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Influence of Environmental Factors on Rose Aphid (*Macrosiphum rosaeiformis* Das (Homoptera:aphididae) Attacking Rose (*Rosa indica* Var. Iceburg, Rosaceae)

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Abstract: Study on the influence of environmental factors on rose aphid (*Macrosiphum rosaeiformis* Das (Homoptera: Aphididae)) was conducted in the campus lawns of University of Arid Agriculture Rawalpindi. The aphid population was found from March to May and peaked in the 2nd week of April, 2000. The greater aphid densities were recorded on top portion of plant. High temperature (over 30 °C) associated with relative humidity, rain fall and windstorm substantially reduced the number of aphids on rose. Deformation of stems, leaves and flowers resulted in case of strong infestation by the aphid.

Key words: *Rosa indica*, *Macrosiphum rosaeiformis* Das., Environmental factors

Introduction

Rose (*Rosa indica*, var. Iceburg, Rosaceae) is an important ornamental plant. It is one of the nature's beautiful creation and is universally acclaimed as the "Queen of flower". No other flower is a symbol of love, odoration, innocence and other virtues than rose. Roses are used for beautification and decoration of gardens, extraction of attar for making fragrant mixtures, for table and house decoration, banquets and public functions, cut flowers and sprays on wedding banquets and funeral ceremonies (Sujatha. *et al.*, 1997). It has also medicinal value and used for making medicines especially Gul-e-Kand and Aurq-e-Gulab. The rose hips long valued for food were shown in 1934 to be the richest natural source of Vitamin c and are now pressed commercially to give rose hip syrup (Anonymous 1982). Tanin contents of rose hips are mildly diuretic and also reduce thirst and alleviate gastric inflammation (Anonymous, 1996).

Growers grow roses both as pot and cut flower. In Pakistan roses are grown on smaller scale hardly to fulfill the local demand. There is no recognized institution for its culture. It has potential to take part in our exports as well as to meet our local demand and add much needed foreign exchange in our shattered economy. In Holland alone the market is estimated to be about 500 million US\$ and is growing by about 7 to 8 % annually (Reddy 1997). It is estimated that 250 to 500 hectares were under modern floriculture in India during 1996. The same is expected to cross 500 hac by 2000 A.D currently. We export floricultural products worth Rs 60 crores per annum. This is envisaged to increase to Rs 200 crores by 2001 (Demodaran, 1997).

The rose plant is attacked by a number of insect pests, out of which rose aphid, *Macrosiphum rosaeiformis* Das (Homoptera: Aphididae) is very serious pest of rose plants. It causes disfiguring of the foliage, crippling of the shoot and injuring the buds and quickly smoothers the plant if allowed to breed freely (Becker 1997).

Aphids feed on buds, shoots and leaves, colonies may persist throughout the year but are most numerous and troublesome in late spring and early summer (Buczacki *et al.*, 1981). Strong infestation by the aphid resulted in the deformation of stems leaves and flowers. (Jaskiewicz, 1997). Based on Atwal (1976), the aphid sucks cell sap from the tender leaves, buds and twigs resulting in the disfigurement and withering of flowers.

The insect pours sugary excreta known as honeydew which facilitate the growth of black fungus on them. A black fungus may also develop on the honeydew excreted by these insects giving an ugly look to the plant. Foliage of plants is fouled with

sticky honeydew and sometimes with sooty moulds and growth may be checked (Buczacki, 1981).

Based on Naeem (1996), honeydew also blocks the leaves stomata ultimately reducing the amount of light that reaches the photosynthetic tissues. According to Leach (1997), aphids also transmit viral diseases in plants. Rose aphid is also involved in transmitting viral diseases such as pea mosaic cauliflower mosaic and cabbage black ring spot (Mandahar, 1987). The population build up of aphid is greatly influenced by the environmental factors such as max. and min temperature, relative humidity and rain fall.

A clear relationship was observed between occurrence and abiotic conditions high temperature (30°C), heavy rain and strong winds which all resulted in a drop in number of Aphids (Jaskiewicz, 1995).

Keeping into view the importance of rose in future and seriousness of this pest on rose, it is desirable to study the occurrence and effect of environmental factors including max. and min. temperature, relative humidity, rain fall and wind storm on the number of rose aphid.

Materials and Methods

Studies on effect of environmental factors on rose aphid were conducted in the campus lawns of the University of Arid Agriculture Rawalpindi. Out of 25 plants, 10 plants were selected randomly. The selected plants were tagged. Aphids were directly counted from lower, middle and upper part of the plant to get total number of aphid per plant. Data were recorded on weekly basis from 27th march 2k to 22nd May, 2k. The lens was also used for observing aphids. Data were taken very carefully so that insects may not be disturbed. The number of aphids found on selected plant was recorded date wise in the form of table.

The environmental factors including relative humidity, max. and min. temperature and rainfall were recorded at Regional Agro Metrological Center Rawalpindi. Descriptive statistics and ANOVA models were calculated using the SPSS package.

Results and Discussion

A total of 2744 aphids were recorded by direct observation. The number of Rose Aphid, *Macrosiphum rosaeiformis* Das, were monitored weekly from March to May. Its number started to develop in the month of March and continued to increase through the middle of April. The highest number of aphids per plant were recorded in the second week of April. After the 2nd week of April, there was gradual and rapid reduction in the aphid population. (Table 1).

More number of rose aphid were recorded on the terminals of

Table 1: Average Number of Rose Aphids (*Macrosiphum rosaeiformis* Das) on different dates under varying Environmental Conditions

Dates	Average population aphid/plant	Mean daily temperature(°C)	Average R-humidity (%)	Rain fall (mm)
27-03-2k	12.06	21.8	51.0	0.0
03-04-2k	13.6	21.5	33.1	0.0
10-04-2k	19.7	25.3	31.07	0.0
17-04-2k	15.4	28.2	33.8	0.0
24-04-2k	11.5	27.8	25.7	0.0
01-05-2k	8.8	30.4	28.1	0.0
08-05-2k	7.3	31.8	43.5	2.3
15-05-2k	2.3	32.2	29.5	4.0
22-05-2k	0.5	32.8	30.2	0.0

Table 2: Average Number of Rose Aphids (*Macrosiphum rosaeiformis* Das) on lower, middle and terminal parts of Rose Plant

Portions of plant	mean	S.D	E.M	Sum
Lower	4.1000	3.368	0.3551	369
Middle	10.788	6.791	0.7159	971
Terminals	15.6000	9.576	1.0094	1404
Total	10.163	8.466	0.5152	2744

the plants as compared to the middle and lower portions. However the lowest number was observed on the lower portion of the plant.(Table 2).There are many factors which influence the rapid increase or decrease in the population density of rose aphids. Both physical and biological factors are potentially important in the variation of aphid population densities (Naeem 1996). Environmental conditions have marked effect on the multiplication of aphids.

Based on Ali *et al.* (2000), the population build up of aphids is greatly influenced by the environmental factors and availability of food. The population started to build up in the month of March and was at peak in April. At that time, the environmental factors favoured to build the aphid numbers. After the 2nd week of April, the number started declining due to increase in temperature. After 2nd week of April, the minimum temperature was 14.4 °C and the maximum as 37°C, the morning relative humidity was 67% and evening as 14%.According to Jaskiewicz (1997),dry and hot weather (over 30 °C) as well as rainstorms substantially reduced the number of aphid on rose bushes.

In the 8th week, the population density reduced dramatically. Although temperature was increasing gradually. The reason of this dramatic reduction in the population density was high windstorm, which resulted in fall of the number of aphids. Temperature over 30 °C ,with no rainfall or heavy rain and strong winds significantly reduced the numbers (Jaskiewicz, 1995a).

In the last week, population density of aphids was nearing zero. This was due to combined effect of temperature and heavy rainfall. The rainfall splash action washed out the aphids from the plants. According to Jaskiewicz (1995 b), number of aphids was limited by temperature over 30°C and by heavy rains. Based on Naeem & Compton (2000), biomodality of the aphid is also influenced by the rain fall.

Aphids are sucking insects ,they suck the sap through their stylets from plants i.e. leaves flowers and stems. In our experiment aphids, showed a preference pattern towards the younger and newly emerged leaves and stems found at the top of the plant as compared to older leaves and stems found at lower and middle portion of the plant. Aphids are found more in number at the top because younger stem and soft leaves are present and it is easy for insects to insert their stylet as compared to older leaves and stems which are rough and hard. The second reason is that the flow of sap is more in the terminals, so aphid prefer top portion of plant for feeding as compared to lower and middle portion.

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