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Antixenosis of *Brevicoryne brassicae* on Different Genotypes of Cabbage (*Brassica oleracea* Var. *Capitata*)

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Abstract: Antixenosis of *Brevicoryne brassicae* on different genotypes of cabbage (*Brassica oleracea* var. *capitata*) was studied. The Golden acre, C110, B_{25}, $14Y_XMEK2$, $DEC_{1X}B_{21}$, $CF_{2X}LI_2$-11, and $CF_{1X}DT_{46}$ showed statistically less number of aphids while $CF_{1X}CF_2$, $CF_{2X}E_{34}$-A_1 and $DEC_{1X}RB_4PE$ attracted more number of aphids and the aphid thus showed more preference on these genotypes as compared to the others. The native variety Golden acre from Pakistan although attracted the least number of aphids but the number was not statistically different from the others mentioned earlier. The aphid, *Brevicoryne brassicae* discriminated among different cabbage genotypes and environmental factors including temperature, humidity and rainfall influenced the number of aphids per plant.

Key Words: *Brassicae oleracea*, *Brevicoryne brassicae*, *preference*, host plant resistance.

Introduction

The values of vegetables in maintaining human health are increasing day by day especially in those areas where protein is scarce (Tindall, 1983). Cruciferous vegetables, *Brassica compestris* (sarsoon), *Brassica rapa* (turnip), *Raphinus sativus* (reddish), *Brassica oleracea* (cauliflower and cabbage) and *Beta vulgaris* (beet) are very good source of roughages, vitamin A, and Ascorbic acid (Homer and Kelly, 1972). Cabbage and cauliflower are natural source of vitamin K, calcium and phosphorus, while most crucifers are good source of oil that may be used for edible purposes (Paul and John, 1955). Cabbage *Brassica oleracea* var. *capitata* is very ancient vegetable derived from wild sea kale (Libner, 1989). Plants in cruciferous family are attacked by a number of pests, which greatly affect their production and quantity (CIBC, 1984). Among the insects, aphids are extremely successful group and are widely distributed throughout the world, with tremendous number of species in the temperate regions (Baranyourits, 1973) and are important from economic view point being pests of very precious crops (Lowe, 1973, Dixon, 1973). They are small and inconspicuous and can frequently become numerous owing to their capacity to proliferate tremendously (Jones and Jones, 1984). Many species are pests of the agricultural and horticultural crops and severely retard the growth of their host (Dixon, 1973). Nymphs and adults remove plant sap, causing distortion, stunting, curling, wilting and often the death of the plants. *Brevicoryne brassicae* is one of the species of insects commonly called plant lice. These insects are most injurious during the later part of the season than earlier (Thompson and Kelly, 1979). Based upon Ellis and Farrel, (1998), the cabbage aphid attack on different hybrids was different. The major objective is to study antixenosis of *Brevicoryne brassicae* on different genotypes of cabbage under natural environmental and field conditions so that such genotypes could be found out which may be least attacked by this insect pest.

Materials and Methods

The trial on the comparative study of performance of 10 cabbage genotypes was carried out at National Agricultural Research Centre Islamabad, during the year 2000-2001. Russian Agricultural Academy Timrazira was the source of hybrid seed. Golden acre was the most popular and widely cultivated variety in Pakistans sown as standard for comparison of other Russian and exotic hybrids and particularly their relative resistance against cabbage aphid *Brevicoryne brassicae* under field conditions. The genotypes included the Golden acre, C_{110}, B_{25}, $F_{14}Y \times MEK_2$, $DEC_1 \times B_{21}$, $CF_2 \times LI_2$-11, $CF_1 \times CF_2$, $CF_2 \times E_{34}$ –A_1, $CF_1 \times DT_{46}$ and $DEC_1 \times RB_4PE$.

The sowing of seeds was done in wooden boxes of 0.5m^2 in the month of September 2000. The seed germination was completed in October and the seedlings were transferred in the plots using Randomized Complete Block Design at the Horticultural Research Station, NARC, Islamabad. The aphid attack was started in the 1st week of December. The data on the relative preference of cabbage aphid were collected at four days interval. The cabbage aphid attack was assessed by counting the number of aphids/plant and their specific attack on the upper, lower and middle leaves following Singh *et al.*, (1995). The statistical analysis was performed using SPSS 7.5 for Windows (1996).

Results and Discussion

Golden Acre, C110, B25, $14Y_XMEK2$, $DEC_{1X}B_{21}$, $CF_{2X}LI_2$-11, and $CF_{1X}DT_{46}$ showed statistically equal number of aphids as compare to control but less number of aphids as compared to $CF_{1X}CF_2$, $CF_{2X}E_{34}$-A_1 and $DEC_{1X}RB_4PE$ while these genotypes attracted significantly more number of aphids. Based upon Ellis and Farrel (1998), the cabbage aphid attack on different hybrids was different. Table 1 clearly depicts that Golden acre a native cultivar has less population of the cabbage aphids; but statistically it does not differ from the others mentioned earlier bearing the same letters as the others in Table 1 have.

The environmental factors affected the number of aphids per plant. There was a long dry spell during the year 2000. This type of situation affected the position of crop plants very badly. It also influenced the insect pest position. Table 2 depicts the fluctuations in insect pest numbers due to changes in temperature, relative humidity and rainfall. According to Ali *et al.* (2000), the population build up of aphids was greatly influenced by environmental factors. Based upon Naeem and Compton (2000), biomodality of aphids was also influenced by the rainfall. There was a rain of about 10mm on 20-12-2000. It is evident from (Table 2) that after rain, the number of aphids per plant drastically reduced to a lower level. This clue can in a best way be used to reduce the number of aphids from the plants by spraying simple water on the surfaces of the leaves of this crop and other crop plants.

Table 3 indicates that highest number of aphids per plant were recorded on upper portion of the plant as compared to the

Table1: The Mean Number of the Cabbage Aphids on Different Genotypes.

F1 hbrids	Mean population	Std. Deviation	Std. Error of mean
Golden acre	24.00 a	8.0414	2.5430
C_{110}	24.40 a	14.1358	4.4701
B_{25}	30.50 a	8.6313	2.7295
$F_{14}Y \times MEK_2$	32.90 a	10.1374	3.2057
$DEC_1 \times B_{21}$	27.90 a	10.7956	3.4139
$CF_2 \times LI_2$-11	25.30 a	18.2760	5.7794
$CF_1 \times CF_2$	44.30 b	21.3284	6.7446
$CF_2 \times E_{34} - A_1$	40.30 b	13.6092	4.3036
$CF_1 \times DT_{46}$	28.80 a	18.7427	5.9270
$DEC_1 \times RB_4PE$	40.40 b	10.3674	3.3181

Means followed by the same letters are not different significantly from one another at alpha = 0.05

Table 2: Average Number of Aphids/Plant During Different Dates Under Different Environmental Factors

Dates	Mean T°C	Average RH%	Rainfall (mm)	Average (Aphids)
04-12-2000	12.70	50.50	0.00	27
08-12-2000	12.60	54.50	0.00	35
12-12-2000	12.00	52.50	0.00	25
16-12-2000	13.20	62.50	0.00	45
20-12-2000	13.00	69.00	10.00	37
24-12-2000	13.02	60.50	0.00	20

Table 3: Average Number of Cabbage Aphids on Lower, Middle and Upper Parts of Cabbage Plant

Portion of Plant	Mean Number of Aphids
Lower	27
Middle	30
Upper	39

middle and lower parts. Ahmad and Aslam (2000) concluded that more aphids were present on the top portions of the plants due to the reason that on the top portions generally soft and tender leaves existed and it was thus easy for the aphids to insert their stylets to suck the plant sap easily.

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