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POPULATION DYNAMICS OF ROSE APHID *MACROSIPHUM ROSAE* L. ON DIFFERENT CULTIVARS OF *ROSA INDICA* L. IN PAKISTAN

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ABSTRACT:- The research was carried out at the Pir Mehr Ali Shah-Arid Agriculture University, Rawalpindi research field area on rose plants for rose aphid populations during 2008-09. Data were recorded on weekly basis. Nymphs, winged and wingless adults were counted from leaves (upper, middle and lower leaves), buds and flowers by visual observation from tagged plants. Aphid populations start to develop in November and its population decline with decline in temperature in December. While its population started rising again at the end of February. Significantly more aphid populations were observed on Perfecta than other varieties; however, significantly few aphids were observed on Christan Diar. These studies revealed that farmers growing roses on a commercial scale should grow Christan Diar to avoid aphid attack. Maximum average number of aphid nymph, winged and wingeless adults on leaves, buds and flowers were 11.11, 4.97 and 10.13, respectively observed on Perfecta variety.

Key Words: Aphid; Alates; Cultivars; Population; Incorporate; Perfecta; Pakistan.

INTRODUCTION

Rose (*Rosa indica* L.) is older than man and has been grown on earth for millions of year. Rose is universally acclaimed as the "Queen of flower" (Datta, 1997). Rose has been the most important crop in the floriculture industry. The genus *Rosa* includes 200 species and 18,000 cultivars (Gudin, 2000). At an annual value of $10 billion, roses are used as cut flowers, potted plants, and garden plants. Their economic importance also lies in the use of their petals as a source of natural fragrances and flavorings. The damask rose (*Rosa damascena*) is the most important species used to produce rose water, attar of rose, and essential oils in the perfume industry (Zuker et al., 1998).

Severe infestations of aphid will cause leaves to curl upward and will able to completely kill a small new plant. As they feed, they excrete sticky honeydew like substance that is attractive to ants. This honeydew-like substance can after some time grow molds that make the surface appear black and discolored (Jayma and Ronald, 1992). Two hundred species of aphids are recorded as vectors of plant viruses. The green peach aphid *Myzus persicae* (Muls.) is a common pest of ornamentals and is recorded as a vector of over 100 plant viruses. Ornamental plants that often have virus diseases transmitted by aphids include rose, carnation, chrysanthemum, gladiolus, tulip,

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lilium, hyacinth, iris, narcissus, daphne, lilac, philodendron and many of the Araceae (William, 2000). The objective of this study was, to determine the population dynamics of aphids on different rose cultivars for screening resistant cultivars.

MATERIALS AND METHOD

Study Area

The experiments were carried out at the research rose cultivated field area of Pir Mehr Ali Shah, Arid Agriculture University, Rawalpindi in 2008-09 by screening different cultivars of rose against rose aphids and their management. Rose varieties were selected in different replications under RCD.

Selected Varieties

Studies were carried out on rose varieties planted in the garden in March, 2006. Four varieties of rose including Ice Burg, Perfecta, Christan Diar and Wisky Mac were selected. Then the selected plots were marked for further data recording.

Layout Plan

There were four blocks (7.3 m x 7.3 m) planted with different varieties of rose. Distance between each square was 1.5m, while plant to plant distance was 1.2 m but the 1st plant distance was 0.60 m from their respective sides. In each block there were four (3.7 m x 3.7 m) sub blocks.

Selection of Plants

Each plant was divided into three parts as leaves (upper, middle and lower), buds and flowers. Each variety was planted in a block design in three replications. Two plants of each variety were selected from each replication.

Population Dynamics

The selected plants were tagged to study the population of aphids. Data were recorded on weekly basis. Nymphs, winged and wingless adults were counted from leaves (upper, middle and lower), buds and flowers by visual observation from tagged plants. No insecticide was applied in that experiment to take the actual population of aphids on rose varieties so that there was maximum infestation when data was recorded.

Data Analysis

The data were analyzed by using statistical package MSTAT. ANOVA models were used for logical conclusions on the basis of results (Freed and Eisensmith, 1986).

RESULTS AND DISCUSSION

Mean Population of *Macrosiphum rosae*

Leaves

The maximum mean number of aphid nymphs, aphid winged adults and aphid wingless adults on leaves by visual sampling were 11.67, 5.00 and 9.43, respectively observed in Perfecta as compared to Wisky Mac, Iceburg and Christan Diar varieties (Table 1). Statistical analysis for aphid nymphs, aphid winged adults and aphid wingless adults on rose leaves showed that there were significant effects observed within varieties [$F_{(3,311)}$ = 3.0054, 2.7294 and 3.0285, respectively at P<0.0000*]. Statistical analysis for aphid nymphs, aphid winged adult and aphid wingless adults on rose leaves showed that there were significant effects observed within weeks [$F_{(3,311)}$ =

6.1151, 2.7294 and 7.2203 respectively at P<0.000*].

The population of rose aphid nymphs, aphid winged adults and aphid wingless adults on leaves were high in November. It started to decline in the 1st week of December and continues until it decline to zero. This decline was due to low temperature and intensive rainfall. The results agreed with Rustamani et al. (1999) showed that rainfall reduced the population of aphids. Population of aphid nymphs, aphid winged adults and aphid wingless adults on leaves again starts rising with the rise in temperature in 1st week of February. Due to prevailing conditions of food and also by rainfall, moisture and temperature population rises. In the last week of April population reduced because of rise in temperature. Present results also supported that temperature is very important among environmental factors. Extremely low and extremely high temperature slows down the development of aphids and reduces their population (Carter et al., 1980; Chambers et al., 1985).

Buds

The maximum mean number of aphid nymphs, aphid winged adults and aphid wingless adults on buds by visual sampling were 7.42, 8.67 and 12.97, respectively observed on Perfecta as compared to Wisky Mac, Iceburg and Christen Diar varieties (Table 1). Statistical analysis for aphid nymphs, aphid winged adult and aphid wingless adults on rose plant buds showed that there were significant effects observed within varieties [$F_{(3,311)}$ = 25.2415, 0.3561 and 10.001,8 respectively at P<0.0000*]. Statistical analysis for aphid nymphs, aphid winged adult and aphid wingless adults on rose plant buds showed that there were significant effects observed within weeks [$F_{(3,311)}$ = 13.4397, 1.4862 and 9.8065, respectively at P<0.000*].

The population of rose aphid nymphs, aphid winged adults and aphid wingless adults on buds were high in November. Population started to decline in the 1st week of December and continues until it decline to zero. This decline was due to low temperature and intensive rainfall. Population of aphids again started rising with the rise in temperature in 1st week of March. In April population reduced due to rise of temperature. The results agreed with Ahmed and Aslam (2000) that being a sucking pest aphid prefer to insert their stylets at soft surface with maximum food supply. Our results also supported that population of winged aphids again start rising in the 2nd week of February and suddenly decline due to intensive rainfall. Larval and pupal development was more rapid under high temperature than under low temperature (Kawauchi, 1983). The presence of trees in an agroforest area has direct effects on temperature, wind speed and atmospheric moisture. The maximum number of aphids occurred in the emergence of the flowering period (Hussein, 1993).

Flowers

The maximum mean number of aphid nymphs, aphid winged adults and aphid wingless adults on flowers by visual sampling were 14.25, 1.25 and 8.00, respectively observed on Perfecta as compared to Wisky Mac, Iceburg and Christen Diar varieties (Table 1). Statistical analysis for aphid nymphs, aphid winged adults and aphid wingless adults on rose

Table 1. Comparison of varietal means for the population of *Macrosiphum rosae* on different rose cultivars plant parts by Duncan's multiple range test

Rose variety	On Leaves			On Buds			On Flower		
	Apterous Adult	Alates	Nymphs	Apterous Adult	Alates	Nymphs	Apterous Adult	Alates	Nymphs
Perfecta	9.423[a]	5.000[a]	11.667[a]	12.970[a]	8.667[a]	7.417[c]	8.00[a]	1.25[a]	14.25[a]
Wisky Mac	5.064[b]	3.5833[b]	7.583[b]	08.936[b]	2.667[c]	13.58[a]	3.25[c]	0.58[d]	5.41[c]
Christen Diar	3.051[c]	0.2500[c]	1.000[d]	06.692[c]	1.083[d]	6.833[d]	0.167[d]	0.75[c]	2.75[d]
Ice Burg	1.615[d]	3.5833[b]	3.417[c]	06.603[d]	4.667[b]	9.167[b]	7.58[b]	1.25[b]	9.50[b]
LSD	3.36	1.47	3.14	8.67	4.26	9.15	3.99	2.23	8.176

plant flowers showed that there were significant effects observed within varieties [$F_{(3,311)}$ = 6.0331, 2.8203 and 2.7348, respectively at P<0.0000*]. Statistical analysis for aphid nymphs, aphid winged adults and aphid wingless adults on rose plant flowers showed that there were significant effects observed within weeks [$F_{(3,311)}$ = 2.7292, 2.4490 and 4.6073, respectively at P<0.000*].

The population of rose aphid nymphs, aphid winged adult and aphid wingless adults on flowers were high in November. Population started to decline in the 1st week of December and continues until it decline to zero. This decline was due to low temperature and intensive rainfall. Population of aphids again start rising with the rise in temperature in 1st week of March. In April population reduced due to rise of temperature. The results agreed with Ankersmit and Carter (1986) that development period of eggs, larva and pupa are temperature dependent and become shorter at high temperature. According to Sattar et al. (2001) aphid multiplied much rapidly during the reproductive growth stage of the plant resulting in higher number of aphids on the plant. Ankersmit and Carter (1986) observed that female laid 20-25% eggs. Female laid maximum number of eggs and they hatch earlier as well. Jaskiewicz (2003) found that increase in temperature and rainfall is the main factors affecting aphid population. Heat stress due to increased temperature reduced reproductivity and fecundity of aphids (Richter and Balde, 1993). Bisht et al. (2001) searched that the subtropical and temperate climate, enforcing the sexual reproduction in Rose aphid, is found favorable for the appearance of sexual morphs of *Macrosiphum rosaeformis* at 1180-2350 m above sea level. The greater aphid densities were found on leaves and flowers as compared to stems of rose plants. It can multiply very rapidly under favorable conditions of both nymphs and adults on leaves, stems and inflorescence. Aphids gradually disappear in response to warmer temperatures (Maelzer, 1977; Milles, 1985). Weather conditions alter the activity and reproduction of aphids (Chambers et al., 1985).

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AUTHORSHIP AND CONTRIBUTION DECLARATION

S. No	Author Name	Contribution to the paper
1.	Ms. Quratulain	Conducted the research and collected complete data and did the analysis
2.	Mr. Muhammad Aslam	Supervisor and guideline how to collect the data
3.	Mr. Muhammad Khalid Rafique	Co-researcher and collected complete data and help in the analysis
4.	Mian Atiq Ahmad	Technical Assistance
5.	Dr. Rashid Mahmood	Scientific write up and corresponding author

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