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Efficacy of safer insecticides against aphid on celery

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ABSTRACT

Aphids (*Myzus persicae*) are one of the most important pest of celery, which is cultivated for its fleshy leafstalks, seeds and essential oil. Aphids suck sap from the plant and reduce yield. Also, they transmit viral diseases and contaminate celery produce with honeydew. Some safer insecticides namely flonicamid 50 WG @ 150, 175 and 200 g/ha, imidacloprid 200 SL @ 75, 100 and 125 ml/ha, thiamethoxam 25 WG @ 75, 100 and 125 g/ha and acetamiprid 20 SP @ 37.5, 50 and 62.5 g/ha were evaluated for their efficacy against aphids. Population of aphids per inflorescence before spray varied from 12.03 to 13.20. All the treatments were significantly better than control. On all observation dates flonicamid @ 175 and 175 and 200 g/ha, imidacloprid @ 100 and 125 ml/ha, thiamethoxam @ 100 and 125 g/ha, acetamiprid @ 50 and 62.5 g/ha were statistically better in reducing aphid population than other treatments. Highest seed yield of 11.30 q/ha was obtained with flonicamid50 WG @ 200 g/ha which was statistically at par with imidacloprid 200 SL @ 100 and 125 ml/ha, thiamethoxam 25 WG @ 100 and 125 g/ha and acetamiprid 20 SP @ 50 and 62.5 g/ha and flonicamid50 WG @ 175 g/ha.

Key words: Aphids, Celery, Insecticides, *Myzus persicae*.

INTRODUCTION

Celery *(Apium graveolens* Linn.) belongs to the family Apiaceaeand was introduced in India around 1940 from France for its seed value.India dominates the world market of celery seed because of its best quality and at present it is exporting seeds to over 50 countries mainly to USA, UK, Japan, Russia and France. By far the most important market for Indian celery seed is the USA which alone imported 3965.50 MT celery seed from India during 2017-18 (Anonymous, 2018). It is widely cultivated for its leafstalk used as a vegetable and seed which yields essential oil (Pruthi, 2001). The leaves are used in salad and also cooked as vegetables. Nutritionally they provide only digestive fiber. In international average market price of celery seed was 0.88 US$/lb during 2017-18 (Anonymous, 2018).

Celery requires mild cool climate for luxuriant growth in the early stages and warm and dry weather at maturity. In colder climates and on the hills, celery is a biennial plant and produces seed only in the second year, but in the plains it becomes an annual and produces seeds in the very first year. It is commonly cultivated for seed in India and grown in Punjab, Uttar Pradesh and Haryana. The crop is cultivated mainly in Amritsar, Gurdaspur and Jalandhar districts in Punjab (Kaur, 2009).

Celery crop is attacked by many insect pests. The most important insect and related pests of celery are aphids, aster leafhopper, the tarnished plant bug and cutworms. Carrot weevil larvae, loopers and spider mites are minor or occasional pests (Hausbeck, 2011). Among these, aphid (*Myzus persicae*) is the most serious insect pest of celery crop (Webb, 2006) and can inflict three types of damage to celery. First, they stunt plant growth and reduce yield through removal of significant amounts of sap. Next, they transmit viral diseases and finally, they contaminate celery produce, particularly fresh market celery, with aphid honeydew. It is one of the most important aphid virus vectors and can transmit over 100 plant viruses, including those that affect celery (cucumber mosaic virus and celery mosaic virus). Also, *M. persicae* has developed resistance to several insecticides. Although several commercial insecticides are available for its control but these are toxic to natural enemies. To reduce this problem, some newer insecticides were evaluated for their efficacy against aphids in celery.

MATERIALS AND METHODS

The celery crop was raised according to recommended package of practices at Agronomy Farm, Punjab Agricultural University, Ludhiana (Anonymous, 2011). Sixty days old seedlings were transplanted at a spacing of 45 x 25 cm. As few popular commercial insecticides are highly toxic to natural enemies some safer insecticides namely flonicamid 50 WG @ 150, 175 and 200 g/ha, imidacloprid 200 SL @ 75, 100 and 125 ml/ha, thiamethoxam 25 WG @ 75, 100 and 125 g/ha and acetamiprid 20 SP @ 37.5, 50 and 62.5 g/ha were evaluated for their efficacy against aphid during 2009-10 crop season. Check insecticide malathion 50 EC @ 1000 ml/ha was also

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taken because it is recommended by Punjab Agricultural University, Ludhiana for the control of aphids on celery. There were fourteen treatments including untreated control with three replications (plot size of 5x5 $m^{2)}$. Insecticides were sprayed when population of aphids appeared. The observations on the number of aphids per inflorescence were recorded from 10 plants in each plot before spray, 3, 7, and 10 days after application of insecticide.The crop was harvested when seeds in most of the umbels turned light brown in colour.

RESULTS AND DISCUSSION

From the perusal of data, it was revealed that the population of aphids per inflorescence before spray varied from 12.03 to 13.20 aphids per inflorescence in different treatments. There was no significant difference in aphid population before spray (Table 1). On the third day after spray (DAS) the lowest population of 1.58 aphids per inflorescence was observed in flonicamid treated plot @ 200 g/ha which was statistically at par with the dose 175 g/ha of the same chemical, imidacloprid @ 100 and 125 ml/ha, thiamethoxam @ 100 and 125 g/ha, acetamiprid @ 62.5 g/ ha. Among different treatments, highest population of 6.47 aphids per inflorescence was observed in standard check malathion treated plot (Table 1).

After 7 days of spray, lowest aphid population (0.06 per inflorescence) was observed in flonicamid @ 200 g/ha, being on a par with imidacloprid @ 100 and 125 ml/ha, thiamethoxam @ 100 and 125 g/ha and acetamiprid @ 62.5 g/ha. In control plots population was 13.60 aphids per inflorescence and among various treatments highest population was noted in malathion (5.00 aphids/ inflorescence). On tenth DAS lowest population of aphids per inflorescence (0.03) was observed in flonicamid @ 200 g/ha and imidacloprid @ 125 ml/ha, and these were statistically at par with imidacloprid @ 100 ml/ha, thiamethoxam @ 100 and 125 g/ha and acetamiprid @ 50 and 62.5 g/ha and flonicamid @ 175 g/ha. In standard checks malathion @ 1000 ml/ha population was 3.97 aphids per inflorescence, being highest among all the treatments (Table 1).

On the basis of pooled analysis, flonicamid @ 200 g/ha recorded lowest population of aphids i.e. 0.39 per inflorescence, which otherwise was statistically at par with imidacloprid @ 100 and 125 ml/ha, thiamethoxam @ 100 and 125 g/ha and acetamiprid @ 62.5 g/ha (Table 1). In standard check of malathion treated plot population of aphids per inflorescence remained 5.14 which was statistically inferior to the other insecticidal treatments tested. In control plot, the number of aphids per inflorescence remained 13.17, 13.60 and 14.03 on 3rd, 7th and 10th day.

Seed yield of celery was significantly higher in insecticide treated plots than that in the untreated control (Table 1). Highest seed yield of 11.30 q/ha was obtained with flonicamid @ 200 g/ha which was statistically at par with imidacloprid @ 100 and 125 ml/ha, thiamethoxam @ 100 and 125 g/ha and acetamiprid @ 50 and 62.5 g/ha and flonicamid @ 175 g/ha.

These findings are in conformity with earlier studies in which flonicamid, imidacloprid, thiamethoxam and acetamiprid were found effective against aphids in celery (Chandi and Kaur, 2015). Miller *et al.* (2018) recommended imidacloprid, thiamethoxam and acetamiprid for the management of aphids in celery in Florida. Rinehold *et al.* advocated the use of flonicamid, thiamethoxam and

Table 1: Efficacy of different insecticides against aphid on celery.

Insecticides	Dose ml/gm (per ha)	Mean* number of aphids/inflorescence					Seed yield (q/ha)
		Before spray	3 DAS	7 DAS	10 DAS	Pooled	
Imidacloprid 200 SL	75	12.70	4.43(2.33)	1.83(1.68)	1.57(1.59)	2.61 (1.87)	10.27
	100	12.33	2.40 (1.84)	0.20 (1.09)	0.17 (1.08)	0.92 (1.34)	11.13
	125	12.93	2.03 (1.74)	0.13 (1.06)	0.03 (1.02)	0.73 (1.27)	11.23
Thiamethoxam 25 WG	75	12.60	5.63 (2.57)	4.67 (2.38)	3.53 (2.13)	4.61 (2.35)	10.10
	100	13.03	2.53 (1.87)	0.40 (1.17)	0.10 (1.05)	1.01 (1.35)	11.00
	125	12.43	1.70(1.63)	0.10 (1.05)	0.07 (1.03)	0.62 (1.24)	11.03
Acetamiprid 20 SP	37.5	13.20	6.63 (2.76)	4.47 (2.33)	3.27 (2.06)	4.79 (2.38)	10.03
	50	12.37	3.87 (2.20)	0.80 (1.34)	0.23 (1.11)	1.63 (1.55)	10.80
	62.5	12.80	2.60 (1.89)	0.17 (1.08)	0.10 (1.05)	0.96 (1.34)	10.98
Flonicamid 50 WG	150	12.03	4.37 (2.31)	2.80 (1.95)	2.47 (1.86)	3.21 (2.04)	10.37
	175	12.13	2.30(1.80)	0.60(1.25)	0.23 (1.11)	1.04 (1.39)	11.17
	200	12.63	1.58(1.59)	0.06 (1.03)	0.03 (1.02)	0.39 (1.17)	11.30
Malathion 50 EC	1000	12.50	6.47 (2.73)	5.00(2.44)	3.97 (2.23)	5.14 (2.47)	10.55
Control	-	13.10	13.17 (3.76)	13.60(3.82)	14.03 (3.88)	13.60 (3.82)	8.57
CD (p=0.05)		NS	(0.30)	(0.21)	(0.16)	(0.18)	0.50

***** Mean of ten inflorescences from randomly selected plants.
Figures in parentheses are square root transformed values.

imidacloprid for control of aphids in celery. Ghelani *et al.* (2014) also reported that flonicamid was very effective for the control of aphids on B.t cotton and flonicamid was comparatively safer to coccinellids. Horne (2004) described that imidacloprid fits well in IPM programme of celery.

CONCLUSION

So from the above study it can be concluded that flonicamid 50 WG @ 200 g/ha, imidacloprid 200 SL @ 100 ml/ha, thiamethoxam 25 WG @ 100 g/ha and acetamiprid 20 SP @ 50 g/ha and can be used effectively for the control of aphids on celery.

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