

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

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**Abstract:** A comparative study of six onion (*Allium cepa* L.) varieties (Red Creole, Chiltan-89, Local, Sariab Surkh, White Globe and Local Kandhari) was conducted 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. All the varieties were infested by thrips at various degrees. Maximum yield (11500 kg ha<sup>-1</sup>) was obtained by Chiltan-89 and minimum (812.5 kg ha<sup>-1</sup>) by Red Creole. Local Kandhari followed by Sariab Surkh were the most susceptible to thrips infestation while Chiltan-89 was optimum. The population got its peak (14.74 thrips per plant) at 27.91°C with 52.64% humidity in the month of August. On the basis of the results onion variety Chiltan-89 is recommended for commercial cultivation in the region.

**Key words:** Onion, thrips, variety, Balochistan, Pakistan

### INTRODUCTION

The province of Balochistan is the largest in Pakistan that is well known for the production of fruits and vegetables<sup>[1]</sup>. The province is the second most in onion cultivation after Sind, which contributes 26% of the total onion cultivated area of the country<sup>[2]</sup>. Balochistan has an average of 18.53 tons ha<sup>-1</sup> onion production capacities<sup>[3]</sup>. Onion is an important condimental crop in Asia specifically in Pakistan<sup>[4]</sup>. Among the vegetables onion requires the most number of irrigations. Balochistan is a dry region where around 16-30 irrigations are required in a season. Mostly tube-wells are used to irrigate the crop<sup>[5]</sup>. Availability of water is the worst problem in the province<sup>[6]</sup>. To maximize the yield is the dire need to meet the challenges of the increasing population of the world. Pests are one of the important factors that create hurdles in the achievement of said goal. Chemical control is the most popular method to control the pests<sup>[7]</sup> but it causes different kinds of pollutions and is hazardous for human health<sup>[8]</sup>. Thus entomologists must go for other ways to control the agricultural pests. Hazara *et al.*<sup>[9]</sup> introduced botanical insecticides for the control of the said pest. Coll and Bottrell<sup>[10]</sup> used *Orius insidiosus* as biological agent against thrips.

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-eco system of Balochistan, an experiment was conducted in Quetta, Balochistan, Pakistan during 2003. 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 was reported the most cultivated in the province<sup>[5]</sup> while Red Creole and Local Kandhari are the two newly introduced varieties in the region<sup>[4]</sup>. A piece of well-prepared land was divided into 24 plots of 8x10 (80 m<sup>2</sup>) equal sizes, at the end of February 2003 at Vegetable Section, Agriculture Research Institute, Quetta. Certified and treated seeds, of said onion varieties, were obtained from the Agriculture Research Institute, Quetta. The seeds were broadcast @ 96 g per plot (12 kg ha<sup>-1</sup>) in the prepared plots. The plots were arranged in Randomize Complete Block Design with four replications. No pesticide was applied in the plots during the experiment through out the season so that the direct effect of thrips infestation on the yield of the crop could be recorded. The crop was irrigated 26 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<sup>[4,11-14]</sup>. Data on thrips population were collected weekly from five randomly selected plants in each plot as

recommended by Hussain<sup>[15]</sup>, 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<sup>[16]</sup>. 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.*<sup>[9,17]</sup> and Malik<sup>[4]</sup> discovered the same.

Table 1 revealed 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 (11.17) 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

Table 1: Mean Number of thrips per plant and yield of different onion varieties in Quetta, Pakistan, during the season 2003

Varieties	No. of thrips	Yield (kg ha <sup>-1</sup> )
Red Creole	1.923e*	812.5d
Chiltan-89	5.416d	11500a
Local	7.161c	7469b
Sariab Surkh	9.015b	4531c
White Globe	1.901e	1203d
Local Kandhari	11.77a	4406c

\*Lower case letters indicate(s) significant difference down the column using the LSD test. LSD values for thrips per plant and yield at significance level of 0.05 are 0.1458 and 687.1 respectively.

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<sup>[4]</sup>. Chiltan-89 followed by Local was proved the most resistant to thrips infestation. A mean number of 5.416 and 7.161 thrips per plant were recorded on them, respectively. Chiltan-89 fetched the maximum yield of 11500 followed by Local that produced 7469 kg ha<sup>-1</sup>.

Table 2 depicted the relation between temperature, humidity and per plant population density of thrips on all six varieties. 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 7th week, all varieties had same response to the thrips infestation. Stoller<sup>[18]</sup> reported that plant texture and structure has positive relations with the infestation of thrips and the pest likes young leaves more than old ones. The behavior confirms the statement, initially the varieties have almost

Table 2: Mean weekly, temperature, humidity and thrips population distribution on six different varieties of onion in Quetta, Pakistan, during the season 2003

Weeks	Temperature(°C)	Humidity %	Varieties*						Mean
			A	B	C	D	E	F	
01	20.34	13.58	1.65	1.55	1.70	1.85	1.50	1.45	1.61q
02	23.07	24.00	1.55	1.55	1.60	1.55	1.55	1.60	1.57q
03	22.65	23.00	1.50	1.85	2.00	2.60	1.45	2.75	2.02p
04	27.66	12.86	1.60	2.00	2.10	2.85	1.70	3.30	2.25op
05	25.21	08.57	1.70	2.80	2.85	3.05	1.60	3.75	2.62mn
06	27.45	27.36	1.60	3.30	4.15	4.45	1.65	5.65	3.46
07	27.99	25.00	1.80	5.55	6.85	7.65	1.80	7.60	5.20j
08	28.44	35.64	2.65	6.10	6.85	7.65	2.55	9.15	5.82i
09	27.11	46.93	3.50	8.75	9.07	11.35	3.65	14.25	8.42g
10	27.91	52.64	3.50	14.75	16.90	24.40	3.50	25.40	14.74a
11	23.29	55.14	2.55	13.90	14.45	23.45	2.40	24.65	13.57b
12	27.26	44.15	2.25	10.45	20.18	20.30	2.25	24.25	13.28c
13	26.96	39.57	2.25	10.45	13.25	15.55	2.45	23.60	11.26d
14	26.71	42.07	2.10	8.90	12.40	14.35	2.10	23.25	10.52e
15	26.37	31.71	1.90	6.30	10.90	12.60	2.07	20.20	8.99f
16	26.44	43.14	1.82	2.42	6.20	11.60	1.30	15.95	6.55h
17	22.99	31.29	1.72	2.10	4.40	6.05	1.52	12.50	4.71k
18	22.51	33.36	1.25	1.97	2.02	3.95	1.20	6.45	2.80m
19	22.54	27.50	1.55	1.70	1.95	3.00	1.72	4.80	2.45no
20	18.83	22.14	0.00	1.92	3.40	2.05	0.00	4.85	2.03p

\*Varieties; A = Red Creole, B = Chiltan-89, C = Local, D = Sariab Surkh, E = White Globe, F = Local Kandhari.

\*\* Lower case letter(s) indicate significant difference down the column using LSD test. LSD values for thrips per plant at significance level of 0.05 is 0.2663.

same plant texture for the attraction of food to the thrips, which changed with the growth. Further studies to discover the reasons are suggested. Weekly thrips population distribution on different varieties of onion has proved direct relation to the temperature and humidity. Malik and Ali<sup>[7]</sup> and Solomon *et al.*<sup>[19]</sup> reported that insect's growth and development increases with the increase of temperature and vice versa. Thrips population has gradual increase with the increase of temperature and peak ((14.74 thrips per plant) was observed at maximum temperature (27.91 °C) with 52.64% humidity (Table 2).

The results of the study suggested that Chiltan-89 is the most resistant variety to the thrips (*T. 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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