

Screening of Certain Promising Germplasm of *Brassica* spp. Against *Lipaphis erysimi* Kalt

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Paper No.: 396

Received: 16 Feb 2015

Accepted: 02 Dec 2015

Abstract

Cultivation of resistant or tolerant varieties is the easiest way to protect the mustard crop from insect pests. Varietal screening for aphid resistance and stability of seed yield under aphid-infested and protected environment would help in identifying the tolerant varieties for aphid attack. The present investigations were therefore carried out with the objectives to study the evaluation of 240 *B. juncea* accessions for resistance/tolerance against mustard aphid. Under field conditions, the experiment was conducted with 240 accessions (germplasm) of *Brassica juncea* at Norman E. Borlaug Crop Research Centre (CRC), Pantnagar, during 2010-2011 to evaluate their differential response on the infestation of *Lipaphis erysimi* (Kaltenbach). Accessions 491128, 491176, 491123, 491144 were highly resistant, and 491041, 320648, 426401, 491042 were highly susceptible against mustard aphid based on its population. On the basis of mustard aphid infestation index (AI) the mustard germplasm, 339589 (0.46), 33957, 399816 were found highly resistant, whereas 296703, 491028, 248993, 296690 were highly susceptible.

Highlights:

- Accession no. 491128 (13.64) showed minimum population on the plants compared to the check Varuna (111.05) while accession no. showed population 491041 (267.00) higher than the test.
- Out of 240 tested accessions, 134 belongs to resistant (R) category followed by 75 germplasm falling under moderately resistant (MR) category and 24 germplasm falling under moderately susceptible category, whereas 7 belongs to susceptible.
- No germplasm was found to belong to highly susceptible group while no germplasm was observed as immune to the mustard aphid attack.

Keywords: Mustard, *lipaphis erysimi*

Oilseed crop is an important group of crops in India. Oilseed crops include groundnut, sesame, rapeseed-mustard, sunflower, safflower and soyabean. Among the different oilseed crops, rapeseed mustard is an important oilseed crop commodity contributing 28.3 and 19.8% in world acreage and production respectively (Kumar, 1998). Among various oil seed crops of India mustard occupies a dominant position contributing 23% of oilseed production (Vankatramani 2000).

Among various constraints in the productivity of rapeseed-mustard, infestation of insect-pests is one of the most important limiting factor for its low yield. More

than 43 species of insect pests have been recorded to infest rapeseed-mustard crops in India under biotic stress. Out of these about a dozen species are considered as major pests (Purwar *et al.* 2004). Mustard aphid, *Lipaphis erysimi* Kalt. is the main constraint for qualitative as well as quantitative production of mustard in India, which infests the crops right from vegetative stage to pod stage (Sachan 1990). However, the maximum damage to the crop is done at flowering stage. The yield losses caused by mustard aphid in mustard crop is of 27% to 69% (Bakhetia and Brar, 1983) with 15% reduction in its oil content indicated the severity of this pest. Cultivation of resistant or tolerant varieties is the

easiest way to protect mustard crop from insect pests. Varietal screening for aphid resistance and stability of seed yield under aphid-infested and protected environment would help in identifying the tolerant varieties for aphid attack. Regular and indiscriminate usage of insecticides to manage this pest has resulted into adverse effect on human beings and their ecology. Under these conditions development of a resistant variety/ cultivar and to identify the source of resistance seems a sound and better approach.

Therefore, the present investigations were, therefore, under taken to find out the promising tolerant/ resistant germplasm of *Brassica* spp. against *Lipaphis erysimi* Kalt.

Materials and Methods

A field trial was carried out to study the aphid infestation on 240 accessions of *B.juncea* germplasm at Norman E. Borlaug Crop Research Centre of G.B. Pant University of Agriculture and Technology, Pantnagar during the rabi season of the year 2010- 2011 in Augmented Block Design (ABD).

Total 240 accessions of *Brassica juncea* were used for determining their reaction against mustard aphid under natural conditions. Sowing was done in second week of November crop season during rabi 2010-2011. Each entry was sown in two rows of 3m length line to line and plant to plant distance of 30 cm and 10-15 cm, respectively was maintained. Five checks were shown each after ten tested accessions for comparison under augmented design in 6 blocks (Table 1).

The population of mustard aphid were counted on 5 plants. The aphid population on each plant were observed from 10 cm last shoot. The first count of mustard aphid population was taken at 50 days after sowing and subsequent observations were made at a week interval for 5 weeks. The population of mustard was counted visually.

Evaluation of mustard germplasm based on aphid infestation index

The Aphid Infestation Index for each germplasm was recorded according to the method adopted by Tejavathu *et al.* (1991) as given below.

Group	Percentage of Population rating	Rating Index
I	0	Immune (I)
II	≤ 1	Resistant (R)
III	1.1-1.5	Moderately resistant (MR)

IV	1.6-2.0	Moderately Susceptible (MS)
V	2.1-3.0	Susceptible (S)
VI	> 3.0	Highly susceptible (HS)

The infestation rating of mustard aphid was observed on mustard germplasm and sampling of mustard aphid population was done by counting @ of 5 aphid/ plant.

Results and Discussion

Evaluation of mustard germplasm based on aphid infestation index

The crop was regularly monitored for the infestation of mustard aphid from its first appearance (late January) till the maturity of the crop (mid-March). By mustard aphid infestation induces, five categories of germplasm viz., Immune, Resistant, Moderately resistant, Susceptible, Highly susceptible were made for the infestation causes 0, <1, 1.1, 1-1.5, 1.5-2.0, 2.1-3.0 and >3.0 respectively and abbreviated by I, R, MR, MS, S and HS, respectively.

The results regarding aphid infestation indices by mustard aphid is summarized in Table 3. The perusal of Table 3 revealed that out of 240 germplasm screened against mustard aphid, majority belonged to a resistant category based on aphid infestation index. The results of mustard aphid infestation on number basis are summarized in Table 3. Plant damage on number basis showed significant variations. The lowest aphid infestation was observed in the germplasm, 339589 (0.46), whereas the highest aphid infestation index was recorded in the germplasm viz., 296703, 491028, 248993, 296690.

Thus out of 240 tested accessions, 134 belongs to resistant (R) category followed by 75 germplasm falling under moderately resistant (MR) category and 24 germplasm falling under moderately susceptible category, whereas 7 belongs to susceptible.

No germplasm was found to belong to a highly susceptible category, which is no severe stunting of plants, curling and yellowing of almost all the leaves were recorded. Sufficient flowering and pod setting were observed. Nevertheless, no germplasm was observed as immune to the mustard aphid attack.

Pink *et al.* (2003) reported that, there was no survival of *L. erysimi* on *B. fruticulosa* after 5-8 days of release while maximum survival was observed on BSH-1 followed by AD-4. Almost similar trend was observed w.r.t. development time, fecundity and longevity. In the screen

**Table 1:** Aphid population on mustard accession over the season, during 2010-2011

Sl. No.	Accession (IC No.)	Date of Observations							Total	Mean	Grade
		D1	D2	D3	D4	D5	D6	D7			
CH-1	PJ Kisan	1.00	1.50	3.00	3.75	3.00	2.50	0.75	15.50	2.21	S
1	248993	1.25	3.00	4.00	4.00	2.75	2.00	0.25	17.25	2.46	S
2	255498	-	-	0.75	1.50	2.25	1.00	0.50	6.00	1.20	MR
3	257765	1.00	2.00	2.50	3.00	2.50	2.00	0.50	13.50	1.93	MS
4	291158	1.50	2.00	2.50	2.75	2.00	1.50	0.25	12.50	1.79	MS
5	296685	0.25	0.50	0.75	2.00	3.50	3.50	1.50	12.00	1.71	MS
6	296690	1.75	2.25	3.00	3.50	3.25	1.50	0.25	15.50	2.21	S
7	296703	2.75	3.25	4.50	4.75	3.00	1.00	0.25	19.50	2.79	S
8	296705	1.75	3.00	3.50	3.75	2.00	1.00	0.25	15.25	2.18	S
9	310758	1.75	2.50	3.00	3.25	2.00	0.75	0.00	13.25	1.89	MS
10	320641	0.50	1.00	1.50	2.50	2.50	1.00	0.25	9.25	1.32	MR
11	320648	0.75	1.25	2.00	2.25	2.00	0.75	0.00	9.00	1.29	MR
12	320701	1.25	2.00	3.00	3.25	1.75	0.50	0.00	11.75	1.68	MR
13	324000	0.25	0.50	0.75	1.75	1.50	2.00	0.75	7.50	1.07	MR
CH-2	Rajat	1.00	1.50	2.00	2.25	2.00	1.00	0.50	10.25	1.46	MR
14	326253	1.25	2.00	2.50	3.00	3.75	3.00	0.50	15.50	2.21	S
15	329705	0.25	2.50	1.00	1.50	2.00	1.00	0.75	7.00	1.00	R
16	328316	1.25	1.75	2.25	2.50	2.50	2.00	0.75	13.00	1.86	MS
17	335847	0.25	0.50	0.75	1.00	1.50	0.75	0.50	5.25	0.75	R
18	335854	0.50	0.75	1.00	1.00	1.25	1.50	0.75	6.75	0.96	R
19	338523	0.25	0.50	0.75	1.00	1.50	1.00	0.50	5.50	0.79	R
20	339589	0.25	0.25	0.50	0.75	1.00	0.50	0.00	3.25	0.46	R
21	339597	0.25	0.50	0.50	0.75	1.00	0.75	0.25	4.00	0.57	R
22	339625	0.25	0.50	0.75	1.00	1.25	1.50	0.75	6.00	0.86	R
CH-3	RH- 30	0.75	1.00	1.50	1.75	1.50	1.00	0.50	8.00	1.14	MR
23	341457	0.75	1.25	2.00	2.25	1.50	0.50	0.00	8.25	1.18	MR
24	347947	0.75	1.00	1.50	1.75	1.25	0.25	0.00	6.50	0.93	R
25	347994	0.50	0.75	1.00	1.25	1.50	0.25	0.00	5.25	0.75	R
26	360723	1.00	1.50	2.00	2.50	2.25	1.25	1.00	11.50	1.64	MS
27	360770	1.25	2.00	2.75	3.00	2.50	1.50	0.75	13.75	1.96	MS
28	363606	1.25	2.00	2.75	3.00	2.50	1.00	0.25	12.75	1.82	MS
29	363737	0.50	0.75	1.25	1.50	1.00	0.50	0.00	5.50	0.79	R
30	366460	1.00	1.25	2.00	2.25	1.50	0.50	0.00	8.50	1.21	MR
31	334698	0.50	0.75	1.25	1.75	2.00	1.00	0.25	7.50	1.07	R
32	375924	0.50	0.75	1.50	1.75	2.00	0.50	0.00	7.00	1.00	R
33	375925	1.75	2.25	3.50	4.00	2.50	0.75	0.25	15.10	2.14	S
34	397277	1.25	1.75	2.50	2.75	2.00	0.50	0.25	11.00	1.57	MS
35	397537	0.50	1.00	1.50	1.75	2.50	0.75	0.25	7.25	1.04	MR
CH-4	Varuna	0.75	1.25	1.75	2.25	1.50	1.00	0.50	9.00	1.29	MR
36	399678	0.75	1.50	2.00	2.25	2.00	0.75	0.25	9.50	1.36	MR
37	399784	0.50	1.00	1.75	2.00	1.50	1.50	0.50	8.75	1.25	MR
38	399788	-	0.25	0.50	0.75	1.00	1.25	0.75	4.50	0.75	R
39	399795	0.25	0.50	0.75	1.00	1.25	0.75	1.00	5.50	0.79	R

(Cont...)



40	399802	0.50	0.75	1.25	1.50	1.75	1.25	0.75	7.75	1.11	MR
CH-5	Laxmi	0.75	1.25	2.00	2.25	2.50	1.50	1.00	11.25	1.61	MS
CH-2	Rajat	0.93	0.75	1.00	1.25	1.75	1.00	0.25	6.50	0.93	R
41	399803	0.75	1.50	2.50	3.00	1.50	0.50	0.25	10.00	1.43	MR
42	399808	0.75	1.25	2.00	2.50	1.50	0.75	0.25	8.00	1.14	MR
43	399814	0.50	0.75	1.25	1.50	1.50	1.75	0.50	7.75	1.11	MR
44	399815	0.25	0.50	0.75	1.00	1.25	1.50	0.50	5.75	0.82	R
45	399816	0.25	0.50	0.75	1.25	1.25	0.50	0.25	4.75	0.68	R
46	399824	0.75	1.00	1.25	1.75	2.00	0.50	0.75	8.00	1.14	MR
47	399826	0.25	0.50	0.75	1.00	1.25	0.75	0.50	5.00	0.71	R
CH-3	RH- 30	0.25	0.50	0.75	1.00	1.50	0.50	0.25	4.75	0.68	R
48	399840	0.75	1.00	1.50	1.75	1.50	1.00	0.50	8.00	1.14	MR
49	399853	0.50	0.75	1.00	1.25	1.25	0.75	0.25	5.75	0.82	R
50	399878	0.25	0.50	0.75	1.00	2.00	1.75	0.25	6.50	0.93	R
51	401570	0.75	1.00	1.75	2.00	2.25	1.00	0.50	9.25	1.32	MR
52	401574	1.25	1.75	2.50	2.75	2.50	0.75	0.25	11.75	1.68	MS
53	417020	0.25	0.50	0.75	1.00	1.75	0.75	0.25	5.25	0.75	R
54	422165	0.75	1.25	2.00	2.00	2.25	1.00	0.50	9.75	1.39	MR
55	422195	1.25	1.75	2.25	2.50	2.50	0.50	0.25	11.00	1.57	MS
56	426220	1.00	1.25	2.00	2.25	1.50	0.25	0.00	8.25	1.18	MR
57	426221	1.25	1.50	2.25	2.50	2.00	0.50	0.00	10.00	1.43	MR
58	426346	1.00	1.25	1.75	2.00	1.50	0.25	0.00	7.75	1.11	MR
59	426351	0.50	0.75	1.00	1.50	1.50	0.50	0.00	5.75	0.82	R
60	426354	0.50	0.75	1.25	1.50	1.25	0.50	0.25	6.00	0.86	R
61	426357	0.75	1.00	1.50	1.75	2.50	1.50	0.25	9.25	1.32	MR
62	426358	0.50	0.75	1.25	1.50	1.00	0.50	0.00	5.50	0.79	R
CH-4	Varuna	1.00	1.25	1.50	2.75	3.00	1.25	0.25	12.00	1.71	MS
63	426379	0.75	1.00	1.50	1.75	1.00	0.50	0.00	6.50	0.93	R
64	426395	0.75	1.00	1.50	1.75	1.75	0.50	0.00	7.25	1.04	MR
65	426401	-	0.25	0.50	1.00	1.25	0.25	0.00	3.25	0.54	R
66	490996	0.25	0.50	0.75	1.00	1.75	0.50	0.00	4.75	0.68	R
67	491004	1.00	1.25	2.00	2.25	2.00	0.75	0.75	9.50	1.36	R
68	491011	1.25	1.50	2.50	2.75	2.50	1.00	0.50	12.00	1.71	MS
69	491016	1.25	1.75	3.00	3.50	2.00	0.75	0.25	12.50	1.79	MS
70	491024	1.00	1.50	2.50	2.75	2.00	1.00	0.25	11.00	1.57	MS
71	491028	1.50	2.25	3.00	3.25	3.00	1.00	0.00	14.00	2.33	S
72	491029	1.50	2.00	2.50	3.00	2.00	0.50	0.25	11.75	1.68	MS
73	491031	1.25	2.50	3.25	3.50	2.50	0.75	0.25	14.00	2.00	MS
CH-5	Laxmi	1.75	2.25	3.00	3.50	3.00	2.00	0.75	16.25	2.32	S
74	491036	1.00	1.25	1.75	2.00	2.50	1.50	0.50	10.50	1.50	MR
75	491038	1.00	1.25	1.50	2.00	2.50	1.50	0.50	10.25	1.46	MR
76	491039	0.75	1.00	1.50	1.75	2.00	1.50	0.75	9.25	1.32	MR
77	491040	1.00	1.50	2.50	2.75	3.00	1.75	0.75	13.25	1.89	MS
78	491041	1.25	1.75	2.25	2.50	1.50	0.50	0.25	10.00	1.43	MR
79	491042	0.75	1.00	1.75	2.00	2.25	0.75	0.25	8.75	1.25	MR
80	491043	0.75	1.00	1.25	1.50	2.00	1.50	0.75	8.75	1.25	MR
CH-1	PJ Kisan	1.25	1.75	2.25	2.50	2.75	1.75	0.25	12.25	1.75	MS

(Cont...)

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CH-3	RH- 30	1.00	1.25	1.50	2.00	2.50	1.00	0.75	10.00	1.43	MR
81	491044	1.00	1.50	2.00	2.50	2.50	1.25	0.50	11.25	1.61	MS
82	491046	0.75	1.00	1.50	2.00	1.50	0.75	0.50	8.00	1.14	MR
83	491047	1.00	1.25	2.50	2.75	1.75	1.00	0.25	10.50	1.50	MR
84	491048	1.25	1.75	2.25	2.50	1.00	0.50	0.00	9.25	1.16	MR
85	491049	0.50	0.75	1.25	2.00	1.50	0.75	0.25	7.00	1.00	MR
86	491052	0.75	1.00	1.50	2.00	1.75	2.00	1.00	10.00	1.43	MR
CH-4	Varuna	0.75	1.00	1.25	1.50	2.00	2.25	1.25	10.00	1.43	MR
87	491053	1.25	1.50	2.00	2.25	1.50	0.75	0.25	9.50	1.36	MR
88	491056	1.00	1.50	1.75	2.00	1.50	0.75	0.50	9.00	1.29	MR
89	491057	1.00	1.50	2.00	2.50	3.00	2.00	0.75	12.75	1.82	MS
90	491058	1.75	2.25	3.00	3.25	2.50	1.00	0.25	14.00	2.00	MS
91	491060	—	0.25	0.50	0.75	1.50	0.75	0.50	4.25	0.71	R
92	491061	1.75	2.25	3.50	4.00	2.50	0.75	0.25	15.00	2.14	S
93	491063	1.00	1.25	2.00	2.75	1.75	0.50	0.25	9.50	1.36	MR
94	491067	0.75	1.00	1.50	2.25	1.50	0.50	0.25	7.75	1.11	MR
95	491073	0.50	0.75	1.00	1.50	1.25	0.50	0.00	5.50	0.92	R
96	491074	0.50	0.75	1.25	1.50	1.50	0.75	0.25	6.50	0.93	R
CH-5	Laxmi	0.50	0.75	1.25	1.50	1.75	0.50	0.25	6.50	0.93	R
97	491080	1.00	1.25	1.50	2.00	1.50	0.75	0.50	8.50	1.21	MR
98	491081	0.50	0.75	1.00	1.50	1.75	1.00	0.75	7.25	1.04	MR
99	491082	0.25	0.50	0.75	1.25	1.50	0.75	0.50	5.50	0.79	R
100	491084	0.75	1.00	1.50	1.75	2.00	1.25	0.75	9.00	1.29	MR
101	491085	0.50	0.75	1.25	1.50	1.50	0.50	0.00	6.00	1.00	R
102	491086	0.75	1.50	2.50	2.75	2.50	1.00	0.25	11.25	1.61	MS
103	491093	1.00	1.25	1.75	2.00	2.50	0.75	0.25	9.50	1.36	MR
104	491100	0.50	0.75	1.25	1.50	2.00	0.50	0.00	6.50	1.08	MR
105	491101	0.25	0.50	0.75	1.00	1.75	1.50	0.25	6.00	0.86	R
106	491104	1.00	1.50	2.50	3.00	2.00	1.00	0.50	11.50	1.64	MS
107	491105	0.50	0.75	1.00	1.25	1.50	0.75	0.25	6.00	0.86	R
108	491106	0.25	0.50	0.75	1.00	2.25	2.00	1.00	7.75	1.11	MR
109	491108	1.00	1.25	1.50	1.75	2.50	1.25	0.50	9.75	1.39	MR
110	491111	—	0.25	0.50	1.00	1.50	0.50	0.00	3.75	0.75	R
111	491112	0.50	0.75	1.00	1.25	1.75	1.00	0.50	6.75	0.96	R
112	491114	0.50	0.75	1.25	1.50	1.50	0.75	0.50	6.75	0.96	R
113	491116	0.25	0.50	0.75	1.00	1.25	0.50	0.25	4.50	0.64	R
114	491117	0.75	1.00	1.50	2.00	1.75	0.50	0.00	7.50	1.25	MR
CH-1	PJ Kisan	1.25	1.50	1.75	2.00	2.25	1.00	0.50	10.25	1.46	MR
115	491118	0.50	0.75	1.00	1.50	1.50	0.75	0.25	6.25	0.89	R
116	491119	0.25	0.50	1.00	1.25	1.50	0.25	0.00	4.75	0.79	R
117	491120	-	0.25	0.50	0.75	1.00	1.25	0.50	4.25	0.71	R
118	491123	0.25	0.50	0.75	1.25	1.50	0.75	0.25	5.25	0.75	R
119	491124	0.50	0.75	1.00	1.25	1.50	1.00	0.50	6.50	0.93	R
120	491125	0.25	0.50	1.00	1.25	1.75	1.00	0.75	6.50	0.93	R
CH-2	Rajat	0.50	0.75	1.25	1.50	1.50	1.00	1.00	7.50	1.07	MR
CH-4	Varuna	0.25	0.50	0.75	1.00	1.50	0.75	0.50	5.25	0.75	R
121	491127	—	0.25	0.50	1.00	1.25	0.50	0.50	4.00	0.67	R

(Cont...)



122	491128	0.50	0.50	0.75	1.00	1.00	0.50	0.75	5.00	0.71	R
123	491129	—	0.25	0.50	1.00	1.25	0.50	0.25	3.75	0.63	R
124	491130	—	0.25	0.25	0.75	1.25	0.50	0.25	3.25	0.54	R
125	491131	—	0.25	0.50	1.00	1.25	0.75	0.50	4.25	0.71	R
126	491133	0.50	0.75	1.00	1.50	1.50	0.75	0.25	6.25	0.89	R
127	491136	0.25	0.50	1.00	1.25	1.50	0.50	0.25	5.25	0.75	R
128	491137	—	0.25	0.50	0.75	1.00	0.50	0.25	3.25	0.54	R
CH-5	Laxmi	0.50	1.00	1.25	1.50	1.75	1.00	0.75	7.75	1.11	MR
129	491138	—	0.25	0.50	0.75	1.00	1.00	0.75	4.25	0.71	R
130	491139	—	0.25	0.50	0.75	0.75	0.50	0.00	2.75	0.55	R
131	491141	0.25	0.50	0.75	1.00	1.50	0.75	0.25	5.00	0.71	R
132	491142	0.25	0.25	0.50	1.00	1.50	0.75	0.25	4.50	0.64	R
133	491143	0.50	0.75	1.00	1.25	1.50	0.50	0.25	5.75	0.82	R
134	491144	0.25	0.50	0.75	1.00	1.00	0.25	0.00	3.75	0.63	R
135	491145	0.50	0.75	1.00	1.50	2.00	0.75	0.25	6.75	0.96	R
136	491149	0.75	1.00	1.50	1.50	1.75	0.75	0.25	7.50	1.07	MR
CH-1	PJ Kisan	1.25	1.50	1.75	2.00	2.25	1.00	0.25	10.00	1.43	MR
137	491150	0.50	0.75	1.00	1.25	1.50	0.75	0.25	6.00	0.86	R
138	491151	0.50	0.75	1.00	1.25	1.50	0.75	0.25	5.75	0.82	R
139	491152	0.25	0.50	0.75	1.00	1.25	0.50	0.25	4.50	0.64	R
140	491156	0.50	0.75	1.00	1.25	1.50	0.75	0.50	6.25	0.89	R
141	491157	0.25	0.50	0.75	1.00	1.00	0.25	0.25	4.00	0.57	R
142	491158	1.00	1.25	1.75	2.00	2.50	0.75	0.25	9.50	1.36	MR
143	491162	0.50	0.75	1.00	1.25	1.50	0.50	0.00	5.50	0.92	R
144	491163	1.00	1.25	1.50	1.75	2.50	0.75	0.25	9.00	1.29	MR
145	491165	0.75	1.00	1.50	2.00	2.00	0.50	0.25	8.00	1.14	MR
146	491166	0.25	0.50	0.75	1.00	1.50	1.00	0.50	5.50	0.79	R
147	491167	0.50	0.75	1.00	1.25	1.75	0.75	0.25	6.25	0.89	R
148	491170	0.75	1.00	1.25	1.50	1.00	0.50	0.00	6.00	1.00	R
149	491171	0.75	1.00	1.50	2.00	1.50	0.50	0.25	7.50	1.07	MR
CH-2	Rajat	0.50	0.75	1.00	1.75	2.00	1.00	0.50	7.50	1.07	MR
150	491173	1.00	1.25	2.00	2.25	2.50	1.00	0.25	10.25	1.46	MR
151	491175	0.75	1.00	1.50	1.75	2.25	0.75	0.00	8.00	1.33	MR
152	491176	0.50	0.75	1.00	1.50	1.25	0.50	0.00	5.50	0.92	R
153	491177	0.50	0.75	1.00	1.50	2.25	1.00	0.50	7.50	1.07	MR
154	491180	0.25	0.50	0.75	1.00	2.00	1.25	0.75	6.50	0.93	R
155	491181	—	0.25	0.50	0.75	1.50	0.50	0.25	3.75	0.63	R
156	491182	—	0.25	0.50	0.75	0.75	0.50	0.00	2.75	0.55	R
157	491183	0.25	0.50	0.50	1.00	0.75	0.50	0.25	3.75	0.54	R
158	491184	—	0.25	0.50	0.75	1.00	0.50	0.00	3.00	0.60	R
159	491185	0.25	0.50	0.50	0.75	1.50	0.75	0.25	4.50	0.64	R
160	491186	0.50	0.50	0.75	1.00	1.25	0.75	0.00	4.75	0.79	R
CH-3	RH- 30	1.00	1.25	1.75	2.00	2.50	1.50	0.75	10.75	1.54	MS
CH-5	Laxmi	0.75	1.00	1.25	1.50	2.25	1.75	1.00	9.50	1.36	MR
161	491187	0.50	1.00	1.50	2.00	1.50	0.75	0.25	7.50	1.07	MR
162	491188	0.50	0.75	1.00	1.50	1.50	0.75	0.50	6.50	0.93	R
163	491189	0.50	0.75	1.25	1.50	1.75	0.75	0.25	6.75	0.96	R

(Cont...)

Screening of Certain Promising Germplasm of *Brassica* spp. Against *Lipaphis erysimi* Kalt



164	491190	1.00	1.25	1.50	1.75	2.00	1.00	0.50	9.00	1.29	MR
165	491192	1.50	1.75	2.25	2.50	2.00	0.75	0.25	11.00	1.57	MS
166	491195	1.00	1.25	1.75	2.25	2.00	0.50	0.25	9.00	1.29	MR
167	491198	0.50	0.75	1.00	1.50	1.50	0.50	0.00	5.75	0.96	R
CH-1	PJ Kisan	0.75	1.25	1.75	2.00	2.00	1.50	0.75	10.00	1.43	MR
168	491200	0.25	0.50	0.75	1.25	1.00	0.50	0.25	4.50	0.64	R
169	491201	—	0.25	0.50	0.75	1.00	0.50	0.00	3.00	0.60	R
170	491202	0.75	1.00	1.25	1.50	1.75	0.75	0.25	7.25	1.04	MR
171	491203	0.75	1.25	1.75	2.00	1.50	0.50	0.25	8.00	1.14	MR
172	491205	0.50	0.75	1.00	1.50	1.75	0.75	0.25	6.50	0.93	R
173	491206	0.75	1.00	1.25	1.50	1.50	0.50	0.25	6.75	0.96	R
174	491210	0.75	1.25	1.75	2.00	2.25	1.00	0.50	9.50	1.36	R
175	491211	1.00	1.25	1.50	2.00	1.50	0.75	0.25	8.25	1.18	MR
176	491213	0.50	0.75	1.00	1.75	2.25	1.25	0.50	8.00	1.14	MR
177	491214	1.00	1.50	2.00	2.25	2.50	1.00	0.25	10.50	1.50	MR
178	491215	0.75	1.00	1.50	2.00	1.75	0.50	0.25	7.75	1.11	MR
CH-2	Rajat	0.75	1.00	1.25	1.50	2.00	1.00	0.25	7.75	1.11	MR
179	491217	0.75	1.25	1.75	2.00	2.25	1.00	0.50	9.50	1.36	MR
180	491219	0.25	0.50	0.75	1.25	1.50	0.50	0.00	4.75	0.79	R
181	491220	0.75	1.00	1.25	1.50	2.00	0.75	0.50	7.75	1.11	R
182	491221	0.25	0.50	1.00	1.00	2.00	1.00	0.50	6.25	0.89	R
183	491222	0.50	0.75	1.00	1.25	1.50	0.75	0.25	6.00	0.86	R
184	491224	0.25	0.50	0.75	1.25	0.75	0.50	0.25	4.25	0.61	R
185	491225	0.25	0.50	0.75	1.00	1.00	0.50	0.00	4.00	0.67	R
186	491227	0.75	1.00	1.25	1.50	1.00	0.50	0.00	6.00	1.00	R
187	491229	0.50	0.75	1.25	1.25	1.00	0.50	0.25	5.50	0.79	R
188	491230	0.50	0.75	1.00	1.50	1.75	1.00	0.50	7.00	1.00	R
189	491231	0.25	0.50	1.00	1.25	1.50	0.50	0.25	5.25	0.75	R
190	491232	0.25	0.50	0.75	1.00	1.00	0.25	0.00	3.75	0.61	R
191	491233	—	0.25	0.50	0.75	1.00	0.50	0.00	3.00	0.60	R
192	491234	0.25	0.50	0.50	0.75	0.75	0.50	0.25	3.50	0.50	R
CH-3	RH- 30	—	0.25	0.25	0.50	0.75	0.75	0.50	3.00	0.50	R
193	491235	—	0.25	0.25	0.75	0.75	0.75	0.25	3.00	0.50	R
194	491237	—	0.25	0.25	0.50	0.50	0.50	0.25	2.25	0.38	R
195	491238	—	0.25	0.50	0.75	1.00	0.75	0.25	3.50	0.58	R
196	491240	—	0.25	0.50	1.00	1.50	0.75	0.25	4.25	0.71	R
197	491241	—	0.25	0.25	0.50	0.75	0.50	0.25	2.50	0.42	R
198	491242	0.25	0.50	0.50	0.75	1.00	0.50	0.00	3.50	0.58	R
199	491243	0.25	0.50	0.75	1.25	2.00	0.75	0.25	5.75	0.82	R
200	491244	0.50	0.50	0.75	1.00	2.00	1.00	0.25	6.00	0.86	R
CH-4	Varuna	0.75	1.00	1.25	1.50	2.00	1.00	0.50	8.00	1.14	MR
CH-1	PJ Kisan	0.75	1.00	1.50	2.00	2.50	1.50	0.75	10.00	1.43	MR
201	491245	1.00	1.25	1.50	2.00	1.75	0.75	0.25	8.50	1.21	MR
202	491246	0.75	1.00	1.50	1.75	1.50	0.75	0.25	7.50	1.07	MR
203	491248	0.75	1.00	1.25	1.50	2.00	1.00	0.25	7.75	1.11	MR
204	491249	0.50	0.75	1.00	1.50	1.00	0.75	0.25	5.75	0.82	R
205	491251	0.50	0.75	1.00	1.50	1.50	0.75	0.50	6.50	0.93	R

(Cont...)



206	491253	0.25	0.50	0.75	1.00	1.50	1.00	0.50	5.50	0.79	R
207	491254	0.25	0.50	0.75	1.00	1.25	0.75	0.25	4.75	0.68	R
208	491255	—	0.25	0.50	0.75	1.00	0.75	0.25	3.50	0.58	R
209	491256	0.25	0.50	0.75	1.25	1.50	1.00	0.50	5.75	0.82	R
210	491257	—	0.25	0.50	0.75	1.00	0.75	0.50	3.75	0.63	R
CH-2	Rajat	0.25	0.50	0.75	1.00	1.50	1.00	0.75	5.75	0.82	R
211	491262	—	0.25	0.50	0.75	1.25	0.75	0.25	3.75	0.63	R
212	491264	0.25	0.50	0.50	1.00	1.50	1.00	0.50	5.25	0.75	R
213	491265	—	0.25	0.50	0.75	1.00	0.75	0.25	3.50	0.58	R
214	491266	—	0.25	0.50	0.75	0.75	0.50	0.00	2.75	0.55	R
215	491267	0.25	0.50	0.75	1.00	1.00	1.00	0.25	4.75	0.68	R
216	491268	0.25	0.50	0.75	1.00	1.00	0.75	0.50	4.75	0.68	R
217	491269	0.50	0.50	0.75	1.25	0.75	0.50	0.00	4.25	0.71	R
218	491271	—	0.25	0.50	1.00	1.00	0.50	0.25	3.50	0.58	R
219	491274	—	0.25	0.50	0.75	1.00	0.75	0.25	3.50	0.58	R
220	491276	0.50	0.75	1.00	1.25	1.50	0.75	0.50	6.25	0.89	R
CH-3	RH- 30	0.50	0.75	1.00	1.50	1.75	0.50	0.00	6.00	1.00	R
221	491280	0.25	0.50	0.75	1.00	1.00	0.50	0.25	4.25	0.61	R
222	491281	0.75	1.00	1.25	1.50	1.75	0.75	0.50	7.50	1.07	MR
223	491283	1.00	1.25	1.50	2.00	1.50	0.75	0.50	8.50	1.21	MR
224	491284	0.50	0.75	1.00	1.50	1.25	0.50	0.25	5.75	0.82	R
225	491285	1.00	1.25	1.50	1.75	1.50	0.50	0.25	7.75	1.11	MR
226	491286	0.75	1.00	1.25	1.50	1.50	0.75	0.25	7.00	1.00	MR
227	491287	0.75	1.00	1.25	1.75	2.00	1.00	0.50	8.25	1.18	MR
228	491288	0.25	0.50	0.75	1.00	1.50	0.75	0.25	5.00	0.71	R
229	491290	0.75	1.25	1.75	2.00	2.00	0.75	0.50	9.00	1.29	MR
230	491292	1.25	1.75	2.25	2.50	2.00	1.00	0.50	11.25	1.61	MS
CH-4	Varuna	1.25	1.50	2.00	2.50	2.00	1.00	0.25	10.50	1.50	MR
231	491294	1.00	1.50	1.75	2.25	1.75	0.50	0.00	8.75	1.46	MR
232	491296	0.75	1.00	1.50	1.75	2.00	0.75	0.25	8.00	1.14	MR
233	491298	0.75	1.00	1.25	1.75	1.50	0.50	0.25	7.00	1.00	R
234	491299	0.50	0.75	1.00	1.25	1.00	0.50	0.25	5.25	0.75	R
235	491301	0.50	0.75	1.00	1.25	1.75	0.50	0.00	5.75	0.96	R
236	491304	0.75	1.00	1.25	1.50	1.25	0.50	0.25	6.50	0.93	R
237	491307	0.25	0.50	0.75	1.00	1.50	0.75	0.50	5.25	0.75	R
238	491309	0.50	0.75	1.25	1.50	1.50	1.00	0.75	7.25	1.04	R
239	491310	0.25	0.50	0.50	1.25	1.75	1.00	0.25	5.50	0.79	R
240	491312	0.25	0.50	0.75	1.25	1.50	1.25	0.75	6.25	0.89	R
CH-5	Laxmi	0.50	0.75	1.25	1.75	2.50	1.75	0.75	9.25	1.32	MR

house studies also maximum aphid population and the consequent seedling mortality was observed on BSH-1, while no seedling mortality was observed on *B. fruticulosa*. The amphiploid (AD 4) between *B. fruticulosa* and *B. rapa* produced also harboured significantly lower aphid (*L. erysimi*) population than *B. rapa* parent. It also did not show any seedling mortality. This emphasized the heritability of *B. fruticulosa* resistance. Phenotyping of *B. juncea* introgression lines

for aphid resistance showed excellent resistance in many of the introgression lines. We propose to map the introgressed segment carrying factor(s) for aphid resistance. We made an attempt to fix high levels of resistance in true breeding lines of *B. fruticulosa* to *B. brassicae*. The resistant inbred lines harboured on an average 3.0 aphids/plant compared to 96.0 aphids/plant on susceptible inbred lines.



In the whole season, it was observed that accession no. 491128, 491176, 491123, 491144 showed minimum population on plant, were found resistant against mustard aphid. Accession no. 491041, 320648, 426401, 491042 were observed susceptible against mustard aphid. No germplasm was found to belong immune against mustard aphid. The different category of resistance of mustard plants against aphid based on its population 16 out of 240 has been recorded as resistant, 83 accessions as moderately resistant, 102 accessions as susceptible accessions. Whereas 39 accessions were found highly susceptible.

The lowest percent plant damage observed in the germplasm, accession no. 339589 with 0.46% plant damage was found highly resistant, whereas the highest percent plant damage was recorded in the accession no. viz., 296703, 491028, 248993, 296690, were found susceptible. Thus out of 240 tested, 134 belongs to resistant (R) category followed by 75 accessions falling under moderately resistant (MR) category and 24 accessions as moderately susceptible category, 7 belongs to susceptible. None accessions were found to as highly susceptible.

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