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Evaluation of Cabbage Aphid, *Brevicoryne brassicae* (L.) on Different Varieties of Rapeseed Mustard Crop under Field Conditions

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Abstract: The population densities of Cabbage aphid *Brevicoryne brassicae* (L.) were studied on the thirteen varieties of rapeseed mustard crop. The aphid population were found from February to May and peaked in the last week of March. The greater aphid densities were recorded on leaves and flowers as compared to stems. The significantly higher aphid populations was recorded on CON-I variety as compared to others rapeseed mustard varieties. The lowest significant numbers observed on KS 74 variety.

Key words: Rapeseed mustard varieties, Cabbage aphid *Brevicoryne brassicae*, Population density

Introduction

Pakistan is facing the critical shortage in the edible oil. Presently, the domestic production for edible oil meets only 34% of country's requirements (Government of Pakistan, 1997). Pakistan continued to import large quantities of edible oil to fulfill the local demands at a cost of Rs. 24.4 billions in the form of foreign exchange during 1996-97 (Shah *et al*., 1997). The crop belong to Brassicae oil seeds play a significant role in this direction. Rapeseed mustard crops are conventially grown for edible vegetable oil and their green leaves used as both for human food and animal fodder (Nasir *et al*., 1998).

This important crop is suffered to many insect pest, amongst the aphids are notorious and causes 70-80 percent losses to the yield in Sindh Province (Rustmani *et al*., 1998). The cabbage aphid, *B. brassicae* is severely attack all varieties of sarsoon crop, both nymphs and adults take a heavy tool by sucking cell sap, thereby reducing the vitality of the plant (Marwat *et al*., 1985). The cabbage aphid is also important vector of certain viruses, particularly cabbage black ringspot, cauliflower mosaic virus and turnip mosaic virus. This pest is common destructive pest of brassicas causing serious losses to broccoli, cabbage, cauliflower and oil seeds in some seasons (Graham, 1984), also damage the seed crop of radish (Butani and Juneja, 1984; Choi *et al.,* 1984; Gupta *et al.,* 1985).

Keeping in view the serious activity of this pest, it is desirable to study the population density of the different stages of cabbage aphid on the different varieties of rapeseed mustard crop under rainfed areas.

Materials and Methods

The field work was carried out at research farm of University of Arid Agriculture, Rawalpindi. Thirteen varieties of rapeseed mustard crop were sown in 1999, comprising (1) KS-74 (2) CON-III (3) DGL (4) CON-II (5) Ganyou-5 (6) Shiralee (7) Rainbow (8) Hyola 420 (9) Oscar (10) CON-I (11) Bard I (12) Hybridol (13) Dunkald. Randomized complete block design has employed with three replication R1, R2 and R3. Plot size was 5×1.2 m with four rows having space 30 cm. All the agronomic practices have kept uniform for all plots. Randomized plants were selected from each replication. The selected plants were tagged. Visual samples were taken at the beginning of the period immigration and continued at weekly intervals until the collapse of the aphid population. Aphids were directly counted on the leaves, stems and flowers at weekly intervals. Descriptive statistics and ANOVA models were calculated using the SPSS package.

Results

Aphids were the most frequently found on the different varieties of rapeseed mustard crop. A total of 53835 aphids were recorded by direct observation. Alates, apterous adults and nymphs were distinguished, of which 5641, 22450 were alates and apterous adults respectively. The remainder nymphs were made up 25744.

The population densities of Cabbage aphid *B. brassicae* were monitored weekly between February and April. Its population start to developed in the month of February and continued to increase through the end of March (Fig. 1). The aphid population reached at peak in the last week of March. Subsequently, there was a rapid reduction in the numbers by the end of April. Significant difference was observed weekly on the densities of aphids on the rapeseed mustard varieties (Table 1). Mean densities of aphids collected on the thirteen varieties of rapeseed mustard crop. When the densities of the aphids were compared statistically, significantly highest numbers were detected on CON-I. Lowest numbers found on KS-74 (Fig. 2). These two varieties were significantly differed from all other varieties (Table 2). However, the population density of aphids on the other varieties did not vary greatly.

The density of rapeseed mustard feeding aphids, the greater numbers were recorded on the leaves as compared to both flowers and stems. However, the lowest population observed on the stems of the rapeseed mustard crop. Nymphs were found to be consistently greater than the wing and wingless adults (Fig. 3).

Discussion

There are several factors which effect on the rapid increase and decreased the population of aphids. Both physical and biological factors are potentially important in the variation of aphid population densities (Naeem, 1996). The population build up of aphids is greatly influenced by the environmental factors and availability of foods. The populations were peaked in the month of March. At this time, the environmental factors (particularly temperature and humidity) and foods were favoured to build the aphid numbers. Kotwal *et al.* (1985) observed that the peak population of cabbage aphids found on seed crop of cauliflower in the month of March. The population density of aphids declined in the month of April. The reason for this decrease was the increase of temperature and scarcity of food as crop near to maturity. Nasir *et al*. (1998) observed that population size of mustard aphid *Lipaphis erysimi* Kalt peaked in third week of March and disappeared in third week of April is due to the

Table 1: The numbers of *B. brassicae* recorded on rapeseed mustard crop in 1999. Numbers for each marked plant site were pooled across sample dates with in three replicate blocks, based on direct observations

Sources of variation	DF	SS	MS	F	P
Between groups	9	266825.8	29647.31	28.502	0.000***
Within groups	2330	2423595	1040.17		
Total	2339	2690421			

*** Significant ($p < 0.000$)

Table 2: Anova's comparing the total numbers of *B. brassicae* on rapeseed mustard varieties in 1999. Treatment effects are nested within three replicate blocks during plant visual surveys

Sources of variation	DF	SS	MS	F	P
Treatment between groups	12	289809.3	24150.78	23.41	0.000***
Within groups	2327	2400612	1031.63		
Total	2339	2690421			

*** Significant ($p < 0.000$)

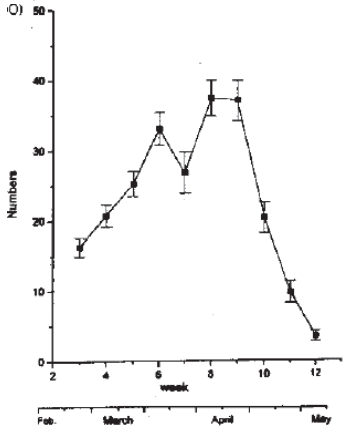

Fig. 1: Numbers of aphid (Mean/plant ± 1S.E.) observed on rapeseed mustard crop, based on direct observation sampling

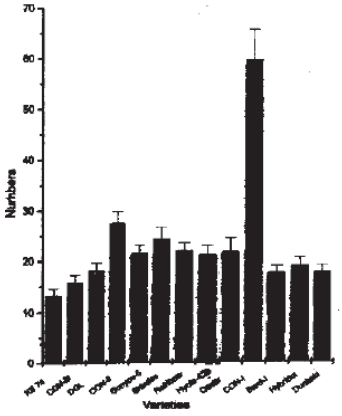

Fig. 2: Number of *B. brassicae* (Mean/plant ± 1 S.E.) on rapeseed mustard crop, based on visual plant surveys

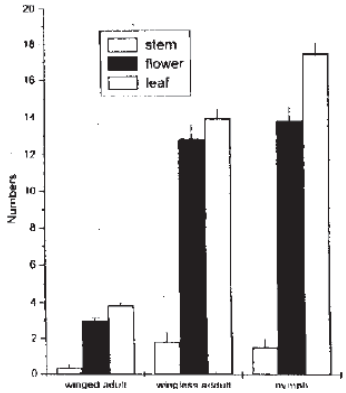

Fig. 3: Total numbers of *B. brassicae* (Mean/plant ± 1 S.E.) on the thirteen varieties of rapeseed mustard crop, based on visual sampling

conditions available become unfavourable for the survival of aphids, i.e., less food availability and the increased of temperature. The temperature is very important in the multiplication of mustard aphid (Sinha *et al*., 1990), while frequent rains keep the population density low. The population drop in the 7th week of March is due to effect of rain. Bimodality of the aphid is also influenced by rainfall (Naeem and Compton, 2000). Significantly lower populations are observed on KS 74 as compared to CON-II and CON-I. The highest significantly differences are found in CON-I. The height of the plants are lowered than the others varieties. It could be due to effect of greater aphid densities. The greater aphid densities were found on leaves and flowers as compared to stems of the rapeseed mustard plants. It can multiply very rapidly under favourable conditions to form large dense colonies of both nymphs and adults on leaves, stems and inflorescence (Hussain, 1983). As we know that aphid is a sucking insect and it can easily suck the cell sap from the leaves and flowers due to their soft nature. The surface area of the stem of the rapeseed mustard crop is comparatively hard and hairy than the leaves and flowers.

References

Butani, D.K. and S.S. Juneja, 1984. Pests of radish in India and their control. Pesticides, 18: 10-12.

Choi, H.K., I.Y. So and K.H. Park, 1984. Studies on the correlation between virus diseases and aphid vectors in radish fields. Korean J. Applied Entomol., 23: 28-36.

Government of Pakistan, 1997. Agriculture statistics of Pakistan. Ministry of Food, Agriculture and Co-Operatives, Islamabad, Pakistan.

Graham, C.W., 1984. Cabbage aphid, leaflet. Ministry of Agriculture, Fisheries and Food, No. 269, UK., pp: 8.

Gupta, P.R., R.C. Mishra and J.K. Gupta, 1985. Effectiveness of some insecticide sprays against the cabbage aphid and thrips on seed crop of radish. Indian J. Agric. Res., 19: 6-10.

Hussain, T., 1983. Evaluation of some oleiferous brassicae for resistance to cabbage aphid *Brevicoryne brassicae* Linn. (Aphididae: Homoptera). Pak. J. Zool., 15: 95-99.

Kotwal, D.R., A.K. Verma and O.P. Bhalla, 1985. Prediction of the cabbage aphid, *Brevicoryne-brassicae* (L) peaks on cauliflower seed crop from thermal unit accumulations. Entomon, 10: 219-222.

Marwat, G.N., I. Ahmad and S. Khatoon, 1985. Role of different levels of potassium on population densities of cabbage aphids *Brevicoryne brassicae* L. on sarsoon and its yield potential. Sarh. J. Agric., 1: 223-229.

Naeem, M. and S. Compton, 2000. Population dynamics of filbert aphid, *Myzocallis coryli* (Goetze) on hazel bushes to an agroforestry system. Pak. J. Biol. Sci., 3: 306-308.

Naeem, M., 1996. Responses of aphids and their natural enemies to a Silvoarable agro-forestry envirnoment. Ph.D. Thesis, Leeds University, Leeds, England.

Nasir, A.B., H. Javed, M. Aslam and A.A. Khan, 1998. Influence of abiotic factors on the population of mustard aphid, *Lipaphis erysimi* Kalt. Sarhad J. Agric., 14: 453-455.

Rustmani, M.A., U.F. Qaimkhani and G.H. Munshi, 1998. Efficacy of different insecticides against Mustard aphid. Sarhad J. Agric., 4: 659-664.

Shah, S.A., I. Ali, K. Rahman and R. Zamir, 1997. Oil seed brassica improvement. Peshawar, Pakistan, pp: 34-43.

Sinha, R.P., S.S. Yazdani and G.D. Verma, 1990. Population dynamics of mustard aphid Lipaphis erysimi Kact. (Homoptera: Aphididae) in relation to ecological parameters. Indian J. Entomol., 52: 387-392.