



SUSCEPTIBILITY IN WHEAT VARIETIES TO INFESTATION OF WHEAT APHID (*Rhopalosiphum padi* L) (Homoptera : Aphididae)

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Abstract: Ten wheat varieties viz., NLAW301, NLAW 917, NLAW 1415, NLAW 34, NLAW 1994, NLAW5439, LOK-1, GW 496, NIDW 295 and A-9-30-1 were studied against wheat aphid (*Rhopalosiphum padi* L) for their susceptibility during Rabi 2016-17. Seedling bulk test and antixenotic test were carried out for the resistant, moderately resistant and susceptible wheat varieties. The result revealed that varieties namely NLAW 917, NLAW 301, NLAW 34 and NLAW 1994 were found moderately resistant with damage rating 4 to 5, three varieties namely NLAW1415, NLAW 5439 and Lok-1 were moderately susceptible and three varieties namely A-9-30-1, NIDW 295 and GW 496 were found susceptible in seedling bulk test. Antixenosis test after 24 hours showed that out of ten wheat varieties six varieties were found to be least preferred (LP) by aphids viz., NLAW 917, NLAW 1994, NLAW 301, NLAW 1415, NLAW 34 and LOK-1. Four varieties were found highly preferred by aphids A-9-30-1, GW 496, NIDW 295 and NLAW 5439. While, antixenosis test after 48 hours showed the same trend of varietal preference by aphids except Lok-1.

Key words: Wheat, varieties, aphid, infestation.

Introduction:

Among the cereals wheat (*Triticum aestivum*) is the most important food crop of India and staple food through the world. It is extensively grown in irrigated and rainfed condition in the world. It occupies an area of 30.72 million hectare with a production and productivity of 97.44 million tonnes and 3172 kg/ha, respectively (Anonymous,2017). Wheat is one of the important *rabi* crop of Maharashtra and was grown on an area of 10.73 lakh hectare with a production and productivity of 16.72 lakh tonnes and 1558 kg/ha, respectively during *rabi* 2016-17 (Anonymous,2017). In India damage by aphids is regular in some part of the country. They are known for their direct and indirect damage. Direct damage by sucking cell sap of the leaves, young shoot, causing distortion, stunting, leaf curling, wilting, twisting and transmitting plant viruses. They cause indirect damage by depositing honey dew that reduce photosynthetic activity and

induce sooty mould production and pre mature leaf senescence (Akhtar and Khaliq 2003; Schotzko and Bosque2000). Tradon and Milevoj,1999 reported that aphid caused 10 to 50% reduction in crop yield directly and 20 to 80% indirectly. To overcome to economical losses caused by aphids attack, the most eco-friendly and sound method for the control of aphids is the use of resistant wheat variety in pest management strategy (Dong *et al.*,2006; Tyler *et al.*,1987). The use of resistant varieties is an effective and efficient tool for the control of aphids. (Starks *et al.*,1983; Akhtar *et al.*,2006). Identification of the factors that confer resistance or susceptibility and study of their inheritance in cereals would improve breeding strategy to identify the resistant variety. In this way, for recognising the mechanism of host plant resistance will lead to breeding for long term resistance. The present study was undertaken with an object to identify the resistant varieties for aphids by determining the influence of infestation on growth of

wheat and ability of varieties to resist stunting caused by infestation of aphid.

Material and Methods:

To find out the resistant wheat varieties experiment was carried out under laboratory condition during 2016-17 at Agricultural Research Station, Niphad, Dist. Nashik. The wheat varieties viz, NIAW301, NIAW 917, NIAW 1415, NIAW 34, NIAW 1994, NIAW5439, LOK-1, GW 496, NIDW 295 and A-9-30-1 were evaluated against aphid. Evaluation of resistance was done by seedling bulk test and antixenosis test. Experiment was conducted in completely Block Design with three replications. The experiment was carried out under control environmental condition.

Mass rearing of aphid: Aphids were collected from wheat field of Agricultural Research Station, Niphad, Dist. Nashik and their culture was maintained in iron racks measuring 120x60x60cm lightened with florescent light (40w) bulb. About twenty seeds of susceptible wheat variety were sown in plastic pot of 12cm diameter. Seedlings were obtained for mass rearing from twenty wheat seeds sown per plot. Culture of aphids was maintained under control condition of 28+₋ 2^oC and 50 to 70% humidity and 16h:8h day:night photoperiod in the rearing room. Resistance was evaluated by seedling and antibiosis test.

Seedling Bulk/ Flat Test: The test was performed in three plastic trays measuring 36cmx28cmx8cm.

Trays were filled with soil and four rows on one cm depth. There were 20 seedlings of every test entry sown in furrows of each row. When the seedlings attained the height of 5 to 8cm, aphids was released on them with the average of 10 aphids per seedling. Damage rating (DR) scale of 0-9, where 0 stands for healthy and 9 stands for dead. After 10-15 days of infestation, when lodging and chlorosis started, plants was observe and data was categorized as highly resistant lines/ varieties having DR=2, resistant lines/varieties having DR=3, moderately resistant (MR) lines/varieties having DR=4-6 and susceptible lines/varieties were having DR=7-9.

Antixenosis Test: In randomized complete block design tests of wheat varieties in three replications was conducted to find out the results of non-preference. Seeds of test varieties were sown in a circular pattern about 3cm from the edge of 30cm diameter plastic pot. When seedling was attained 5 to 8cm height, 100 adult wingless aphids were released on the circular paper of 3cm diameter in the centre of the pot and then pots were covered by cage. After 24 hours aphids were settled on each seedling and was counted. There were three categories for preference, least preference (LP) having least number of aphids, moderately preferred (MP) having moderate number of aphids and highly preferred (HP) having highest number of aphids (Akhtar and Mujahid, 2006).

Categorization:

SN	No. of aphids attracted	Nature of preference	Rating/ Preference catagory
1	0 to 2.50	Least preferred	LP
2	2.51 to 3.50	Moderately preferred	MP
3	3.51 and above	Highly preferred	HP

Results and Discussion:

Seedling Bulk Test: Data regarding reaction of various wheat varieties against aphid are presented in Table 1. Out of ten varieties four varieties viz., NIAW 301, NIAW 917, NIAW 34 and NIAW 1994 were found moderately resistant with damage rating 4-5. Three varieties NIAW 1415, NIAW 5439, LOK-

1 were found moderately susceptible and three varieties GW 496, NIDW 295 and A-9-30-1 were found susceptible to wheat aphid. Hesler *et al.*(2002) evaluated resistance by antixenosis to aphid (*R.padi* L.) among eight wheat accessions on line of work of present studies and concluded that even low levels of resistance could be important in limiting aphid

infestations. The present results are also in conformity with those reported by Akhtar *et al.*(2008) that out of 20 varieties five lines V-01078, V-00055, KT-7, V-01180 and DN-47 were resistant with damage rating of 2-3 and ten lines and two varieties were moderately resistant with damage rating 4-5 and two lines were found moderately susceptible.

Antixenosis Test: Antixenosis tests are presented in Table 2. Data reveals significant difference at 24 and 48 hours after release of aphids. Results of antixenosis tests of data taken after 24hrs showed that out of ten varieties six varieties were found to be least preferred (LP) by aphids with their respective names and mean aphid preference a NIAW 917 (0.33), NIAW 1994 (0.66), NIAW 301 (1.00), NIAW 1415 (1.33), NIAW 34 (1.33) and LOK-1 (1.33). Four varieties were found highly preferred by aphids with their names and aphids preference as A-9-30-1 (9.33), GW 496 (7.33), NIDW 295 (6.33) and NIAW 5439 (4.66).

Data taken after 48 hours of aphid release in antixenosis test on wheat varieties (Table 2) showed that five varieties were found least preferred (LP) by aphids with their respective names and mean aphids preference NIAW 917 (0.66), NIAW 301 (1.33), NIAW 1994 (2.00), NIAW 1415 (2.33) and NIAW 34 (2.33). Five varieties were found highly preferred (HP) by aphid with their respective names and mean of aphids preference A-9-30-1 (14.67), GW 496 (11.67), NIDW 295 (9.00), NIAW 5439 (6.33) and LOK-1 (4.00).

Data from average of 24 and 48 hours revealed that five varieties were found least preferred (LP) by aphids with their respective name and means of aphids preference namely NIAW 917 (0.50), NIAW 301 (1.17), NIAW 1994 (1.33), NIAW 1415 (1.83) and NIAW 34 (1.83) while one variety LOK-1 (2.67) was moderately preferred (MP) and remaining

four showed highly preference category with their respective names and means of preference A-9-30-1 (12.00), GW 496 (9.50), NIDW 295 (7.50) and NIAW 5439 (5.50). In present study most suitable varieties against aphids were NIAW 917, NIAW 301, NIAW 1994, NIAW 1415 and NIAW 34. The present findings are in confirmed with those reported by Tiwari and Sharma (2002) who screened wheat lines for resistance against aphid and five lines were graded as highly resistant while one variety was graded as susceptible in seedling bulk test. They also estimated least aphid population as (<5.00) and maximum (>30.00) in antixenosis test. Results of Akhtar (2001) indicated that two rainfed wheat varieties V-4 and 95022 were found to be resistant against aphid. Results of present findings are also in line with Akhtar *et al.* 2008 and Li *et al.* (2001).

The present investigation is in close agreement with (Li *et al.*2001) who evaluated the wheat varieties in similar way as highly resistant, moderately resistant and least resistant wheat varieties against aphid. (Akhtar and Mujahid 2006) indicated that two rainfed wheat varieties V-4 and 95022 were resistant to aphid. (Aslam et al.2004) reported that the wheat variety Inqulab-91 was the most resistant to aphid and PND+ was the most susceptible among the various tested wheat variety. Naheed Akhtar *et al.*(2009) reported that three wheat lines V-01180, PR 84 and DN 47 were least preferred by aphids as these findings are in corroboration with the present finding of the research.

Conclusion: From the results it is concluded that the variety NIAW 917,NIAW 301, NIAW34 and NIAW1994 is identified as resistant to aphid by seedling bulk test method which recorded lowest damage of aphid and least preferred by aphid under antixenosis test while the variety A-9-30-1,GW 496 and NIDW295 were emerged as susceptible to aphid.

Table 1: Varietal reaction of wheat against aphid under seedling bulk test /flat test

T.N.	Treatments / Name of varieties	Damage rating	Nature of resistance against aphid
1.	NIAW 301	4	MR
2	NIAW 917	4	MR
3	NIAW 1415	6	MS

4	NIAW 34	5	MR
5	NIAW 1994	4	MR
6	NIAW 5439	6	MS
7	LOK-1	6	MS
8	GW 496	8	S
9	NIDW 295	8	S
10	A-9-30-1	8	S

R=Resistant MR=Moderately Resistant MS= Moderately Susceptible S= Susceptible

Table 2: Effect of different wheat varieties on attraction of aphids under antixenosis test

TN	Treatments / Name of Variety	Aphids attracted after 24 hrs	Nature of preference	Aphids attracted after 48 hrs	Nature of preference	Av. No. of aphids attraction of 24 & 48 hrs	Rating/ Preference category
1.	NIAW 301	1.00 (1.41)	LP	1.33 (1.53)	LP	1.17 (1.47)	LP
2	NIAW 917	0.33 (1.15)	LP	0.66 (1.29)	LP	0.50 (1.22)	LP
3	NIAW 1415	1.33 (1.53)	LP	2.33 (1.82)	LP	1.83 (1.68)	LP
4	NIAW 34	1.33 (1.53)	LP	2.33 (1.82)	LP	1.83 (1.68)	LP
5	NIAW 1994	0.66 (1.29)	LP	2.00 (1.73)	LP	1.33 (1.53)	LP
6	NIAW 5439	4.66 (2.38)	HP	6.33 (2.71)	HP	5.50 (2.55)	HP
7	LOK-1	1.33 (1.53)	LP	4.00 (2.24)	HP	2.67 (1.92)	MP
8	GW 496	7.33 (2.89)	HP	11.67 (3.55)	HP	9.50 (3.24)	HP
9	NIDW 295	6.33 (2.71)	HP	9.00 (3.16)	HP	7.50 (2.92)	HP
10	A-9-30-1	9.33 (3.21)	HP	14.67 (3.96)	HP	12.00 (3.62)	HP
SE ±		0.133	--	0.100	--	--	--
CD at 5%		0.396	--	0.296	--	--	--

* Figures in parentheses are $\sqrt{n+1}$ transformed values

LP= Least Preferred MP=Moderately Preferred HP=Highly Preferred

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