

Chemical control of aphid *Lipaphis erysimi* (Kalt) on cabbage

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International Journal of Plant Protection (April, 2010), Vol. 3 No. 1 : 101-103

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SUMMARY

The results on the efficacy of different insecticides tested against aphid, *Lipaphis erysimi* (Kalt.) showed that the treatment of thiamethoxam 0.01 per cent recorded the highest mortality percentage of aphid and was found most effective followed by imidacloprid 0.01 per cent, acetamiprid 0.004 per cent and methyl-o-demeton 0.025 per cent. Higher yield of healthy cabbage head was recorded in the treatment of thiamethoxam 0.01 per cent (221.54 q/ha) followed by imidacloprid 0.01 per cent, acetamiprid 0.004 per cent and methyl-o-demeton 0.025 per cent (218.10 to 206.83 q/ha). The treatment of thiamethoxam 0.01 per cent was found most economical with highest cost benefit ratio (1:42.44) followed by methyl-o-demeton 0.025 per cent, acetamiprid 0.004 per cent and imidacloprid 0.01 per cent (1:26.19 to 1:22.49).

Key words :

Chemical control,
cabbage, Aphid,
Lipaphis erysimi

Cabbage is one of the important cruciferous leafy vegetables and cultivated in all five continents including Asia. India ranks next to China in production in Asia. In Gujarat, total cultivated area of cabbage is about 19,046 hectares with the total production of 3,29,236 metric tonnes and the average productivity of cabbage is 17,286 kg per hectare (Anonymous, 2006). The crop is attacked by 375 species of insects (Oatman and Plantner, 1969). Among these pests, the aphids cause both qualitative as well as quantitative losses to the crop in Saurashtra region and have been observed as the most destructive and regularly occurring sucking pest throughout the world (Sharma and Bhalla, 1964). The estimated loss in yield due to aphid, *Lipaphis erysimi* (Kalt.) in cabbage crop was reported 47.1 to 96.0 per cent (Bakhetia, 1986 and Suri *et al.*, 1988). Attempts were, therefore, made to study the relative merits of some insecticides for the control of *Lipaphis erysimi* (Kalt.) on cabbage.

MATERIALS AND METHODS

With a view to test the efficacy of different insecticides against cabbage aphid, *L. erysimi*, a field trial was conducted during Rabi season of 2006-07 at College Farm, College of Agriculture, Junagadh on cabbage cv. GOLDEN ACRE. Ten treatments were tried in randomized block design with four replications. The seedlings were transplanted at the spacing of 120 cm x 45 cm having gross and net plot size

of 3.6 m x 2.7 m and 3.0 m x 1.8 m, respectively. First spray was given after initiation of pest infestation. Subsequent sprays (second and third) were given at 10 days interval. For the purpose of recording the observations, five plants were selected randomly. Observations of aphids were recorded from 3 leaves *viz.*, top, middle and bottom from each randomly selected plant before 24 hours and after 24 hours, 3 days and 7 days. The data thus, obtained were converted into per cent mortality by using a modified formula given by Henderson and Tilton (1955). Data on per cent mortality of aphids obtained after each spraying were analyzed statistically by using statistical procedure of RBD as suggested by Panse and Sukhatme (1985). The yield and economics for each treatment was worked out.

RESULTS AND DISCUSSION

Data presented in Table 1 indicate that the differences in mortality per cent of aphids in various insecticidal treatments after different intervals of spraying was found significant.

Per cent reduction of aphid, L. erysimi after first spray:

After 24 hours of insecticidal spray, thiamethoxam 0.01 per cent recorded the highest mortality of aphid (82.67 per cent), which was statistically at par with acetamiprid 0.004 per cent, imidacloprid 0.01 per cent and methyl-o-demeton 0.025 per cent (77.37, 77.23

Accepted :
March, 2010

Table 1: Efficacy of different insecticides against aphid, *L. erysimi* on cabbage during Rabi, 2006-07

Sr. No.	Treatments	Percentage mortality of aphid after sprays								
		First spray			Second spray			Third spray		
		1 day	3 rd day	7 th day	1 day	3 rd day	7 th day	1 day	3 rd day	7 th day
1.	Acephate 75 SP 0.15%	54.80*	59.96	57.46	59.40	58.91	58.61	61.50	59.80	58.00
		(66.77)	(74.93)	(71.06)	(74.08)	(73.33)	(72.87)	(77.23)	(74.69)	(71.91)
2.	Acetamiprid 20 SP 0.004%	61.60	67.00	69.00	63.48	68.14	65.46	67.91	71.20	66.34
		(77.37)	(84.73)	(87.15)	(80.06)	(86.13)	(82.75)	(85.85)	(89.61)	(83.89)
3.	Carbosulfan 25 EC 0.05%	56.00	60.13	59.10	60.40	62.93	59.74	62.35	59.61	58.15
		(68.73)	(75.19)	(73.62)	(75.60)	(79.29)	(74.60)	(78.46)	(74.40)	(72.15)
4.	Imidacloprid 70 WG 0.01%	61.50	67.80	68.50	63.25	68.40	65.40	68.10	70.90	67.25
		(77.23)	(85.72)	(86.56)	(79.74)	(86.44)	(82.67)	(86.08)	(89.29)	(85.04)
5.	Methyl-o-demeton 25 EC 0.025%	61.00	65.33	62.46	62.64	67.57	59.27	68.46	69.80	65.71
		(76.49)	(82.57)	(78.62)	(78.87)	(85.44)	(73.88)	(86.52)	(88.07)	(83.07)
6.	Thiamethoxam 25 WG 0.01%	65.40	68.95	72.00	71.61	73.24	68.15	70.60	73.50	71.85
		(82.67)	(87.09)	(90.45)	(90.04)	(91.68)	(86.14)	(88.96)	(91.93)	(90.29)
7.	Endosulfan 35 EC 0.07%	56.33	54.81	52.00	58.84	57.95	53.41	61.10	59.70	52.74
		(69.26)	(66.78)	(62.09)	(73.22)	(71.84)	(64.46)	(76.64)	(74.54)	(63.34)
8.	<i>B. bassiana</i> @ 2.5 kg/ha	38.00	42.40	49.20	39.85	46.26	51.09	46.30	49.40	51.80
		(37.90)	(45.46)	(57.30)	(41.05)	(52.19)	(60.54)	(52.26)	(57.64)	(61.75)
9.	<i>V. lecanii</i> @ 2.0 kg/ha	34.95	40.15	48.00	43.30	48.20	49.89	44.20	48.70	50.50
		(32.81)	(41.57)	(55.22)	(47.03)	(55.57)	(58.49)	(48.60)	(56.43)	(59.54)
	S. E. ±	2.59	2.82	2.62	2.86	2.58	2.63	2.50	3.20	2.90
	C.D. (P=0.05)	7.56	8.25	7.65	8.35	7.53	7.68	7.32	9.34	8.48
	C.V. %	10.58	10.73	9.75	10.94	9.36	9.91	9.11	11.37	10.72

* Arcsine transformed values

Figures in parentheses are retransformed values

and 76.49 per cent mortality of aphid, respectively). The treatment of *V. lecanii* 2.0 kg/ha was found to be the least effective for the control of aphid (32.81 per cent mortality) followed by *B. bassiana* 2.5 kg/ha (37.90 per cent mortality). The treatment of endosulfan 0.07 per cent was found moderately effective with the mortality of 69.26 per cent and was statistically at par with carbosulfan 0.05 per cent and acephate 0.15 per cent (68.73 and 66.77 per cent mortality, respectively). More or less similar observations were recorded after 3 and 7 days of insecticidal spraying.

Per cent reduction of aphid, *L. erysimi* after second and third spray:

The data on per cent mortality of aphid after second and third spray revealed that the same pattern in the mortality percentage was observed as it was found in the first spraying.

Thus, looking to the results of three sprayings, it can be concluded that thiamethoxam 0.01 per cent recorded the highest mortality of *L. erysimi* and proved to be the most effective insecticide against *L. erysimi* infesting cabbage. However, the treatments of imidacloprid 0.01 per cent, acetamiprid 0.004 per cent and methyl-o-demeton 0.025 per cent were found equally effective. While *B. bassiana* 2.5 kg/ha and *V. lecanii* 2.0 kg/ha

were found least effective. These findings are more or less in the agreement with the results of earlier research workers.

Lal *et al.* (2002) indicated that the thiamethoxam was found most effective insecticide against the mustard aphid, *L. erysimi* on cabbage. More or less similar observations were also reported by Meena and Lal (2004), Rohilla *et al.* (2004) and Sachan *et al.* (2006).

Yield and economics:

The data presented in Table 2 revealed that the differences in yield recorded in various treatments were found statistically significant. The yield of cabbage head in different treatments varied from 110.12 to 221.54 q/ha. The highest yield (221.54 q/ha) was recorded in the treatment of thiamethoxam 0.01 per cent and it was statistically at par with imidacloprid 0.01 per cent, acetamiprid 0.004 per cent and methyl-o-demeton 0.025 per cent (218.10, 216.33 and 206.83 yield q/ha, respectively). The treatments found next in order were carbosulfan 0.05 per cent, acephate 0.15 per cent and endosulfan 0.07 per cent (176.98 to 166.80 yield q/ha, respectively). The treatment, *B. bassiana* 2.5 kg/ha and *V. lecanii* 2.0 kg/ha recorded the low yield *i.e.* 140.00 and 134.75 q/ha, respectively. Significantly lowest yield of 110.12 q/ha was recorded in control.

Table 2 : Yield and economics of different insecticidal treatments applied for control of aphid on cabbage (cv. GOLDEN ACRE)

Sr. No.	Treatments	Average yield (q/ha)	Net yield in over control q/ha	Gross* realization (Rs./ha)	Realization over control (Rs./ha)	Total cost** of insecticides including labour charge (Rs./ha)	CBR
1.	Acephate 75 SP 0.15%	170.23	60.11	68092	24044	1560	1:15.41
2.	Acetamiprid 20 SP 0.004%	216.33	106.21	86532	42484	1758	1:24.16
3.	Carbosulfan 25 EC 0.05%	176.98	66.86	70792	26744	2190	1:12.21
4.	Imidacloprid 70 WG 0.01%	218.10	107.98	87240	43192	1920	1:22.49
5.	Methyl-o-demeton 25 EC 0.025%	206.83	96.71	82732	38684	1477	1:26.19
6.	Thiamethoxam 25 WG 0.01%	221.54	111.42	88616	44568	1050	1:42.44
7.	Endosulfan 35 EC 0.07%	166.80	56.68	66720	22672	1380	1:16.42
8.	<i>B. bassiana</i> @ 2.5 kg/ha	140.00	29.88	56000	11952	1800	1:6.64
9.	<i>V. lecanii</i> @ 2.0 kg/ha	134.75	24.63	53900	9852	1740	1:5.66
10.	Control	110.12	-	44048	-	-	-

* The market price of cabbage head @ Rs. 400/quintal

** The labour charges have been calculated @ Rs. 100/ha/spray

Lal *et al.* (2002) reported that thiamethoxam 25 WG gave the higher yield of cabbage head. Meena and Lal (2004) reported that imidacloprid (0.01%) and endosulfan (0.07%) gave significantly highest marketable yield of cabbage. Thus, the results are in close agreement with the results of earlier workers.

The economics worked out of different insecticidal treatments tested against aphid, *L. erysimi* (Table 2) indicated that the highest cost benefit ratio (1:42.44) was obtained in the treatment of thiamethoxam 0.01 per cent followed by methyl-o-demeton 0.025 per cent (1:26.19), acetamiprid 0.004 per cent (1:24.16) and imidacloprid 0.01 per cent (1:22.49). The treatments of endosulfan 0.07 per cent, acephate 0.15 per cent and carbosulfan 0.05 per cent (1:16.42 to 1:12.21) were found next in order with moderate cost benefit ratio. Whereas, the treatment of *B. bassiana* 2.5 kg/ha (1:6.64) and *V. lecanii* 2.0 kg/ha (1:5.66) showed comparatively lower cost benefit ratio.

Looking to overall efficacy of various insecticides against aphid on cabbage, yields and economics of different treatments, the treatments of thiamethoxam 0.01 per cent, methyl-o-demeton 0.025 per cent, acetamiprid 0.004 per cent and imidacloprid 0.01 per cent were found the most effective as well as economical treatments against aphid, *L. erysimi* infesting cabbage.

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