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Research Article

FIELD EVALUATION OF SELECTED ONION GENOTYPES TOWARDS ONION THRIPS, *THRIPS TABACI* L. (THYSONOPTERA: THRIPIDAE)

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Abstract – This present study was conducted for the evaluation of different onion cultivars against onion thrips *Thrips tabaci* L. (Thysonoptera: Thripidae). The data regarding maximum population of adults on Marvi with 3.4 adults per leaf and minimum number of adults on Red Orb with 1.6 adults per leaf were recorded. According to Physico-morphic characters the height and girth of Marvi cultivar was minimum with 14.95 cm and 9.02 mm respectively. Maximum height of Red Orb cultivar with 19.94 cm and girth with 9.84 mm were noticed. The leaf infestation of Marvi was maximum with 43.04 percent while minimum infestation was recorded on Red Orb i.e. 22.58 percent. Maximum yield was observed on Red Orb with 151.4 g per 5 plants while the Marvi cultivar had low yield 100.3 g per 5 plants.

Keywords – Onion, Thrips, Physico-Morphic Characters, Yield And Infestation.

I. INTRODUCTION

Onion (*Allium cepa* L.) belongs to the family Alliaceae which is also known as Amaryllidaceae and is a biennial herbaceous crop [1]. Onion (*Allium cepa* L.) is member of family Amaryllidaceae which is known as major horticulture cash crop in Pakistan [2]. Onion contain high amount of phosphorus, calcium and carbohydrates. It is pungent because of sulphuric compound and it is also used as appetizer and rich source of energy [3].In India onion is cultivated in large area for the consumption of domestic purpose and as well as for export [4].Onion crops seriously attacked by different insect pest including thrips, maggots, head borer and cutworm etc, which are main yield reducing factors. Among these, *Thrips tabaci* is the most major pest of onion crop[5]. *T. tabaci* causes damage to the onion crop directly as well as indirectly, directly by feeding and indirectly by transmitting virus[6].As compare to other insect pest of onion, *T.tabaci* is the most serious pest in tropical area[7].

The number of thrips increases from bulb initiation and attack onion at all stages of crop growth [8]. As compare to adult usually nymph does more damage in peculiar feeding behavior in fruit as well as in flower of onion [9].During last two decades it has been recorded that *T. tabaci* became a globally recognized pest of onion crop[10].Onion thrips which is known as most economically important pest of onion in all over the world [11].Various studies on onion resistant against *T. tabaci* have been reported and also conducted the association of resistance with onion bulb color[12]. It has been reported that further development of resistance in *T.tabaci* is due to commonly use of insecticides[13].

The present study was conducted to evaluate different cultivars against *T. tabaci*. The findings will also help to increase the onion yield and also facilitate farming community of Pakistan for this pest management.

II. MATERIALS AND METHOD

Randomized Complete Block Design (RCBD) was used to conduct the experiment and to evaluate different cultivars of Onion along with four replications in the field. The onion cultivars were collected from different areas for the screening of onion against onion thrips *T. tabaci.*

Screening of Onion Cultivars

Nursery was raised in the greenhouse of the University. Seedling was transplanted after 60 days in the field. Different cultivars of onion were sowed. Land preparation was done through standard farm operation. The plot size was dimension 20 m × 25 m. The distance from plant to plant and row to row was maintained as 10 cm and 15 cm respectively. Irrigation was done at 7 days and 10 days. The total number of pest population of onion thrips was recorded on five different randomly selected plants from each replication starting 40 days after sowing till the time of harvesting.

Adult Population

The total number of adult thrips was observed from five different randomly selected plants of each replication of each treatment. The data was recorded on weekly basis (7± 1day) interval. The number of onion thrips population was counted from different portion of onion crop i.e. upper, middle and lower. The average was calculated by

$$\textit{Average number of adult per leaf} = \frac{\textit{Total number of adult counted}}{\textit{Total number of leaves observed}}$$

Statistical Analysis

The data regarding to pest population of *T. tabaci* on different cultivars of onion and the physico-morphic characters of various cultivars were subjected to Analysis and mean were compared with Duncan's multiple test range at 5% level of probability, after that the data was processed for simple correlation.

III. RESULTS

Screening of different onion cultivars against onion thrips *Thrips tabaci.*

Adult population

Analysis of variance was given in Table 1 (a) however the mean were evaluated by DMR Test at (P=0.05) in the Table 1 (b) the comparison of different onion cultivars were done to investigate the adult population. The presence of adult of onion thrips on different cultivars of onion revealed that Red orb cultivar was comparatively resistant and significantly different as compared to all other onion cultivars with 1.6 adult per leaf. The highest number of onion thrips was recorded on the Marviand White pearl which was less susceptible to the onion thrips 3.4 and 2.3 thrips per leaf respectively.

Leaf Infestation of onion cultivars

Analysis of variance was given in the table 2 (a) where the mean were compared by DMR test at (P=0.05) in the table 2 (b). The means of leaf infestation of onion thrips on different cultivars were evaluated by applying DMR test (P=0.05). The result revealed that Marvi cultivar was most infested and most significantly different as compare to other cultivars of onion .F1 Mustang, White pearl and Golden Orb were statistically similar to each other 32.88, 34.03 and 32.27 percent respectively. Red Orb with 22.58 percent was less infested to onion thrips. Recorded high leaf infestation on Golden Orb cultivar relatively moderate susceptible to onion thrips which is similar to the result of current study.

Table 1 (a): Analysis of variance on different onion cultivars number of adults of *Thrips tabaci* per leaf.

S.O.V	df	S.S	M.S	F.Value	Prob
Replication	3	1.13	0.37	0.22	0.8769 *
Cultivars	4	72.3	18.09	10.90	0.0000 ***
Weeks	9	383.1	42.57	25.67	0.0000 ***
Cultivars x Weeks	36	57.4	1.59	0.96	0.5354 ns
Error	147	243.7	1.65		
Total	199	757.9			

Coefficient of Variation: 49.20%

Table 1 (b): Mean comparison data on different onion cultivars number of adults of *Thripstabaci*per leaf during 2017.

Cultivars	**Means**
F1 Mustang	2.4 b
Marvi	3.4 a
White pearl	2.3 b
Red Orb	1.6 c
Golden Orb	3.0 a

LSD = 0.79

Means sharing the similar letters are not significantly different by the DMR Test at P=0.05

Table 2 (a): Analysis of variance on different onion cultivars regarding leaf infestation by *Thripstabaci*

S.O.V	df	S.S	M.S	F.Value	Prob
Replication	3	427.1	142.3	2.28	0.886 ns
Cultivars	4	3374.5	843.6	13.53	0.0000 ***
Weeks	3	705.6	235.2	3.77	0.154*
Cultivars x Weeks	12	430.8	35.90	0.57	0.8523 ns
Error	57	3553.0	62.33		
Total	79	8491.2			

Coefficient of Variation: 23.95 %

Table 2 (b): Mean comparison data on different onion cultivars number regarding leaf infestation by *Thripstabaci* during 2017.

Cultivars	**Means**
F1 Mustang	32.88 b
Marvi	43.04 a
White pearl	34.03 b
Red Orb	22.58 c
Golden Orb	32.27 b

LSD = 5.76

Means sharing the similar letters are not significantly different by the DMR Test at P=0.05

Physico-morphic Characters on Different Onion Cultivars

i. Height of onion cultivars in (cm) after 40 days

Analysis of variance was given in Table 3 (a) and the mean data regarding plants height was compared by DMR test at 0.05 P value in the table 3 (b). The result showed that the Red Orb was significantly different from all other cultivars with the mean height of 19.94 cm. The average height of White pearl and Golden Orb were evaluated with 15.02 cm and 15.70 cm which were similar to each other. Maximum height mean was recorded on Red Orb 19.94 cm.

ii. Height of onion cultivars in (cm) after 70 days

Analysis of variance was given in Table 4 (a) and the mean were compared by DMR Test at (P=0.05) in the table 4 (b). The result showed that the maximum average plant height of Red Orb with 25.26 cm was assumed. Plant average height of Marvi and Golden Orb cultivars with 20.05 cm and 20.51 cm were statistically similar to each other.

iii. Height of onion cultivars in (cm) after 100 days

The data related to the height of onion cultivars after 100 days were given in table 5 (a) and the means data regarding plant height were compared by using DMR test at 0.05 P value in the Table 5 (b). The result revealed that Red Orb was the most resistant and most non-significantly different from other 4 cultivars with 33.76 cm followed by F1 mustang, Golden Orb, Marvi and White pearl with 26.49 cm, 23.58 cm, 22.10 cm and 21.45 cm respectively.

Table 3 (a): Analysis of variance of plant height in (cm) after 40 days of different onion cultivars

S.O.V	df	S.S	M.S	F.ValueProb
Replication	3	0.38	0.12	0.43 0.7324 ns
Cultivars	4	71.70	17.92	61.3 0.0000 ***
Error	12	3.50	0.2	
Total	19	75.59		

Coefficient of Variation: 3.25%

Table 3 (b): Mean comparison data of plant height in (cm) after 40 days of different onion cultivars during 2017

Cultivars	Means
F1 Mustang	17.46 b
Marvi	14.95 c
White pearl	15.02 c
Red Orb	19.94 a
Golden Orb	15.70 c

LSD = 0.79

Means sharing the similar letters are not significantly different by the DMR Test at P=0.05

Table 4 (a): Analysis of variance of plant height in (cm) after 70 days of different onion cultivars

S.O.V	df	S.S	M.S	F.Value	Prob
Replication	3	0.85	0.28	0.43	0.7327 ns
Cultivars	4	115.6	28.90	44.12	0.0000 ***
Error	12	7.86	0.65		
Total	19	124.3			

Coefficient of Variation: 3.80%

Table 4 (b): Analysis of variance of plant height in (cm) after 70 days of different onion cultivars 2017.

Cultivars	**Means**
F1 Mustang	23.31 b
Marvi	20.05 c
White pearl	18.13 d
Red Orb	25.26 a
Golden Orb	20.51 c

LSD = 1.16

Means sharing the similar letters are not significantly different by the DMR Test at P=0.05

Table 5 (a): Analysis of variance of plant height in (cm) after 70 days of different onion cultivars

S.O.V	df	S.S	M.S	F.Value	Prob
Replication	3	4.47	1.4	1.59	.2429 ns
Cultivars	4	403.7	100.9	107.6	0.0000 ***
Error	12	11.24	0.93		
Total	19	419.4			

Coefficient of Variation: 3.79%

Table 5 (b): Analysis of variance of plant height in (cm) after 100 days of different onion cultivars 2017

Cultivars	**Means**
F1 Mustang	26.49 b
Marvi	22.10 d
White pearl	21.45 d
Red Orb	33.76 a
Golden Orb	23.58 c

LSD = 1.44

Means sharing the similar letters are not significantly different by the DMR Test at P=0.05

Yield in (g) Per Plant of Different Onion Cultivar

The data regarding comparison of yield in (g) of different onion fruits were shown in Table 6 (a) and mean were compared by DMR test at 0.05 P value showed in Table 6 (b). The result revealed that the

average yield comparison in (g) of different cultivars of onion fruits were statistically different from each other. The result revealed that Red Orb gave the highest yield with 151.4 g per five plants followed by F1 Mustang, White pearl and Golden Orb with 129.6, 123.4 and 115.5 (g) per five plants. Least yield was observed in Marvi with 100.3 g per five plants.

Table 6 (a): Analysis of variance for the yield in gram per five plants of different onion cultivars

S.O.V	df	S.S	M.S	F.Value	Prob
Replication	3	22.63	7.54	0.46	0.7114 ns
Cultivars	4	5676.0	1419.01	87.63	0.0000 ***
Error	12	194.31	16.19		
Total	19	5892.9			

Coefficient of Variation: 3.24%

Table 6 (b): Mean comparison data for the yield in gram per five plants of different onion cultivars during 2017

Cultivars	**Means**
F1 Mustang	29.6 b
Marvi	100.3 c
White pearl	123.4 c
Red Orb	151.4 a
Golden Orb	155.5 d

IV. DISCUSSION

In this study five cultivars of onion namely F1 mustang, Marvi, White pearl, Red Orb and Golden Orb were studied for the population density of onion thrips at weekly interval throughout the season during 2017. The population mass of onion thrips was recorded on the basis of their population pattern per leaf or stem on different randomly selected onion cultivars. There were significant variations in the population distribution pattern of onion thrips among the treatments and as well as in the time interval. These results were compared with various scientist works for the assessment of interaction between onion thrips population towards the different onion crop gynotypes. The results of present study reviewed Red Orb showed comparatively resistant while Marvi variety proved moderately susceptible towards the behavior of onion thrips population dynamics. F1 mustang, White pearl and Golden orb showed in-between susceptibility. The present research is somewhat similar to [14]they conducted research to check the susceptibility of onion crops to a most important pest of onion *T.tabaci*and compared the varieties and evaluated that genotype 'VRIO-3' was highly susceptible having 181.7 thrips per plant as compare to 'Desi Large' which was moderately highly resistance 94.2 thrips per plant. It has been revealed through the survey of susceptibility of onion that there is highly scarcity of Onion resistant varieties in agro-ecosystem of Punjab, Pakistan. So we should develop the thrips resistant varieties to overcome population of thrips and their attack. Our results were also inconformity to those of [15] they stated that the hairs density on the leaves of vines that strongly correlate with the oviposition that exposed negative and significant findings.The results of [16] are in reliable with those of present study in which hair length on the leaves midrib, hair length on the veins of leaves and plant height showed negative and significant relationship with the pest population distribution pattern. The present study is also similar to those of [17] who conducted the experiment in Agriculture research institute Tarnab Peshawar to test the onion cultivars against *T. tabaci during* 2011-12. Eight onion cultivars (Swat-1, Ambika, Trichmir, Barkel,

Macarena, Red ball and sunset) were cultivated to determine the resistant variety against *T.tabaci*infestation. On weekly basis the population of *T.tabaci*was monitored on onion crops under natural field condition. After all highest number of population was recorded in Trichmer 10.99 per plant and lowest number was recorded in Swat-1(5.98 thrips per plant).The maximum yield was obtained from swat-1 cultivar and minimum was recorded from Ambikacultivar.

V. CONCLUSION

According to the present study Red Orb is comparatively resistant cultivar with lowest infestation percentage against *T. Tabaci* and highest yield of 151.4 g per 5 plants among all the cultivars. According to the physico-morphic characters i.e. plant length and girth the Red Orb cultivar also showed highest in numbers and found as the least susceptible cultivar. Through this research Red Orb has been recommended for the cultivation.

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