



# BIO-EFFICACY OF CERTAIN BOTANICAL EXTRACTS AGAINST COWPEA APHID (*APHIS CRACCIVORA* KOCH.)

R. Ragul\* and V. Sathyaseelan

Department of Entomology, Faculty of Agriculture, Annamalai University, Annamalai Nagar (Tamil Nadu), India.

## Abstract

Cowpea aphid, *Aphis craccivora* Koch can cause severe damage even with minimum colony population by sucking the sap from stem, leaves, flower buds, flowers and pods and it has been regarded as the most serious cosmopolitan pest it causes greater yield losses up to 35 percentage respectively. The present study was carried out to evaluate the efficacy of various botanical leaf extracts against the cowpea aphid, *A. craccivora* Koch. The leaf extracts such as *Eucalyptus globulus*, *Vitex negundo*, *Ocimum sanctum* and *Justicia adhatoda* at different level doses viz., 1%, 3% and 5% along with an untreated check respectively. After 24 hours of treatment maximum mortality was recorded in case of *Vitex* leaf extract 5% (58.66%) followed by *Eucalyptus* leaf extract 5% (48.00%). The moderate mortality was recorded in case of *Justicia* leaf extract 5% (41.33%) and *Ocimum* leaf extract 5% (37.33%) recorded the least mortality percentage. The obtained results indicate that the botanical leaf extracts may be recommended for the management of aphids with the consideration of the corresponding ETL level.

**Key words:** *Aphis craccivora*, Botanical leaf extracts and Management.

## Introduction

Cowpea, *Vigna unguiculata* is an important economic crop, because of its various attributes such as ability to adapt different type of soils and suitability for intercropping, it grows and covers the topmost soil which in turn prevents erosion and all parts of cowpea are useful. The cowpea aphid, *Aphis craccivora*, Koch is a notorious key pest of this crop. The nymphs and adults feed the sap gregariously on the leaves, tender shoots, inflorescence and tender pods thus causing malformations, stunting and even drying up of the parts. *A. craccivora* adults are mostly shiny black or dark brown, variable in size, being from 1.5 to 2 mm long. Nymphs are wingless, dark or dusty brown with wax and fairly rounded in body shape. The insect passes through four nymphal instars before reaching adult. There are many insecticides used for the management of aphids, whereas considering the environment pollution and other hazardous factors due to these chemical, we can adapt eco-friendly management tactics such as using of plant derived phytochemicals against pests. In this experiment certain botanical leaf extracts were tested against aphids.

\*Author for correspondence : E-mail: rahul.ranganathan96@gmail.com

## Materials and Methods

### Preparation of leaf extracts

Leaf extracts such as notchi, eucalyptus, adathoda, thulasi were prepared by collecting and washing the leaves of above plants. Each 200g of fresh leaves were taken separately and soaked in 500 ml of water for overnight and grind it. Then the grinded semisolid paste was filtered using filter paper and the extracts were collected separately, which was further diluted to the corresponding doses before the extracts being made ready for use.

### Dry film bioassay technique

Test insect was exposed to film of the toxicant in this technique as followed by Sathyaseelan and Baskaran, 2016. Different concentrations of botanical leaf extracts were applied thoroughly on the petridishes, closed it and swirled briefly in upright and inverted positions.

Excess solution drained and the deposits were allowed to air dry for 15 min. Control dishes were treated with solvent in the same way. If not in use, dishes could be stored at 2°C and used within twelve days. Open dishes are placed briefly on chilled freezer pack. Twenty Five

numbers of aphids were released in each dish before closing them tightly, the petridish brim was smeared with vaseline and firmly binds with rubber band to avoid escape of test aphid, *A.craccivora*

Each individual petridish was examined under a stereo binocular micro scope after 1, 3, 6, 9, 12 and 24 hours after treatment, the mortality of aphid was recorded. The respective treatments were replicated thrice; the data on the aphids mortality recorded at different intervals were subjected to ANOVA to infer about the differences among the treatments

## Results and Discussion

Percent mortality of aphids was recorded for various concentrations of different leaf extracts. The effects of different extracts were evaluated initially at different concentrations of 1%, 3% and 5% as shown in table 1.

The aphids mortality was observed during 1 hour of treatment. The Maximum aphid mortality was recorded on *Vitex negundo* leaf extract 5% (8.00%) followed by *Eucalyptus* leaf extract 5% (6.66%) and *Adathoda* leaf

extract 5% (4.00%). Moderate aphid mortality was recorded in case of *Vitex* leaf extract 3% (6.66%) followed by *Eucalyptus* leaf extract 3% (5.33%) and *Adathoda* leaf extract 3% (2.66%) respectively. Least mortality of aphids was observed in *Ocimum* leaf extract 1% (1.33%). Similar trend was noticed during 3 and 6 hours of treatment.

During 9 hours of treatment *Vitex* leaf extract 5% (37.33%) was recorded highest mortality followed by *Eucalyptus* leaf extract 5% (28.00%) and *Adathoda* leaf extract 5% (22.66%). Moderate aphid mortality was observed in *Vitex* leaf extract 3% (25.33%) followed by *Eucalyptus* leaf extract 3% (20.00) and *Adathoda* leaf extract 3% (17.33%). *Ocimum* leaf extract 1% (6.66%) recorded the least mortality against aphids. Similar flow was observed during 12 hours of treatment.

Maximum aphid mortality was recorded on *Vitex* leaf extract 5% (58.66%) followed by *Eucalyptus* leaf extract 5% (48.00) and *Adathoda* leaf extract 5% (41.33%). *Vitex* leaf extract 3% (45.33%) followed by *Eucalyptus* leaf extract 3% (38.66%) and *Adathoda* leaf extract

**Table 1:** Bio efficacy of certain botanical extracts against cowpea aphid, *Aphis craccivora* using dry film method.

	Treatment	Concentration	Per cent Aphid mortality						
			1 hrs	3 hrs	6 hrs	9 hrs	12 hrs	24 hrs	Mean
T1	<i>Ocimum</i> leaf extract	1%	1.33	2.66	4.00	6.66	9.33	12.00	5.99
			3.84	7.68	11.53	14.79	17.70	20.08	12.60
T2	<i>Justicia</i> leaf extract	1%	2.66	4.00	6.66	10.66	16.00	20.00	9.99
			7.68	9.31	14.44	18.80	23.46	26.48	16.69
T3	<i>Vitex</i> leaf extract	1%	5.33	8.00	10.66	18.66	25.33	32.00	16.66
			13.16	16.07	18.80	25.37	30.10	34.40	22.98
T4	<i>Eucalyptus</i> leaf extract	1%	4.00	6.66	8.00	12.00	17.33	22.66	11.77
			11.53	14.79	16.07	19.80	24.10	28.40	19.11
T5	<i>Ocimum</i> leaf extract	3%	2.66	4.00	6.66	10.66	14.66	21.33	9.99
			7.68	11.53	14.44	18.98	22.46	27.47	17.09
T6	<i>Justicia</i> leaf extract	3%	2.66	6.66	9.33	17.33	22.66	29.33	14.66
			7.68	14.44	17.17	24.38	28.18	32.56	20.73
T7	<i>Vitex</i> leaf extract	3%	6.66	10.00	13.33	25.33	36.00	45.33	22.77
			14.44	18.27	21.36	30.19	36.77	42.27	27.21
T8	<i>Eucalyptus</i> leaf extract	3%	5.33	8.00	10.66	20.00	29.33	38.66	18.66
			13.163	16.072	18.805	26.482	32.769	38.416	24.28
T9	<i>Ocimum</i> leaf extract	5%	4.00	6.66	10.66	17.33	25.33	37.33	16.88
			11.53	14.44	18.80	24.38	30.19	37.62	22.82
T10	<i>Justicia</i> leaf extract	5%	4.00	8.00	13.33	22.66	28.00	41.33	19.55
			11.53	16.07	21.07	28.18	31.69	39.97	24.75
T11	<i>Vitex</i> leaf extract	5%	8.00	14.66	24.00	37.33	46.66	58.66	31.55
			16.07	22.46	29.21	37.62	43.06	49.97	33.06
T12	<i>Eucalyptus</i> leaf extract	5%	6.66	12.00	15.33	28.00	33.33	48.00	23.88
			14.79	20.08	22.92	31.89	35.19	43.82	28.11
T13	Control	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C.D( $p=0.05$ )		6.773	7.522	6.706	6.524	6.694	5.447	6.611
	S.E(d)		3.277	3.639	3.244	3.156	3.239	2.635	3.198

3% (29.33%) recorded moderate aphids mortality. Least mortality of aphids was observed in *Ocimum* leaf extract 1% (12.00%) during 24 hours of treatment.

Overall mean values revealed that the maximum mortality of aphids was observed in case of *Vitex* leaf extract 5% (31.55%) followed by *Eucalyptus* leaf extract 5% (23.88%) and *Adathoda* leaf extract 5% (19.55%). Moderate effects on aphids was recorded on *Vitex* leaf extract 3% (22.77%), *Eucalyptus* leaf extract 3% (18.66%) followed by *Adathoda* leaf extract 3% (14.66%). The least was recorded in *Ocimum* leaf extract 1% (5.99%) against aphids.

This is confirming with the findings of Belmain *et al.*, (2001) who also confirmed that *Vitex negundo* recorded the highest mortality against sucking pests. Ayyanar *et al.*, (2017) also confirmed that *Vitex* leaf extract recorded highest mortality percentage against sucking pests. This is accordance with the present study.

Nia *et al.*, (2015) also reported that the *Eucalyptus* leaf extract has an insecticidal property, against *Myzus persicae*. Haifa and Ali, (2016) evaluated that the insecticidal activity of (acetone, methanol and water) crude leaf extract of *Adhatoda* was effective against sucking pests. This was in line with the present research.

From the above experiment at higher concentration it was concluded that the *Vitex* leaf extract shows the maximum mortality followed by *Eucalyptus* leaf extract. Moderate percent aphid mortality was recorded in case of *Justicia* and *Ocimum* recorded the least mortality percentage. The awareness and consideration of environment recently as eco-friendly pest management, more focus could be given to the *Vitex* leaf extract for better results.

## Reference

- Ayyanar, S., C. Chinniah, M. Kalyanasundram, K. Balakrishnanan and M. Muthamilan (2017). Field Efficacy of Certain Plant Derivatives against the Major Sucking Pests of Brinjal *Solanum melongena* L. *International Journal of Current Microbiology and Applied Sciences*, **6**: 3678-3691.
- Belmain, S.R., G.E. Neal, D.E. Ray and P. Golob (2001). Insecticidal and vertebrate toxicity associated with Ethanobotanical used as post-harvest protectants Ghana. *Food Chemistry toxicology*, **39**: 287-291.
- Haifa, N.M. and S.M. Ali (2016). Insecticidal effect of crude Plant Extract of *Adhatoda vasica* against *Brevicoryne brassicae*. *World Journal of Experimental Biosciences*, **4**: 49-52.
- Nia, B., N. Frah and I. Azoui (2015). Insecticidal Activity of Three Plant Extracts against *Myzus persicae* (Suzler, 1776) and their Phytochemical Screening. *Acta Agirculturae Slovenica*, **105**: 261-267.
- Oparaeke, A.M., M.C. Dike and C.I. Amatobi (2005). Botanical Pesticide Mixtures for Insect Pest Management on Cowpea, *Vigna unguiculata* (L.) Walp Plants – 2. The Pod Borer, *Maruca vitrata* Fab. (Lepidoptera: Pyralidae) and Pod Sucking Bug, *Clavigralla tomentosicollis* Stal (Heteroptera: Coreidae). *Agricultura Tropica Et Subtropica*, **38**: 33-38.
- Ranilalitha, P., M. Sukumaran, S. Raveendran and A.K. Amirthanayagi (2015). Evaluation of Nymphicidal Effect of Two Indigenous Plant Extracts on Cotton Pest, *Dysdercus cingulatus* (Fab.). *International Journal of Pure and Applied Zoology*, **3**: 24-30.
- Sathyaseelan, V. and V. Baskaran (2016). Phytochemicals -An Economically Cheaper Pesticide. In: *Dynamics of Agrarian Transformation in Rural India*, (Eds.) Prabhakar, C. and K. Sita Devi, Manivasgar pathipagam, Chidambaram. 225-227.