
IMPACT OF DIFFERENT NITROGEN LEVELS AND IRRIGATION INTERVALS ON INCIDENCE OF THRIPS (*Thrips tabaci* LINDMAN) INFESTING GARLIC

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ABSTRACT

Study on impact of nitrogen levels and irrigation intervals on incidence on thrips, *Thrips tabaci* in garlic was carried out at Main Vegetable Research Station, Anand Agricultural University, Anand during *rabi* season of 2009-10. Of the different three nitrogen doses (25, 50 and 75 kg/ha) tested, nitrogen applied @ 50 kg/ha recorded significantly lowest thrips population (8.50 thrips/plant) as compared to the lowest nitrogen level @ 25 kg/ha (9.36 thrips/plant) and the highest nitrogen level @ 75 kg/ha (11.54 thrips/plant). Among three irrigation intervals (7, 14 and 21 days), the crop irrigated at 14 days interval recorded significantly lower number of thrips (8.38 thrips / plant) than crop irrigated at 7 days (9.72 per plant) and 21 days (11.29 per plant) interval. The combined effect of nitrogen and irrigation (N x I) was significant. Nitrogen applied @ 50 kg/ha and irrigation applied at 14 days interval (N₂I₂) registered significantly minimum thrips infestation (6.95 thrips / plant) (Table 1 & Figure 1) than rest of the combinations. Significantly the highest bulb yield (8.43 t/ha) was obtained under treatment of 75 kg N/ ha (N₃) followed by 50 kg N/ ha (7.24 t/ha) and 25 kg N/ha (6.22 t/ha). Among the three irrigation intervals, crop irrigated at an interval of 14 days (8.44 t/ha) recorded significantly higher bulb yield as compared to crop irrigated at 21 days (5.79 t/ha), but was at par with the crop irrigated at 7 days (7.65 t/ha). The interaction effect of N x I was non-significant for bulb yield.

KEY WORDS: Garlic, irrigation, nitrogen, *Thrips tabaci*, yield

INTRODUCTION

Garlic [*Allium sativum* (L.)] is the second most important bulb crop grown throughout the plains of India for spices and condiments. The raw garlic can also be used in the manufacturing of powder, paste, oil and dehydrated garlic etc. Besides these, it is also well known for having numerous valuable medicinal properties. According to the traditional Indian medication Ayurveda, it is used in treatment for diseases like running cold, saliva formation, chronic bronchitis, respiratory catarrh, whooping cough, asthma, influenza, diarrhea etc. It is a rich

source of protein, phosphorus, calcium, magnesium, potash and ascorbic acid. In Gujarat, it is mainly cultivated in Junagadh, Rajkot, Jamnagar and Bhavnagar districts in 0.40 lakh hectares of area with total production of 2.75 lakh tons and a productivity of 6875 kg/ha (Anon., 2010).

Many factors affecting the production and productivity of garlic, of which infestation of insect pests is major one. Of the various insect pests, thrips, *T. tabaci* (Thripidae; Thysanoptera) is an important and major biological constraint in garlic production causing heavy economical loss, if infestation starts at bulb initiation stage. The principal form of damage caused by thrips resulted from the piercing of cells and removal of cell contents by larvae and adults. Manipulation in fertilizer doses would also be helpful to keep pests in control. Use of fertilizers not only affects the nutritive value of plants, but also influences the life style of the insect pests. Nitrogen applied at higher rates than requirements also responsible for attraction of insect pests due to increase in lustre of the crop. Irrigation has not only been incriminated in the increase of levels of certain pests, but also has been associated with satisfactory control measures. Keeping in view above points, field experiment was planned to study the impact of different nitrogen levels and irrigation intervals on incidence of *T. tabaci* on garlic cv. Gujarat Garlic 4 at Main Vegetable Research Station, Anand Agricultural University, Anand during *rabi* season of 2009-10.

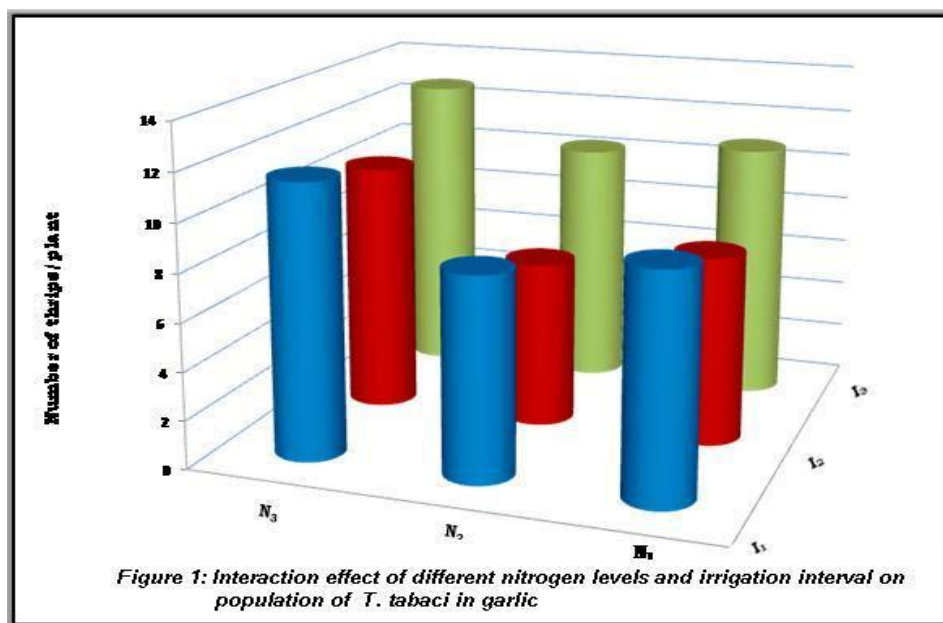
MATERIALS AND METHODS

Garlic cloves of cv. Gujarat Garlic 4 were evaluated with 3 different nitrogen levels (25, 50 and 75 kg/ha) and 3 irrigation intervals (7, 14 and 21 days) in Factorial Randomized Block Design replicated thrice in the plot size of 2.7 x 3.8 m with the spacing of 15 x 10 cm. The experiment was sown during 4th week of November at Main Vegetable Research Station, Anand Agricultural University, Anand during *rabi* season of 2009-10 adopting recommended agronomical practices. The half dose of nitrogen and full dose of phosphorus as well as potash were given at the time of sowing as basal application, while the remaining half dose of nitrogen was given one month after sowing. For recording observations of thrips, 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). Recording of observations were started from the first week after germination and were continued till to the harvesting of the crop at the beginning of each standard meteorological week. The bulb yield was recorded from each net plot at harvest. The irrigation was stopped before one month of harvest in all the plots. The whole experimental plot was kept free from any insecticide application. The data obtained on thrips population were analysed after transforming them in to square root, while the bulb yield data were analysed without any transformation.

RESULTS AND DISCUSSION

The results of study on the impact of different nitrogen levels and irrigation intervals based on thrips population as well as garlic bulb yield were presented in Table 1 and Figure 1. Of the three different nitrogen levels, nitrogen applied @ 50 kg/ha recorded significantly lowest thrips population (8.50 thrips/plant) as compared to the lowest nitrogen level @ 25 kg/ha (9.36

thrips/plant) and the highest nitrogen level @ 75 kg/ha (11.54 thrips/plant). The lowest nitrogen dose (25 kg/ha) also recorded significantly minimum thrips population than the highest nitrogen dose (75 kg/ha). Among three irrigation intervals, the crop irrigated at 14 days interval recorded significantly lower number of thrips (8.38 thrips / plant) than crop irrigated at 7 days (9.72 per plant) and 21 days (11.29 per plant) interval. The crop irrigated at 7 days interval also recorded significantly lower thrips population as compared to crop irrigated at 21 days interval.



The combined effect of nitrogen and irrigation (N x I) was significant. Nitrogen applied @ 50 kg/ha and irrigation applied at 14 days interval (N₂I₂) registered significantly minimum thrips infestation (6.95 thrips / plant) (Table 1 & Figure 1) than rest of the combinations, which was followed by application of nitrogen @ 25 kg/ha and irrigation given at 14 days interval (N₁I₂) (7.91 thrips / plant). The higher dose of nitrogen (75 kg N/ha) and irrigation applied at 21 days interval (N₃I₃) had significantly maximum thrips population (12.75 thrips / plant) among all the combinations. These results are in line with the results of Chhatrola *et al.* (2006). He reported that thrips population increased at higher dose of nitrogen with wider irrigation interval. Patel (2006) also found the similar results in chilli against thrips.

The results of impact of different nitrogen levels on garlic bulb yield (Table 1 and Figure 2) indicated that all the nitrogen levels differed significantly from each other. Significantly the highest bulb yield (8.43 t/ha) was obtained under treatment of 75 kg N/ ha (N₃) followed by 50 kg N/ ha (7.24 t/ha) and 25 kg N/ha (6.22 t/ha). Among the three irrigation intervals, crop irrigated at an interval of 14 days (8.44 t/ha) recorded significantly higher bulb yield as compared to crop irrigated at 21 days (5.79 t/ha), but was at par with the crop irrigated at 7 days (7.65 t/ha). The interaction effect of N x I was non-significant for bulb yield. Kannan and Mohamed (2001) reported the higher onion bulb yield with shorter irrigation frequencies (6 and

10 days interval) as compared to extended frequencies (14 and 18 days interval). Malik *et al.* (2003) and Srivastava *et al.* (2005) found the higher onion bulb yield in the treatment of 150 N Kg/ha. Kumar *et al.* (2008) also reported that highest onion bulb yield registered in the higher dose of fertigation (100:50:50 kg NPK/ ha).

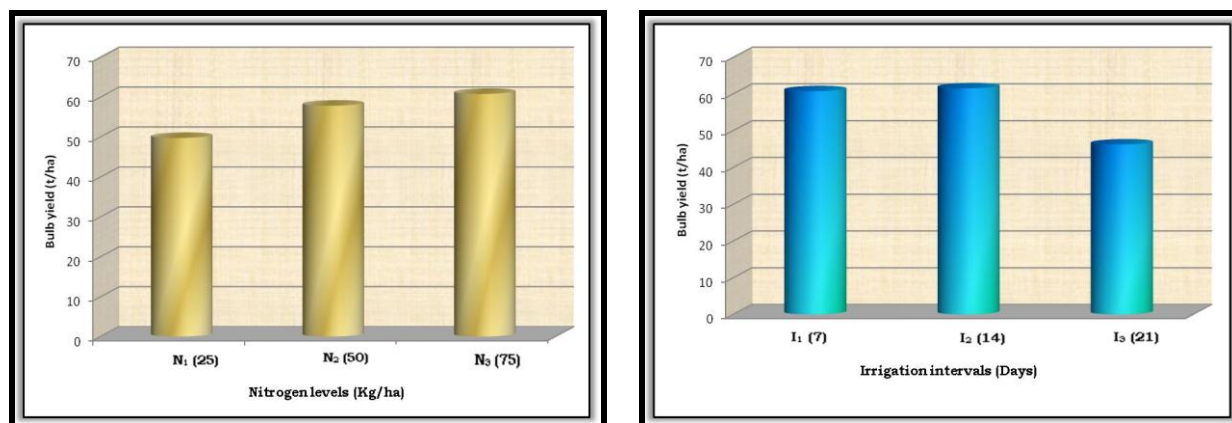


Figure 2: Impact of different nitrogen levels and irrigation intervals on bulb yield

CONCLUSION

From the above results, it is concluded that nitrogen applied @ 50 kg/ha and crop irrigated at 14 days interval recorded significantly lowest thrips population. Significantly highest bulb yield (8.43 t/ha) was obtained under treatment of 75 kg N/ha and crop irrigated at 14 days interval (8.44 t/ha). Interaction effect also revealed that nitrogen applied @ 50 kg/ha and crop irrigated at 14 days interval (N₂I₂) registered significantly minimum thrips population.

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Table 1: Impact of different irrigation intervals and nitrogen levels (days) on incidence of thrips and bulb yield in garlic

Treatment	Number of Thrips per plant*				Bulb Yield (t/ha)			
Main/Sub	I ₁	I ₂	I ₃	Mean	I ₁	I ₂	I ₃	Mean
N ₁	3.14 (09.36)	2.90 (07.91)	3.37 (10.86)	3.14 (09.36)	6.44	7.56	4.67	6.22
N ₂	2.99 (08.44)	2.73 (06.95)	3.29 (10.32)	3.00 (08.50)	7.56	8.44	5.71	7.24
N ₃	3.46 (11.47)	3.31 (10.46)	3.64 (12.75)	3.47 (11.54)	8.96	9.33	7.00	8.43
Mean	3.20 (09.72)	2.98 (08.38)	3.43 (11.29)	-	7.65	8.44	5.79	-
ANOVA								
S.Em ±	N			0.02	0.14			
	I			0.02	0.61			
	N x I			0.03	1.07			
	N x I x P			0.07	-			
C. D. at 5%	N			0.05	0.56			
	I			0.05	1.91			
	N x I			0.09	NS			
	N x I x P			0.20	-			
C. V. (%)				3.95	25.44			

* $\sqrt{X + 0.5}$ transformed values while, those in parentheses are retransformed values

Where,

N₁ = 25 kg N / ha

N₂ = 50 kg N / ha

N₃ = 75 kg N / ha

I₁ = 7 days irrigation interval

I₂ = 14 days irrigation interval

I₃ = 21 days irrigation interval

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