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Shaikh R.R.

Department of Agricultural
Entomology, Junagadh
Agricultural University,
Junagadh (Gujarat), India

Acharya M.F.

Department of Agricultural
Entomology, Junagadh
Agricultural University,
Junagadh (Gujarat), India

Rode N.S.

Department of Agricultural
Entomology, Junagadh
Agricultural University,
Junagadh (Gujarat), India

Correspondence:

Rode N.S.
Department of Agricultural
Entomology, Junagadh
Agricultural University,
Junagadh (Gujarat), India

Screening of onion varieties against onion thrips, *Thrips tabaci* Lind

Shaikh, R. R.; Acharya, M. F. and Rode, N. S.

Abstract

A field experiment was conducted at Vegetable Research Station, Junagadh Agricultural University, Junagadh during rabi season of 2012-13 to ascertain the susceptibility of eleven white onion and fifteen red and dark red promising genotypes (with one recommended cultivar in both) of onion to *Thrips tabaci*. Considering categorization for red onion varieties, Talaja Red, AGFL Red and Pilipatti was categorized as highly resistant, JRO-10-07, JRO-06-17, JRO-07-13 and JRO-1-09 as resistant. JRO-10-12, JRO-12-11, JRO-09-12, JRO-10-11, JRO-12-06, JRO-04-234 as well as JRO-10-06 were found susceptible while, JRO-12-12 grouped into highly susceptible. However among white onion varieties GWO-1 and AWSO-07-10 recorded less thrips population and proved highly resistant. The genotypes JWO-05-07, AWSO-01-2, JWO-05-08 and AWSO-10-3 were categorized into resistant group. AWSO-10-4 and JWO-08-09 were found susceptible. JWO-08-08, AWSO-04-7 and JWO-12-10 recorded highest thrips population and could be categorized as highly susceptible.

Keywords: Onion, Thrips, *Thrips tabaci*, Varietal Screening.

1. Introduction

Onion (*Allium cepa* L.) is one of the most important vegetable crops among the various bulbous vegetables commercially grown in tropical and subtropical countries. Both mature and immature bulbs of onion are used as vegetable and also as a condiment. According to colour there are three types of onion i.e. red, white and yellow, among which red and white varieties are extensively grown in India. Onion is consumed in all the countries, hence it has export value. India stands second in productivity next to China in onion production. Onion is being grown in area of 4,80,600 hectares of land with total production of 36,86,000 tonnes in the nation ^[1]. Onion is an important *rabi* crop grown in Saurashtra region of Gujarat State and area under this crop has been increasing year by year due to its high demand in the market and its remunerative price. It has been found to be the best companion crop with sugarcane under south Saurashtra condition ^[2].

A major constraint in vegetable production is poor and inadequate control of pest and diseases, which cause high yield losses ^[3]. Among the various pests of onion, the thrips (*Thrips tabaci* Lind.) is one of the most common and serious pest of onion. *T. tabaci* is polyphagous and regular pest of onion and garlic. It occurs throughout the year on different cultivated and wild plant species *viz.* cotton, okra etc. Indeed *T. tabaci* is considered to be such a potentially harmful pest of alliums that considerable effort and expenditure is employed in its control. The problem lies in the method by which *T. tabaci* feeds. Feeding by the thrips damages the host plant via direct removal of cell contents. As individual plant cells are killed, scarring of the leaf, in the form of silvery, due to high visibility of emptied cell cavities, is observed. Despite individual feeding sites being small, the damaged area of the leaf does not recover and becomes larger and more pronounced as the plant grows. This can quickly lead to damage that is visible on the leaf even to the untrained observer. Due to rapid reproduction, high mobility and interstitial characteristics thrips have gained importance over the years. Despite the use of insecticides, the level of control attained by employing traditional chemical strategies often insufficient to overcome the economic damage caused by *T. tabaci*. ^[4, 5] the present investigation was thus planned to ascertain the susceptibility of different onion varieties against *T. tabaci*.

2. Material and Methods

Twenty six varieties of onion (eleven white onion- JWO-05-07, JWO-05-08, JWO-08-08,

JWO-08-09, AWOS-01-2, AWOS-04-7, AWOS-07-10, AWOS-10-3, AWOS-10-4, JWO-12-10 and GWO-1 (C) and fifteen red onion- JRO-04-234, JRO-06-17, JRO-09-12, JRO-10-06, JRO-10-07, JRO-12-06, JRO-1-09, JRO-10-11, JRO-10-12, JRO-07-13, JRO-12-11, AGFL Red (C), Pilipati and Talaja Red) were evaluated for their susceptibility to *T. tabaci* under field condition at Vegetable Research Station, Junagadh Agricultural University, Junagadh during *rabi* season of 2012-13. Experiments were laid out in a Randomized Block Design (RBD) with three replications. The plot size was kept at 2.25 × 2.00 m, with 15 cm row-to-row and 10 cm plant-to-plant distance. All the recommended agronomic practices were carried out on experimental plot except control measures against *T. tabaci*.

2.1 Observations recorded

The susceptibility of different onion varieties to *T. tabaci* was evaluated on the basis of number of thrips per plant. Five plants were selected randomly in each plot and absolute population of thrips was recorded by examining the plant. The observations were taken at weekly interval from third week after transplanting till to the harvest of the crop. Mean pest population was worked out and the data, thus obtained were transformed in to square root transformation and then statistical analysis done for assessing the relative susceptibility to *T. tabaci*.

2.2 Categorization of varieties

The onion varieties were also grouped into four categories *viz.*, highly resistant, resistant, susceptible and highly susceptible based on number of thrips per plant. For the purpose, mean value of individual genotype (\bar{X}_i) was compared with mean value of all genotypes (\bar{X}) and standard deviation (sd) following the modified scale adopted by. [6, 7, 8] The retransformed data were used for computation of \bar{X} , \bar{X}_i and sd in case of this parameter. The scale used for categorizing different genotypes was as under.

Category of resistance	Scale for resistance
Highly Resistant (HR)	$\bar{X}_i < \bar{X} - sd$
Resistant (R)	$\bar{X}_i > \bar{X} - sd < \bar{X}$
Susceptible (S)	$\bar{X}_i > \bar{X} < (\bar{X} + sd)$
Highly Susceptible (HS)	$\bar{X}_i > (\bar{X} + sd) < (\bar{X} + 2sd)$

3. Results and Discussion

3.1 Red varieties

It has been observed that the pest infestation was very low (5.67 to 7.10 thrips/plant) during medial of January in different varieties (Table 1). The population data could not differ significantly in the varieties under test. However, the variety JRO-1-09 registered the highest population of thrips (7.10 thrips/ plant).

In 5th standard week the lowest thrips population was recorded from AGFL Red (6.63 thrips/plant), which was statistically similar with Talaji Red (6.90 thrips/plant), Pilipatti (7.03 thrips/plant), JRO-06-17 (7.20 thrips/plant), JRO-10-11 (7.33 thrips/plant), JRO-07-13 (7.33 thrips/plant), JRO-10-06 (8.38

thrips/plant), JRO-04-234 (8.47 thrips/plant), JRO-12-11 (8.63 thrips/plant) and JRO-1-09 (8.83 thrips/plant). More susceptibility was assessed, from JRO-12-12 (12.17 thrips/plant) and it was at par with JRO-09-12 (10.77 thrips/plant) JRO-10-12 (10.10 thrips/plant) and JRO-12-06 (9.83 thrips/plant). The same trend was observed in thrips population during 6th and 7th standard weeks, after which it suddenly hiked. In 8th standard week, JRO-12-12 was observed to be more susceptible (24.10 thrips/plant) to thrips. However, JRO-10-12, JRO-12-06, JRO-10-06, JRO-04-234, JRO-10-11, JRO-1-09 and JRO-12-11 showed higher susceptibility (22.30 to 19.93 thrips/plant) and was at par with JRO-12-12, while the Talaja Red variety exhibited the lowest population (14.43 thrips/plant).

The thrips population in onion field at 9th week attained the peak with thrips population ranging from 13.73 to 28.67 thrips/ plant. The variety Talaja Red reported the lowest population (13.73 thrips/plant) of thrips, which was statistically similar with AGFL Red (17.37 thrips/plant), Pilipatti (19.67 thrips/plant), JRO-06-17 (19.87 thrips/plant). The variety JRO-12-12 registered the highest thrips population (28.67 thrips/ plant). During 10th, 11th and 12th week, the thrips population started to reduce. But in 13th week, the thrips population again started to increase. In 14th week, a second peak was obtained in the thrips population. The lowest thrips population was observed from the variety Talaja Red (8.73 thrips/plant), AGFL Red (14.67 thrips/plant) and Pilipatti (15.00 thrips/plant). The genotypes JRO-06-17 (15.83 thrips/plant) JRO-07-13 (15.87 thrips/plant) and JRO-10-07 (15.90 thrips/plant) were found moderately susceptibility to thrips. The highest population observed from the variety JRO-12-12 (22.77 thrips/plant). During 15th week, the thrips population was decreased drastically and diminished to negligible range in 16th week. This could possibly be explained on the basis on increase in temperature.

As indicated in Table 1, JRO-12-12 was found to be highly susceptible to the pest as it supported the highest population throughout the crop season, whereas Talaja Red was found to be least susceptible.

3.2 Categorization of red onion varieties for susceptibility

The different varieties of onion were also grouped into four different categories of resistance *viz.*, highly resistant, resistant, susceptible and highly susceptible. Varieties were grouped into above categories based on number of thrips per plant and comparing the mean number of thrips of individual genotype (\bar{X}_i) with mean number of thrips of all genotypes (\bar{X}) and standard deviation (sd). The results are presented in Table 2.

Based on thrips population, genotypes Talaja Red, AGFL Red and pilipatti recorded less than 3.60 thrips per plant and found to be highly resistant (Table 2). However, genotypes JRO-10-07, JRO-06-17, JRO-07-13 and JRO-1-09 found resistant with less than 4.44 but more than 3.60 thrips population per plant. Genotypes JRO-10-12, JRO-12-11, JRO-09-12, JRO-10-11, JRO-12-06, JRO-04-234 as well as JRO-10-06 were found susceptible with more than 4.44 but less than 5.12 thrips per plant. Genotype JRO-12-12 recorded more than 6.12 thrips per plant and was grouped as highly susceptible

Table 1: Incidence of *Thrips tabaci* Lind. in different onion Varieties (Red onion)

Sr No	Genotypes/Varieties	Mean population / plant at different standard week													
		4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th	12 th	13 th	14 th	15 th	16 th	Mean
1	JRO-04-234	2.61 (6.33)	2.99 (8.47)	3.79 (13.87)	3.96 (15.20)	4.71 (21.73)	4.86 (23.20)	4.58 (20.50)	3.29 (10.37)	2.31 (4.87)	3.44 (11.37)	4.26 (17.70)	3.24 (10.03)	2.46 (5.57)	2.31 (4.87)
2	JRO-06-17	2.49 (5.73)	2.77 (7.20)	2.26 (10.17)	3.62 (12.67)	4.26 (17.73)	4.51 (19.87)	4.10 (16.37)	2.92 (8.07)	2.11 (3.93)	3.00 (8.53)	4.04 (15.83)	2.92 (8.07)	2.14 (4.10)	2.11 (3.93)
3	JRO-09-12	2.68 (6.73)	3.35 (10.77)	3.43 (11.27)	3.83 (14.23)	4.33 (18.27)	4.66 (21.30)	4.32 (18.17)	3.14 (9.40)	2.30 (4.80)	3.46 (11.53)	4.24 (17.50)	3.16 (9.50)	2.33 (4.93)	2.30 (4.80)
4	JRO-10-06	2.64 (6.50)	2.97 (8.38)	3.81 (14.03)	4.09 (16.27)	4.72 (21.87)	4.90 (23.52)	4.55 (20.23)	3.61 (12.60)	2.33 (4.97)	3.54 (12.06)	4.28 (17.87)	3.23 (9.97)	2.37 (5.13)	2.33 (4.97)
5	JRO-10-07	2.72 (6.90)	3.12 (9.27)	3.38 (10.97)	3.60 (12.47)	4.27 (17.80)	4.52 (19.97)	4.11 (16.40)	3.24 (10.00)	2.09 (3.90)	3.01 (8.60)	4.04 (15.90)	3.00 (8.50)	2.25 (4.57)	2.09 (3.90)
6	JRO-12-06	2.54 (6.00)	3.21 (9.83)	3.87 (14.53)	4.16 (16.87)	4.76 (22.17)	5.03 (24.90)	4.62 (20.87)	3.42 (11.23)	2.31 (4.87)	3.64 (12.80)	4.34 (18.37)	3.28 (10.27)	2.43 (5.43)	2.31 (4.87)
7	JRO-1-09	2.75 (7.10)	3.05 (8.83)	2.84 (14.27)	3.84 (14.27)	4.54 (20.13)	4.83 (22.87)	4.46 (19.40)	3.29 (10.33)	2.22 (4.43)	3.46 (11.33)	4.19 (17.13)	3.25 (10.10)	2.42 (5.40)	2.22 (4.43)
8	JRO-10-11	2.64 (6.47)	2.79 (7.33)	3.89 (14.70)	4.14 (16.70)	4.64 (21.10)	5.02 (24.73)	4.56 (20.37)	3.43 (11.30)	2.30 (4.83)	3.60 (12.53)	4.40 (18.90)	3.40 (11.07)	2.54 (5.97)	2.30 (4.83)
9	JRO-10-12	2.66 (6.60)	3.25 (10.10)	4.00 (15.53)	4.35 (18.43)	4.77 (22.30)	5.07 (25.27)	4.61 (20.77)	3.56 (12.23)	2.23 (4.50)	3.71 (13.30)	4.40 (18.90)	3.38 (10.93)	2.39 (5.23)	2.23 (4.50)
10	JRO-07-13	2.49 (5.73)	2.86 (7.33)	3.29 (10.33)	3.66 (12.90)	4.30 (18.07)	4.52 (20.00)	4.20 (17.17)	3.22 (9.87)	2.19 (4.30)	3.06 (8.87)	4.04 (15.87)	3.01 (8.60)	2.16 (4.20)	2.16 (4.20)
11	JRO-12-11	2.70 (6.80)	3.02 (8.63)	3.82 (14.13)	4.02 (15.70)	4.51 (19.93)	4.84 (22.93)	4.34 (18.40)	3.48 (11.63)	2.24 (4.53)	3.67 (12.97)	4.41 (18.97)	3.43 (11.30)	2.42 (5.37)	2.42 (4.53)
12	JRO-12-12	2.73 (6.97)	3.55 (12.17)	4.27 (17.77)	4.44 (19.23)	4.95 (24.10)	5.40 (28.67)	5.08 (25.37)	4.12 (16.50)	2.68 (6.67)	3.95 (15.17)	4.82 (22.77)	3.50 (11.77)	2.72 (6.90)	2.68 (6.67)
13	AGFL Red (C)	2.49 (5.73)	2.67 (6.63)	3.25 (10.10)	3.48 (11.63)	4.09 (16.27)	4.22 (17.37)	3.59 (12.43)	2.85 (7.63)	1.94 (3.40)	2.95 (8.23)	3.89 (14.67)	2.82 (7.47)	2.03 (3.63)	1.94 (3.40)
14	Pilipatti (C)	2.62 (6.40)	2.74 (7.03)	3.69 (13.13)	3.92 (14.90)	4.19 (17.13)	4.49 (19.67)	3.91 (14.83)	2.99 (8.47)	1.99 (3.47)	2.99 (8.47)	3.93 (15.00)	2.91 (8.00)	2.04 (3.70)	1.99 (3.47)
15	Talaja Red (C)	2.48 (5.67)	2.72 (6.90)	3.28 (10.27)	3.46 (11.50)	3.86 (14.43)	3.77 (13.73)	3.45 (11.43)	2.86 (7.70)	1.94 (3.27)	2.96 (8.30)	3.03 (8.73)	2.87 (7.77)	2.04 (3.67)	1.94 (3.27)
S.Em. ±		0.19	0.14	0.19	0.16	0.20	0.25	0.26	0.17	0.13	0.17	0.25	0.14	0.13	
C.D. at 5%		NS	0.42	0.55	0.46	0.57	0.73	0.75	0.48	0.38	0.50	0.72	0.41	0.36	
C.V %		13.46	8.60	9.18	7.17	7.79	9.43	10.63	8.94	10.50	9.16	10.53	8.01	9.90	

*Figures in parentheses are retransformed values.

Table 2: Categorization of different varieties of red onion for their susceptibility to *T. tabaci*

Category of resistance	Scale	Varieties (\bar{X}_i)	
1	2	3	
Based on population of thrips/plant : $\bar{X} = 4.44$ and $sd = 0.84$			
Highly resistant	$\bar{X}_i < 3.60$	Talaja Red	(3.27)
		AGFL Red	(3.38)
		Pilipatti	(3.47)
Resistant	$\bar{X}_i > 3.60 < 4.44$	JRO-10-07	(3.90)
		JRO-06-17	(3.93)
		JRO-07-13	(4.20)
		JRO-1-09	(4.43)
Susceptible	$\bar{X}_i > 4.44 < 5.28$	JRO-10-12	(4.50)
		JRO-12-11	(4.53)
		JRO-09-12	(4.80)
		JRO-10-11	(4.83)
		JRO-12-06	(4.87)
		JRO-04-234	(4.87)
JRO-10-06	(4.97)		
Highly Susceptible	$\bar{X}_i > 5.28 < 6.12$	---	
Highly-Highly Susceptible	$\bar{X}_i > 6.12$	JRO-12-12	(6.67)

3.3 White variety

Eleven varieties of white onion were screened against thrips. The data was recorded on thrips population per plant in different varieties and presented in Table 3. The standard resistant variety GWO-1 (used as check), always exhibited low susceptibility to thrips population compared to all varieties. The data (Table 3) revealed that among different varieties under the test, during 4th standard week, the variety GWO-1 supported the lowest population (8.50 thrips/plant) of thrips. The variety JWO-12-10 supported the highest thrips population (12.33 thrips/plant) and it was at par with AWSO-04-7, JWO-08-08, JWO-08-09, AWSO-10-4 and JWO-05-07, which recorded 11.87, 11.77, 10.53, 9.80 and 9.23 thrips population. During 5th

standard week the variety GWO-1 was found resistant (10.03 thrips/plant) and it was at par with AWSO-07-10 (10.17 thrips/plant), AWSO-01-2 (11.43 thrips/plant), JWO-05-07 (11.97 thrips/plant), JWO-05-08 (12.10 thrips/plant), AWSO-10-3 (12.50 thrips/plant) and AWSO-10-4 (12.90 thrips/plant). The variety JRO-12-10 supported the highest thrips population (16.47 thrips/plant) and was statistically at par with AWSO-04-7 (16.13 thrips/plant), JWO-08-08 (15.83 thrips/plant) and JWO-08-09 (13.80 thrips/plant). In 6th standard week onwards the thrips population was started to increase. The highest thrips population observed in JWO-12-10 (22.47 thrips/plant), which was statistically similar with AWSO-04-7 (20.20 thrips/plant), JWO-08-08 (19.13 thrips/plant), JWO-08-09 (17.77 thrips/plant), AWSO-10-3 (17.23 thrips/plant) and AWSO-10-4 (17.20 thrips/plant). The lowest population was observed in the variety GWO-1 (11.93 thrips/plant) which at par with AWSO-07-10 (14.43 thrips/plant), JWO-05-07 (15.20 thrips/plant), AWOS-01-2 (15.77 thrips/plant), JWO-05-08 (16.50 thrips/plant). Similar trend was observed during 7th standard week. The thrips population in onion field at 8th standard week attained the peak because of sudden rise in the atmospheric temperature. The data revealed that the variety GWO-1 supported the lowest population (18.23 thrips/plant). The variety JWO-12-10 supported the highest thrips population (30.70 thrips/plant) and the varieties, AWSO-04-7 (27.27 thrips/plant), JWO-08-08 (27.00 thrips/plant), AWSO-10-4 (26.00 thrips/plant), AWSO-10-3 (25.83 thrips/plant) and JWO-05-08 (24.50 thrips/plant) were found to be at par with JWO-12-10.

9th week onwards the thrips population started to diminish up to 12th standard week, due to continuous reduction in temperature. The thrips population attained second peak, during 13th standard week (11.90 to 23.50 thrips/plants). The lowest thrips population was recorded from GWO-1 and highest population was assessed from the variety JWO-12-10. The AWSO-07-10, AWSO-01-2 and JWO-05-07 varieties recorded thrips population of 16.97, 17.43 and 17.63 thrips/plant. After the 14th standard week the population gradually diminished up to negligible range, due to low atmospheric temperature.

The variety JWO-12-10 was found to be highly susceptible to the pest as it supported the highest population throughout the crop season, whereas GWO-1 exhibited less susceptibility.

Based on thrips population, genotypes GWO-1 and AWSO-07-10 recorded less than 2.90 thrips per plant and were found to be highly resistant (Table 4). However, genotypes JWO-05-07, AWSO-01-2, JWO-05-08 and AWSO-10-3 were found resistant with more than 2.90 but less than 3.71 thrips per plant. Genotypes, AWSO-10-4 and JWO-08-09 were found susceptible with more than 3.71, but less than 4.52 per plant. Genotypes JWO-08-08, AWSO-04-7 and JWO-12-10 were grouped into highly susceptible.

Table 3: Incidence of *Thrips tabaci* Lind. in different onion varieties (White onion)

Sr. No.	Genotype/Varieties	Mean population / plant at different standard week													Mean
		4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th	12 th	13 th	14 th	15 th	16 th	
1	JWO-05-07	3.11 (9.23)	3.53 (11.97)	3.96 (15.20)	4.64 (21.10)	4.86 (23.17)	4.40 (18.87)	3.37 (10.87)	2.11 (3.97)	3.54 (12.07)	4.25 (17.63)	3.18 (9.67)	2.18 (4.27)	1.86 (2.97)	1.86 (5.03)
2	JWO-05-08	3.19 (9.70)	3.54 (12.10)	4.12 (16.50)	4.79 (22.47)	5.00 (24.50)	4.59 (20.60)	3.42 (11.20)	2.30 (4.83)	3.71 (13.30)	4.46 (19.47)	3.34 (10.70)	2.42 (5.40)	2.01 (3.57)	2.01 (4.77)
3	JWO-08-08	3.50 (11.77)	4.04 (15.83)	4.43 (19.13)	5.03 (24.83)	5.24 (27.00)	4.93 (23.83)	3.92 (14.90)	2.44 (5.47)	4.09 (16.30)	4.78 (22.43)	3.72 (13.37)	2.56 (6.07)	2.25 (4.60)	2.25 (4.60)
4	JWO-08-09	3.32 (10.53)	3.78 (13.80)	4.27 (17.77)	4.80 (22.60)	4.96 (24.20)	4.60 (20.67)	3.50 (11.80)	2.33 (4.97)	3.70 (13.23)	4.47 (19.50)	3.33 (10.63)	2.33 (4.97)	2.09 (3.87)	2.09 (3.87)
5	AWSO-01-2	3.10 (9.13)	3.45 (11.43)	4.03 (15.77)	4.64 (21.03)	4.76 (22.23)	4.37 (18.63)	3.31 (10.47)	2.07 (3.80)	3.67 (13.03)	4.23 (17.43)	3.12 (9.27)	2.14 (4.10)	1.94 (3.27)	1.94 (3.80)
6	AWSO-04-7	3.51 (11.87)	4.07 (16.13)	4.54 (20.20)	5.10 (25.60)	5.26 (27.27)	4.87 (23.30)	3.80 (14.00)	2.57 (5.63)	4.09 (16.23)	4.80 (22.63)	3.71 (13.27)	2.51 (5.83)	2.29 (4.77)	2.39 (3.63)
7	AWSO-07-10	3.03 (8.73)	3.26 (10.17)	3.86 (14.43)	4.60 (20.70)	4.71 (21.77)	4.20 (17.17)	3.22 (9.90)	1.97 (3.40)	3.53 (12.03)	4.17 (16.97)	3.08 (9.00)	2.16 (4.17)	1.80 (2.77)	1.80 (3.57)
8	AWSO-10-3	3.17 (9.60)	3.60 (12.50)	4.21 (17.23)	4.89 (23.43)	5.13 (25.83)	4.57 (20.40)	3.43 (11.33)	2.32 (4.90)	3.70 (13.20)	4.42 (19.10)	3.36 (10.80)	2.46 (5.57)	2.03 (3.63)	2.03 (3.27)
9	AWSO-10-4	3.20 (9.80)	3.66 (12.90)	4.20 (17.20)	4.94 (23.97)	5.14 (26.00)	4.63 (21.00)	3.51 (11.83)	2.22 (4.47)	3.75 (13.63)	4.51 (19.93)	3.28 (10.27)	2.38 (5.17)	2.07 (3.80)	2.07 (2.97)
10	JWO-12-10	3.58 (12.33)	4.14 (16.47)	4.79 (22.47)	5.44 (29.10)	5.58 (30.70)	5.16 (26.13)	4.02 (15.70)	2.42 (5.40)	4.13 (16.60)	4.89 (23.50)	3.78 (13.83)	2.58 (6.20)	2.35 (5.03)	2.35 (2.77)
11	GWO-1 (C)	3.00 (8.50)	3.24 (10.03)	3.53 (11.97)	4.04 (15.83)	4.32 (18.23)	3.75 (13.63)	3.20 (9.80)	2.13 (4.07)	3.25 (10.07)	3.52 (11.90)	2.93 (8.13)	2.25 (4.60)	1.75 (2.57)	1.75 (2.57)
S.Em. ±		0.13	0.15	0.22	0.21	0.21	0.19	0.16	0.10	0.18	0.19	0.16	0.09	0.12	
C.D. at 5%		0.39	0.44	0.66	0.63	0.61	0.57	0.46	0.29	0.54	0.56	0.48	0.27	0.34	
C.V %		7.21	7.25	9.44	7.75	7.21	7.51	7.87	7.98	8.64	7.52	8.59	7.11	10.52	

*Figures in parentheses are retransformed values.

Categorization of white onion varieties for susceptibility

Table 4: Categorization of different varieties of white onion for their susceptibility to *T. tabaci*

Category of resistance	Scale	Varieties (\bar{X}_i)	
1	2	3	
Based on population of thrips/plant : $\bar{X} = 3.71$ and sd = 0.81			
Highly resistant	$\bar{X}_i < 2.90$	GWO-1	(2.57)
		AWSO-07-10	(2.77)
Resistant	$\bar{X}_i > 2.90 < 3.71$	JWO-05-07	(2.97)
		AWSO-01-2	(3.27)
		JWO-05-08	(3.57)
		AWSO-10-3	(3.63)
Susceptible	$\bar{X}_i > 3.71 < 4.52$	AWSO-10-4	(3.80)
		JWO-08-09	(3.87)
Highly Susceptible	$\bar{X}_i > 4.52 < 5.33$	JWO-08-08	(4.60)

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