



## POPULATION DYNAMICS OF THRIPS *FRANKLINIELLA TRITICI* (FITCH) ON DIFFERENT ROSE VARIETIES

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### ABSTRACT

Rose is an important cut flower grown on large scale in Pakistan for commercial purposes. Thrips is one of the most important sucking pests of Rose causing a huge loss to yield and beautification of roses. The present research work was carried out under Randomized Complete Block Design (RCBD) to study the population dynamics of rose thrips in experimental field area of Pir Mehr Ali Shah Arid Agriculture University Rawalpindi on ten different rose cultivars (Iceberg, Christian dair, Visky Mac, Love, Surkha rose, Macadi, Perfecta and Gold Medal). Thrips was recorded on buds and flowers by using magnifying lens and the effect of environmental factors on thrips population was studied. The data was collected from 1<sup>st</sup> appearance of thrips on rose cultivars, and was continued until the end of population. Significantly greater thrips populations were observed on Perfecta, Iceberg and Gold Medal. However, significantly lesser thrips population was observed on Love and Mecadi. The expected results concluded from the studies will be helpful for the end users including gardeners and park managers to improve the health of their roses by knowing about the population fluctuation of rose thrips for its better management.

**Keywords:** Population, Rose, Thrips, Varieties

### INTRODUCTION

Rose (*Rosa indica*) has been the most important crop in the floriculture industry. The genus *Rosa* includes 200 species and 18,000 cultivars (Weiss, 1997; Gudin, 2000). Roses are of different types which includes white rose, pink rose, maroon rose, red rose, yellow rose and orange rose (Palmer *et al.*, 1992). Roses are used for beauty and decoration of garden, extraction of attar for making fragrant mixtures, tables and house decoration, large formal feasts and public functions and sprays on wedding banquets and funeral ceremonies (Sujatha and Gowda, 1997). The current world checklist of thrips (Thysanoptera) contains about 7400 species-group and 1200 genus-group (Mound, 2007). *Frankliniella* spp. (Thysanoptera: Thripidae) thrips damage a variety of crops,

feed on a broad range of hosts and often migrate into cropping systems from adjacent vegetation. The most common *Frankliniella* species on every plant species was *F. tritici* which was highly aggregated in the flowers or flower racemes, rather than leaves or fruit (Northfield *et al.*, 2008). The development and reproduction of *F. occidentalis* and *F. tritici* were evaluated and both species showed similar patterns in development and reproduction at 28 °C (Childers, 1997). MacIntyre *et al.* (2005) studied population dynamics of flower thrips by using both white sticky traps and plant counts, to gain insight into flight height, and to determine the genus and sex of thrips fauna present in monitored fields. *F. tritici* (Fitch) was the most abundant species. In both the fall and spring, significantly more adults occurred on flowers in the upper part of the plant canopy than in flowers in the lower

part of the plant canopy. Immature thrips occurred in the lower part of the plant canopy than in flowers in the upper part of the plant canopy. Differences in seasonal patterns and within plant distribution should be considered in developing sampling protocols and management plans for thrips (Reitz, 2002). Daily occurrence and flight activity of *Frankliniella* spp. is observed in the morning than in the afternoon. Numbers of *F. tritici*, *F. fusca* and immature thrips on flowers or foliage did not differ among sample hours. Temperature was an important factor in the flight activity of *F. tritici*. Populations of *F. tritici* peaked earlier in the season and declined sooner than those of *F. occidentalis* (Cho *et al.*, 2000). Thrips population growth was mainly dependent on temperature, population density and food availability. The damaged leaf area caused by the pest infestation was simulated separately. Thrips samples were taken during the whole cultivation period and larvae and adult thrips were summarized as pest individuals in the population (Nothnagl *et al.*, 2008). Their studies showed that thrips puncture the leaves, flowers or stems with their mouth parts and suck up the exuding sap. Waterhouse and Norris (1989) studied that there are 4 stages, or instars, between the egg and adult. The feeding instars (the first 2 stages) are called larvae and the non-feeding instars are called pupae. Durations of each stage vary depending primarily on temperature. They said that reproduction in many species may occur without fertilization (parthenogenetically). Rosenheim *et al.* (1990) reported that the flower thrips is primarily a flower feeder that eats both the flower petals and pollen. They also feed on foliage of certain hosts and produce a characteristic silvery appearance of thrips damage. Vacante (2000) studied that the flower thrips are harmful to numerous vegetables (tomato, aubergine, pepper, cucumber, strawberry, etc.) and ornamental plants (rose, carnation, gerbera, etc.) grown in greenhouses. The objective of this research work was to study the population dynamics of thrips, *Frankliniella tritici* (Fitch) on different rose varieties.

## MATERIALS AND METHODS

The research was carried out to study the population dynamics of thrips on rose under field conditions during 2007-2009. The research was conducted in experimental field area of Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi under Randomized Complete Block Design (RCBD). The plants were selected in the 1<sup>st</sup> week of November to mid February during 2007 to 2008 and 2008 to 2009. Varieties including Iceberg, Love, Goldmedal, Wiskymac, Perfecta, Meccadi, were selected in four replications. Each plant was divided into upper, middle and lower portions and each portion was further divided into buds and flowers to count the population of thrips by visual counts method. Each experimental plot had a measurement of 576 square feet, from which the population of thrips was recorded. The distance between each plot was 5ft, while the plant to plant distance was 4ft but the 1<sup>st</sup> plant distance was 2ft from their respective sides. Irrigation was done fortnightly. There were six treatments with four replications. No insecticide was applied in experiment in order to take the actual population of thrips on rose varieties. Excessive use of insecticides can also lead to development of insecticide resistance (Gill and Garg, 2014). Plants were selected from each variety of rose and tagged by paper strips.

The purpose of selecting the plants was to study the population dynamics of thrips and to see the environmental impacts on their population. Data were recorded on weekly basis during the evening time. One bud or flower was selected from the upper portion, 2<sup>nd</sup> from the middle portion relatively and third from the lower portion of the plant. Then the number of nymphs and adults were counted with the help of a magnifying lens. The percent population of thrips was counted from buds with the help of a formula as given below:

$$\% \text{ Population on buds} = \frac{\text{Total number of thrips on buds}}{\text{Total number of thrips on plants}} \times 100$$

The data collected on weekly basis were analyzed by using ANOVA through MSTAT-C (1991) micro computer statistical programme, Michigan State University, USA.

## RESULTS AND DISCUSSION

### Mean population of thrips nymph on flowers and buds during the year 2007-08

The comparison of varieties means for the population of thrips nymph on flowers and buds by Duncan's multiple range test at 0.05 level of probability during the year 2007-08 are given in Table 1. Statistically higher population of nymph was observed on rose flowers in variety Perfecta (10.41) which proved the most susceptible followed by Wiskymac (9.09) and Iceberg (8.78). Minimum population was observed on Mecadi variety which proved the most resistant (2.69) followed by Gold medal (7.59) and Love (7.04) showing similar population with little difference. The sudden decline in population was due to rainfall. Shower of rainfall reduced the population of thrips (Rustmani *et al.*, 1999). Weather conditions alter the activity and reproduction of thrips (Chambers *et al.*, 1985). While in case of buds, statistically significant population of nymphs was observed on buds of Iceberg (8.25), then on Goldmedal (6.09). The rose varieties Perfecta and Love showed similar population i.e 4.67 and 3.86. Chellemi (1994) reported that *F. tritici* followed by *F. bispinosa*, *F. occidentalis* and *F. fusca*. *F. tritici* was the most abundant species in December to February and August. The minimum population was observed on Mecadi (3.06) and Wiskymac (2.64) which proved resistant varieties. Overall thrips nymph population was observed higher on flowers than on buds.

### Mean population of thrips adults on flowers and buds during the year 2007-08

The comparison of varieties means for the population of thrips adult on flowers and buds by Duncan's multiple range test at 0.05 level of probability during the year 2007-08 are given in Table 1. Statistically higher significant population of thrips adult was observed on rose flowers variety Perfecta (3.13) and Wiskymac (3.08) which showed susceptibility. The minimum population was observed on Mecadi (0.67) which proved the most resistant variety. Reitz (2002) documented that thrips were much more abundant in the spring than in the fall. Iceberg, Goldmedal and Love varieties showed similar

population with minimum difference (2.55, 2.08 and 2.33, respectively). In case of buds, statistically higher population of adult thrips was observed on rose variety Perfecta (1.54) and Wiskymac (1.48) which proved more susceptible as compared to the rest of varieties. Iceberg, Goldmedal, Love and Mecadi varieties showed similar population (1.17, 0.93, 0.93 and 0.89). Leskey *et al.* (1997) showed that for diets with and without pollen, thrips adult longevity significantly decreased with increasing temperature.

#### Mean population of thrips nymph on rose flowers and buds during the year 2008-09

The comparison of varietals means for the population of thrips nymph on flowers and buds by Duncan's multiple range test at 0.05 level of probability during the year 2008-09 are given in Table 2. Statistically higher and similar significant population of thrips nymph was observed on rose flower varieties Wiskymac Goldmedal, Perfecta and Iceberg (11.03, 9.89, 9.84 and 9.78, respectively). The minimum population was observed on Mecadi variety (3.54) which showed resistance. Love showed average mean population of thrips nymph (7.98). While in case of buds, statistically higher population of thrips nymph was observed on Perfecta (5.87) which was susceptible variety. Population on Iceberg, Goldmedal and Love were non-significantly different (4.94, 5.00 and 4.35, respectively). Chyzik and Ucko (2002) assumed that the thrips survived the hottest months by aestivation and migrated to the plants when air temperature decreased. The minimum population was observed on Mecadi (3.46) and Wiskymac (3.75) which proved resistant varieties.

#### Mean population of thrips adults on flowers and buds during the year 2008-09

The comparison of varietals means for the population of adult thrips on flowers and buds by Duncan's multiple range test at 0.05 level of probability during the year 2008-09 are given in Table 3. Statistically significant and higher population of thrips adults was observed on flowers of Iceberg (3.57) which proved the most susceptible variety followed by Goldmedal (3.40). The minimum population was observed on Mecadi (0.98) which was resistant variety. Perfecta and Wiskymac varieties showed similar population (2.31 and 2.45, respectively). Magalhaes *et al.* (2007) reported that the prey refuges are expected to affect population dynamics of thrips. While in case of buds, statistically higher and significant population of adult thrips was observed on Goldmedal (1.26) and Iceberg (1.23) which proved comparatively more susceptible varieties. Wiskymac, Perfecta and Love varieties showed similar average population (1.01, 1.06 and 1.01, respectively). Jaskiewicz (2003) found that increase in temperature and rainfall is the main factors affecting thrips population. There was no significant difference between mean thrips population observed on Goldmedal, Iceberg, Wiskymac, Perfecta and Love. Mean thrips population on Mecadi was minimum (0.89). Cho *et al.* (2000) reported that temperature is an important factor in the flight activity of *F. tritici*. Populations of *F. tritici* peaked earlier in the season and declined sooner. The results concluded from the studies will be helpful for the end users including gardeners and park managers to improve the health of their roses by knowing about the population fluctuation of rose thrips for its better management.

**Table 1**

Comparison of varietal means for the population of thrips on rose flowers and buds during 2007-08 by Duncan's Multiple Range Test.

Varieties	Means on flowers		Means on Buds	
	Nymphs	Adults	Nymphs	Adults
Perfecta	10.41 a	3.13 a	8.25 a	1.54 a
Wiskymac	9.09 a	3.08 a	6.09 b	1.48 a
Iceberg	8.78 bc	2.55 b	4.67 c	1.17 b
Goldmedal	7.59 cd	2.33 b	3.86 cd	0.93 b
Love	7.05 d	2.08 b	3.06 de	0.93 b
Mecadi	2.69 e	0.67 c	2.64 e	0.89 b

**Table 2**

Comparison of varietal means for the population of thrips on rose flowers and buds during 2008-09 by Duncan's Multiple Range Test.

Varieties	Means on flowers		Means on Buds	
	Nymphs	Adults	Nymphs	Adults
Perfecta	9.84 a	2.31c	5.87 a	1.06 ab
Wiskymac	11.03 a	2.45 c	3.75 cd	1.01 ab
Iceberg	9.78 a	3.57a	4.94 b	1.23 a
Goldmedal	9.89 a	3.40 ab	5.00 b	1.26 a
Love	7.98 b	3.00 b	4.35 bc	1.10ab
Mecadi	3.54 c	0.98 d	3.46 d	0.89 b

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