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Evaluation of Promising Onion (*Allium cepa*) Varieties Against Thrips Infestation in the Agro-Ecosystem of Balochistan, Pakistan – I

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Abstract: Six onion (*Allium cepa* L.) varieties (Red Creole, Chiltan-89, Local, Sariab Surkh, White Globe and Local Kandhari) were evaluated against thrips infestation in Quetta, Pakistan. The results of the trial revealed that *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) is the attacking species to onion in the region. The said pest infested more or less all varieties. Local Kandhari followed by Sariab Surkh were the most susceptible to thrips infestation while Chiltan-89 was the least. Red Creole and White Globe were discarded due to their poor performance in terms of growth and yield. Both are short days varieties thus not suited to the region. Maximum yield (10750 kg ha⁻¹) was obtained by Chiltan-89 and minimum by Sariab Surkh and Local Kandhari (2543 and 3418 kg ha⁻¹ respectively). The population got its peak at 28.51°C in the month of August when maximum numbers of thrips per plant (17.55) were recorded. On the basis of the results onion variety Chiltan-89 is recommended for commercial cultivation in the region.

Key words: Onion, thrips, variety, botanical insecticide, biological agent, Balochistan

Introduction

Onion is an important condimental crop in Asia specifically in Pakistan. Among the vegetables, onion is grown over a maximum area of 109.8 thousands hectares in Pakistan. Balochistan is the second most onion-cultivated province after Sind, which contributes 26% of the total onion cultivated area of the country (Khokhar *et al.*, 2002). Balochistan has an average of 15.972 t ha⁻¹ onion production capacities (Anonymous, 1988-99). Onion requires around 16-30 irrigations in a season (Malik *et al.*, 2003). Availability of water is the worst problem in the province (Shah *et al.*, 2002). In the prevailing situation of water one could not increase the acreage of onion but production capacity may increase by minimizing the factors affecting good yield. Thrips, onion maggots and weeds are the most serious enemies of onion crop in the region that check the yield of the crop (Hazara *et al.*, 1999 b). By controlling the said insect pest and weeds onion production could increase.

Different controlling methods were used against the insect pests of onion. Pawar *et al.* (1987), Seal *et al.* (1994), Richter, *et al.* (1995) tried chemical control against onion thrips successfully. Hazara *et al.* (1999 a) introduced botanical insecticides for the control of the said pest. Coll and Bottrell (1995) used *Orius insidiosus* as biological agent against thrips. No attempt to discover suitable resistant variety of onion against thrips is reported.

Keeping in view, this study was designed to evaluate the most suitable resistant variety of onion against thrips infestation, among the existing local cultivated varieties in the province of Balochistan, Pakistan.

Materials and Methods

To evaluate the best onion variety against the minimum infestation of thrips for the specific agro-ecosystem of Balochistan, an experiment was conducted in Quetta, Balochistan, Pakistan during 2002. Six onion varieties (Red Creole, Chiltan-89, Local, Sariab Surkh, White Globe and Local Kandhari) were selected for the trial. Among these varieties Chiltan-89, Sariab Surkh, Local and white Globe were reported the most cultivated in the province while Red Creole and Local Kandhari are the two newly introduced varieties in the region (Alizai, 2002). A piece of well-prepared land was divided into 24 plots of 8 x 10 (80 m²) equal size, at the end of February 2002. Certified and treated seeds, of said onion varieties, were obtained from the Vegetable Section, ARI, Quetta. The seeds were broadcast @ 96 g per plot (12 Kg ha⁻¹) in the prepared plots. The plots were arranged in Randomize Complete Block Design (RCBD) with four replications. No pesticide was applied in the plots during the experiment throughout the season so that the direct effect of thrips infestation on the yield of the crop could be recorded. The crop was irrigated 22 times by tube-well at different intervals. Hand weeding was done thrice to keep the

experimental area free of weeds. Weed crop competition affects the yield or plays a possible role as alternate host for thrips (Roberts, 1973; Hassan and Malik 2001a, 2001b and 2002). Data on thrips population were collected weekly from five randomly selected plants in each plot as recommended by Hussain (1998), till the digging of the crop. Thrips specimens were identified and corroborated by the Entomology Section, ARI, Quetta, Pakistan. After digging, produce of each onion variety was measured and was compared with one another for the thrips infestation response. Meteorological data were obtained at Meteorological Station, ARI, Quetta.

Data were analyzed by the Microcomputer Statistical Program for Experiments, Designs and Analysis (Russell, 1992). Two factors, variety and week, were considered as group variables. Observations were recorded on thrips population and temperature. ANOVA was constructed to test the significant differences between the variables. Least Significant Difference test was applied to differentiate the means.

Results and Discussion

T. tabaci was the specie attacks to the onion crop in the region. Hazara *et al.* (1999 a, b) discovered the same.

Table 1, reveals the mean number of thrips per plant and yield of the six tested onion varieties. It was observed that, more or less all onion varieties were attacked by the thrips. Local Kandhari, which is introduced in the region, is most susceptible to the thrips infestation. The maximum mean number of thrips per plant (12.22) was recorded on this variety but the yield is at par to Sariab Surkh that shows good potential in the cultivars. The germ sperm of the variety may use in breeding to get a desirable combination. Though fewer numbers of thrips were observed on Red Creole and White Globe but plant vigor was worst affected by the slow and week growth that retarded the yield. These two are short-day varieties thus are not recommended for the area because the climatic conditions of day light period do not meet to their critical light dark regime (Alizai, 2002). Chiltan-89 followed by Local was proved the most resistant to thrips infestation. A mean number of 7.05 and 8.88 thrips per plant were recorded on them respectively. Chiltan-89 fetched the maximum yield of 10750 followed by 5334 kg ha⁻¹ by Local.

Table 2, depicts the relation between temperature and per plant population density of thrips on all six varieties as a whole. The thrips population had direct relation to the temperature. Malik and Ali (2002) and Solomon *et al.* (1996) reported that insect's growth and development increases with the increase of temperature and vice versa. Thrips population has gradual increase with the increase

Table 1: Mean Number of thrips per plant and yield of different onion varieties in Quetta, Pakistan, during the season 2002

Variety	No. Of Thrips	Yield (t ha ⁻¹)
Red Creole	2.612*e	960d
Chiltan-89	7.050d	10750a
Local	8.881c	5334b
Sariab Surkh	9.320b	2543c
White Globe	2.547e	972d
Local Kandhari	12.22a	3418c

*Lower case letters indicate significant difference down the column using the LSD test. LSD values for thrips per plant and yield at significance level of 0.05 are 0.1855 and 1432 respectively

Table 2: Mean weekly thrips population per plant with relation to temperature on onion in Quetta, Pakistan, during the season 2002

Week	Temperature °C	No. of Thrips/Plant	Week	Temperature °C	No. of Thrips/Plant
01	19.55*r	2.525l	11	25.49k	15.82b
02	24.26o	3.042jk	12	28.51a	17.55a
03	25.29l	2.775kl	13	27.84c	15.79b
04	24.82n	3.158j	14	26.45l	9.621e
05	24.92m	3.125j	15	27.66d	8.171f
06	27.26f	3.375j	16	25.61j	7.050g
07	26.79g	4.200i	17	26.68h	5.617h
08	28.11b	10.10d	18	26.77g	2.533l
09	27.43e	10.36d	19	24.01p	1.692m
10	27.83c	14.16c	20	21.35g	1.150n

*Lower case letters indicate significant difference down the column using the LSD test. LSD values for temperature and thrips per plant at significance level of 0.05 are 0.08227 and 0.3387, respectively

Table 3: Weekly thrips population distribution on different varieties of onion in Quetta, Pakistan, during the season 2002

Weeks	Varieties						Mean
	A	B	C	D	E	F	
01	2.45	2.30	2.55	2.75	2.45	2.65	2.521**
02	2.70	2.05	2.95	4.15	2.70	3.70	3.042jk
03	2.90	2.35	2.70	3.10	2.70	2.90	2.775kl
04	2.80	2.90	3.30	3.70	2.70	3.55	3.158j
05	2.60	2.80	3.30	3.95	2.55	3.55	3.125j
06	3.15	2.95	3.20	4.10	2.90	3.95	3.375j
07	4.35	3.50	3.95	4.70	4.40	4.30	4.200i
08	5.10	9.95	11.55	15.35	5.10	13.55	10.10d
09	4.65	9.25	12.95	16.20	4.55	14.55	10.36d
10	3.75	12.05	18.15	25.90	3.60	21.50	14.16c
11	3.50	17.70	18.70	27.20	3.35	24.45	15.82b
12	3.35	18.30	22.63	28.95	3.35	28.70	17.55a
13	3.45	18.15	19.30	25.80	3.15	24.90	15.79b
14	2.50	10.50	13.88	11.60	2.15	17.10	9.621e
15	2.35	9.05	13.08	5.45	1.80	17.30	8.171f
16	2.65	7.95	9.30	3.50	1.70	17.20	7.050g
17	---	6.20	9.15	---	---	18.35	5.617h
18	---	3.05	4.40	---	---	7.75	2.533l
19	---	---	2.60	---	---	7.55	1.692m
20	---	---	---	---	---	6.90	1.150m

*Varieties; A = Red Creole, B = Chiltan-89, C = Local, D = Sariab Surkh, E = White Globe, F = Local Kandhari. ** Lower case letters indicate significant difference down the column using LSD values 0.3387

of temperature and peak (17.55 thrips per plant) was observed at maximum temperature, 28.51°C.

Table 3, gives a picture of weekly thrips population distribution on different varieties of onion. Week one

denotes to that week when the first thrips was recorded on the crop. It was observed that in the initial stages of crop growth almost up to 6th week, all varieties had same response to the thrips infestation. The behavior confirms that initially the varieties have almost same plant texture for the attraction of food to the thrips, which changed with the growth. Further studies to discover the reasons are suggested.

The results of the study suggest that Chiltan-89 is the most resistant variety to the thrips (*Thrips tabaci*) infestation. The variety is good yielding and might be recommended to cultivate commercially in the specific agro-ecosystem of the province of Balochistan, Pakistan.

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