

## EFFECT OF SPRAY REGIMES ON INCIDENCE AND CHEMICAL CONTROL OF COWPEA APHID (*Aphis craccivora* KOCH.) ON COWPEA IN KANO

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### ABSTRACT

An experiment was conducted at the Teaching and Research Farm of the Faculty of Agriculture, Bayero University, Kano (11°58"N; 8°26"E, 460m above sea level) to determine the effect of spray regimes on incidence of cowpea aphid (*Aphis craccivora* Koch.) on cowpea and the impact of synthetic pyrethroid, lambda cyhalothrin on the pest's population. The experiment was laid out in Randomized Complete Block Design (RCBD), consisting of three treatments (0, 1 and 2 sprays) which were replicated four times in a plot of 100 m<sup>2</sup>. The first spray was carried out at 50% flowering and the second at 50% podding. Results showed that there was significant reduction in the population of the aphids in the treated plots when compared with the control, with maximum protection recorded at 5 and 7 days after treatment in both the 1 and 2 spray plots. The highest mean cowpea grain yield (1399.25 Kg/ha) was recorded in the 2-spray plots, compared to the 1-spray (774.25 Kg/ha) and the control (648.25 Kg/ha) treatments. The 2-sprays proved more effective than 1-spray and this could be recommended as a minimum insecticide spray to complement other pest control options in the management of *A. craccivora* in cowpea fields.

**KEYWORDS:** Spray regimes, incidence, cowpea aphid

### INTRODUCTION

Cowpea (*Vigna unguiculata* L. Walp) is the most important grain legume grown in the tropical savanna zone of Africa. It is a highly versatile crop, cultivated primarily for seed, but it is also cultivated as vegetable (for leafy greens, green pods, fresh shelled green peas, and shelled dried peas), as cover crop and for fodder and plays a vital role in the lives of millions of people in Africa and other parts of the developing world (Quin, 1997). Cowpea grain contains about 23% protein, 1.3% fat, 1.8% fiber, 67% carbohydrate and 8-9% water (Hall *et al.*, 1997). It has been estimated that cowpea supplies about 40% of the daily protein requirements to most of the rural populace in Nigeria (Mulebaet *al.*, 1997). It is also an excellent improver of soil fertility because of its ability to fix atmospheric nitrogen thus providing soil with nitrogen for normal growth and development of cereal crops (such as maize, millet and sorghum) when grown in rotation, especially in areas where soil fertility is poor (Asiweet *al.*, 2009). Despite its potential advantages, cowpea production is generally becoming lower and lower due to insect pest infestation. Damage from pests such as beetle, leaf hoppers, aphids and birds could lead to poor plant growth and yield (Singh *et al.*, 1997). Losses in grain or foliage attributed to cowpea field pests especially aphids ranged from 20 to 100% (Raheja; 1976, Singh and Allen; 1980). In most tropical countries cowpea cannot be grown successfully without at least one or two insecticide sprays. The use of synthetic chemicals has been reported to reduce the incidence of pest infestation leading to higher cowpea yield (Jackaiaet *al.*, 1988). This study was designed to determine the effect of spray regimes on incidence of cowpea aphid (*Aphis craccivora* Koch.) on cowpea and the impact of synthetic

pyrethroid, lambda cyhalothrin on the pest's population and yield of the cowpea.

### MATERIALS AND METHODS

The experiment was conducted at the Teaching and Research Farm of the Faculty of Agriculture, Bayero University Kano (11°58"N; 8°26"E, 460m above sea level) on plots measuring 100 m<sup>2</sup>. The cowpea variety, IT93K-452-1 was used for the experiment. The seeds were sown at the rate of 3 seeds per hill on ridges at a spacing of 0.2m (intra row) and 0.75m (inter row). There were 3 plots per each block and each plot within block was separated by 1.5m discard and the blocks were separated by 2m discard. A Randomized Complete Block Design (RCBD) was used in the experiment, consisting of 3 treatments: control (i.e. no spray), 1 spray and 2 sprays of synthetic pyrethroid, Lambda cyhalothrin (Laraforce) 2.5% EC. The chemical was sprayed in accordance with the manufacturer's recommendation of 1l/ha of the formulation. In the 1-spray plots, insecticide was sprayed only at 50% flowering, while in the 2-spray plots, the first spray was carried out at 50% flowering and the second spray at 50% podding. Each treatment was replicated 4 times. All other agronomic practices were carried out as per the requirements of the crop. Level of infestation was assessed by estimating the number of aphid colonies on plant/plot using a scale of 0 - 9 (Mohammed and Yusuf, 2010): 0 (no infestation), 1 (a few individual aphids), 3 (a few isolated colonies), 5 (several small colonies), 7 (large isolated colonies), 9 (large continuous colonies). The number of plants in the two center ridges in each plot was counted and recorded and the two middle rows of each plot were harvested as a sample of the plot. Fresh pods were counted, weighed and recorded, then they were dried and weighed again before threshing.

The threshed grains were also weighed and recorded and grain yield/Kg of the harvested pods from the sample of each plot was calculated using the formula (Raheja, 1976):

$$\text{Seed yield (Kg/ha)} = \frac{a \times 10,000}{b \times 1,000}$$

Where;

a = plot/sample yield (g)

b = plot size (m<sup>2</sup>)

Data collected were analyzed using analysis of variance (ANOVA) and the means were separated using Least Significant Difference (LSD).

## RESULTS AND DISCUSSION

### Aphid Population Count

The result shows that there was no significant difference on the population means of cowpea Aphids (*A. craccivora*) a day before spray (Table 1). Aphids appeared as early as 15 days after planting (DAP) in all plots of the crop. The occurrence of aphid at this period probably was due to a dry spell which could have enhanced the establishment of the insect colonies. However, significantly (P=0.05) lower population of *A. craccivora* was observed in the sprayed plants when compared with the control. There was a significant reduction in the population of the aphids between the control and the treated plots

a day after spray (1DAS) to seven days after spray (7DAS) with maximum protection (lower aphid population) recorded at 5 and 7DAS in both the 1- and 2-spray plots, except that there were no significant differences between them. Similar result was obtained by Omongoet *al.* (1998), Egho (2010) and Dzemoet *al.* (2010) using Chlorpyrifos, Cypermethrin and Dimethoid + Deltamethrin respectively in various experiments on chemical control of aphids on cowpea.

Table 2 shows the effect of spraying Lambda cyhalothrin insecticide on the yield and some related parameters of cowpea. Significantly (P<0.05) higher number of plants per plot, fresh pod weight, dry pod weight, grain weight and yield per ha were recorded in treatments with 2-sprays than the 1-spray and control treatments. The higher yield recorded in the 2-spray (1399.25 Kg/ha) and 1-spray (774.25 Kg/ha) plots compared to the control (648.25) may be attributed to low insect pest pressure on the sprayed crop. Result from the present study confirmed previous findings by Jackiaiet *al.* (1988) and Degriet *al.* (2000), who reported that application of synthetic chemicals to cowpea crop against aphids caused a remarkably higher yield compared to unprotected crops.

**Table 1: Effect of chemical spray regimes on the population of aphids on cowpea in Kano**

Treatment	1DBS	1DAS	3DAS	5DAS	7DAS
Control	7.25	4.00 <sup>a</sup>	2.75 <sup>a</sup>	2.50 <sup>a</sup>	1.25 <sup>a</sup>
One Spray	5.00	2.25 <sup>b</sup>	1.00 <sup>b</sup>	0.25 <sup>b</sup>	0.00 <sup>b</sup>
Two Sprays	7.25	1.75 <sup>b</sup>	0.75 <sup>b</sup>	0.00 <sup>b</sup>	0.00 <sup>b</sup>
LSD	NS	1.075	1.553	1.23	0.991

DBS = day before spray, DAS = day(s) after spray

Means that carry a superscript of the same letter(s) within a column are statistically similar at 5% level of significance using Least Significant Difference (LSD)

**Table 2: Effect of chemical spray regimes against aphids on yield and related parameters of cowpea in Kano**

Treatment	NOP	FPW	DPW	GW	Yield (kg/ha)
Control	559.00 <sup>b</sup>	1.72 <sup>c</sup>	1.25 <sup>b</sup>	1.05 <sup>b</sup>	648.25 <sup>b</sup>
One Spray	724.8 <sup>ab</sup>	2.12 <sup>b</sup>	1.37 <sup>b</sup>	1.16 <sup>b</sup>	774.25 <sup>b</sup>
Two Sprays	1043.50 <sup>a</sup>	3.00 <sup>a</sup>	2.40 <sup>a</sup>	2.10 <sup>a</sup>	1399.25 <sup>a</sup>
LSD	399.00	0.33	0.40	0.32	142.00

Means that carry a superscript of the same letter(s) within a column are statistically similar at 5% level of significance using Least Significant Difference (LSD)

NOP = Number of Plants in the two center ridges, FPW = Fresh Pod Weight (Kg), DPW = Dry Pod Weight (Kg), GW = Grain Weight (Kg)

## CONCLUSION

The two insecticide spray regimes tested in this study significantly reduced the incidence of *A. craccivora* and caused higher cowpea grain yield per ha than the control treatments. Combination

of 2-spray regimes as a minimum insecticide spray strategy with other pest control options, when adopted by farmers in the management of *A. craccivora* could significantly improve cowpea grain yields.

## REFERENCES

- Asiwe, J. A. N., Belane, A. and Dakora, F. D. (2009). Evaluation of cowpea breeding lines for nitrogen fixation at ARC-Grain Crops Institute, Potchefstroom, South Africa. Paper presented at the 16<sup>th</sup> International Congress on Biological Nitrogen Fixation, Montana, USA, 14-19 June, 2009.
- Degri, M. M. and Hadi, H. M. (2000) Field evaluation and economies of some insecticides against the major insect pests of cowpea (*Vigna unguiculata* (WALP) in Bauchi, Nigeria. ESN Occasional Publication 32 (113-118).

- Dzemo W. D., A. S. Niba<sup>1</sup> and J. A. N. Asiwe (2010). Effects of insecticide spray application on insect pest infestation and yield of cowpea [*Vigna unguiculata*(L.)Walp.]in the Transkei, *South Africa African Journal of Biotechnology* Vol. 9(11), pp. 1673-1679, Available online at <http://www.academicjournals.org/AJB> ISSN 1684-5315 © 2010 Academic Journals.
- Egho E.O. (2010). Studies on the control of major insect pests and yield of cowpea (*Vigna unguiculata*(L) Walp. under calendar and monitored application of synthetic chemical in Abraka, Southern Nigeria. *Archives of Applied Science Research*, 2010, 2 (4): 224-234
- Hall, A.E., B.B. Singh, and J.D. Ehlers.(1997). Cowpea breeding. *Plant Breeding Reviews*, 15: 215-274.
- Jackai, L.E.N., Roberts, J.M.F. and Singh, S.R. (1988). Cowpea seed treatment with carbosulfan potential for control of seedling pests. *Crop Protection* 7: 384-390.
- Mohammed, I.B. and Yusuf, A.U. (2010). Influence of cowpea genotype and sorghum-cropping system on cowpea infestation by some insect pests in the Sudan savannah of Nigeria. *Bayero Journal of Pure and Applied Science*, 3(1): 91 - 95p.
- Muleba, N., Dabirae, C., Sul, J. B., Drabo, I. and Ouedraogo, J. T. (1997). Technologies for cowpea production based on genetic and environmental manipulations in the semi-arid tropics, pp 195-206. In: Technology options for sustainable agriculture in sub-Saharan Africa. T. Bezuneh, A. M. Emechebe, J. Sedgo and M. Ouedraogo (Eds). Publication of the Semi-Arid Food Grain Research and Development Agency (SAFGRAD) of the Scientific, Technical and Research Commission of OAU, Ouagadougou, Burkina Faso.
- Omongo, C. A., Adipala, E., Ogenga-Latigo, M. W., Kyamanywa, S. (1998) Insecticide application to reduce pest infestation and damage on cowpea in Uganda. *African Journal of Plant Protection*, 4 (2), 91-100.
- Quin, F. M. (1997). Introduction to Advances in Cowpea Research. In B. B. Singh, D. R. Mohan Raj, I. E. Dashiel, and L. E. N. Jackai (eds). Advances in Cowpea Research. Co-publication of International Institute of Tropical Agriculture (IITA) and Japan International Center for Agricultural Sciences (JIRCAS), IITA, Ibadan, Nigeria.
- Raheja, A.K. (1976). Assessment of Losses Caused by Insect Pests of Cowpea in Northern Nigeria. *Pesticide Action Network*. 22: 229 - 333.
- Singh, B.B. and Allen H.D. (1980). A miniature mutant of cowpea. *Tropical Grain Legume Bulletin* 21:13 - 14.
- Singh, S.R., Singh, B.B., Jackai. L.E.N. and Ntare, B.R (1997) Cowpea Research at IITA information serial No. 14. 20p.