Eco. Env. & Cons. 30 (May Suppl. Issue) : 2024; pp. (S382-S385)
Copyright@ EM International
ISSN 0971–765X

DOI No.: http://doi.org/10.53550/EEC.2024.v30i03s.066

Screening of rose germplasm against *Tetranychus urticae* under screen house conditions

Poonam and Rachna Gulati

Department of Zoology,
Chaudhary Charan Singh Haryana Agricultural University, Hisar 125 004, India

(Received 15 September, 2023; Accepted 16 November, 2023)

ABSTRACT

The three germplasms of hybrid tea rose includes pink, yellow and white supported *T. urticae* population but showed significant variation in mite numbers during screening in accordance with susceptibility index. The germplasm white sheltering lowest mite populations was marked as the least susceptible. However, pink was found to be highly susceptible and yellow was categorized as moderately susceptible. Among the different observational period, peak population of pink rose was found in the month of November and March. Irrespective of germplasm, maximum number of mites was found on grown up leaves when compared to tender and older leaves.

Key words: *Screening, Germplasm, Population, T. urticae*

Introduction

Flowers are the most gorgeous and attractive beauty of God which fill the heart with affection, happiness, and joy. Among ornamental flowers, rose (*Rosa* sp.) belongs to family Rosaceae and is universally recognized as "Queen of flower" (Reza *et al*., 2017); a title conferred by Sappo, a poetess over 2500 years back. Rose plant having showy and fragrant blossoms is a chief and extensively grown ornamental shrub (Bidarmania *et al.,* 2015) throughout the cooler and temperate region of the northern hemisphere including India. Roses are susceptible to several pests and diseases which reduce plant growth and quality of a flower. More than 150 species of insects and mites are found to feed on various parts of both wild and cultivated rose plants. Amongst these, red spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae) also known as two-spotted spider mite is a major pest of rose belongs to subphylum Chelicerata. Severe infestation cause reduced photosynthetic activity, bronzing, drying and leaf dropping and sometimes death of plant (Jeppson *et al*., 1975).

Materials and Methods

Plant Material

Rose plants were purchased from local nursery for the present investigation. For screen house study, rose germplasm were transplanted under replicated conditions in pots containing moisture retentive soil. Standard agronomical practices were used to raise and maintain the crop.

Mite culture

Fresh young rose potted plants were placed near heavy infested rose plants. Mites were allowed to migrate from infested to uninfested plants.

Counting

Mite infested leaves were examined with the aid of

stereo zoom microscope and hand lens. Three leaves selected from each leaf stage (tender, grown up, older) of the plant to count the number of mites.

Statistical analysis

Two-way ANOVA was used for the study the two independent factor (Observation period and leaf age) and one dependent factor (mite number) by using SPSS software.

Results

The results on the screening of three rose germplasm from tea hybrid (pink, yellow and white rose) and floribunda rose (dark pink, orange, pinkish white) against *T. urticae* incidence from September, 2018 to March, 2019 are presented in Tables 1-9 and illustrated in Figs. 1.

Hybrid Tea roses

Three colours of hybrid tea roses, *viz.*, pink, yellow and white rose were transplanted under replicated conditions in screen house.

Pink rose

The data pertaining to susceptibility of pink rose germplasm leaves to *T. urticae* under screen house conditions is presented in Table 1. On comparing the incidence of mites on different leaf stages, it was found that grown up leaves contained higher number of mites (9.52 mites/leaf) as compared to older (7.14 mites/leaf) and tender leaves (5.76 mites/leaf) (CD=0.34; p = 0.05). The increase ranged between 5.88 and 12.33 mites/leaf which showed significant difference in mite's numbers at all observation periods (CD= 0.72; p= 0.05). The *T. urticae* depicted a peak in population in the second fortnight of November (12.33 mites/leaf). Afterwards, it declined from 6.11 to 4.22 mites/leaf during first fortnight of December to first fortnight of January. Thereafter, it again increased from 7.44 in second fortnight of January to 10.89 mites/ leaf in second fortnight of March when a second peak was witnessed in *T. urticae* population. The number of mites was at par during second fortnight of December (4.44 mites/ leaf) and first fortnight of January (4.22 mites/leaf).

Values with the same superscript do not differ significantly

Yellow rose

As is evident from Table 2, with increase in observation period from September to March, corresponding increase in *T. urticae* population was witnessed in yellow rose plants under screen house conditions. The increase ranged between 2.89 and 7.55 mites/ leaf which showed significant difference in mites numbers at all observation periods (CD= 0.68; p= 0.05). The *T. urticae* population depicted a peak in population in the first fortnight of November (7.55

Table 1. Screening of pink rose against *Tetranychus urticae* under screen house conditions

Observation Period	Average number of mites/leaf			Mean
	Tender leaves	Grown up leaves	Older leaves	
1st Fortnight September	7.66	6.66	3.33	5.88 [b]
2nd Fortnight September	8.00	7.66	3.00	6.22 [b, e]
1st Fortnight October	2.66	13.33	4.66	6.88 [e, c]
2nd Fortnight October	4.00	12.00	5.66	7.22 [c]
1st Fortnight November	4.66	15.33	10.00	10.00
2nd Fortnight November	9.66	13.00	14.33	12.33
1st Fortnight December	6.00	9.33	3.00	6.11 [b]
2nd Fortnight December	5.66	4.66	3.00	4.44 [a]
1st Fortnight January	4.00	5.66	3.00	4.22 [a]
2nd Fortnight January	4.33	8.33	9.66	7.44 [c]
1st Fortnight February	4.66	8.00	10.66	7.77 [c, d]
2nd Fortnight February	5.66	7.33	8.33	7.11 [c]
1st Fortnight March	5.66	10.33	8.33	8.11 [d]
2nd Fortnight March	8.00	11.66	13.00	10.89
Mean	5.76	9.52	7.14	

CD (p=0.05) for Period = 0.72; SE(m)=0.26
CD (p=0.05) for Leaf stage = 0.34; SE(m)=0.12
CD (p=0.05) for Period × Leaf age = 1.25; SE(m)=0.45

mites/leaf). Afterwards, it declined during first fortnight of December from 6.89 to 0.55 mites/leaf to second fortnight of January.

During the study, the mite count was statistically insignificant during first and second fortnights of September and second fortnightof December.Leaf wise, grown up leaves contained higher number of mites/leaf (5.59 mites/leaf) as compared to tender (3.02 mites/leaf) and older leaves (2.95 mites/leaf) (CD=0.31; p = 0.05). A significant interaction was observed between the observation period and the leaf age (CD =1.17; p = 0.05) which indicate that fortnightly observation on number of mites recorded in three leaves differed significantly with each other.

Table 2. Screening of yellow rose against *Tetranychus urticae* under screen house conditions

Observation Period	Average number of mites/leaf			Mean
	Tender leaves	Grown up leaves	Older leaves	
1st Fortnight September	1.33	6.00	1.33	2.89[b]
2nd Fortnight September	2.66	6.00	2.66	3.77[b, g]
1st Fortnight October	1.00	8.33	2.66	4.00[c, g]
2nd Fortnight October	4.66	9.00	3.33	5.66[f]
1st Fortnight November	12.00	8.33	2.33	7.55
2nd Fortnight November	2.33	2.00	2.00	2.11[a]
1st Fortnight December	5.33	5.33	10.00	6.89
2nd Fortnight December	1.33	4.66	3.66	3.22[b]
1st Fortnight January	0.66	2.66	2.33	1.88[a]
2nd Fortnight January	0.33	0.66	0.66	0.55
1st Fortnight February	1.33	1.66	1.33	1.44[a]
2nd Fortnight February	2.66	7.33	3.33	4.44[c, d]
1st Fortnight March	3.33	8.00	2.33	4.55[c, d]
2nd Fortnight March	3.33	8.33	3.33	5.00[d, f]
Mean	3.02	5.59	2.95	

CD (p=0.05) for Period = 0.68; SE(m)=0.24
CD (p=0.05) for Leaf age = 0.31; SE(m)=0.11
CD (p=0.05) for Period × Leaf age = 1.17; SE(m)=0.42
Values with the same superscript do not differ significantly

Table 3. Screening of white rose against *Tetranychus urticae* under screen house conditions

Observation Period	Average number of mites/leaf			Mean
	Tender leaves	Grown up leaves	Older leaves	
1st Fortnight September	3.33	2.33	0.00	1.89[a]
2nd Fortnight September	1.00	4.66	0.66	2.11[a, e]
1st Fortnight October	1.66	3.33	1.66	2.22[a, b]
2nd Fortnight October	1.33	5.00	2.00	2.78[c]
1st Fortnight November	1.33	5.00	2.66	3.00[c]
2nd Fortnight November	0.66	3.33	2.00	2.00[a, f]
1st Fortnight December	0.33	4.00	1.66	2.00[a, f]
2nd Fortnight December	1.00	1.66	2.66	1.77[a]
1st Fortnight January	0.33	2.00	0.66	1.00
2nd Fortnight January	1.00	3.66	2.33	2.33[a, b, e, f]
1st Fortnight February	2.00	4.33	4.00	3.44[d]
2nd Fortnight February	2.66	5.00	3.33	3.66[d]
1st Fortnight March	3.00	5.33	4.00	4.11[e]
2nd Fortnight March	4.00	5.66	3.66	4.44[e]
Mean	1.69	3.95	2.23	

CD (p=0.05) for Period = 0.40; SE(m)=0.14
CD (p=0.05) for Leaf age = 0.19; SE(m)=0.07
CD (p=0.05) for Period × Leaf age = 0.70; SE(m)=0.25
Values with the same superscript do not differ significantly

White rose

As depicted in Table 3, mite population was found to significantly increased from 1.89 mites/ leaf in the first fortnight of September till the attainment of peak (3.00 mites/leaf) in white rose hybrid in the first fortnight of November (CD=0.40; p=0.05). Thereafter, it declined significantly with the progression of observation period till first fortnight of January when lowest population (1.00 mites/leaf) was recorded. Similar trend of second peak as witnessed in other two rose germplasms showed maximum population (4.44 mites/ leaf) in second fortnight of March.

Irrespective of observation period, maximum *T. urticae* incidence (3.95 mites/leaf) was recorded on grown up leaves followed by older leaves (2.23 mites/leaf) (CD=0.21; p=0.05). Least number of mites (1.69 mites/leaf) was recorded on tender leaves. A significant interaction was recorded between observation period and leaf age (CD=0.70; p=0.05) indicating that at each observation period, significantly lower mite population was observed on tender leaves than on grown up and older leaves.

Table 1. General scale of the germplasm resistance

Sl. No.	Reaction category	Population of mites/leaf
1	Least susceptible	0 to 5.50
2	Moderately susceptible	>5.50 to 10
3	Highly susceptible	10 to 15

Discussion

During the present study, screening of rose germplasm against *T. urticae* were recorded under screen house conditions. The hybrids exhibited wide difference in population of *T. urticae* however, none of them was found immune to this pest. The white rose of Hybrid Tea roses category with a population ranging from 5.77 to 8.94 mites per leaf were categorized as moderately susceptible germplasms. However, Pink germplasm of Hybrid Tea roses category showing maximum number of mites per leaf was categorized as highly susceptible germplasm.

In earlier studies, Grzeszkiewicz and Witaszek (1994) evaluated 26 rose cultivars for cut flower yield, quality and for resistance against *T. urticae* and reported that Parfait, Lady Rose and Hidalgo cultivars were found most resistant to *T. urticae*. Out of the thirty cultivars of rose screened against mite *T. urticae,* Hole and Salunkhe (2005) recorded maximum number of mites on cultivar Arjun while cultivar Rajhans was found to be most promising for recording the population of mites. Similarly, Toke (2010) reported rose variety Shakira as tolerant to *T. urticae* under poly house conditions.

Conclusion

The present study conducted a comprehensive evaluation of various rose germplasms to assess their susceptibility and resistance to mite populations. This research aimed to contribute to the understanding of how different rose varieties respond to mite infestations, which is crucial for rose cultivation and pest management.

Acknowledgement

We appreciate the ICMR and the Head of the Department for providing necessary financial help during the completion of this manuscript.

Conflict of Interest

The authors declare no conflict of interest

References

Bidarmania, F., Sanatgar, E. and Shabanipoor, M. 2015. Spatial distribution pattern of *Tetranychus urticae* Koch (Acari: Tetranychidae) on different rosa cultivars in greenhouse. *Journal of Ornamental Plants*. 5: 175-182.

Grzeszkiewicz, W.H. and Witaszek, W.1994. Evaluating the suitability of 26 rose cultivars grown for cut flowers in heated plastic tunnel. *Scientific Notebooks of Institute of Horticulture and Floriculture in Skierniewice.* 1: 85-94.

Hole, U. B. and Salunkhe, G. N. 2005. Studies on relative resistance of rose cultivars to two spotted spider mite (*Tetranychus urticae* Koch). *Journal of Maharashtra Agricultural Universities*. 30 (3): 316-317.

Jeppson, L.R., Keifer, H.H. and Baker, E.W. 1975. Mites injurious to economic plants. *University California Press*, 614pp.

Reza, M.E., Razib, N.M., Hossain, M.I., Islam, M.R., Hossain, B.M.S. and Bhuiyan, M.S.I. 2017. Incidence of spider mites (*Tetranychus urticae* Koch) infestation on different rose cultivars in Bangladesh. *American Journal of Plant Biology*. 2(1): 11-16.

Toke, N. R. 2010. *Biology, population dynamics, varietal screening and chemical control of rose mite (Tetranychus urticae Koch.).* M.Sc. (Agri.) Thesis. Navsari Agricultural University, Navsari. 110. pp