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Comparative Resistance of Different Canola (*Brassica napus* L.) Varieties Against Turnip Aphid (*Lipaphis erysimi* Kalt.)

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Abstract.- Resistance of different canola *(Brassica napus* L.) varieties against turnip aphid *(Lipaphis erysimi* Kalt.) was studied during 2002-2003 crop season at the University College of Agriculture, Multan, Pakistan. Ten varieties were planted on 16th October, 2002. Sampling for aphid was done at weekly intervals from last week of February to the last week of March, 2003. Population was recorded on 10 cm of inflorescence by gently beating it on white sheet and counting the falling aphids. Number of aphid was non-significantly different among varieties on different sampling dates. Seasonal mean population was significantly different on all the tested varieties. Maximum population (9.1 aphids) was recorded on the variety Con-I and minimum (4.0 aphids) was found on KS-75. Mean number of aphid on other varieties were 8.4 on Oscar, 7.6 on Rainbow, 5.9 on Con-II and Westar, 5.6 on Shiralee , 5.5 on Dunkeld, 5.4 on Con-III and 5.2 on Abaseen. Based on the mean seasonal population it is concluded that the variety KS-75 was resistant against turnip aphid. Varieties Westar, Abaseen, Con-I, Dunkeld and Shiralee were moderately resistance and Con-I, Oscar and Rainbow were susceptible.

Key words: Canola, *Brassica napus*, aphid resistance, turnip aphid, *Lipaphis erysimi*.

INTRODUCTION

Rapeseed and mustard are the traditional oilseed crops and the second most important source of edible oil after cottonseed in Pakistan (Rehman *et al.,* 1987). Pakistan is deficient in edible oil and imports were worth Rs. 34 billions during 2001-2002 (Anonymous, 2003a). By increasing local production of oilseed crops this import bill can be reduced. Canola *(Brassica napus* L.) is a genetic variation of rapeseed and is also known as sweet mustard. It was introduced in Pakistan during 1980-81 by Pakistan Agricultural Research Council and is now an important oilseed crop of Pakistan (Syed *et al.,* 1999). In the year 2001-2002, total area under canola was 49.39 thousand hectares and the production of oilseed and oil was 73 and 29 thousand tons, respectively. During 2002-2003, total area under cultivation was 90.28 million hectares and the production of oilseed and oil was 136 thousand tone and 52 thousand tons, respectively.

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Canola seed yields 35-45% oil, which is low in Erucic Acid (less than 2%) and Glucosinulates (less than 30 µmole/g of defatted meal). Canola meal is high protein animal feed (MINFAL, 1995; CODEX, 1999). Canola oil, used for cooking and in margarine, is free from cholesterol. It contains two fatty acids, *i.e.* linoleic acid and alpha linolenic acid that are essential in our diets because our bodies can not manufacture them. They play important roles in growth reproduction and vision, in maintaining healthy skin and cell structures, and reduce cholesterol level in human blood (Cagguilla and Mustad, 1997; Syed *et al.,* 1999).

A number of insect pests feed on canola but aphids are more serious. Three species of aphids, *i.e.* cabbage aphid *(Brevicoryne brassicae* L.), turnip aphid *(Lipaphis erysimi* Kalt.) and green peach aphid *(Myzus persicae* Sulz.) are most abundant and widely distributed (Rehman *et al.,* 1987). Among these aphid species turnip aphid is the most destructive pest of *Brassica* crops and has worldwide distribution (Blackman and Aestop, 2000). It forms large colonies on leaves, stems and inflorescence. It causes severe distortion of leaves

and results in heavy losses to the crops and serves as vector of several diseases (Russell, 1984). Kelm and Gadomski (1995) reported that aphid infested plants showed growth and development inhibition and the seed yield loss ranged from 9-77%. Aphid also caused an 11% reduction in seed oil content.

To overcome these pest problems, methods of biological management such as development of resistant varieties to aphids is becoming very popular (Yue and Liu, 2000). This method is not only cost effective but also environmentally safe and comparable with other methods of pest control (Maurya, 1998) as compared to insecticidal control (Kumar and Sharma, 1999). Host plant resistance is successfully used in integrated pest management programme. Plant resistance prevents the crop from damage by antibiosis, antixenosis or tolerance, which occur in most *Brassica* varieties (Ellis and Farrel, 1995; Ellis *et al.*, 1996) and affects developmental time, reproduction rate or survival of insects (Amjad and Peters, 1992). It has been suggested that aphid resistant rape varieties can give good control of cabbage aphid (Lowe, 1969). Keeping in view the importance of the crop and the pest, canola varieties were screened against turnip aphid to find out a resistant and/or susceptible cultivar for using it as a base for some future studies on integrated pest management of aphid.

MATERIALS AND METHODS

The experiment was conducted at the Agricultural Farm of the University College of Agriculture, Bahauddin Zakariya University, Multan during the crop season 2002-03. The trial was laid out in a Randomized Complete Block Design in four replicates. Seeds of 10 canola *(Brassica napus* L.) varieties (treatments), *viz.* Dunkeld, Rainbow, Oscar, Westar, Shiralee, Con-I, Con-II, Con-III, KS-75, and Abaseen were sown in rows on 16th October 2002 using hand drill. Plot size was 4.57 m x 1.82 m. Plot to plot distance was 0.91m. Each plot consisted of four rows with row-to-row distance of 45cm. Plant-to-plant distance was 10 cm. One bag each of DAP and Urea per acre were applied at the time of sowing. The cultural practices were performed through out the growing season uniformly in all the plots.

To determine the degree of resistance, aphid population was recorded at weekly intervals from late February to late March, 2003. Six randomly selected plants, *i.e.* three from each of the two central rows, were taken. Top 10 cm of the inflorescence of central shoot was gently beaten five times with a 15 cm long stick of pencil thickness while holding a white sheet under the inflorescence. Aphids falling on the sheet were collected and counted. Seasonal mean aphid population was calculated by dividing the total number of aphids counted by the number of sampling dates during the study. The data were subjected to statistical analysis by using ANOVA and LSD test (Steel and Torrie, 1984) at 0.05 percent level of significance to compare the mean number of aphid on different varieties.

RESULTS AND DISCUSSION

Number of turnip aphid on different sampling dates was non-significantly different among all the varieties used in the trial (Table I). Although the difference in number of aphid per 10 cm of inflorescence was statistically non-significant, the variety KS-75 had lower number on most of the sampling dates as compared to other varieties. Seasonal mean population/top 10 cm of inflorescence was significantly different on all the

Table I.- Mean population of *L. erysimi* per top 10 cm of the inflorescence of canola varieties on different sampling dates at Multan during 2003.

Variety	Sampling date				
	23/02	01/03	08/03	15/03	23/03
Dunkeld	0.96n.s	4.96n.s	2.46n.s	7.75n.s	11.50n.s
Rainbow	0.58	12.59	6.00	9.08	9.58
Oscar	1.63	9.04	10.08	12.50	8.88
Westar	1.33	4.25	4.67	10.88	8.37
Shiralee	0.96	4.79	3.98	7.50	10.96
Con-I	0.96	6.21	5.88	16.71	13.25
Con-II	1.42	3.92	7.21	9.79	7.92
Con-III	3.34	4.54	3.67	6.92	8.75
KS-75	0.38	3.50	6.56	3.29	6.25
Abaseen	0.50	4.38	2.89	7.84	10.54

n.s.= non significantly different.

varieties (Fig. 1). Minimum mean seasonal aphid population (4.0 aphids) was observed on KS-75, while the maximum (9.1 aphids) was recorded on Con-I. Variety Oscar, having 8.4 aphids was statistically different from Rainbow with 7.6 aphids in its response to support mustard aphid population. Varieties Con-II, Westar, and Shiralee had non-significantly different population with 5.9, 5.9 and 5.6 aphids per 10 cm of inflorescence, respectively. These varieties were significantly different from Dunkeld (5.5 aphids), Con-III (5.4 aphids) and Abaseen (5.2 aphids), which were non-significantly different from each other in respect of number of aphids per 10 cm inflorescence. None of the varieties was completely free from the attack of mustard aphid. Hence, all the varieties showed a varying degree of resistance against mustard aphid. Variety KS-75 was considered resistant due to low population of aphid found on it.

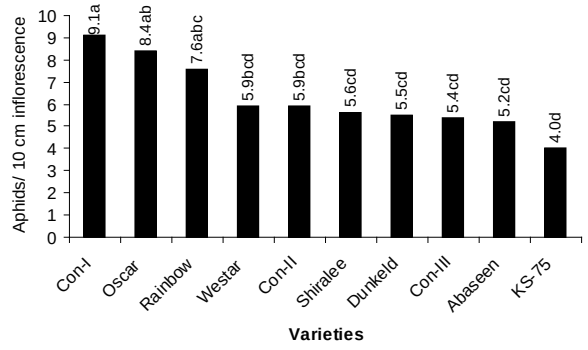

Fig. 1. Mean seasonal population of *L. erysimi* on different canola varieties at Multan during 2003.

Bars having similar letters are non-significantly different (LSD; P=0.05).

Many studies have been reported in literature, which confirm and support the findings of present study. Syed *et al.* (1999) reported maximum population of aphid on Oscar and minimum on Westar variety in their study. Saljoqi (2001) found that aphid population was maximum on Rainbow and minimum on Dunkeld. Brar and Sandhu (1978), Amjad and Peters (1992), Aheer *et al.* (1999), and Kumar and Sharma (1999) also reported significant difference in *L. erysimi* population developing on different varieties of *Brassica*. Prasad and Phadke (1980) studied the population dynamics of *L. erysimi* and concluded that actual change in degree of infestation rate appeared to be determined by varietal characteristics of the food plant. Khattak and Hamed (1993) reported that the susceptibility of a crop to insect pests depends on multiple factors including biotic and abiotic ecological phenomena. The most important amongst these could be the crop genetic potential, insect species and the environment.

In this study, K.S-75 had the lowest aphid population during most of the season and was found relatively resistant, while Westar, Abaseen, Con-III, Dunkeld and Shiralee were moderately resistant because of having medium level of aphid population on them. Con-I, Rainbow and Oscar had the highest aphid population and thus, were considered susceptible.

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