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VARIETAL PREFERENCE OF *LIPAPHIS ERYSIMI* (KALTENBACH) ON THREE SPECIES OF *BRASSICA*

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Abstract

Context: *Lipaphis erysimi* have different type of preference to settle on different varieties of mustard. Pest preferential movement is important for ecofriendly pest control.

Objectives: The aim of this study was to determine the *L. erysimi* resistance varieties of mustard to get more yields by lower cost and avoid most aphid infesting varieties for higher cost

Materials and Methods: Two criteria were used to determine the varietal preference of *L. erysimi*, *viz.* (i) dispersal of aphids by cutting the base of host plants and enforce to settle on different varieties of three species of *Brassica* under free choice conditions, and (ii) suitability of those varieties based on the aphid infestation in the field crop condition at same season.

Results: The preferential movement of *L. erysimi* on ten varieties of *Brassica* showed significant differences ($P<0.01$). The variety, Bari sharisa-6 showed highest (90.00 ± 7.21) aphid settlement followed by the variety, Rai-5 (89.00 ± 5.69). The variety, Bari sharisa-10 showed lowest (10.00 ± 0.58) aphid settlement followed by the variety, Bari sharisa-11 (19.00 ± 3.61). Naturally infested aphid population on first sowing date was recorded highest (2.1 ± 0.79) on the variety Bari Sarisha-8, followed by Bari Sarisha-6 (1.93 ± 0.88). The lowest (0.19 ± 0.09) number of aphids recorded on Bari Sarisha-12. In second sowing date, Bari Sarisha-7 showed highest (19.5 ± 6.51) aphid population, followed by Bari Sarisha-8 (15.42 ± 5.72). The lowest (1.2 ± 0.38) aphid population found on the variety, Bari Sarisha-11. In third sowing date, highest (14.69 ± 5.69) number of aphids was recorded on the variety, Bari Sarisha-6, followed by the variety, Sonali-75 (14.48±4.74). Lowest number (6.06 ± 2.30) of aphids was found on the variety, Bari Sarisha-12. In the fourth sowing date, highest (15.54 ± 5.72) aphid population recorded on the variety, Bari Sarisha-8, followed by Bari Sarisha-7 (14.39 ± 5.70); and the lowest (4.41 ± 1.75) number of aphids recorded on the variety, Bari Sarisha-9.

Key words: *Lipaphis erysimi*, varietal preference, *Brassica*, Sarisha, Rai.

Introduction

Varietal preference is the most economic tools in pest control (Elmali 1998). Host plant selection by aphids involves responses to a variety of physical and chemical plant characteristics but is fundamentally affected by gustatory cues detected during stylet penetration of peripheral plant tissues (Powell *et al*. 2006).

Mustard and rai are economically important group among *Brassica* crops of Cruciferae family in Bangladesh (Mondal and Wahhab 2001). *Lipaphis erysimi* (Kaltenbach) is one of the most serious and destructive aphid pests on these crops (Ansary *et al*. 2007). A number of authors worked on host/ varietal preference of different aphid species on different host plants (Powell and Hardle 2000, Yue and Liu 2000, Jatoi *et al*. 2002, Rana 2005, Powell *et al*. 2006). However, work in relation to host/ varietal preference of *L. erysimi* on different varieties of mustard and rai in Bangladesh is not enough till date to recommend any one, where there is still a need to develop more resistant varieties in this country. This might be facilitated by studying the preference of this aphid on different species of *Brassica*.

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Materials and Methods

Two criteria were used to determine the varietal preference of *L. erysimi*, *viz.* (i) dispersal of aphids by cutting the base of host plants and enforced to settle on different varieties of mustard and rai under free choice conditions, and (ii) suitability of those mustard and rai varieties based on the aphid infestation in the field crop condition at same season (Elmali 1998). Ten varieties of mustard and rai of three species, *viz. Brassica campestris* (Bari Sarisha-06, Bari Sarisha-09, Bari Sarisha-12, Tory-07 and Sonaly-75), *Brassica juncea* (Bari Sarisha-10, Bari Sarisha-11, Rai-05) and *Brassica napus* (Bari Sarisha-07, Bari Sarisha-08) were selected for both the experiments. In order to study the settlement of enforced mustard aphids, ten varieties of *Brassica* seeds were sown in the tubs (33 tubs; 18 cm height and 26 cm diameter) which was prepared by soil and bio-fertilizer. Only one plant was allowed to grow up in each tub. The tubs were left in the open field within nets to protect them from aphids. Six tubs with the excess plants were kept open for natural infestation of *L. erysimi*. Thereafter, those plants were checked regularly to observe the level of infestation.

First experiment (dispersal of aphids by cutting the base of host plants and enforce to settlement on different varieties of mustard and rai under free choice conditions) was started after attaining a thick infestation (both apterae and alatae) on the experimental plants, which were not kept under the net. Each of the above ten varieties was arranged in a circle of two feet radius with equal spacing at random with three replications. One tub with thick infestation of *L. erysimi* with both alatae and apterous females were placed in the centre of the circle and cut at the base. Thereafter, observations were made on the movement of aphids from these cut plants to the nearest fresh and healthy plants of ten varieties. Aphids those were settled on different varieties of plants were counted at two days interval. Counting was continued up to 8th days. This experiment was replicated three times and conducted in the fields of Rajshahi University Campus during 2005-2006 seasons.

Second experiment was on the suitability of the experimental varieties based on the aphid infestation in the field crop condition at same season. The alatae of *L. erysimi* comes naturally in the field and settle its preferred varieties and started colony formation.

Results

Preferential settlement of *L. erysimi* on ten different varieties of mustard and rai under frees choice condition is provided in Table 1. The mean aphid population infested naturally on the ten varieties of mustard and rai in the field sown on four dates is provided in Table 2. From the Table 1, it is observed that the preferential movement of *L. erysimi* on ten varieties of *Brassica* showed significant differences ($P < 0.01$). The variety, Bari sharisa-6 showed highest (90.00 ± 7.21) aphid settlement followed by the variety, Rai-5 (89.00 ± 5.69). The variety, Bari sharisa-10 showed lowest (10.00 ± 0.58) aphid settlement followed by the variety, Bari sharisa-11 (19.00 ± 3.61). Naturally infested aphid population on first sowing date differed significantly ($P < 0.05$) among the ten varieties and highest (2.1 ± 0.79) population was recorded on the variety Bari Sarisha-8, followed by Bari Sarisha-6 (1.93 ± 0.88). The lowest (0.19 ± 0.09) number of aphids recorded on Bari Sarisha-12. Second and third lowest number of aphids was recorded on the varieties Bari Sarisha-10 (0.26 ± 0.13) and Bari Sarisha-11(0.33 ± 0.15), respectively. In second sowing date, aphid population differed significantly ($P < 0.01$) and the variety, Bari Sarisha-7 showed highest (19.5 ± 6.51) aphid population, followed by Bari Sarisha-8 (15.42 ± 5.72). The lowest (1.2 ± 0.38) aphid population found on the variety, Bari Sarisha-11. The variety, Bari Sarisha-10 was the second lowest in terms of number of aphids (1.57 ± 0.59) on this season (Table 2). In third sowing date, highest (14.69 ± 5.69) number of aphids was recorded on the variety, Bari Sarisha-6, followed by the variety, Sonali-75 (14.48 ± 4.74). Lowest number (6.06 ± 2.30) of aphids was found on the variety, Bari Sarisha-12. No significant difference exists among the varieties of third sowing date (Table 2).

Table 1. Preferential settlement of *L. erysimi* on ten different varieties of *Brassica* under frees choice condition.

Mustard and rai varieties	Average number (mean ±SE) of aphid settled per variety				'F' value	'p'
	2nd day	4th day	6th day	8th day		
Bari Sarisha-6	8.67±0.33bD	26.67±2.40bC	46.33±5.70bB	90.00±7.21aA	54.11	0.000
Bari Sarisha-7	6.33±0.88bB	11.67±2.19cB	21.00±2.31cA	27.00±3.06cdA	16.96	0.001
Bari Sarisha-8	6.67±1.20bC	8.67±2.73cdC	20.33±0.88cB	35.67±5.81cA	16.36	0.001
Bari Sarisha-9	5.00±2.08bcC	11.00±0.58cdB	17.00±0.58cA	21.67±2.67cdeA	15.64	0.001
Bari Sarisha-10	1.00±0.58dC	4.00±1.00dB	8.00±0.58dA	10.00±0.58eA	32.50	0.000
Bari Sarisha-11	2.33±0.33cdC	10.67±2.91cdB	16.33±0.88cAB	19.00±3.61deA	9.73	0.005
Bari Sarisha-12	7.00±1.16bD	22.67±2.73bC	40.67±1.76bB	52.67±5.17bA	41.66	0.000
Rai-5	22.00±1.15aD	44.33±3.38aC	66.33±2.03aB	89.00±5.69aA	67.36	0.000
Tory-7	7.67±1.76bB	12.67±0.67cB	21.33±3.38cA	27.67±2.19cdA	16.05	0.001
Sonali-75	5.67±1.45bcC	27.33±1.45bB	39.00±3.61bAB	51.00±7.02bA	22.42	0.000
'F' value	21.61	30.07	44.49	34.90		

Means followed by same letters are not significantly different at p<0.01 or p<0.001 by DMRT. Small and capital letters indicate column and rows respectively.

Table 2. Naturally infested aphid population ((Mean± SE)) on ten varieties of *Brassica* sown on four different dates in the field.

Mustard and rai varieties	First sowing date (Mean± SE)	Second sowing date (Mean± SE)	Third sowing date (Mean± SE)	Fourth sowing date (Mean± SE)
Bari Sarisha-06	1.93±0.88a	11.19±4.26abc	14.69±5.69	9.52±4.09
Bari Sarisha-07	1.2±0.35ab	19.5±6.51a	13.58±5.57	14.39±5.70
Bari Sarisha-08	2.10±0.79a	15.42±5.72ab	14.45±5.16	15.54±5.72
Bari Sarisha-09	0.79±0.29ab	1.98±0.63c	8.24±3.24	4.41±1.75
Bari Sarisha-10	0.26±0.13b	1.57±0.59c	6.34±2.80	5.66±2.46
Bari Sarisha-11	0.33±0.15b	1.20±0.38c	7.62±2.86	8.76±4.40
Bari Sarisha-12	0.19±0.09b	2.00±0.93c	6.06±2.30	6.02±2.68
Rai-05	0.27±0.15b	7.18±2.57bc	6.88±2.91	11.03±4.03
Tory-07	0.97±0.34ab	2.20±0.73c	7.32±2.49	9.36±4.05
Sonali-75	1.41±0.61ab	6.03±2.76bc	14.48±4.74	10.49±4.46
'F' value	2.286	3.879	0.904	0.764

Means followed by same letters are not significant different at p<0.01 or p<0.001 by DMRT. Small and capital letters indicate column and rows respectively.

In the fourth sowing date, highest (15.54 ±5.72) aphid population recorded on the variety, Bari Sarisha-8, followed by Bari Sarisha-7 (14.39 ±5.70); and the lowest (4.41 ± 1.75) number of aphids recorded on the variety, Bari Sarisha-9. No significant difference in the number of aphids could be found among the ten varieties.

Discussion

In the present study the aphid showed distinct preference for different test varieties of *Brassica* in both the cases when the experiment was conducted in a free choice situation and in the field for naturally infestation. Prasad (1983) reported the minimum mean aphid infestation index in the mustard cultivar IB-680 and the maximum in the yellow sarson variety IB-787 among 4 cultivars of yellow sarson, 8 of brown sarson and 36 of mustard. Khan and Akbar (1999) studied the performance of *L. erysimi* on three canola varieties of mustard (*Brassica napus*) and mentioned that the varieties, Dankeld, Altex and Wester were non-resistant to the attack of *L. erysimi* and out of all these three varieties, Dankeld variety showed least susceptibility. Jatoi *et al*. (2002) conducted experiments on twenty-two *Brassica napus* cultivars against *L. erysimi* and found that the variety, Shiralee and hybrid were susceptible; and they identified some varieties as resistant and semi-resistant.

Rana (2005) studied the preference and performance of *L. erysimi* on different *Brassica* species in the field and under greenhouse conditions and recorded that *L. erysimi* prefers the first group of species (*B. campestris* var. BSH-1, *B. campestris* var. YSPB-9 and *B. juncea* var.RH-30) over the second (*B. napus*, *B. nigra*, *B. carinata*, *E. sativa*), which are not widely cultivated.

There are few studies on the role of plant attributes as attractants for aphids. Visual cues are very important in host selection (Yue and Liu, 2000) by insects, which might have been the reason for *L. erysimi* preferring dark to light green-coloured leaves. But there is no report on the extent to which these cues govern the host-selection process. A few studies (Teotia and Lal 1970, Prasad and Phadke 1988) on general preferences of different germplasm lines support the present findings. The waxy nature of leaves/foliage also influences whether aphids will land on a surface (Agarwal *et al*. 1996).

Conclusion

From the present experiment, the varieties, Bari Sarisha-6, Bari Sarisha-7, Bari Sarisha-8 and Rai-5 can be identified as most susceptible for the significant attack of the aphid pest, *L. erysimi* and the varieties, Bari Sarisha-10, Bari Sarisha-11 and Bari Sarisha-12 as the least susceptible. The results would be helpful to select the proper varieties of mustard and rai crops in Bangladesh.

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