



## Evaluation of Some Plant Extracts Against Major Insect Pests of Cauliflower (*Brassica oleracea var. botrytis* L.)

B Viswanadha Rao, G Ramachandra Rao, P Rajasekhar and V Srinivasa Rao

Department of Entomology, Agricultural College, Bapatla 522 101, Andhra Pradesh

### ABSTRACT

The studies were carried out to evaluate insecticidal properties of 5% aqueous extracts of nine plant species against major insect pests infesting cauliflower viz., diamondback moth, *Plutella xylostella* (Linn.), tobacco caterpillar, *Spodoptera litura* (Fab.) and mustard aphid, *Lipaphis erysimi* (Kalt.) during rabi 2007-2008. The results revealed that all the plant extracts gave significantly superior control of the pests over the untreated check. Among different plant extracts tested neem seed kernel extract (NSKE) 5% was found to be the most effective treatment in bringing down the pest population of *S. litura* and *P. xylostella* followed by the leaf extracts of *Melia azedarach* and *Pongamia glabra*. Whereas NSKE was found to be the most effective treatment in bringing down the pest population of *L. erysimi* followed by the leaf extracts of *P. glabra* and *M. azedarach*.

**Key words :** Cauliflower, Insect pests, Plant extracts.

Cauliflower (*Brassica oleracea var. botrytis* Linn.) is one of the most important vegetable crops of India, grown throughout the world. In India, cauliflower is cultivated in 0.26 million hectares and the annual production is 4.80 million tonnes (CMIE, 2004). The achievable yield are much less than the actual yields; among the various factors responsible for low yields, are insect pests; of which the diamondback moth, *Plutella xylostella* (Linn.), tobacco caterpillar, *Spodoptera litura* (Fab.) and mustard aphid, *Lipaphis erysimi* (Kalt.) are the most important pests. The use of botanical pesticides for protecting crops from insect pests has assumed great importance in recent years due to Continuous and indiscriminate use of broad spectrum insecticides has triggered the development of pest resistance, resurgence, secondary pest outbreak, health hazards to man and animals, reduction in the natural enemies, environmental pollution (Talekar and Shelton, 1993) and toxic residues in food chain (Chari *et al.*, 1990). In view of this it became imperative to develop alternative strategies for the control of these pests and attempts were made to screen some of the plants to explore insecticidal properties against these pests.

### MATERIAL AND METHODS

The leaves of nine plant species viz., *Clerodendron inerme*, *Pongamia glabra*, *Annona squamosa*, *Parthenium hysterophorus*, *Melia azedarach*, *Lantana camera*, *Murraya koenigii*,

*Ipomia cornea*, *Embllica officinalis* and neem seed kernel extract (NSKE) were collected and air dried in shade for a week and then dried at 40°C in hot air oven for 24hours. The dried material was ground into fine powder and soaked in water (200g dry powder in 600ml water) for 48hours and filtered through muslin cloth under suction. The filtrate so obtained was diluted to 4 liters to obtain 5% extract of each plant (Mehta *et al.*, 2005). The collected 5% aqueous leaf extracts were used for studying their efficacy against pest complex of cauliflower in field.

The field experiment was conducted at Agricultural College Farm, Bapatla during rabi, 2007-2008. The experiment was laid out in randomized block design (RBD) with three replications. Cauliflower seedlings were transplanted on November 23<sup>rd</sup> 2007. Plot size was 5m X 5m with spacing of 60cm X 45 cm (plant to plant and row to row, respectively). All the recommended agronomical practices were followed. The treatments were imposed soon after noticing the incidence of any one of the insect pest or their damage symptoms in the field. The first spray was imposed at 39 days after transplanting when moderate level of infestation of the pests was observed in the experimental plot and a total of three sprays were given at fortnightly interval during the crop period. The observations were recorded from ten randomly selected plants of each treatment. The population of *S. litura* and *P. xylostella* were recorded one day before spraying as pre-treatment count and at two, eight and fourteen days

Table 1. Cumulative efficacy of the treatments (Three sprays) on *S. litura*.

Treatments	Pre-treatment Count (No. of larvae/plant)	Mean per cent larval reduction over untreated check			Overall mean efficacy
		2DAS	8DAS	14DAS	
T <sub>1</sub> : <i>Clerodendron inerme</i> (5% leaf extract)	4.54	7.60 (16.02) <sup>c</sup>	42.77 (40.80) <sup>c</sup>	25.35 (30.20) <sup>c</sup>	25.26 (30.16) <sup>c</sup>
T <sub>2</sub> : <i>Pongamia glabra</i> (5% leaf extract)	4.40	10.18 (18.53) <sup>ab</sup>	51.79 (45.97) <sup>b</sup>	34.71 (36.09) <sup>b</sup>	31.89 (34.33) <sup>b</sup>
T <sub>3</sub> : <i>Annona squamosa</i> (5% leaf extract)	4.40	7.57 (15.89) <sup>c</sup>	40.92 (39.76) <sup>cd</sup>	22.52 (28.32) <sup>d</sup>	23.67 (29.06) <sup>c</sup>
T <sub>4</sub> : <i>Parthenium hysterophorus</i> (5% leaf extract)	4.40 4.43	7.07 11.56	38.37 58.82	21.86 37.22	23.54 35.82
T <sub>5</sub> : NSKE (5%)		(19.82) <sup>a</sup>	(50.07) <sup>a</sup>	(37.58) <sup>a</sup>	(36.75) <sup>a</sup>
T <sub>6</sub> : <i>Melia azedarach</i> (5% leaf extract)	4.20	9.9 (18.34) <sup>b</sup>	52.85 (46.61) <sup>b</sup>	32.86 (34.94) <sup>b</sup>	32.33 (34.63) <sup>b</sup>
T <sub>7</sub> : <i>Lantana camera</i> (5% leaf extract)	4.06	7.87 (16.22) <sup>c</sup>	35.67 (36.63) <sup>e</sup>	20.61 (26.99) <sup>de</sup>	21.38 (27.49) <sup>d</sup>
T <sub>8</sub> : <i>Murraya koenigii</i> (5% leaf extract)	4.03	7.53 (15.89) <sup>c</sup>	30.54 (33.52) <sup>f</sup>	22.39 (28.18) <sup>de</sup>	20.31 (26.78) <sup>d</sup>
T <sub>9</sub> : <i>Ipomea cornea</i> (5% leaf extract)	4.26	6.52 (14.77) <sup>cd</sup>	31.39 (34.02) <sup>f</sup>	20.47 (26.85) <sup>e</sup>	19.46 (26.13) <sup>de</sup>
T <sub>10</sub> : <i>Embllica officinalis</i> (5% leaf extract)	4.13	5.77 (13.81) <sup>d</sup>	30.21 (33.34) <sup>f</sup>	18.19 (25.18) <sup>f</sup>	17.60 (24.80) <sup>e</sup>
T <sub>11</sub> : Control (Untreated)	4.46	0.0	0.0	0.0	0.0
F-Test	NS	Sig	Sig	Sig	Sig
Sem ±		0.43	0.58	0.50	0.48
CD (P=0.05)		1.34	1.67	1.43	1.48

Sig: Significant      NS: Non Significant      DAS: Days After Spraying  
Values in parentheses are angular transformed values.

Figures followed by same letters in each column are not significantly different.

after spraying as post-treatment counts. The aphid population was counted from three leaves one from top, middle and bottom of the selected plants.

## RESULTS AND DISCUSSION

The mean overall efficacy of treatments of total sprays given against *S. litura* (Table 1) revealed that all the treatments were found to be significantly superior to untreated check in reducing the *S. litura* larval population. NSKE 5% was found to be significantly superior than all other tested plant

extracts at every observation (2, 8 and 14 days after spray) in reducing the *S. litura* larval population with a maximum mean per cent population reduction of 35.82%. The next best treatments were leaf extracts of *M. azedarach* (32.33%) and *P. glabra* (31.89%), respectively and were on par with one another. Lowest mean per cent population reduction was observed in case of *E. officinalis* (17.60%). The present results are in conformity with Soujanya *et al.*, (2004) and Chari *et al.*, (1993) who reported the efficacy of NSKE against *S. litura* on cabbage.

Table 2. Cumulative efficacy of the treatments (Three sprays) on *P. xylostella*

Treatments	Pre-treatment Count (No. of larvae/plant)	Mean per cent larval reduction over untreated check			Overall mean efficacy
		2DAS	8DAS	14DAS	
T <sub>1</sub> : <i>Clerodendron inerme</i> (5% leaf extract)	1.23	10.31 (18.72) <sup>bc</sup>	41.06 (39.82) <sup>c</sup>	35.87 (36.75) <sup>bc</sup>	29.07 (32.58) <sup>c</sup>
T <sub>2</sub> : <i>Pongamia glabra</i> (5% leaf extract)	1.46	12.81 (20.96) <sup>a</sup>	52.12 (46.20) <sup>b</sup>	44.23 (41.67) <sup>a</sup>	36.26 (36.99) <sup>b</sup>
T <sub>3</sub> : <i>Annona squamosa</i> (5% leaf extract)	1.33	10.12 (18.53) <sup>bc</sup>	34.93 (36.21) <sup>e</sup>	35.48 (36.51) <sup>bc</sup>	26.85 (31.18) <sup>d</sup>
T <sub>4</sub> : <i>Parthenium hysterophorus</i> (5% leaf extract)	1.40	11.02 (19.37) <sup>b</sup>	38.26 (38.17) <sup>cd</sup>	34.42 (35.91) <sup>c</sup>	27.90 (31.88) <sup>cd</sup>
T <sub>5</sub> : NSKE (5%)	1.23	14.11 (22.06) <sup>a</sup>	58.87 (50.07) <sup>a</sup>	45.90 (42.65) <sup>a</sup>	39.63 (39.00) <sup>a</sup>
T <sub>6</sub> : <i>Melia azedarach</i> (5% leaf extract)	1.50	13.88 (21.81) <sup>a</sup>	50.31 (45.17) <sup>b</sup>	44.59 (41.84) <sup>a</sup>	36.39 (37.05) <sup>b</sup>
T <sub>7</sub> : <i>Lantana camera</i> (5% leaf extract)	1.40	6.65 (14.89) <sup>d</sup>	36.73 (37.29) <sup>de</sup>	31.44 (34.08) <sup>d</sup>	24.95 (29.93) <sup>d</sup>
T <sub>8</sub> : <i>Murraya koenigii</i> (5% leaf extract)	1.26	11.14 (19.46) <sup>b</sup>	37.12 (37.52) <sup>de</sup>	38.00 (38.06) <sup>b</sup>	28.74 (32.39) <sup>cd</sup>
T <sub>9</sub> : <i>Ipomea cornea</i> (5% leaf extract)	1.50	9.07 (17.46) <sup>c</sup>	35.56 (36.57) <sup>de</sup>	32.98 (35.00) <sup>cd</sup>	25.88 (30.53) <sup>d</sup>
T <sub>10</sub> : <i>Embllica officinalis</i> (5% leaf extract)	1.60	7.03 (15.34) <sup>d</sup>	32.43 (34.70) <sup>e</sup>	35.98 (36.81) <sup>bc</sup>	27.10 (31.37) <sup>cd</sup>
T <sub>11</sub> : Control (Untreated)	1.23	0.0	0.0	0.0	0.0
F-Test	NS	Sig	Sig	Sig	Sig
Sem ±		0.40	0.62	0.55	0.42
CD (P=0.05)		1.31	1.73	1.69	1.33

Sig: Significant      NS: Non Significant      DAS: Days After Spraying

Values in parentheses are angular transformed values.

Figures followed by same letters in each column are not significantly different.

The results from the Table 2 revealed that among different plant extracts tested, NSKE 5% was found to be significantly superior than all other tested plant extracts at every observation (2, 8 and 14 days after spray) in reducing the *P. xylostella* larval population with a maximum mean per cent population reduction of 39.00% over untreated check. The next best treatments were leaf extracts of *M. azedarach* (36.39%) and *P. glabra* (36.26%), respectively and were on par with one another. Lowest mean per cent population reduction was

observed in case of *L. camera* (24.95%). The present results are in conformity with Fargoone (1986) and Drayer (1987) who reported the highest efficacy of NSKE against *P. xylostella* on cabbage.

The results from the Table 3 revealed that among different plant extracts tested, NSKE 5% was found to be superior than all other tested plant extracts at every observation (2, 8 and 14 days after spray) in reducing the *L. erysimi* population with a maximum mean per cent population reduction of 38.74% over untreated check followed by leaf

Table 3. Cumulative efficacy of the treatments (Three sprays) on *L. erysimi*

Treatments	Pre-treatment Count (No. of larvae/plant)	Mean per cent larval reduction over untreated check			Overall mean efficacy
		2DAS	8DAS	14DAS	
T <sub>1</sub> : <i>Clerodendron inerme</i> (5% leaf extract)	71.00	15.71 (23.34) <sup>b</sup>	44.29 (41.67) <sup>b</sup>	33.53 (35.37) <sup>c</sup>	31.16 (33.90) <sup>b</sup>
T <sub>2</sub> : <i>Pongamia glabra</i> (5% leaf extract)	73.00	17.50 (24.73) <sup>ab</sup>	57.90 (49.55) <sup>a</sup>	40.43 (39.47) <sup>ab</sup>	38.61 (38.41) <sup>a</sup>
T <sub>3</sub> : <i>Annona squamosa</i> (5% leaf extract)	74.00	13.21 (21.30) <sup>cd</sup>	38.25 (38.17) <sup>c</sup>	29.47 (32.83) <sup>d</sup>	26.54 (30.98) <sup>c</sup>
T <sub>4</sub> : <i>Parthenium hysterophorus</i> (5% leaf extract)	63.66 66.00	13.70 18.42	38.12 58.20	27.28 42.96	26.36 38.74
T <sub>5</sub> : NSKE (5%)		(25.40) <sup>a</sup>	(49.72) <sup>a</sup>	(40.92) <sup>a</sup>	(38.47) <sup>a</sup>
T <sub>6</sub> : <i>Melia azedarach</i> (5% leaf extract)	64.00	17.15 (24.43) <sup>ab</sup>	55.39 (48.04) <sup>a</sup>	39.01 (38.65) <sup>b</sup>	37.18 (37.52) <sup>a</sup>
T <sub>7</sub> : <i>Lantana camera</i> (5% leaf extract)	72.66	12.79 (20.88) <sup>cd</sup>	38.08 (38.06) <sup>c</sup>	28.31 (32.14) <sup>de</sup>	26.39 (30.85) <sup>c</sup>
T <sub>8</sub> : <i>Murraya koenigii</i> (5% leaf extract)	64.00	12.17 (20.36) <sup>cd</sup>	34.68 (36.03) <sup>d</sup>	25.24 (30.13) <sup>e</sup>	24.03 (29.33) <sup>c</sup>
T <sub>9</sub> : <i>Ipomea cornea</i> (5% leaf extract)	69.66	11.66 (19.91) <sup>d</sup>	35.53 (36.57) <sup>cd</sup>	26.56 (30.98) <sup>e</sup>	24.58 (29.67) <sup>c</sup>
T <sub>10</sub> : <i>Embllica officinalis</i> (5% leaf extract)	77.00	11.76 (20.00) <sup>d</sup>	33.63 (35.43) <sup>d</sup>	25.37 (30.20) <sup>e</sup>	25.59 (30.33) <sup>c</sup>
T <sub>11</sub> : Control (Untreated)	68.33	0.0	0.0	0.0	0.0
F-Test	NS	Sig	Sig	Sig	Sig
Sem ±		0.48	0.65	0.57	0.50
CD (P=0.05)		1.52	1.85	1.73	1.68

Sig: Significant      NS: Non Significant      DAS: Days After Spraying

Values in parentheses are angular transformed values.

Figures followed by same letters in each column are not significantly different.

extracts of *P. glabra* (38.61%) and *M. azedarach* (37.18%), respectively and were on par with one another. Lowest mean per cent population reduction was observed in case of *M. koenigi* (24.03%). The present results are in conformity with Singh and Sharma (1986) who reported that 3-4 sprays of 0.1 to 0.4% NSKS significantly reduced the aphid population on cauliflower. Kabir and Mia (1987) and Mani *et al.* (1990) who reported the highest efficacy of neem leaf extract against *L. erysimi* on mustard.

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