SCREENING OF ONION GENOTYPES/CULTIVARS FOR SUSCEPTIBILITY TO THRIPS, *Thrips tabaci* LINDEMAN

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ABSTRACT

A field experiment was conducted to study the susceptibility of different onion genotypes/cultivars to thrips, *Thrip stabaci* during *rabi* season of the year 2009-2010 at Main Vegetable Research Station, Anand Agricultural University, Anand, Gujarat. Out of twelve genotypes/cultivars, JRO-2000-181 found highly resistant (HR) by recording significantly lowest thrips population (7.57/plant) and higher bulb yield (56.83 t/ha) followed by Gujarat White Onion-1 (9.61 thrips/plant and bulb yield of 49.11 t/ha) and Talaja red (9.87 thrips/plant and bulb yield of 48.44 t/ha). Among the different morphological characters, plant height at 30 (r = - 0.70098), 60 (r = - 0.47893*) and 90 (r = - 0.67327**) days after transplanting as well as bulb length(r = - 0.72369**) and girth(r = - 0.62836**)also conferring the mechanism of resistance.**

Key words: Genotypes, cultivars, thrips, bulb yield, morphological characters, plant height, bulb length, bulb girth

INTRODUCTION

Onion (*Allium cepa*Linnaeus) is one of the important vegetable grown extensively in almost all part of the country.Among the various factors, insect pests are one of the important factors which cause considerable losses in yield of onion. Of these insect pests, thrips, *Thripstabaci*Lindeman (Thysanoptera: Thripidae)is a major biological constraint in onion production.This polyphagous insect occurs worldwide and attacks virtually all *Allium* crops (Gupta *et al.*, 1994). Thrips are concentrated in between base of spathes. Both nymphs and adults suck the cell sap from spathes. It leads to an irregular or blotchy whitening of the leaves, a condition sometimes termed “blast.” Heavy levels of feeding injury disrupt the hormonal balance of the plant, causing the leaves to curl and twist, and the foliage to be stunted(Kendall and Bjostad, 1990).In case of severe infestation, the bulbs remain undersized and distorted.Use of resistant or tolerant genotype is one of the effective tools in integrated pest management of any insect pest. To fulfill this purpose continuous screening of varieties / genotypes resistant or tolerant to thrips is required hence, the experiment was planned.

MATERIALS AND METHODS

The present investigation was carried out to evaluate the susceptibility of different twelve genotypes/cultivars of onion against onion thrips at Main Vegetable Research Station, AAU, Anand, Gujarat in randomized block designed with three replications during *rabi* season of the year 2009-10. For recording observations, 5 plants were selected randomly from the each plot and the observations on absolute thrips population were recorded at weekly interval in the morning hours as per the method suggested by Mote (1981). Different onion genotypes/cultivars were also categorized into highly resistant, resistant, susceptible and highly susceptible to thrips. For the purpose, mean value of individual genotypes/cultivars ($\bar{x}_i$) was compared with mean value of infestation of all genotypes/cultivars ($\bar{x}$) and standard deviation (sd) following the modified scale [Highly resistant: $\bar{x}_i < \bar{x}$ - sd for highly resistant; $\bar{x}_i > \bar{x}$ - sd< $\bar{x}$ for resistant; $\bar{x}_i > \bar{x} <$ ($\bar{x}$ + sd) for susceptible; and $\bar{x}_i >$ ($\bar{x}$ + sd) < ($\bar{x}$ + 2 sd) for highly susceptible] as adopted by Patel *et al*. (2002). The retransformed data were used for computation of $\bar{x}$, $\bar{x}_i$ and sd for the each parameter. Various morphological characters (plant height, bulb colour, bulb length and girth) of onion genotypes/ cultivars were further studied to know the factors responsible in imparting resistance/susceptibility to *T. tabaci*.

The observations on morphological characters *viz*., plant height, bulb colour, bulb length and girth were recorded from the experimental plot on varietal susceptibility conducted during 2009-10. For recording plant height, ten plants were selected randomly from each plot and the plant height was measured in centimeter using measure tape at 30, 60 and 90 days after transplanting. For observations on different bulb characters, ten bulbs were selected from each plot at the time of harvest and length as well as girth of bulb was measured in centimeter using measure tape. For determination of colour, the index 1 to 4 (1: White, 2: Yellowish white *i.e.* Golden, 3: Light red and 4: Dark red) was given to the bulbs.

The genotypes-wise data on plant height, length, girth and colour of bulb were correlated with the data on number of thrips per plant to know the role of above morphological characters in imparting resistance against *T. tabaci*.

RESULTS AND DISCUSSION

The data pooled over periods on thrips population as well as bulb yield are presented in Table 1. Among the different genotypes/ cultivars, JRO-2000-181 recorded significantly lowest thrips (7.57/plant) population as compared to rest of the genotypes/cultivars screened. Variety Gujarat White Onion-1 (9.61/plant)was at par with Talaja Red (9.87/plant) and genotype JRO-606(10.59) but recorded significantly lower thrips population than remained genotypes. Genotypes JRO-606, JRO-610, PKV Selection White, PWF-131, JRO-602 and JRO-604 were at par with each other. The varieties L-28 (12.82/plant), Agri White(14.71/plant)and Pili Patti (16.39/plant)recorded significantly higher thrips population and were differed significantly from each other. In response of bulb yield, genotype JRO-2000-181 (56.83 t/ha) registered significantly higher bulb yield as compared to JRO-610, Agri White, JRO-602, PKV Selection White , JRO-604, PWF-131 and Pili Patti while, it was at par with Gujarat White Onion-1 (49.11 t/ha) , Talaja Red (48.44 t/ha), JRO-606 (46.61 t/ha) and L-28 (45.72 t/ha).

So far as categorization (Table 2) on population of *T. tabaci* is concerned,genotypes JRO-2000-181 (<9.20 thrips/plant) was categorized as highly resistant, GWO-1, Talaja Red, PKV Selection White, PWF-131, JRO-606, JRO-610, JRO-602 (9.20 to 11.51 thrips/plant) were grouped as resistant. JRO-604 and L-28 (11.51 to 13.82 thrips/plant) were found susceptible while, Agri White and Pili Patti (more than 13.82 thrips/plant) grouped into highly susceptible.

Among the morphological characters (Table 3) of genotypes/cultivars studied, plant height at 30 (r = - 0.70098**), 60 (r = - 0.47893*) and 90 DAT (r = - 0.67327**) as well as bulb length (r = - 0.72369**) and girth (r = - 0.62836**) were significantly negatively correlated with thrips population. The bulb colour was negatively correlated with thrips population but, the result was non significant.

However, no published information is found on susceptibility while spanning the literatures except the result of Anon. (2009), who reported that the curling due to onion thrips was more in onion variety L-28. Thus, present findings as in case of onion variety L-28 is in accordance with this report.

CONCLUSION

Among the twelve onion genotypes/cultivars screened for their susceptibility to thrips at Anand, Gujarat, JRO-2000-181 found highly resistant (HR) by recording significantly lowest thrips population and higher bulb yield followed by Gujarat White Onion-1 and Talaja red. Among the different morphological characters, plant height at 30, 60 and 90 days after transplanting as well as length and girth of bulb were responsible for providing susceptibility/resistance of genotypes/cultivars.

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Table 1: Thrips population and yielding ability of different genotypes/cultivars of onion

Genotypes/cultivars	Thrips/plant	Bulb yield (t/ha)
JRO-602	3.46 [d] (11.47)	44.44[bcd]
JRO-604	3.47 [d] (11.54)	37.78[cd]
JRO-606	3.33[bcd] (10.59)	46.61[abcd]
JRO-610	3.39 [cd] (10.99)	45.56[bcd]
JRO-2000-181	2.84 [a] (7.57)	56.83[a]
Agri White	3.90 [f] (14.71)	44.44[bcd]
Pili Patti	4.11 [g] (16.39)	36.94[d]
PKV Selection White	3.42 [d] (11.20)	39.17[bcd]
PWF-131	3.45 [d] (11.40)	37.56[cd]
L-28	3.65 [e] (12.82)	45.72[abcd]
GWO-1	3.18 [b] (9.61)	49.11[ab]
Talaja Red	3.22[bc] (9.87)	48.44[abc]
S. Em+ Genotype (G)	0.06	38.24
Period (P)	0.03	
G x P	0.11	
C. D. at 5% G	0.17	11.22
P	0.09	
G x P	NS	
C. V. (%)	5.63	14.92

Note: 1. Treatment means with letter(s) in common are not significant at 5 % level of significance in respective column
2. Figures in parentheses are retransformed values; those outside are $\sqrt{X+0.5}$ ****transformed values***

Table 2: Categorization of different genotypes/cultivars of onion for their susceptibility to *T. tabaci*

Category of resistant	Scale	Varieties ($\overline{X_i}$)	
Based on population of thrips/plant : $\overline{X}$ = 11.51 and sd = 2.31			
Highly resistant	$\overline{X_i}$ < 9.20	JRO-2000-181	(07.57)
Resistant	$\overline{X_i}$ > 9.20 < 11.51	GWO-1	(09.61)
		Talaja Red	(09.87)
		JRO-606	(10.59)
		JRO-610	(10.99)
		PKV Selection White	(11.20)
		PWF-131	(11.40)
		JRO-602	(11.47)
Susceptible	$\overline{X_i}$ > 11.51 < 13.82	JRO-604	(11.54)
		L-28	(12.82)
Highly Susceptible	$\overline{X_i}$ > 13.82	Agri White	(14.71)
		Pili Patti	(16.39)

Table 3: Morphological parameters of different onion genotypes/cultivars and their relationship with *T. tabaci* population

Genotypes/ cultivars	No. of thrips/ Plant	Plant height (cm)			Bulb Length (cm)	Bulb Girth (cm)	Bulb colour
		30 DAT	60 DAT	90 DAT			
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
JRO-602	11.47	34.13	65.40	66.80	17.72	19.17	3(Light red)
JRO-604	11.54	34.87	59.87	65.87	17.93	19.33	3(Light red)
JRO-606	10.59	36.40	66.13	68.93	17.65	18.51	3(Light red)
JRO-610	10.99	36.13	67.07	66.80	18.15	19.69	3(Light red)
JRO-2000-181	07.57	36.87	64.87	69.93	19.55	21.39	3(Light red)
Agri White	14.71	33.60	59.13	63.93	17.83	18.63	1 (White)
Pili Patti	16.39	31.47	57.73	60.33	17.51	18.93	2(Golden)
PKV SelectionWhite	11.20	31.87	56.87	62.60	18.74	19.95	1(White)
PWF-131	11.40	32.73	55.40	61.73	17.93	19.46	1(White)
L-28	12.82	35.40	67.80	69.07	18.36	19.37	1(White)
GWO-1	09.61	36.07	68.07	68.07	18.65	20.03	1(White)
Talaja Red	09.87	36.38	67.73	67.27	18.79	18.85	4(Red)
Infestation levels (Y)		**Correlation co-efficient (r)**					
No. of thrips/ Plant		-0.70098**	-0.47893*	-0.67327**	-0.72369**	-0.62836**	- 0.38316

** Significant at 0.05% level of significance* *** Significant at 0.01% level of significance*

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