INTERNATIONAL JOURNAL OF PLANT PROTECTION
VOLUME 9 | ISSUE 1 | APRIL, 2016 | 146-149

● e ISSN-0976-6855 | Visit us : *www.researchjournal.co.in*

IJPP

RESEARCH PAPER

DOI : 10.15740/HAS/IJPP/9.1/146-149

Study on the effectiveness of pesticides against cowpea aphid (*Aphis craccivora*) Koch

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ARITCLE INFO

Received : 01.02.2016
Revised : 16.02.2016
Accepted : 01.03.2016

KEY WORDS :
Chemical pesticide, Efficiency, Cowpea, Aphid

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ABSTRACT

Considering the importance of safe food, avoiding of excess pesticide application and pesticide pollution the present study was conducted. In this experiment totally four pesticides were tested against cowpea aphid *Aphis craccivora* under pot culture experiment at College of Agricultural Technology, Theni. Among the four acetamprid 20 SP (0.125g/ml) proved highly effective against *Aphis craccivora* compared to the rest of the pesticides with mortality of 98.75 per cent. In case of dosage wise acetamprid 20 SL (0.125g/ml) and imidacloprid17.8 SL(0.25ml/l)proved to be highly effective with mortality percentage of 98.33 and 86.66, respectively. Thus, it is concluded that all the studied pesticides, Acetamprid proved effective to control the cowpea aphids.

How to view point the article : Gowtham, V., Dilipsundar, N., Balaji, K. and Karthikeyan, S. (2016). Study on the effectiveness of pesticides against cowpea aphid (*Aphis craccivora*) Koch. *Internat. J. Plant Protec.*, **9**(1) : 146-149.

INTRODUCTION

Cowpea (*Vigna unguiculata* L. Walp.) (2n = 2x = 22) is a member of Leguminosae family. Cowpea is one of the most important legume crops cultivated by many resource-poor farmers in many countries of tropical Africa, Asia and South America . It is either grown as a monocrop or often intercropped with various crops such as millet, sorghum and maize. Man benefits from cowpea in several ways - the grains are cheap source of protein to man and in recent times, largely depend on it because of the rising cost of meat, fish and egg. Cowpea is rich in vitamins, minerals and low in fats (Alabi *et al*., 2003). Cowpea is a rich source of protein and certain minerals necessary for the healthy growth of humans and animals such as cattle (Uzogara and Ofunya, 1992). On the average cowpea contains 23-25 per cent protein, 50-67 per cent carbohydrate and 1.9 per cent fat, making it one of the most nutritious crops (Bressani, 1985). Cowpea has considerable adaptation to high temperatures and drought compared to other crops (Hall, 2004) and is widely adapted to different climatic conditions. In India it occupies 0.5 million ha area and grown in Rajasthan, Haryana, Uttar Pradesh, Punjab, Tamil Nadu and peninsular regions. Under sole cropping, the potential grain yield is high (1.5 - 3.0 t/ha), especially, when insecticide was applied. However, the actual yields obtained by farmers are much lower averaging less than

500 kg/ha.

The cowpea aphid, *Aphis craccivora* (Koch) (Aphididae :Homoptera) is a widely distributed species of insect prevalent throughout India. Aphids are economically important insects causing severe damage to a number of crop plants. Both nymphs and adults suck plant sap and cause serious damage right from the seedling to pod bearing stage. *Aphis craccivora* causes direct damage by feeding, which may induce plant deformation and indirect damage caused either by honeydew or by transmission of viruses. Cowpea aphids inject toxins into the plant while feeding; they most likely reduce mung bean vigour and yields. Besides causing direct damage to the host by sucking the sap from various plant parts, they may lower the yield, quality and marketability of crops by transmitting plant viruses which result in early plant death and the production of an excess of honey dew.

In desperate efforts to control cowpea pests, farmers have sometimes, over sprayed their crops for 8 to 10 times with insecticides. While this will increase production cost, the large number of sprays is hazardous to farmers' health as well as consumers and can also destroy non target beneficial insects (e.g. insect pollinators, predators) and pesticide pollution in the environment (Alabi *et al*., 2003). Hence in the present study was conducted to identify the effective pesticide to control the cowpea aphid, *Aphis craccivora.*

MATERIAL AND METHODS

The pot culture experiment was conducted to study the efficacy of insecticide molecules against *Aphis craccivora*. All the treatments were conducted in potted cowpea plants under confined condition.

Insect culture maintenance :

A stock culture of *Aphis craccivora* was maintained on cowpea (*Vigna unguiculata)* under net cage conditions. A local variety of cowpea (*Vigna unguiculata)* was selected for mass culturing of aphids (Fig. A). Initial cultures of aphids were obtained from infested plants (*Vigna unguiculata)* at dry land block of College of Agricultural Technology. They are transferred to the fresh cowpea plants raised inside the net cage at trifoliate stage using camel brush. Seedlings were surface irrigated at three days interval. This culture maintenance cage is a source of nymphs and adults for experiments conducted.

Fig. A : Nymphs and adults of Cowpea aphids

Potted cowpea plants :

Seeds of *Vigna unguiculata* (local variety) are sown in 7.5x7.5cm plastic bag containing pot mixture (sand+ red soil+ FYM) which is grown separately under protected condition. For each treatment 20 numbering 3rd instar nymphsof *Aphis craccivora* was collected from the mass culture and are inoculated into 15 days old cowpea plants by using camel hair brush.

Efficacy of insecticides against *Aphis craccivora* :

To test the efficacy of insecticides against *Aphis craccivora* four insecticides were selected *viz.*, Dimethoate 30 per cent EC, Monocrotophos 36WSC, Imidacloprid 17.8 SL and Acetampride 20 SP among which the former two belongs to organophosphorus group and the rest belongs to Neonicotinoide group. Pots in control were sprayed with distilled water. Each treatment was replicated four times. Details of the treatments are given in Table A.

Table A : Treatment details

Treatments	Chemicals	Dose
T_1	Dimethoate 30% EC	1.25ml/lit.
T_2	Imidacloprid 17.8 SL	0.25ml/lit
T_3	Monocroptophos 36 WSC	1ml/lit.
T_4	Acetampride 20 SP	0.125g/lit
T_5	Control	

Indirect spray method :

The cowpea plant of 15 days old were dipped in test solution for 5 sec and allow it to dry under shade for1 hour. Insects are released on the treated plants then the treated pots were covered with mylar cage and the observation were made after 12 and 18 hours of

treatment.

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under the following heads:

Efficacy of insecticides against *Aphis craccivora :*

All the chemicals tested were significantly superior over the control in respect of reducing aphid population count at 12 and 18 hours after spray (Table 1 and 2). Acetamiprid @ 0.125g/ lconcentration recorded highest mortality percentage about 76.25 per cent and 98.75 per cent of *Aphis craccivora* population after12 and 18 hours of treatment. Another neonicotinoid Imidacloprid also has inflicted high mortality of *Aphis craccivora* at concentration of 0.25ml/lit. The mortality percentage of *Aphis craccivora* at 12 hours and 24 hours after spray was 75 per cent and 63.50 per cent, respectively. It is followed by Monocrotopos and Dimethoate with the adult mortality of 85 per cent and 75 per cent, respectively after 18 hours of the treatment. Acetamiprid and Imidaclopride were considered to be the best treatments as they significantly ($p < 0.05$) reduce the aphid population over other treatments (Fig. 1).

The present findings are in line with the work of Ghosal *et al.* (2013) reported bio efficacy of Acetamiprid

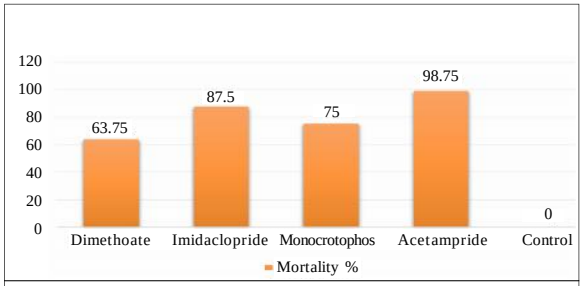

Fig. 1 : Efficacy of pesticides against *Aphis craccivora*

(Pride 20 SP®) in okra (*Abelmoschus esenlentus*) against *Aphis gossypii*, at the rate of 40g a.i/ha, recorded lowest aphid count significant reduction of aphid at 1, 7 and 14 days after first spray 1.03, 0.95 and 1.00 aphid per leaf, respectively with 83.19 per cent, 84.50 per cent and 83.68 per cent reduction of aphid population over pre-treatment count.

Neonicotinoids as better option for managing various sucking pests with higher C: B ratio. Acetamiprid 20SP @ 40g *a.i.* ha^{-1}, Imidacloprid 17.8SL @ 50g *a.i.* ha^{-1} and Thiamethoxam 25WG @ 50g *a.i.* ha^{-1} were effective in controlling aphid and registered higher yields with best cost: benefit ratio.

The reports on the bioefficacy of the nicotineoides molecules *viz.*, Imidacloprid, Thiamethoxam and Acetamiprid in spray and seed dressing formulation against sucking pests of cotton and other crops. Ella

Table 1 : Mortality of *Aphis craccivora* for different insecticides after 12 hours

Treatments	Chemicals	Dead count of aphids	Mortality %
T_1	Dimethoate 30% EC	9.00 (17.44) [c]	45.00
T_2	Imidacloprid 17.8 SL	13.00 (21.09) [b]	65.00
T_3	Monocroptophos 36 WSC	10.25 (18.64) [c]	51.25
T_4	Acetampride 20 SP	15.25 (22.97) [a]	76.25
T_5	Control	0 (2.02) [d]	0

Figures in the parentheses are arcsine transformed values

S.E.±	C.D. (P=0.05)	C.D.(P=0.01)
0.7799	1.6624	2.2983

Table 2 : Mortality of *Aphis craccivora* for different insecticides after 18 hours

Treatments	Chemicals	Dead count of aphids	Mortality %
T_1	Dimethoate 30% EC	12.75 (20.90) [d]	63.75
T_2	Imidacloprid 17.8 SL	17.50 (24.72) [b]	87.50
T_3	Monocroptophos 36 WSC	15.00 (22.77) [c]	75.00
T_4	Acetampride 20 SP	19.75 (26.38) [a]	98.75
T_5	Control	0.25 (2.94) [e]	1.25

Figures in the parentheses are arcsine transformed values

S.E.±	C.D. (P=0.05)	C.D. (P=0.01)
0.6765	1.4420	1.9936

(2014) tested the toxicity of the neonicotinoid insecticides against field strain of cowpea aphids using leaf-dib bioassay under field and laboratory conditions and reported the toxicity index showed that Acetamprid and Imidacloprid have the highest aphicidal activity, with LC_{50}0.71 and 1.16 mg/lit., respectively, while dinotefuran was the least toxic one with LC_{50}23.41 mg/lit. In our experiment, also Acetamprid recorded the highest mortality of 98.75 per cent over the control and it is followed by imidacloprid with mortality of 87.50 per cent which were proved to be best as mentioned by the previus reports.

Conclusion :

Neonicotinoid pesticides like Acetamprid and Imidacloprid recorded the highest mortality 98.75 per cent and 87.50 per cent, respectively against cowpea aphids. Based upon the experiment results, we can conclude that neonicotinoid insecticides were highly effective against cowpea aphid under field and laboratory conditions.

REFERENCES

Alabi, O.Y., Odebiyi, J.A. and Jackai, L.E.N. (2003). Field evaluation of cowpea cultivars [*Vignaunguiculata* (L.) Walp.] for resistance to flower bud thrips (*Megalurothrips sjostedti* Trybom) (Thysanoptera: Thripidae). *Internat. J. Pest Mgmt*., **49**(4) : 287-291.

Bressani, R. (1985). Nutritive value of cowpea: In cowpea Research, Production and Utilization. John Wiley and Sons Ltd. pp. 353-359.

Ella, A. (2014). Toxicity and persistence of selected neonicotinoid insecticides on *Aphis craccivora* Koch (Homoptera: Aphididae). *Archives Phytopathol. & Plant Protec*., **47**(3): 366-376.

Ghosal, A., Chatterjee, M.L. and Bhattacharyya, A. (2013). Bio-efficacy of neonicotinoids against *Aphis gossypii* Glover of okra. *J. Crop & Weed.,* **9**(2):181-184.

Hall, A.E. (2004). Breeding for adaptation to drought and heat in cowpea. *European J. Agron.,* **21**: 447-454.

Uzogara., S.G. and Ofunya, Z.M. (1992). Processing and utilization of cowpea in developing countries: A review. *J. Food Processing & Preservation,* **16** (2) : 105-147.