



Studies on Plant Extracts as Insecticides Against White Flies *Bemisia Tabaci* (Gen.) on Tomato to Protect Environmental Pollution

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ABSTRACT

Due to excessive use of chemical insecticides, many problems like pollution and residual hazards are created. In organic farming plant extracts are traditionally applied for control of insect pests. The present investigation deals with aqueous extract of ten different plant species available in and around agricultural fields which were screened for their insecticidal activity against *Bemisia tabaci* on tomato plants. The results showed that leaf extract of *Argimone mexicana*, *Lantana camera* and *Azadirachta indica* were able to significantly control *Bemisia tabaci* than the chemical insecticides.

INTRODUCTION

Tomato *Lycopersicon esculentum* L. is one of the economically important vegetable crops in India. Among insect pests white fly, *Bemisia tabaci* Gen. is one of the important pests of tomato. Damage caused by this insect to commercial tomato is both directly through phloem-feeding and indirectly by the transmission of plant viruses such as tomato yellow leaf curl viruses (Mehta et al. 1994). It can seriously injure plants by sucking juices causing wilting, stunting and irregular ripening of fruits. In addition, the excretion of honeydew induces growth of the sooty mould that can block sunlight from reaching the surface, thus, reducing photosynthesis (Oliveira et al. 2001).

Bemisia tabaci was first described in 1889 as a pest of tobacco in Greece and designated as *Aleyrodes tabaci*, the tobacco white fly. In 1957, this species and 18 other previously described white fly species (Gill 1992) were synonymized into a single taxon *Bemisia tabaci* (Russel 1957). It is primarily polyphagous white fly that colonizes predominantly annual, herbaceous plants. *Bemisia tabaci* feeds in the phloem of its host plant, passing its stylet between host-plant cells until it penetrates the phloem. Wind dispersal of adult white flies can occur over both short and long distances. Humans also transport immature and adult stages on plants.

Deshmukh & Borle (1975) screened 20 plant materials for their insecticidal properties in the form of aqueous extracts against two different species of insects viz., *Prodenia litura* and *Dactynotus carthami*. These two plant materials gave some kill of the test insects. Webb et al. (1983) evaluated aqueous solution of neem seed extract for insecticidal effect against leaf minor and got successful effect. The objectives of the present study include to study the insecticidal activity of some selected plant extracts against white flies and to check the effective concentrations of plant extract that control white flies.

Table 1: Effect of plant extracts on the adults of *Bemisia tabaci* Gen.

Plant extract	Time of observation (% mortality)											
	0 hrs			4 hrs			8 hrs			12 hrs		
	Concentration of the leaf extracts											
	1%	2%	3%	1%	2%	3%	1%	2%	3%	1%	2%	3%
<i>Lantana camara</i>	00	00	00	30.00 (33.21)	30.00 (33.21)	40.00 (39.23)	50.00 (45.00)	70.00 (56.79)	80.00 (63.44)	50.00 (45.00)	70.00 (56.79)	90.00 (71.56)
<i>Blumea malcomii</i>	00	00	00	12.50 (20.70)	12.50 (20.70)	12.50 (20.70)	25.00 (30.00)	25.00 (30.00)	37.50 (37.76)	25.00 (30.00)	25.00 (30.00)	37.50 (37.76)
<i>Tridax procumbens</i>	00	00	00	12.50 (20.70)	12.50 (20.70)	25.00 (30.00)	25.00 (30.00)	25.00 (30.00)	37.50 (37.76)	25.00 (30.00)	37.50 (37.76)	50.00 (45.00)
<i>Celosia argentea</i>	00	00	00	14.28 (22.22)	28.56 (32.33)	28.56 (32.33)	28.56 (32.33)	42.84 (40.86)	42.84 (40.86)	28.56 (32.33)	42.84 (40.86)	57.12 (49.08)
<i>Datura stramonium</i>	00	00	00	22.22 (28.11)	28.56 (32.33)	57.12 (49.08)	33.33 (35.24)	42.84 (40.86)	71.40 (57.67)	33.33 (35.24)	42.84 (40.86)	85.68 (67.78)
<i>Annona squamosa</i>	00	00	00	14.28 (22.22)	22.22 (28.11)	50.00 (45.00)	28.56 (32.33)	33.33 (35.24)	62.50 (52.24)	28.56 (32.33)	33.33 (35.24)	62.50 (54.76)
<i>Nerium oleander</i>	00	00	00	25.00 (30.00)	28.56 (32.33)	28.56 (32.33)	37.50 (37.76)	42.84 (40.86)	42.84 (40.86)	37.50 (37.76)	42.84 (40.86)	57.12 (49.08)
<i>Azadirachta indica</i>	00	00	00	25.00 (30.00)	37.50 (37.76)	42.84 (40.86)	37.50 (37.76)	62.50 (52.24)	71.40 (57.67)	50.00 (45.00)	62.50 (52.24)	85.68 (67.78)
<i>Vitex negundo</i>	00	00	00	00.00	12.50 (20.70)	28.56 (32.33)	12.50 (20.70)	37.50 (37.76)	57.12 (49.08)	25.00 (30.00)	37.50 (37.76)	71.50 (57.67)
<i>Argemone mexicana</i>	00	00	00	57.12 (49.08)	71.42 (57.67)	88.88 (70.54)	71.42 (57.67)	85.68 (67.78)	99.99 (89.43)	71.42 (57.67)	99.96 (89.19)	99.99 (89.43)
Dimethoate, 0.03%		20.00 (26.56)			40.00 (39.23)			60.00 (50.77)			60.00 (50.77)	
Control	00	00	00	00	00	00	00	00	00	00	00	00
S.E. ±	00	00	00	3.89	4.90	5.10	4.86	4.80	5.99	5.33	4.35	3.14
CD at 5%	00	00	00	8.07	10.17	10.58	10.08	9.96	12.42	11.05	9.03	6.50

Figures in parentheses are arcsin transformed values.

MATERIALS AND METHODS

The present work was undertaken with a view to test the insecticidal properties of some plants against a pest *Bemisia tabaci* on tomato. Four-week old healthy seedlings of *Lycopersicon esculentum* variety NS-2535 were transplanted in the plot size 5 × 3 m with a spacing of 60 × 60 cm.

White fly infestation started after one month of planting. Small netted nylon bags of size 6 × 12 cm were used to cover the infested leaves. Three infested leaves from bottom, middle and top were selected and covered with nylon bags. The number of the adult flies on the trapped leaves were recorded and tabulated. Aqueous extracts were prepared from leaves of ten selected plants and made into concentrations of 1%, 2% and 3% by adding water. Dimethoate (0.03%) was used as a standard check and water spray was used as a control. The prepared leaf extract concentrations were sprayed on covered leaves through nylon net with the help of a small spray pump and labelled properly. Then at 0 hr (immediately after spraying), 4 hr, 8 hr, and 12 hr, the number of dead adults were recorded. For the final observation, the mean number of dead adults on 3 leaves per plant were considered.

RESULTS AND DISCUSSION

The results of the study are given in Table 1. The data were subjected to ANOVA to compare means

for significance of differences. The treatment with *Argimone mexicana* was found to be significantly superior over all other treatments, which recorded 99.99 % mortality at 8 and 12 hours with 3% leaf extract against adults of *Bemisia tabaci*. The treatment with *Lantana camera* and *Azadirachta indica* was next in order of efficacy. The treatment with *Datura stramonium* was recorded 85.68% mortality at 12 hours with 3 % leaf extract. The treatments with *Argimone mexicana*, *Lantana camera* and *Azadirachta indica* were significantly superior over the insecticidal treatment with 0.03% Dimethoate. However, significant differences did not exist among rest of the treatments.

The results from the present study suggest that these plant extracts have insecticidal activity and can be used to control the *Bemisia tabaci*. The plant extracts are the natural source of insecticides and do not create any environmental problem. Such plant extracts are safe for controlling the white flies in vegetables as well as other food plants.

REFERENCES

- Deshmukh, S.D. and Borle, M.N. 1975. Studies on insecticidal properties of indigenous plant products. Indian J. Entomol., 37(1): 11-18.
- Gill, R.J. 1992. Reviews of the sweet potato white fly in southern California. Pan-Pacific Entomology, 68: 144-52.
- Mehta, P., Wyman, J.A., Nakhla, M.K. and Maxwell, D.P. 1994. Transmission of tomato yellow leaf curl geminivirous by *Bemisia tabaci*. Journal of Economic Entomology, 87: 1291-1297.
- Oliveria, Henneberry and Anderson, P. 2001. History, current status and collaborative research projects for *Bemisia tabaci*. Crop protection, 20: 709-723.
- Russell, L.M. 1957. Synonyms of *Bemisia tabaci* (*Gennadius*) (Hemiptera: Aleyrodidae). Bulletin of Brooklyn Entomology. Soc., 52: 122-123.
- Webb Ralph, E., Mark, A. Hinebaugh, Richard K. Lindquist and Martin Jacobson. 1983. Evaluation of aqueous solution of neem seed extract against *Liriomyza sativa* and *L. trifolii*. Econ. Ent., 76: 357-362.