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Assessment of the varietal preference and resistance against Lipaphis Erysimi (K.) in segregating mustard genotypes under agro-ecological conditions of Peshawar, Pakistan

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Abstract
A total of 46 genotypes were screened in the field for susceptibility/resistance to aphids at flowering to pods stage. In preliminary screening 31 lines were selected. Further data were collected for percent (%) infestation and mean number of aphids. Genotypes were grouped as 'Highly resistant' 'Resistant' 'Moderate' 'Susceptible' and 'Highly susceptible'. In percent (%) infestation variation was as genotypes (G7, G28, and G46) < (G1, G27, G31, G35, G36, G37) < (G3, G6, G11, G12, G14, G24, G25, G29, G30, G43) < (G2, G4, G5, G18, G19, G20, G22, G39, G45) < (G9, G10, G21). In mean number of aphid/10 cm of florescence genotype G7, G28 and G46 carried minimum number of 2.22 aphids while genotype G9, G18, G20, G21 and G36 got maximum number of 391.60 aphids.

Keywords: Genotypes, Rapeseeds-mustard (Brassica napus), Resistance, Mustard Aphid (Lipaphis erysimi K.)

1. Introduction
Brassica crops are grown worldwide for oil, food and feed purposes and hold a significant economic value due to their medicinal, bio-industrial and nutritional properties. Rapeseed-mustard (*Brassica napus*) is the second most important source of oil in Pakistan after cotton with annual production of Pakistan is 191.9 (000) tones (886 kg/hc). It is cultivated over an area of 17.1 (000) hc in Khyber-Pakhtunkhwa with total of 219.5 (000) hc in Pakistan [6] Rapeseed-mustard is the major contributor among traditional oilseed crops [1].
Brassica crops are attacked by a large number of insect pests including mustard aphid (*Lipaphis erysimi* K.), Cabbage aphid (*Brevicoryne brassicae* L.) Whiteflies, painted bugs, mustard leaf eater, thrips etc. Among the various insect pests infesting Brassica, mustard aphid (*L. erysimi* K.) (Aphididae: Hemiptera) is the most prominent one causing as high as 97.6% yield losses [7]. The aphid's feeding on the plant directly results in stunted growth, yellowing, wilting and distortion of plants while indirectly by transmission of diseases which leads to huge losses. Both the adults and nymphs cause damage to mustard plant at vegetative, flowering and pod formation by sucking sap from the plant. In case of intense infestation leaves become curled, plant give up to develop pods; the young pods when developed do not get maturity and not able to produce healthy seeds. As a result, plant lose their health and growth is stunted [3, 9].
The losses caused by insect pests particularly aphids have compelled the entomologists to develop control strategies for these insect pests. Feeling the gravity of the situation, the study was carried out to assess the varietal preference of *L. erysimi* (K.) and locate aphid resistance in different mustard genotypes under agro-ecological conditions of New Developmental Farm (NDF) Malakandher, The University of Agriculture, and Peshawar, Pakistan.

2. Materials and Methods
Current study was designed for the screening of various segregating rapeseed-mustard lines against mustard aphid *L. erysimi* (K.) from flowering to pod maturity stage at New Developmental Farm, during 2013-14. A total of 46 genotypes of Rapeseed-mustard

(*B. napus*). (Table 1.) Were tested for resistance in the field against mustard aphid *L. Erysimi* (K.). Seeds of all the test accessions were provided by the Institute of Biotechnology and Genetic Engineering (IBGE), The University of Agriculture, Peshawar-Pakistan.

Table 1: Rapeseed-mustard (*B.* napus) genotypes name and their parentage.

Genotypes	Pedigree/Parentage	Genotypes	Pedigree/Parentage
G1	Dunkled x E2	G24	Bnwc8sy x E8-2
G2	Dunkled x E3	G25	Bnwc8sy x E8-1
G3	Dunkledx E4	G26	Bnwc8sy x E7-2
G4	Dunkled x E5	G27	Bnwc8sy x E7-1
G5	Dunkled x E5-2	G28	Bnwc8sy x E6-2
G6	Dunkled x E6-2	G29	Bnwc8sy x E5-2
G7	Dunkled x E7-1	G30	Bnwc8sy x E6-1
G8	Dunkled x Bnwc8sy-2	G31	Bnwc8sy x Rainbow-2
G9	Dunkled x Bnwc8sy-1	G32	Bnwc8sy x Dunkled-1
G10	Dunkled x Rainbow-2	G33	Rainbow x Dunkled-1
G11	Dunkled x Rainbow-1	G34	Bnwc8sy x Dunkled-1
G12	Dunkled x Abasin95-1	G35	Rainbow x Dunkled-1
G13	Dunkled x E8-1	G36	Bnwc7rd x E3-4
G14	Dunkled x E7-2	G37	Rainbow x E4-1
G15	Dunkled x E7-1	G38	Rainbow x E6-1
G16	Dunkled x Bnwc8sy-2	G39	Rainbow x Bnwc8sy-1
G17	Dunkled x Roz-3	G40	Rainbow x Abasin95-1
G18	Bnwc8sy x E1-2	G41	Rainbow x E9-2
G19	Bnwc8sy x E2-2	G42	Rainbow x E8-1
G20	Bnwc8sy x E3-1	G43	Rainbow x E6-2
G21	Bnwc8sy x E4-1	G44	Rainbow x E6-1
G22	Bnwc8sy x E5-1	G45	Rainbow x Bnwc8sy-1
G23	Bnwc8sy x Rainbow-1	G46	Dunkled x Abasyn95-1

Field Experiment

Mustard seeds were sown by hand drill at 3-4cm depth in a RCBD plots of size (3mx5m) with in total area of $15m^2$ maintaining 30cm plant to plant and 60cm row to row distance. Each line was replicated three times. Prior to sowing pre-sowing irrigation was applied to plant experiment under optimum moisture conditions. Afterwards the experiments were grown under rain fed conditions during the season. Thinning was done to maintain optimum plant population. No plant protection practices were applied throughout the season and Data was recorded on the following parameters.

Preliminary screening

Preliminary screening was conducted for successful germination, plants vigour, and development till the maturity.in the field sown 46 genotypes and only 31 line were selected for further screening.

Percent infestation

The percent infestation of plant was determined according to Mamun [5] Percentage of plant infested = B/A x 100 whereas;

A = Total number of plants

B = Number of infested plants

Plants were counted at flowering stage while total numbers of infested and un-infested plants were counted in each line from all replications of each genotype for calculation of percent infestation by aphids.

Number of aphids at flowering stage

The population of aphids in the field was counted on 2 randomly selected plants from each replication and total of 6 plants from each accession at flowering stage. The top 10 cm apical twigs of the selected plants were cut with the help of scissor and ruler, and then brought to the laboratory in polythene bags separately for counting the number of aphids per plant. Pests were removed from the infested plant parts with the help of a soft camel hair brush on a piece of white paper and number of aphids (with progeny) were counted carefully.

The infestation parameters were based on percent infestation index and aphid population count. Its score was based on 0-to-5 grades (Table 2) adopted by Bakhetia [2] with slight modifications for this study.

Table 2: Scale for grading resistance categories against Mustard aphid in the field condition

Scale	Plant reaction To aphids	% infestation of plants by aphids	Mean No of aphids/10cm inflorescence
0.1-1.0	Highly resistant	0 – 10%	0-20
1.1-2.0	Resistant	>10 – 20%	>20-100
2.1-3.0	Moderate	>20 – 30%	>100-200
3.1-4.0	Susceptible	>30 -40%	>200-300
4.1-5.0	Highly susceptible	>40%	>300

3. Data Analysis

The data obtained were subjected to ANOVA for testing significance by using the statistical package Statisitix 8.1 [12].

4 Results and Discussion

The accessions G7, G28 and G46 plants got minimum (3.33) percent (%) infestation and falls in highly resistant category while the accessions G1, G27, G31, G35, G36 and G37 declared as resistant category based on (16.8) percent (%) infestation but the percent (%) infestation was higher in case of moderate category of resistance genotypes G3, G6, G11, G12, G14, G24, G25, G29, G30 and G43 (24.50). In case of susceptible category the genotypes “G2, G4, G5, G18, G19, G20, G22, G39 and G45” were recorded with higher number (33.47 %) of mean infestation of plants. The highly susceptible category of plants were G9, G10 and G21 with maximum mean percent (%) infestation of plants (42.75) compared to the tested genotypes (Table. 3)

This may be due to the plant morphological characteristics/parental qualities. These findings are in line with the results of Subhash [11] who reported that the differential behaviour of germplasm/accessions ranged from highly susceptible to highly tolerant. The percentage of highly resistant and tolerant germplasms in different species of Brassica ranged from 5% to 100% in closely related species. The infestation variation among the genotypes were also observed by Mamun [5]. Prasad [8] also concluded that among the different genotypes of Brassica, incidence of aphid showed variability as in the same group of cultivars. The level of aphid infestation and population on different Brassica accessions seem to be the ability of plant characteristics of different germplasm [7]. The lowest plant infestation was recorded in the variety MM014-02wf (1.79%) followed by the variety MM012-02ys (2.23%) and the variety Binasarisha-4.

Table 3. Frequency distribution of Brassica lines to aphid infestation (based on mean percent (%) infestation)

Categories	Accessions name	Mean % infestation of plants	Standard deviation	Coefficient of variation (%)
Highly resistant	G7, G28, G46	3.33	1.52	45.82
Resistant	G1, G27, G31, G35, G36, G37	16.82	2.42	14.38
Moderate	G3, G6, G11, G12, G14, G24, G25, G29, G30, G43	24.51	2.26	9.24
Susceptible	G2, G4, G5, G18, G19, G20, G22, G39, G45	33.47	3.00	8.97
Highly susceptible	G9, G10, G21	42.75	1.21	2.84

In 'highly resistant' category, accessions G7, G28 and G46 with minimum mean population density of aphid 2.22 per 10cm inflorescence ranked the group as 'highly resistant' category. Secondly in 'resistant' category the average population density of aphid on genotypes G3, G6, G12, G19, G24, G25, G27 and G35 recorded with 81.79 of aphids/10cm inflorescence. 'Moderate' category of resistance with accessions G1, G2, G11, G22, G29, G37 and G39 had a density of average aphid population 135.95 aphid/10cm of inflorescence. The average density of aphid population on 'susceptible' category of plants G4, G5, G10, G14, G30, G31, G43 and G45 attracted higher number 224.87 aphid/10cm inflorescence. The maximum number of aphids density population on plants of 'highly susceptible' category recorded on genotypes G9, G18, G20, G21 and G36 with (391.60) aphid /10cm inflorescence (Table. 4).

Solonagi [10] also reported the preference of *L. erysimi* (K.) on different cultivars of canola. They revealed that *L. erysimi* (K.) preferred the variety PR-1005 then the others, having peak population (593.5 aphids/plant) during last week of February while, variety AH-2001 have peak population (375.5 aphids/plant) and labelled AH-2001, as resistant to mustard aphid and PR-1005 as susceptible. Same results were also derived by Jatoi [4] from their experiments on twenty-two *B. napus* cultivars against *L. erysimi*. They the variety Shiralee and hybrid as susceptible and some other varieties as resistant and semi-resistant.

Table 4: Average population density of mustard aphid on 10cm inflorescence of brassica lines

Categories	Accessions name	Mean no of aphid/ 10cm inflorescence	Standard deviation	Coefficient of variation (%)
Highly resistant	G7, G28, G46	2.22	1.34	25.67
Resistant	G3, G6, G12, G19, G24, G25, G27, G35	81.79	11.55	14.13
Moderate	G1, G2, G11, G22, G29, G37, G39	135.95	17.62	12.96
Susceptible	G4, G5, G10, G14, G30, G31, G43, G45	224.87	12.22	5.43
Highly susceptible	G9, G18, G20, G21, G36	391.60	69.52	17.75

5. Conclusion

After thorough investigations total 31 selected genotypes were put under trials in which 3 genotypes were ranked as highly resistant and 3 highly susceptible in mean percent infestation while again 3 were ranked as highly resistant and 5 as highly susceptible in Mean no of aphid/ 10cm inflorescence.

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7. References

1. Ali N, Mirza MY. Present status of research for increased oilseeds production. Proceedings of National Conference on Achieving Self Sufficiency in Edible Oils. Agricultural Foundation of Pakistan, Islamabad, Pakistan, 2005.
2. Bakhetia DRC, Sandhu RS. Differential response of Brassica species/varieties to aphid, Lipaphis erysimi (Kalt.) infestation, J Res Punjab Agric. Uni. 1973; 10:272-279.
3. Husain M, Begum M. A number of insect pests attack mustard, J Agric. Res. 2009, 46.
4. Jatoi MY, Aslam M, Misbah-ul-haq, Ahmad S. Antixenosis of Brevicoryne brassicae on Different Genotypes of Cabbage (Brassica oleracea var. capitata), J Bio. Sci. 2002; 17:621-622.
5. Mamun MSA, Ali MH, Ferdous MM, Rahman MA, Hossain MA. Assessment of Several Mustard Varieties Resistance to Mustard Aphid, Lipaphis erysimi (Kalt.) J Soil Nature. 2010; 4(1):34-38.
6. Pakistan Bureau of Statistics. Government of Pakistan 2010-11, 2015. http://www.pbs.gov.pk/sites/default/files/agriculture_statistics/publications/Agricultural_Statistics_of_Pakistan_2011011/tables/Table29.pdf. 3rd Sep.
7. Patel SR, Awasthi AK, Tomar RKS. Assessment of yield losses in mustard (Brassica juncea L.) due to mustard aphid Lipaphis erysimi (Kalt.) under different thermal environment in Eastern Central India. App. Eco. And Env. Res 2004; 2:1-5.
8. Prasad YK, Phadke KG. Incidence of Mustard Aphid and its Correlation with the Flowering Time and Oil Content in Some Brassica Species, J App. Genetics. 1989; 3:162-168.
9. Shahjahan M. Field and laboratory evaluation of some

Brassica germplasm for resistance to aphid. M.Sc. (Ag) Thesis, Department of Entomology, Bangladesh Agril. Univ. Mymensingh, 1994, 1-50.
10. Solangi BK, Talpur MA, Nizamani IA. Preference of Lipaphis erysimi (Kalt.) to Different Canola Varieties. Sarhad J Agric. 2007; 23(3):701-704.
11. Subhash C, Prasad TV, Ranbir S, Subadas S, Gautam RD, Shashi B. Evaluation of Different Brassica Species against Mustard Aphid, Lipaphis erysimi. Indian J Plant Prot. 2013; 41(1):38-44.
12. Analytical Software. Statistix version 8.1: User's manual. Analytical Software, Tallahassee, Florida, 2005.