*Pakistan J. Zool., vol. 39(3), pp. 195-198, 2007.*

# Varietal Screening of *Brassica* spp. Against Aphids in Southern Punjab (Pakistan)

**AMJAD FAROOQ AND ZAHIDA TASAWAR**
*Institute of Pure and Applied Biology, Bahauddin Zakariya University, Multan, Pakistan*
*E-mail: amjadbzubio@yahoo.com*

**Abstract.-** Twenty three cultivars of *Brassica* were screened for their susceptibility to aphids, during 2000-2001. *Brassica napus* (var. Bulbul-98) was found to be most susceptible with maximum population of aphids 70.66 aphids. *Brassica campestris* (var. Peeli sarson) was found to be tolerant with minimum population of 41.74 aphids per 10 cm inflorescence. Amongst aphids, *Lipaphis erysimi* was found dominant over *Brevicoryne brassicae.* As regards the population of predators, Peeli sarson and *Brassica juncea* (var.Toria) showed maximum population of *Coccinella septempunctata* (L.), whereas Bulbul-98 showed maximum individuals of *Chrysoperla carnea* (Stephen). The observations made on February 26, 2001 showed maximum population of both the predators having positive and significant correlation with *L. erysimi* and *B. brassicae.*

**Key words:** *Brassica*, varietal screening of *Brassica* spp., aphids.

## INTRODUCTION

There are various insect pests which attack *Brassica* like aphids, white fly, painted bug, pea leaf miner and saw fly but aphids are very serious in India (Agarwal and Datta, 1999). Aphids multiply very rapidly under favorable conditions on leaves, stems and inflorescence from where these pests suck the sap. Due to the attack of aphids on *Brassica* affected pods and seeds remain stunted (Devi *et al.,* 2002). The yield loss ranges 30-35% by the attack of aphids on *Brassica* spp. (Phadke, 1985). The yield loss may rise up to 70% by the attack of aphids on *Brassica* (Bhatti *et al.,* 1976).

The resistant crop varieties do not have any of the preceding problems, rather they have many beneficial aspects. The use of resistant varieties is more important in low yield producing crops especially where yield fluctuates greatly because of weather and other intermittent hazards or situations in which insecticide control is unknown, unavailable or costly. Resistant crop varieties should be of special use in countries where acreage worked by individuals are small and farmers are unfamiliar with the use of insecticides. The present studies were initiated to avoid chemical control and to select resistant varieties, to record the relative abundance of two aphids on three *Brassica* species

0030-9923/2007/0003-0195 $ 8.00/0


*viz. B. juncea, B. campestris* and *B. napus.* Since aphids are host specific. It is known that when they get transferred to alternate hosts, they do not produce as much as on their primary host. A poor development of aphid species on a host will imply the resistance to that particular variety.

Development of varieties resistant to the insect pests is an important strategy of integrated pest management (Bhatti *et al*., 1976). According to Van Den Bosch (1972) a study of the development of plant resistance is an effective approach for the formulation of a rational policy of pest control. Several researchers have advocated the use of resistant varieties as one of the most promising methods of insect pests management (Beck, 1965; Van Dinther, 1972; Gullun *et al.*, 1972; Naqvi, 1984; Bhatti *et al.*, 1976; Maxwell *et al.*, 1972). A few attempts have been made with different cultivars according to their environments by various researchers (Upadhyay *et al*., 1992; Hussain and Shah, 1997).

Lal *et al*. (1997), Manzar *et al.* (1998), Dubey *et al*. (1998), Anwar *et al*. (1999), Verma *et al.* (1999) and Kulkarni and Patel (2001) reported that aphid incidence occurred between the first week of January and the fourth week of February with the high incidence during the first week of February. They further reported that the population of the ladybird beetle appeared during the last week of

January (0.67 per plant), reached the peak (2.90 per plant) during the third week of February and then declined to 1.22 per plant in the last week.

The present project was undertaken on 23 cultivars of *Brassica,* to determine resistance based on population density counts of major species of aphids, to observe the population of *C. septempunctata* and *C. carnea,* and to work out the correlation between pest and the predators.

## MATERIALS AND METHODS

Experiments were conducted in the Research area of Agricultural Farm, University College of Agriculture, Bahauddin Zakariya University, Multan, Punjab, Pakistan in 2000-2001 crop season. Experiment was laid out in a Randomized Complete Block Design (RCBD) with four replicates. The plot size was kept as 10-m x 10-m. Twenty three (23) cultivars of *Brassica* spp. (Table 1) were grown on October 10, 2003. Based on per 10 cm inflorescence of central shoot population density of aphids at weekly interval from January 15 to March 31, 2001 was recorded. Six varieties of *Brassica,* two showing susceptible, two intermediate and two resistant responses were selected for the next year studies. These varieties were sown on October 15, 2000 following RCBD with four replications. The plot size was kept as 10x10 m. Population density of the test insect predators like *C. septempunctata* and *C. carnea* was recorded at weekly interval from January 15 to March 15, 2001.

Data on the population of aphids per 10 cm inflorescence from central shoot was recorded at weekly interval by randomly selecting 10 tillers from each plot. The population of *C. septempunctata* (immature and adults) and *C. carnea* (immature) was recorded from central shoot of randomly selected 10 plants from January 15 to March 15, 2001.

The data was analyzed by using M-stat Package. Means were separated for different significant using Least Significant Difference Test LSD (Steel and Torrie, 1980) or by Duncan's Multiple Range Test DMRT (Duncan, 1955).

## RESULTS AND DISCUSSION

The results presented in Table I revealed significant difference among cultivars tested. The population of aphids per 10 cm length of inflorescence in various cultivars under descending order in Table I. From these results two susceptible varieties *viz.,* Bulbul-98 and RBN-3057, two varieties showing intermediate response *viz*., RL-18 and Khanpur raya and two varieties showing comparatively resistant trend *viz*., Toria and Peeli sarson were selected for final screening.

**Table I.- Comparison of the data (means) regarding population of aphids on various commercial varieties/advanced line of *Brassica* during 2000-2001.**

| Varieties / advanced lines | Population per 10 cm length inflorescence per central shoot |
|---|---|
| ***Brassica juncea* (Raya)** | |
| Commercial varieties | |
| 1. Poorbi Raya / Anmol | 53.97 c |
| 2. RL-18 | 53.53 cd** |
| 3. Khanpur Raya | 52.36 cd** |
| Advanced lines | |
| 4. RBJ-3031 | 50.79 cd |
| 5. RBJ-3041 | 50.30 cd |
| 6. RBJ-3050 | 50.79 cd |
| 7. RBJ-217 | 49.96 cd |
| 8. RBJ-219 | 51.19 cd |
| 9. KJ-147 | 51.31 cd |
| 10. KD-151 | 50.38 cd |
| 11. Total | 43.89 ef *** |
| ***Brassica campestris* (Sarson)** | |
| Commercial varieties | |
| 12. Bhuri Sarson | 48.10 de |
| 13. Peeli Sarson | 41.74 f*** |
| ***Brassica napus* (Canola)** | |
| Commercial varieties | |
| 14. Gobhi Sarson | 62.14 b |
| 15. Rain Bow | 62.61 b |
| 16. Bulbul-98 | 70.66 a* |
| 17. Zafar-2000 | 62.35 b |
| 18. KN-158 | 54.57 c |
| 19. RBN-3255 | 64.29 b |
| 20. RBN-3033 | 61.69 b |
| 21. RBN-3041 | 62.70 b |
| 22. RBN-3057 | 66.03 b* |
| 23. RBN-3075 | 62.38 b |

*, Susceptibility; **, Intermediate; ***, Resistant.

Means sharing similar letters are not significantly different by DMR Test at P=0.01.

The study conducted during 2000-2001 (Table II) revealed significant variation among selected genotypes of *Brassica.* Bulbul-98 again noted to be the most susceptible followed by RBN-3057 and Toria. The variety Khanpur Raya showed

**Table II.- Means comparison of the data regarding population of aphid species on various selected varieties/advanced lines of *Brassica* during 2000-2001.**

| Varieties / advanced lines | *Lipaphis erysimi* | *Brevicoryne brassicae* | Average |
|---|---|---|---|
| Bulbul-98 | 34.59 a | 14.77 fg | 24.68 a (49.36) |
| RBN-3057 | 32.04 a | 15.24 f | 23.64 ab (47.28) |
| RL-18 | 25.79 b | 11.92 gh | 18.86 c (37.71) |
| Khanpur Raya | 22.42 cd | 11.07 h | 16.74 d (33.49) |
| Toria | 27.43 b | 20.80 de | 24.12 ab (48.23) |
| Peeli Sarson | 25.34 bc | 18.85 e | 22.09 b (47.19) |
| Average | 27.93 a | 15.44 b | |

Means sharing similar letters are not significantly different by DMR Test at P=0.05.
Figures in parenthesis are square root transformed.

the lowest population of aphids. The other varieties were intermediate. From these results, it was observed that the variety Peeli sarson was noted to be the most susceptible during preliminary screening trial but in final screening during 2000-2001, this variety was appeared as intermediate. Furthermore, two species of aphids were found on these selected genotypes *viz. L. erysimi* and *B. brassicae.* The results showed that *L. erysimi* was the dominant over *B. brassicae.* Upadhyay *et al.* (1992), Hussain and Shah Jahan (1997), Lal *et al.* (997) and Dubey *el al.* (1998) studied population resistant to various *Brassica* varieties other than those included in the present investigation. In the present study the population of aphids declined towards the maturity of crop which is in line with earlier studies of Anwar *et al.* (1999). Our study demonstrates that *B. napus* is the most susceptible followed by *B. juncea* and *B. campestris.* These findings are not compatible with those of Manzar *et al.* (1998) who reported that *B. campestris* was found to be more susceptible as compared to *B. juncea.*

**Table III.- Means comparison of the data regarding population of predators on various selected varieties/advanced lines of *Brassica* during 2000-2001.**

| Varieties / advanced lines | *Coccinella septempunctata* | *Chrysoperla carnea* | Average |
|---|---|---|---|
| Bulbul-98 | 0.65 b | 0.38 c | 0.51 ab |
| RBN-3057 | 0.68 b | 0.29 cd | 0.49 abc |
| RL-18 | 0.60 b | 0.23 d | 0.42 c |
| Khanpur Raya | 0.71 b | 0.19 d | 0.45 bc |
| Toria | 0.83 a | 0.24 d | 0.54 a |
| Peeli Sarson | 0.91 a | 0.23 d | 0.57 a |
| Average | 0.73 a | 0.26 b | |

Means sharing similar letters are not significantly different by DMR Test at P=0.05.

The results (Table III) regarding population of predators showed significant variations among genotypes. *C. septempunctata* was more abundant as compared to *C. carnea.* The relationship between population of aphids and predators showed significant and positive correlation individually as well as on cumulative basis (Table IV).

**Table IV.- Relationship between aphid species and predators on *Brassica* during 2000-2001.**

| Aphid species | *C. septempunctata* | *C. carnea* | Cumulative |
|---|---|---|---|
| *L. erysimi* | 0.500 | 0.371 | 0.687* |
| *B. brassicae* | 0.513 | 0.412 | 0.847** |
| Cumulative | 0.544 | 0.430 | 0.777* |

* - Significant at P $\leq$ 0.05. ** -Significant at P $\leq$~0.01.

## REFERENCES

AGARWAL, B.K. AND DATTA, N., 1999. Life history of responses of mustard aphid *(Lipaphis erysimi)* to phonological changes in its host. *J. biol. Sci.,* **24:** 223-231.

ANWAR, M., SHAFIQUE, M., ANWAR, M. AND SHAFIQUE, M., 1999. Relative development of aphid on different *brassiea* cultivars. *Pakistan J. Zool.*, **31**: 357-359.

BECK, S.D., 1965. Resistance of plants to insects. *Annu. Rev. Ent.*, **10**: 205-231.

BHATTI, M.A., SAEED, M., CHATTAN, N. AND IQBAL, S., 1976. Host-plant resistance and importance to insect population suppression in cotton crop. *Proc. Cott. Prod. Seminar*, ESSO, Pak. Fertilizer Co. Ltd. pp. 132-142.

BUNTIN, G.D., KAUSHIK, U.K., YADU, Y.K. AND GANGULI, R.N., 1998. Assessment of relative susceptibility of different *brassica* genotype to mustard aphid, *Lipaphis erysimi. J. Soils Crops*, **8**: 23-27.

DEVI, C., SINGH, T.K. AND VARATHARAJAN, R., 2002. Management of mustard aphid with natural enemies plant product and chemical insecticides. *Indian J. Ent*., 373-376

GALLUN, R.L., STARKS, K.J. AND GUTHRIE, W.D., 1975. Plant resistance to insects attacking cereals. *Annu. Rev. Ent.* **20**: 337.

HUSAIN, M. AND SHAHJAHA, M., 1997. Field and net house evaluation of some *Brassiea* variety/mutants for reaction to aphid. *Bangladesh J. Ent.*, **7**: 27-35.

KULKARNI, A. V. AND PATEL. I.S., 2001. Seasonal abundance of mustard aphid (*Lipaphis erysimi*) and associated bio agents in Indian mustard *(Brassieajuneea)* crop. *Indian J. agric. Sci.*, **71**: 681682.

LAL, M.N., SINGH, S.S. AND SINGH, V.P., 1997. Relative susceptibility of *brassiea* germplasm to mustard aphid, *Lipaphis erysimi. Indian J. Ent.*, **59**: 369-373.

MANZAR, A., LAL, M.N., SINGH, S.S. AND ABU, M., 1998. Field infestatgion of mustard aphid, *Lipaphis erysimi* (Kalt.) on different varieties of *brassica* spp. *Ann. Plant Protect.*, **6**: 161-164.

MAXWCLL. F.G., JOHNI~ N.J. AND PARROTT. W.L., 1972. Resistance of Plant to Insects. *Adv. Agron.*, **24**: 187265.

NAQVI, K.M., KHANZADA, A.G. AND ABBASSI, F.D., 1984. Field evaluation of systemic insecticides and their comparative efficacy against potato sucking insect pests. *Sind J. agric. Res.*, 10: 7-14.

PARASAD, S.K., 1992. Relative efficacy of some synthetic pyrethroid and phosphamidon against the mustard aphid, *Lipaphis erysimi. Annu. Agric. Res.*, **13**: 137-140.

PHADKE, KG., 1985. *Oil Seed Production: Constraints and Opportunities.* Division of Entomology, IARI, New Delhi. Mohan Primlani for oxford and IBH publishing Co) pp.416-417.

STEEL, R G. D. AND TORRIE, J.H., 1980. *Principles and procedures of statistics with special reference to biological sciences*. McGraw Hill, New York.

UPADHYAY, S., AGRAWA, R.K, KANDALKAY, V.S. AND NIGAM, K.B., 1992. Screening of Indian mustard *(Brassica juncea)* varieties resistant to mustard aphid *(Lipaphis erysimi)* in infested and protected. environments. *Indian J agric. Sci*., **62**: 684-687.

VAN DEN BOSCH, R, 1972. The cost of poisons. *Environ.*, **14**: 8-13.

VAN DINTHER, J.B.M., 1972. Insect control and new approaches. *World crops*, 24: 180-182.

VERMA, T.L., SUBODH, J, THAKUR, P.C., BARWAL, R.N. AND JOSH, S., 1999. Correlation between aphid infection severity and yield in some cabbage *(Brassica oleracae* L.) varieties. *News Lett.*, **21**: 13 7 -138.

*(Received 11 January 2007, revised 16 March 2007)*