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Bioefficacy of different insecticides against aphid (*Myzus persicae*) in cumin (*Cuminum cyminum* L.)

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Abstract

A field trial was conducted in Udaipur to the evaluate efficacy of carbosulfan 25% EC at 250, 312.5 and 375 g a.i. ha^{-1} along with thiamethoxam 25% WG at 25 g a.i. ha^{-1}, imidacloprid 17.8 SL at 25 g a.i. ha^{-1} and acetamiprid 20% SP at 10 g a.i. ha^{-1} against aphid (*Myzus persicae*) in cumin during *Rabi*, 2013-14 and 2014-15. The result revealed that two sprays of carbosulfan 25% EC at 375 g a.i. ha^{-1} was found effective against aphid. It caused maximum mean reduction in aphid population after second spray at 10 days after application, which was 87.52% and 88.45% during 2013-14 and 2014-15, respectively. It was followed by carbosulfan 25% EC at 312.5 g a.i. ha^{-1}. The maximum yields were recorded in case of carbosulfan 25% EC at 375 g a.i. ha^{-1}, which were 622.3 and 456.7 kg ha^{-1} during 2013-14 and 2014-15, respectively.

Keywords: aphid, bioefficacy, carbosulfan, cumin, incremental yield, population

Introduction

Cumin (*Cuminum cyminum* L.) is an very important seed spices crop. India ranks first in the world in terms of area under cultivation and annual production. In India it is mainly grown in Rajasthan and Gujarat states. Cumin is frequently affected by diseases and insect pests, which are highly detrimental to its growth and yield. Aphids (*Myzus persicae* and *Aphis gossypii*), thrips (*Thrips tabaci*) and mites (*Tetranychid lateens*) are major sucking insects which causes serious economic losses in cumin (Kant *et al.* 2010). Cumin aphid causes serious damage at flowering stage of the crop by desaping the tissue, resulting in yellowing and curling of leaves in the initial stage and later the plants show stunted growth and the inflorescences set a few seeds which are shriveled. Thrips cause considerable damage and the yield is affected quantitatively and qualitatively. Scattered and scanty information is available for management of insect-pests in cumin.

Proper schedule of application of management practices are required for effective management of important insects. Therefore, present study was envisaged to work out the effective plant protection schedule for the management of aphids.

Materials and methods

Field experiments were carried out at two locations for two seasons to study the bioefficacy of carbosulfan 25% EC against aphid. Cumin variety GC-2 was sown at a spacing of 30 x 10 cm at KVK, Bhilwara and DFRS, Bhilwara during 2013-14 and 2014-15. All agronomical practices were followed except insecticidal sprays. The experiments were conducted in a RBD with seven treatments replicated three times. The treatments were carbosulfan 25% EC at 250, 312.5 and 375 g a.i. ha^{-1} along with thiamethoxam 25% WG at 25 g a.i. ha^{-1}, imidacloprid 17.8 SL at 25 g a.i. ha^{-1} and acetamiprid 20% SP at 10 g a.i. ha^{-1}. Two sprays of all treatments were done initiating 1^{st} at economic threshold level (ETL) of the aphid and second spray was done after 15 days of first spray. The populations of aphids were recorded one day before and 1, 5 and 10 days after each spray of insecticide on five randomly selected plants in each plot. Efficacy of different treatments in controlling the aphid was analyzed by analysis of variance. The data on populations were corrected after Henderson & Tiltion (1955). Seed yield of cumin in each plot was recorded separately at the time of harvest.

Results and discussion

The data recorded on mean reduction in the population of aphid at 1, 5 and 10 days after first and second spray are presented in Table 1. All the treatments were found significantly superior over control during both the years in reducing the population of aphids. During 2013, two sprays of carbosulfan 25% SC at 375 g a.i. ha^{-1} caused maximum reduction in the aphid population. It caused 73.50, 78.67, 83.86; 76.53, 83.30, 87.52 and 73.31, 78.42, 83.11; 79.18, 84.37 and 88.45% reduction at 1, 5 and 10 days after first and second spray during 2013 and 2014, respectively. It was found significantly superior to all treatments. Next effective treatment was spray of carbosulfan 25% EC at 312.5 g a.i. ha^{-1}, which were at par with each other. The spray of thimethoxam 25% WG at 25 g a.i. ha^{-1}, carbosulfan 25% EC at 250 g a.i. ha^{-1}, imidacloprid 17.8 SL at 25 g a.i. ha^{-1} and acetamiprid 20% EC at 10 g a.i. ha^{-1} were found

Table 1. Bioefficacy of different treatments against cumin aphid during 2013-14 and 2014-15

Treatment details	Mean reduction population of aphid days after spray (%)												Yield ($kg\ ha^{-1}$) Pooled of both years
	2013-14						2014-15						
	1^{st} Spray			2^{nd} Spray			1^{st} Spray			2^{nd} Spray			
	1DAA	5DAA	10DAA	1DAA	5DAA	10DAA	1DAA	5DAA	10DAA	1DAA	5DAA	10 DAA	
T_1- Carbosulfan 25% EC	47.68**	52.21	57.19	49.65	55.55	60.35	45.10**	49.06	54.56	46.50	50.71	59.02	384.3
@250 g a.i. ha^{-1}	(54.65)*	(62.29)	(70.20)	(58.02)	(67.67)	(74.79)	(50.22)*	(57.01)	(66.09)	(52.63)	(59.79)	(72.90)	
T_2- Carbosulfan 25% EC	56.89	61.30	65.05	58.83	63.99	67.08	57.61	61.26	64.74	60.48	63.88	69.19	502.7
@312.5 g a.i. ha^{-1}	(70.04)	(76.67)	(81.74)	(73.04)	(80.37)	(84.19)	(71.16)	(76.61)	(81.34)	(75.49)	(80.22)	(86.50)	
T_3- Carbosulfan 25% EC	59.03	62.53	66.41	61.05	65.96	69.48	58.90	62.36	65.81	62.89	66.81	70.34	539.5
@350 g a.i. ha^{-1}	(73.50)	(78.67)	(83.86)	(76.53)	(83.30)	(87.52)	(73.31)	(78.42)	(83.11)	(79.18)	(84.37)	(88.45)	
T_4- Thiamethoxam 25% WG	49.97	55.10	59.04	51.39	56.70	61.03	46.34	50.94	55.33	48.89	52.56	60.19	399.8
@25 g a.i. ha^{-1}	(58.63)	(67.18)	(73.35)	(61.03)	(69.73)	(76.27)	(52.36)	(60.27)	(67.55)	(56.77)	(63.00)	(75.05)	
T_5- Imidacloprid 17.8% SL	43.33	46.64	52.60	46.60	49.61	56.19	40.98	46.79	52.07	44.13	49.26	53.70	324.8
@25 g a.i. ha^{-1}	(47.13)	(52.83)	(62.88)	(52.77)	(57.91)	(68.55)	(43.09)	(53.10)	(62.00)	(48.51)	(57.30)	(64.65)	
T_6- Acetamiprid 20% SP	39.26	44.03	50.06	42.01	47.56	51.49	39.90	45.29	49.53	41.92	47.35	51.00	289.4
@10 g a.i. ha^{-1}	(40.09)	(48.35)	(58.79)	(44.83)	(54.48)	(61.23)	(41.20)	(50.53)	(57.88)	(44.67)	(54.12)	(60.40)	
T_7- Untreated control	-	-	-	-	-	-	-	-	-	-	-	-	180.9
SEm ±	1.97	2.31	2.77	2.13	2.59	3.10	1.89	2.21	2.63	2.07	2.42	3.13	-
	6.20	7.27	8.72	6.72	8.15	9.75	5.95	6.96	8.30	6.52	7.62	9.85	-

**Angular transformed values; *Figures in the parenthesis are original values; DAA-Days after Spray

less effective. The findings of present investigation are in conformity with the finding that dressing with carbosulfan @10 g kg^{-1} seed was more effective for the control of early sucking pests of soybean (Kundu & Trimohan 1989). Patel & Srivastava (1990) observed that carbosulfan @5 g a.i/100 g seeds significantly improved plant growth by controlling both whiteflies and aphids in cowpea and greengram. Calafiori *et al.* (1999) reported that carbosulfan @0.6 L ha^{-1} gave more than 80% control of thrips and aphids in cotton. Chinnaiah & Asif (1999) reported that carbosulfan @25 g a.i kg^{-1} seed reduced the sucking pests of cotton such as aphids and leafhoppers upto 45 days after sowing. Patil & Patel (2013) reported that carbosulfan @0.05% was found most effective, because aphid population in isbagol was found lowest. Bharpoda *et al.* (2014) reported that imidacloprid 17.8 SL @0.008%, thiamethoxam 25 WG @0.0125% and diafenthiuron 50 WP @0.05% were found more effective against aphid and whitefly in cotton.

The seed yield of cumin for different treatments is shown in Table 1 and revealed that all the treatments showed significant increase in yield during 2013-14 (354.1 to 622.3 kg ha^{-1}) and 2014-15 (224.7 to 456.7 kg ha^{-1}) over untreated control. Highest mean seed yield of cumin was recorded in carbosulfan 25% EC at 1500 mL ha^{-1} during 2013-14 (622.3 kg ha^{-1}) and 2014-15 (456.7 kg ha^{-1}). The pooled mean data on seed yield also provided similar results and showed an incremental yield of 358.6 kg ha^{-1} for carbosulfan 25% EC at 1500 mL ha^{-1} over untreated control.

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