6.0 | 6.0 | 6.0 |
| *S. aromaticum* | aq.4% | 2.6 | 4.3 | 5.0 | 6.0 | 5.0 |
| *S. aromaticum* | aq.5% | 1.3 | 3.3 | 4.3 | 5.0 | 5.0 |
| | | | | | | |
| *Piper guineense* | aq.3% | 3.0 | 5.0 | 6.3 | 6.0 | 6.3 |
| *P. guineense* | aq.4% | 2.6 | 4.0 | 4.3 | 5.3 | 6.0 |
| *P. guineense* | aq.5% | 1.0 | 3.3 | 4.3 | 5.0 | 5.0 |
| | | | | | | |
| *Afromomum Melegueta* | aq.3% | 3.0 | 5.7 | 8.0 | 8.0 | 8.0 |
| *A. Melegueta* | aq.4% | 2.3 | 5.0 | 7.3 | 7.3 | 8.0 |
| *A. Melegueta* | aq.5% | 2.0 | 4.7 | 7.0 | 7.0 | 7.0 |
| | | | | | | |
| Decis | 3ml/L | 0.7 | 3.0 | 3.0 | 3.7 | 4.0 |
| Decis | 4ml/L | 0.0 | 2.0 | 2.0 | 3.0 | 3.0 |
| Decis | 5ml/L | 0.0 | 2.2 | 2.0 | 2.7 | 2.7 |
| | | | | | | |
| Perfekthion | 3ml/L | 1.0 | 3.0 | 3.5 | 4.0 | 4.3 |
| Perfekthion | 4ml/L | 0.7 | 3.0 | 3.3 | 3.7 | 4.0 |
| Perfekthion | 5ml/L | 0.3 | 2.3 | 3.0 | 3.7 | 3.7 |
| | | | | | | |
| Control Untreated | | 3.0, 3.0, 3.0 | 6.0, 5.7, 6.0 | 12.0, 11.7, 11.7 | 9.7, 9.7, 9.7 | 11.0, 11.0, 11.0 |
| | | | | | | |
| LSD btw 2 spices/chemicals (P <0.05) | | 2.97 | 3.4 | 0.06 | 6.4 | 0.18 |
| LSD btw 2 rates | (P <0.05) | --------- | 1.8 | 0.05 | 1.08 | 1.4 |

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