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EVALUATION OF SOME BOTANICALS AGAINST THE POMEGRANATE APHID IN BHILWARA OF RAJASTHAN

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ABSTRACT

Aqueous extracts of six botanicals *viz*., *Azadirachta indica* (L) A. Juss leaf (5%), *A. indica* oil (2%), *A. indica* kernel (5%), *Pongamia glabara* leaf (5%), garlic (5%) and chilli (5%) were evaluated against the pomegranate aphid during *kharif* 2012 and 2013 at a farmer's orchard under the KVK, Bhilwara during two successive years 2012-13 and 2013-14. The data on mean per cent reduction of aphid population in all treatments during two seasons revealed that except chilli extract (5%), all the treatments recorded significant reduction in aphid population over control. The *A. indica* kernel extract (5%) recorded maximum reduction in aphid population from 63.45 to 92.48 and 63.87 to 93.02 per cent during *kharif* 2012 and 2013, respectively. The lowest reduction in aphid population ranged from 48.25 to 65.65 and 48.45 to 66.29 per cent due to application of chilli extract (5%) in both years. The highest respective marketable fruit yield of 37.80 and 36.10 q/ha was recorded for the treatment with *A. indica* kernel extract (5%) during both the years. Use of botanicals proved to be an effective measure to manage the sucking pest problems in pomegranate.

Key words: aphid, pomegranate, botanicals.

INTRODUCTION

The pomegranate aphids, *Myzus persicae* (Sulzer) and *Aphis punicae* P. (Hemiptera: Aphididae) are among the key pests and often widespread in pomegranate orchards. The aphid infestation leads to reduction in plant vigor, facilitates the growth of mould on leaves, and consequently, causes a reduction in crop quality and yield. Both adults and nymphs suck sap from tender leaves, inflorescences and fruits (Moawad and Al-Barty, 2011). Apart from causing direct damage they secrete honeydew on leaves and fruits on which sooty mold grows, which is a serious problem for growers while packing the fruits for sale. Besides, aphids have a high reproductive capacity and extensive usage of insecticide for their management results in the development of resistance (Garg *et al*., 1987; Udaeen and Narang, 1988; Khurana and Batra, 1989; Zheng *et al*., 1997; Pavela *et al*., 2009). To overcome these problems, it is necessary to develop eco-friendly management practices; therefore, the present investigation was under taken to evaluate the relative efficacy of botanicals against pomegranate aphid.

MATERIALS AND METHOD

The present investigation was carried out at farmer's field under Krishi Vigyan Kendra, Bhilwara during *kharif* 2012 and 2013 to evaluate the bio-efficacy of different botanicals against the pomegranate aphid. The experiment was conducted in a five-year old orchard of pomegranate, variety Mridula, in randomized block design (RBD) with three replications. In each block five trees were selected and data on aphid population were collected from 4 directions (North, South, East and West) of each tree randomly. Six botanicals *viz*., *A. indica* leaf extract (5%), *A. indica* oil (2%), *A. indica* kernel extract (5%), *Pongamia glabara* leaf extract (5%), garlic extract (5%) and chilli extract (5%) were sprayed twice at fortnightly interval at the population level of 2-3 aphids/twig. The observations on aphid population were recorded one day before and on 1, 3, 7, 10 and 15 days after each spray. The data obtained were subjected to square root transformations and analyzed. The fruit yield per tree was recorded at harvest and converted on a per hectare basis.

Table- 1. Bio-efficacy of different botanicals against aphid, *Aphis punnicae* (Passerini) during 2012-13

S.No.	Treatment	Mean reduction (%)in aphid population days after I Spray						Mean reduction (%)in aphid population days after II Spray						Yield (q/ha)
		PTP	1	3	7	10	15	PTP	1	3	7	10	15	
T_1	Pongamia glabara leaf extract 5%	8.21 (2.95)	56.75 (48.88)	58.05 (49.64)	61.65 (51.74)	61.25 (51.51)	63.78 (53.01)	6.87 (2.71)	62.66 (52.34)	63.98 (53.12)	66.90 (54.89)	73.99 (59.36)	75.02 (60.06)	34.83
T_2	Garlic extract 5%	8.11 (2.93)	51.65 (45.95)	53.65 (47.10)	54.69 (47.70)	55.75 (48.31)	56.98 (49.02)	5.27 (2.40)	56.65 (48.83)	57.25 (49.18)	63.60 (52.92)	66.25 (54.52)	66.35 (54.58)	33.63
T_3	Chilli extract 5%	8.61 (3.02)	48.25 (44.00)	49.86 (44.92)	49.98 (44.99)	50.25 (45.14)	52.65 (46.52)	5.99 (2.55)	49.65 (44.80)	49.98 (44.99)	56.98 (49.03)	59.89 (50.73)	65.65 (54.17)	32.37
T_4	Neem leaf extract 5%	8.56 (3.01)	57.68 (49.43)	59.89 (50.72)	62.08 (52.01)	62.98 (52.54)	64.80 (53.63)	7.83 (2.89)	63.25 (52.70)	66.85 (54.88)	71.50 (57.78)	79.08 (62.89)	79.19 (62.97)	35.80
T_5	Neem kernel extract 5%	8.32 (2.97)	63.45 (52.81)	68.98 (56.18)	71.67 (57.88)	72.65 (58.50)	77.89 (62.01)	6.45 (2.64)	69.78 (56.68)	74.56 (59.75)	83.50 (66.14)	92.35 (74.43)	92.48 (74.59)	39.76
T_6	Neem oil 2%	8.92 (3.07)	61.65 (51.75)	63.98 (53.13)	64.98 (53.73)	66.86 (54.87)	69.50 (56.50)	6.02 (2.55)	66.45 (54.62)	68.98 (56.18)	79.80 (63.37)	88.26 (70.23)	88.39 (70.35)	37.80
T_7	Control	8.23 (2.95)	0.00	0.00	0.00	0.00	0.00	12.43 (3.60)	0.00	0.00	0.00	0.00	0.00	23.13
	Sem±	0.054	1.138	1.195	1.261	1.260	1.334	0.048	1.255	1.322	1.561	2.006	2.113	1.320
	CD5%	0.0171	3.587	3.766	3.974	3.970	4.205	0.152	3.955	4.165	4.919	6.321	6.658	4.067

*Figures in parenthesis are square root transformed values

Table- 2. Bio-efficacy of different botanicals against aphid, *Aphis punnicae* (Passerini) during 2013-14

S.No.	Treatment	Mean reduction (%)in aphid population days after I Spray						Mean reduction (%)in aphid population days after II Spray						Yield (q/ha)
		PTP	1	3	7	10	15	PTP	1	3	7	10	15	
T_1	Pongamia glabara leaf extract 5%	8.43 (2.99)	57.07 49.07)	58.74 (50.03)	62.27 (52.11)	61.92 (51.90)	64.30 (53.31)	7.32 (2.80)	63.20 (52.66)	65.10 (53.79)	67.20 (55.07)	74.56 (59.72)	75.89 (60.62)	32.67
T_2	Garlic extract 5%	8.34 (2.97)	52.06 (46.18)	53.95 (47.27)	55.34 (48.07)	56.41 (48.69)	58.27 (49.76)	5.96 (2.54)	57.01 (49.04)	58.46 (49.87)	64.00 (53.16)	66.71 (54.79)	67.01 (54.99)	33.57
T_3	Chilli extract 5%	8.86 (3.06)	48.35 (44.05)	50.10 (45.06)	51.00 (45.57)	50.83 (45.48)	53.32 (46.91)	6.80 (2.70)	50.20 (45.12)	50.48 (45.28)	57.64 (49.41)	60.19 (50.90)	66.29 (54.54)	29.20
T_4	Neem leaf extract 5%	8.68 (3.03)	58.04 (49.63)	60.44 (51.04)	62.71 (52.38)	64.35 (53.35)	65.44 (54.01)	8.27 (2.96)	63.62 (52.92)	68.02 (55.57)	71.88 (58.02)	79.52 (63.18)	79.84 (63.41)	33.57
T_5	Neem kernel extract 5%	8.52 (3.00)	63.87 (53.07)	69.32 (56.38)	73.67 (59.14)	74.43 (59.63)	78.24 (62.24)	7.58 (2.84)	70.13 (56.89)	75.74 (60.50)	83.90 (66.43)	92.93 (74.94)	93.02 (75.07)	36.10
T_6	Neem oil 2%	9.07 (3.09)	62.44 (52.21)	64.09 (53.20)	65.33 (53.94)	67.24 (55.10)	70.16 (56.91)	7.68 (2.85)	66.90 (54.89)	69.62 (56.57)	80.32 (63.73)	88.74 (70.62)	88.56 (70.49)	35.47
T_7	Control	8.63 (3.02)	0.00	0.00	0.00	0.00	0.00	10.93 (3.38)	0.00	0.00	0.00	0.00	0.00	20.47
	Sem±	0.036	1.072	1.006	1.160	0.905	0.972	0.099	1.003	0.785	1.325	1.709	1.760	1.110
	CD5%	0.113	3.377	3.171	3.654	2.853	3.063	0.311	3.160	2.472	4.176	5.387	5.546	3.391

* Figures in parenthesis are square root transformed values

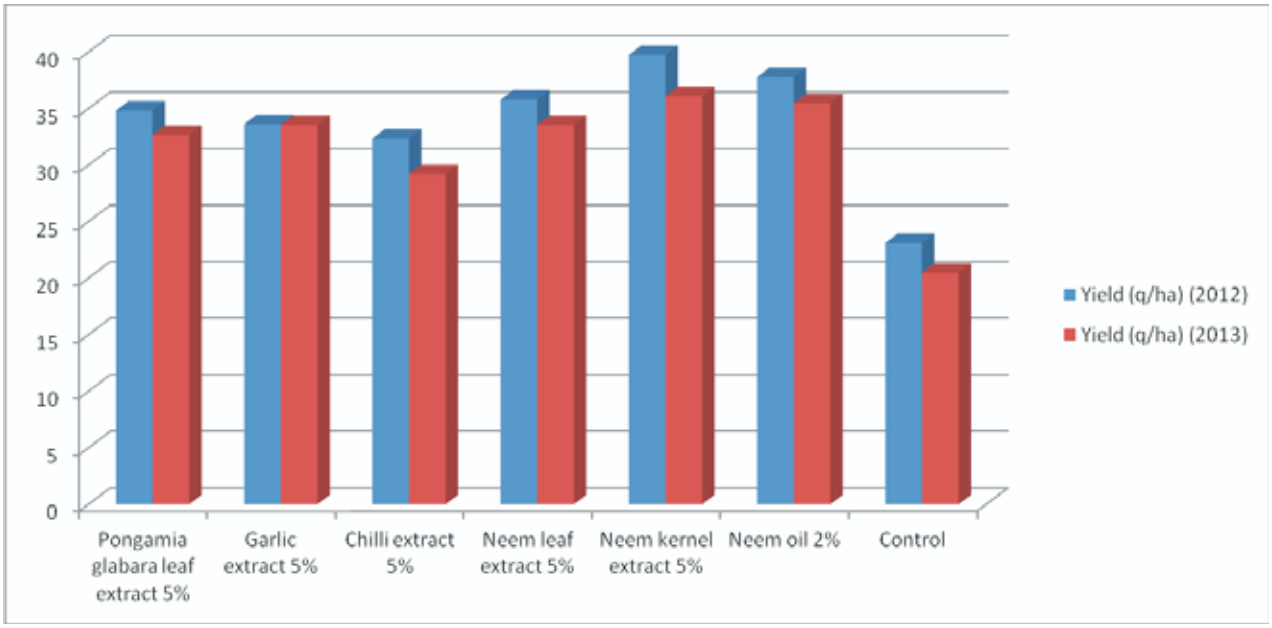


Figure 1. Mean marketable fruit yield in different botanicals treatment during 2012 and 2013

RESULTS AND DISCUSSION

The data on bio-efficacy of the treatments during 2012-13 against the pomegranate aphid revealed that the mean reduction in aphid population ranged from 51.65 to 92.48 per cent**.** Application of *A. indica* kernel extract (5 %) recorded highest reduction in population of aphid i.e., 63.45, 68.98, 71.67, 72.65 and 77.89 per cent at 1, 3, 7, 10 and 15 days after first spray, respectively. A similar trend of effectiveness was observed in case of second spray where the highest reduction in aphid population was recorded in the treatment of *A. indica* kernel extract (5%) with 69.78, 74.56, 83.50, 92.35 and 92.48 per cent reduction at 1, 3, 7, 10 and 15 days after second spray, respectively (Table 1).

The data on efficacy of botanicals during 2013-14 against aphids revealed that the mean reduction among different treatments ranged from 48.35 in chilli extract (5%) to 93.02 per cent in *A. indica* kernel extract (5%)**.** Application of *A. indica* kernel extract (5%) gave highest reduction in population of aphid i.e., 63.87, 69.32, 73.67, 74.43 and 78.24 per cent at 1, 3, 7, 10 and 15 days after first spray during 2013, respectively. The least effective treatment was chilli extract (5%), which recorded minimum reduction in aphid population after first spray. Similar trend was observed after the second spray where the maximum reduction in population of aphid i.e., 70.13, 75.74, 83.90, 92.93 and 93.02 per cent was recorded in *A. indica* kernel extract (5%) at 1, 3, 7, 10 and 15 days after second spray, respectively (Table 2).

The findings of our investigations are in agreement with those reported by Mallapur *et al* (2001), Sultana *et al* (2009), Khan *et al* (2013), Rouhani *et al* (2013) Prasannakumar *et al* (2014) who reported that plant products were effective in controlling sucking pest complex of pomegranate, canola, cabbage, mustard and safflower.

The data recorded on the yield of marketable fruits during 2012-13 revealed that treatment *A. indica* kernel extract (5%) recorded maximum fruit yield (39.76 q/ha) though being at par with *A. indica* oil 2% (37.80 q/ha) and *A. indica* leaf extract 5% (35.80 q/ha). Significantly lowest yield of was recorded from fruit trees treated with *Pongamia glabara* leaf extract (5%), garlic extract (5%) and chilli extract (5%), respectively. The next year during 2013-14 also maximum marketable fruit yield (36.10 q/ha) was recorded in *A. indica* kernal extract (5%) (Fig. 1).

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