

Effect of irrigation intervals and nitrogen levels on the incidence of thrips, *Scirtothrips dorsalis* Hood in chilli*

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(Received : June, 2008)

Abstract: Field experiment was conducted at the Main Vegetable Research Station, Anand Agricultural University, Anand (Gujarat) during kharif 2002-03 and 2003-04 to study the effect of irrigation interval and nitrogen levels on the incidence of thrips, *Scirtothrips dorsalis* Hood in chilli. Results revealed that increase in irrigation interval significantly increased in thrips numbers. Irrigation given at 25 days interval registered significantly highest (3.79 thrips/leaf) population of thrips, whereas thrips population was lowest (2.51 thrips/leaf) when irrigation was given at 10 days interval. Significantly lowest (2.82 thrips/leaf) population was recorded in the plots received with lower dose of nitrogen (100 kg N/ha), however its population increased with increase in the doses of nitrogen. Highest dose of nitrogen (150 kg N/ha) registered maximum (3.32 thrips/leaf) number of thrips. Interaction effect between irrigation intervals and nitrogen levels on the incidence of *S. dorsalis* was found to be significant. Yield of marketable green fruits increased with decrease in irrigation interval from 25 to 10 days. Significantly highest marketable yield (88.21 q/ha) was recorded from the treatment of 10 days irrigation interval. The treatment of longer irrigation interval (25 days) recorded significantly lowest (28.08 q/ha) fruit yield

Key words : Chilli thrips, irrigation, nitrogen, fruit yield

Introduction

Chilli, *Capsicum annum* L. is one the important commercial crops cultivated in Gujarat. It occupies about 0.12 lakh hectares area of the state with average productivity of 7815 kg/ha. More than two dozen insects have been recorded in chilli crop (Butani, 1976) of which the thrips, *Scirtothrips dorsalis* Hood (Thripidae : Thysanoptera) is considered as the most serious and destructive pest causing immense damage to crop. Number of integrated approaches with alternatives to conventional pesticides have been evaluated from time to time against this notorious pest (Lingappa *et al.*, 2002) but with little success. Irrigation intervals and level of nitrogenous fertilizers are two major cultural practices that greatly influence the pest activity in many agricultural ecosystems. Hence, an attempt was made to study on this aspect and the results obtained are presented here. Available literature revealed that no sincere attempts have been made in the past to study the impact of irrigation intervals and nitrogen levels on the incidence of *S. dorsalis* on chilli.

Material and methods

To study the effect of irrigation interval and different levels of nitrogen on the incidence of chilli thrips, a field experiment was conducted at the Main Vegetable Research Station, Anand Agricultural University, Anand (Gujarat) during kharif season of 2002-03 to 2003-04. The experiment was laid out in Factorial Randomized Block Design (FRBD) with three replications. Chilli seedlings (S-49) were transplanted during third week of August at the spacing of 60 X 60 cm having gross

and net plot size of 3.0 X 4.8 m and 1.8 X 1.8 m, respectively. There were 12 treatments combinations including four irrigation intervals (10, 15, 20 and 25 days) with three levels (100, 125 and 150 kg N/ha) of nitrogen. Nitrogen was applied in two equal splits *i.e.* 50% as basal dose and 50% as top dressing. The experimental plots were not sprayed with any of the insecticides throughout the crop season. Observations on population of thrips were recorded at weekly interval starting from 15 days after transplanting and continued till removal of the crop. For the purpose, three leaves of terminal twigs of five randomly selected plants from each treatment were observed critically and thrips numbers were counted and average number of thrips per leaf was worked out. The yield of healthy marketable fruit from each treatment was recorded at every picking and the data obtained were statistically analyzed.

Results and discussion

Results (Table 1) revealed that irrigation interval significantly influenced the thrips population. Increase in irrigation interval significantly increased the thrips numbers. Irrigation interval of 15 and 20 days did not differ significantly during first and second year of experimentations, however the difference was significant in pooled analysis. Irrigation interval of 10 and 15 days significantly differed from 25 days interval with respect to thrips population. Data clearly indicated that irrigation given at 25 days interval registered significantly highest (3.79 thrips/leaf) population of thrips. On the other hand, thrips population was lowest (2.51 thrips/leaf) when irrigation was given at 10 days interval, indicating that delay in irrigation resulted in build up of the thrips population. This perhaps might

* Part of Ph. D. thesis submitted by the senior author to the Anand Agricultural University, Anand- 388110, India.

Table 1. Effect of irrigation intervals and nitrogen levels on incidence of thrips, *Scirtothrips dorsalis* in chilli

Nitrogen Irrigation	Number of thrips/ leaf											
	2002-03				2003-04				Pooled			
	N ₁₀₀	N ₁₂₅	N ₁₅₀	Mean (I)	N ₁₀₀	N ₁₂₅	N ₁₅₀	Mean (I)	N ₁₀₀	N ₁₂₅	N ₁₅₀	Mean(I)
I ₁ 10 days	1.33*	1.44	1.48	1.42	1.83	1.85	1.82	1.83	1.58	1.64	1.65	1.62
	(1.41)	(1.75)	(1.90)	(1.69)	(3.34)	(3.34)	(3.30)	(3.33)	(2.38)	(2.55)	(2.60)	(2.51)
I ₂ 15 days	1.49	1.56	1.49	1.53	1.88	1.99	1.81	1.89	1.69	1.78	1.68	1.71
	(1.95)	(2.23)	(1.95)	(2.10)	(3.53)	(4.09)	(3.25)	(3.62)	(2.74)	(3.16)	(2.69)	(2.86)
I ₃ 20 days	1.56	1.62	1.60	1.59	1.80	1.91	2.12	1.94	1.68	1.76	1.89	1.77
	(2.27)	(2.61)	(2.38)	(2.36)	(3.25)	(3.72)	(4.63)	(3.87)	(2.76)	(3.07)	(3.51)	(3.11)
I ₄ 25 days	1.61	1.64	1.87	1.71	2.05	2.04	2.26	2.12	1.83	1.84	2.07	1.91
	(2.50)	(2.61)	(3.42)	(2.84)	(4.31)	(4.38)	(5.53)	(4.74)	(3.41)	(3.49)	(4.47)	(3.79)
Mean(N)	1.50	1.56	1.63	-	1.89	1.95	2.00	-	1.69	1.76	1.81	-
	(2.03)	(2.25)	(2.46)		(3.61)	(3.88)	(4.18)		(2.82)	(3.07)	(3.32)	
S. Em ±												
I				0.03				0.04				0.02
N				0.01				0.02				0.01
I x N				0.05				0.07				0.03
CD(P= 0.05)												
I				0.09				0.08				0.06
N				0.03				0.04				0.02
I x N				0.15				0.20				0.10
C.V. (%)				10.41				12.79				11.98

* $\sqrt{x+0.5}$

Transformations

Figures in parentheses are original values

be attributed to change in micro climate condition in crop ecosystem especially in niche around the plants. Raizada (1965) also opined that this species multiply at faster rate on chilli during dry weather condition which supports the present finding.

Significant impact of nitrogenous (N) fertilizers on thrips population was noticed during both the year of study (Table 1). Significantly lowest (2.82 thrips/leaf) population was recorded in the plots received with lower (100 kg/ha) dose of N, however its population increased with increase in the dose of N. The highest dose (150 kg/ha) of N registered maximum (3.32 thrips/leaf) number of thrips. The results clearly showed that increase in dose of N enhanced the thrips population. In past, similar results were also reported by Dharmasena (1998) and Kalaiyarasan *et al.* (2002) on chillies.

Interaction effect between irrigation intervals and nitrogen levels on the incidence of *S. dorsalis* was found to be significant (Table 1). Pooled results revealed significantly the highest number of thrips (4.47 thrips/leaf) in the treatment of highest level of N application (150 kg/ha) along with longer duration of irrigation interval (25 days). Lowest incidence (2.38 thrips/leaf) of *S. dorsalis* was recorded in the treatment of irrigation interval of 10 days with 100 kg N/ha and it was at par with treatment combinations of 10 days irrigation interval with 125 and 150 kg N/ha. As no published literature is available on this aspect, the present finding could not be discussed.

Marketable green fruit yield data (Table 2) recorded in different treatments indicated that yield increased with decrease in irrigation intervals from 25 to 10 days during both the years as well as in pooled analysis. Significantly the highest marketable fruit yield (88.21 q/ha) was recorded from the treatment of 10 days irrigation interval. The next best treatment was 15 days irrigation interval followed by 20 days irrigation interval. The treatment of longer irrigation interval (25 days) recorded significantly the lowest (28.08 q/ha) marketable fruit yield. Similarly, the yield of marketable green chilli fruits was significantly influenced by nitrogen levels. Highest dose of nitrogen (150 kg/ha) recorded significantly highest marketable fruit yield. The treatments with 100 and 125 kg N/ha did not show significant variation with respect to marketable fruit yield. Highest dose of N registered 72.67, 81.30 and 76.98 q/ha marketable fruits during 2002-03, 2003-04 and pooled, respectively, while the treatment of N applied @ 100 kg N/ha lagged behind by registering lowest values of marketable fruit yields i.e. 49.40, 56.06 and 52.73 q/ha for 2002-03, 2003-04 and pooled, respectively.

Treatment combination of lowest irrigation interval (10 days) with highest dose of N (150 kg/ha) recorded significantly the highest marketable fruit yield during first (113.23 q/ha) and second (118.99 q/ha) year of study as well as in pooled analysis (113.14 q/ha). The treatment combination of

Table 2. Effect of irrigation intervals and nitrogen levels on marketable green chilli fruit yield

Nitrogen Irrigation	2002-03				2003-04				Pooled			
	N ₁	N ₂	N ₃	Mean	N ₁	N ₂	N ₃	Mean	N ₁	N ₂	N ₃	Mean
	100	125	150	(I)	100	125	150	(I)	100	125	150	(I)
I ₁ 10 days	63.21	79.15	113.23	85.19	74.81	79.92	118.99	91.24	68.97	79.54	113.14	88.21
I ₂ 15 days	70.22	68.49	87.72	75.48	74.23	73.02	98.97	82.07	72.22	70.75	93.35	78.77
I ₃ 20 days	44.71	42.96	57.14	48.27	48.89	46.93	67.41	54.41	46.80	44.95	62.28	51.34
I ₄ 25 days	19.58	24.84	32.51	25.64	26.30	25.42	39.84	30.52	22.94	25.13	36.18	28.08
Mean (N)	49.40	53.86	72.67	-	56.06	56.32	81.30	-	52.73	55.09	76.98	-
S. Em. ±	I			2.79				2.20				1.78
	N			2.42				1.90				1.54
I X N	N			4.83				3.81				3.08
C.D.(P=0.05)	I			8.18				6.45				3.58
	N			7.09				5.58				4.39
	I X N			14.17				11.17				NS
C V %				14.27				10.22				12.23

delayed irrigation (25 days interval) with lowest (100 kg/ha) level of nitrogen resulted in significantly lower value of marketable green chilli fruit yield during 2002-03 (19.58 q/ha) and pooled (22.94 q/ha), whereas irrigation interval of 25 days and nitrogen level @ 125 kg/ha recorded the lowest yield (25.42 q/ha) during 2003-04, but it was at par with treatment of 10 days irrigation interval and 100 kg N/ha (26.30 q/ha) (Table 2). Thus, it could be inferred that lower dose of nitrogen

and closer irrigation intervals resulted in comparatively lower incidence of thrips, *S. dorsalis*. However, yield of green chilli was higher when the crop was irrigated at closer intervals with higher dose of nitrogen. Information on the incidence of thrips influenced by irrigation intervals and nitrogen levels, as well as their interaction effect on yield is very scanty and therefore the results of the present investigation could not be compared with the published literature.

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