

IMPACT OF SPACING AND ORGANIC FERTILIZERS ON INCIDENCE OF THRIPS (*Thrips tabaci* LINDEMAN) INFESTING ONION

PATEL, P. S. AND J. J. PATEL

DEPARTMENT OF ENTOMOLOGY
COLLEGE OF AGRICULTURE
NAVSARI AGRICULTURAL UNIVERSITY
BHARUCH- 392 012, GUJARAT, INDIA

**EMAIL: jjpatel2764@gmail.com*

ABSTRACT

Field experiment was conducted to study the impact of spacing and organic fertilizer on incidence of Thrips tabaci Lindeman in onion at College Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during rabi 2014-15. Of the different 3 spacing, onion transplanted at wider spacing (20 cm x 10 cm) recorded significantly lowest (3.91 thrips/plant) population as compared to crop transplanted at 10 cm x 10 cm and 15 cm x 10 cm. Crop transplanted at 15 cm x 10 cm recorded significantly lower (6.12 thrips/plant) than 10 cm x 10 cm spacing (8.79 thrips/plant). The impact of organic fertilizers on incidence of thrips was non-significant. Among the different spacing, significantly highest onion bulb yield (437.2 q/ha) was obtained under 10 cm x 10 cm spacing which was followed by 15 cm x 10 cm (349.8 q/ha) and 20 cm x 10 cm (276.7 q/ha). The impact of organic fertilizers on bulb yield was also found to be non-significant.

KEY WORDS: *Allium cepa*, Bulb, Jeevamrut, Nadep, Organic fertilizer, Spacing, Thrips *tabaci*

INTRODUCTION

Onion (*Allium cepa* Linnaeus) belonging to family *Alliaceae* is one of the most important vegetable crops in India grown for more than 5000 years. 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, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) is a serious pest of onion causing considerable damage and reduce the yield every season. The principal form of damage caused by onion thrips result from the piercing of cells and removal of cell contents by larva and adults. It causes economical loss if infestation starts at bulb

initiation stage. In case of severe infestation, the bulbs remain undersized and distorted (Butani and Verma, 1976). In onions, this leads to an irregular or blotchy whitening of the leaves, a condition sometimes termed “blast.” A heavy level of feeding injury causes the hormonal imbalance in the plant causing the leaves to curl and twist, and the foliage to be stunted (Kendall and Bjostad, 1990). Such damage decreases onion bulb size and may even lead to death of the plant. Silvering or whitening of the pods on edible-podded peas is also attributed to onion thrips (Shelton and North, 1987). Onion thrips is also implicated in the transmission of tomato spotted wilt virus to several vegetable crops

and purple blotch disease in onion (Jones, 2005).

The basic information on relative occurrence and population dynamic is necessary before deciding the strategy for management of any insect pest. Spacing modifies the micro-environment of the crop, duration of crop growth and development that influence the pest population. Fertilizers provide plants with more nutrients as a result of which the plants not only get lush green colour but also enhance the accumulations of nutrients in the shoot, which attracts phytophagous insects and its impacts also observed on the life style of the insect pests. Hence, the experiment was planned to study the impact of spacing and organic fertilizers on incidence of thrips infesting onion at College Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during *rabi* 2014-15.

MATERIALS AND METHODS

Onion seedlings were transplanted at respective spacing during second week of December and raised successfully by adopting recommended suitable agronomical practices. An experiment was laid out in a Randomised Block Design (Factorial) adopting three replications having plot size of 2.5 m × 2.0 m during *rabi*, 2014-15 at College Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari. Three different levels of spacing (M_1 : 10 cm x 10 cm, M_2 : 15 cm x 10 cm, and M_3 : 20 cm x 10 cm) and three levels of organic fertilizers (F_1 : Jeevamrut @ 3000 l/ha, F_2 : Nadep @ 2500 kg/ha, and F_3 : Jeevamrut + Nadep) were evaluated based on thrips population and onion bulb yield. The fertilizers were applied at basal as well as 30 and 45 days after transplanting. The experimental area was kept free from insecticidal spray.

For recording observations of thrips population, twenty five plants were randomly selected and tagged from whole experimental plot. The observations on absolute thrips population was recorded at weekly interval by counting the number of thrips per three leaves per plant during morning hours starting from one week after transplanting till to harvesting of the crop. The bulb yield was recorded at harvest from each plot.

RESULTS AND DISCUSSION

Impact of spacing on thrips incidence

Onion seedlings planted at 20 cm x 10 cm recorded significantly lower thrips population as compared to crop transplanted at 10 cm x 10 cm and 15 cm x 10 cm. The data on pooled over periods (Table 1 and Figure 1A) revealed that the wider spacing (20 cm x 10 cm) recorded significantly lowest (3.91 thrips/plant) population as compared to crop transplanted at 10 cm x 10 cm and 15 cm x 10 cm. Crop transplanted at 15 cm x 10 cm recorded significantly lower (6.12 thrips/plant) than 10 cm x 10 cm spacing (8.79 thrips/plant). Malik *et al.* (2003), Arif *et al.* (2006) and Patel *et al.* (2015) found that the plant with closer spacing showed more population of thrips as compared to crop planted at wider spacing.

Impact of organic fertilizers on thrips incidence

The data pooled over periods on impact of organic fertilizers on thrips incidence (Table 1 and Figure 1B) was non-significant indicated that the impact of organic fertilizers on incidence of thrips was negligible. Ahmed *et al.* (2003) found that there was no impact of organic and synthetic fertilizers on thrips as well as aphids and jassid population on cotton as the difference was non-significant. In present investigation, numerically the incidence of *T. tabaci* in onion was lowest in the wider spacing (20 cm x 10 cm) as compared to 10 cm x 10 cm and 15 cm x 10 cm spacing.

Bulb yield

So far as bulb yield (Table 2 and Figure 2A and 2B) is concerned, impact of spacing on bulb yield was significant. Among the different spacing, significantly highest onion bulb yield (437.2 q/ha) was obtained under 10 cm x 10 cm spacing which was followed by 15 cm x 10 cm (349.8 q/ha) and 20 cm x 10 cm (276.7 q/ha). The impact of organic fertilizers on bulb yield was non-significant. It is cleared from the results that as the plant stand increases, the yield also increases though the incidence of thrips was higher on close spacing.

CONCLUSION

Of the three planting spacing (10 cm x 10 cm, 15 cm x 10 cm and 20 cm x 10 cm), onion seedlings planted at wider spacing (20 cm x 10 cm) recorded significantly lowest (3.91 thrips/plant) thrips population, while onion planted at 10 cm x 10 cm registered the highest (437.2 q/ha) bulb yield. Of the three organic fertilizers [Jeevamrut (3000 l/ha), Nadep (2500 kg/ha) and Jeevamrut + Nadep] evaluated, the impact of organic fertilizers on incidence of thrips and bulb yield was found non-significant indicating no response of organic fertilizers on thrips incidence and bulb yield in onion.

REFERENCES

Ahmed, S.; Nisar, S.; Rehman, Z. U. and Bashir, M. (2003). Comparative incidence of insect pest complex on cotton varieties subjected to organic

and synthetic fertilizers. *Int. J. Agri. Bio.*, 5(3): 236-238.

Arif, M. J.; Gogi, M. D.; Mirza, M.; Zia, K. and Hafeez, F. (2006). Impact of plant spacing and abiotic factors on population dynamics of sucking insect pests of cotton. *Pakistan J. Bio. Sci.*, 9(7): 1364-1369.

Butani, D. K. and Verma, S. (1976). Insect pests of vegetables and their control: onion and garlic. *Pesticides*, 10(11): 33-35.

Jones, D. R. (2005). Plant viruses transmitted by thrips. *European J. Pl. Path.*, 113: 119-157.

Kendall, D. M. and Bjostad, L. B. (1990). Phytohormone ecology; herbivory by Thrips tabaci induces greater ethylene production in intact onions than mechanical damage alone. *J. Chem. Ecol.*, 16: 981-991.

Malik, M. F.; Nawaz, M. and Hafeez, Z. (2003). Inter and intra row spacing effect on thrips (*Thrips spp.*) population in onion (*Allium cepa*)-I. *Asian J. Pl. Sci.*, 2: 713-715.

Patel, C. K.; Bharpoda, T. M.; Zala, M. B. and Shah, K. D. (2015). Impact of plant spacing and nitrogenous fertilizer on incidence of sucking pests in Bt cotton. *Int. J. Pl. Protec.*, 8(1): 34-40.

Shelton, A. M. and North, R. C. (1987). Injury and control of onion thrips (Thysanoptera: Thripidae) on edible podded peas. *J. Econ. Ent.*, 80: 1325-1330.

Table 1: Impact of spacing and organic fertilizers on incidence of *T. Tabaci* in onion (pooled over period)

Treatments		Number of thrips per Plant			
Main\ Sub		F ₁	F ₂	F ₃	Mean
M ₁		2.91(8.86)	2.90(8.79)	2.89(8.74)	2.90 ^c (8.79)
M ₂		2.37(5.72)	2.50(6.39)	2.47(6.27)	2.45 ^b (6.12)
M ₃		2.06(4.10)	1.98(3.79)	2.00(3.84)	2.01 ^a (3.91)
Mean		2.45(6.22)	2.46(6.32)	2.45(6.28)	
ANOVA					
S.Em. ±	M	0.05			
	F	0.01			
	P	0.01			
	M x F	0.02			
	M x P	0.03			
	F x P	0.03			
	M x F x P	0.06			
C. D. at 5%	M	0.16			
	F	NS			
	P	NS			
	M x F	0.06			
	M x P	0.11			
	F x P	NS			
	M x F x P	NS			
C. V. (%)		4.79			

Note: 1. Figures in the parentheses are retransformed values, while those outside are $\sqrt{x + 0.5}$ transformed values

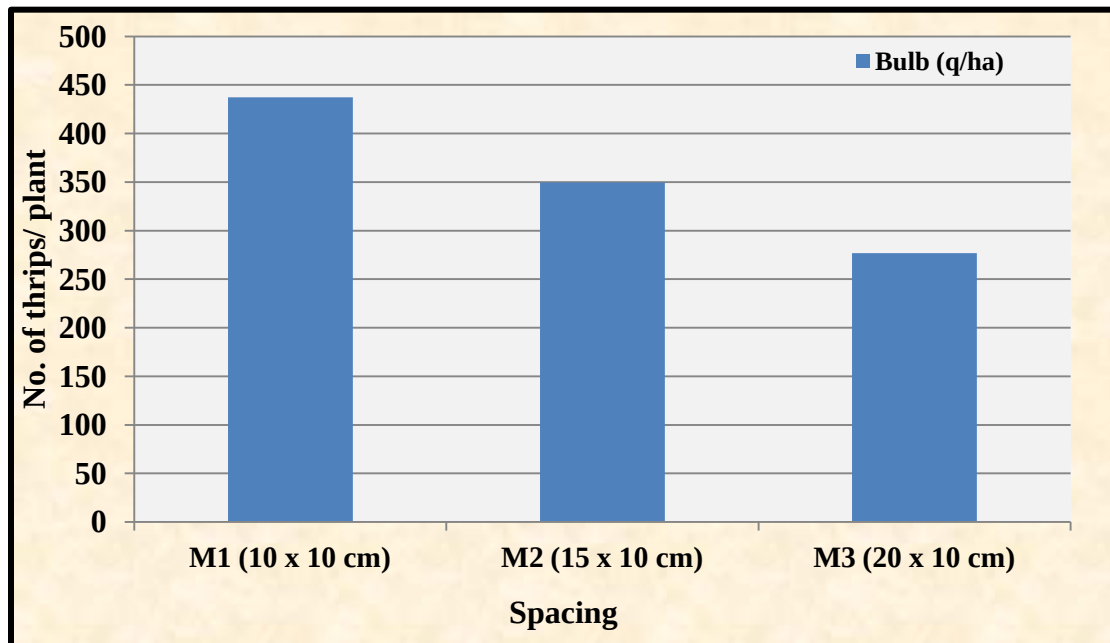
2. Treatment means with letter(s) in common are not significant at 5% level of significance in respective columns

Table 2: Impact of spacing and organic fertilizers on onion bulb yield

Treatments		Bulb Yield (q/ha)			
Main\ Sub		F ₁	F ₂	F ₃	Mean
M ₁		435.1	439.8	436.7	437.2 ^a
M ₂		347.2	350.3	351.8	349.8 ^b
M ₃		240.7	317.9	271.6	276.7 ^c
Mean		341.0 ^a	369.3 ^a	353.3 ^a	
ANOVA					
S.Em. ±	M	9.12			
	F	9.12			
	M x F	9.12			
C. D. at 5%	M	27.35			
	F	NS			
	M x F	NS			
C. V. (%)		7.72			

Note: Treatment means with letter(s) in common are not significant at 5% level of significance in respective columns

1A) Spacing



1B) Organic fertilizers

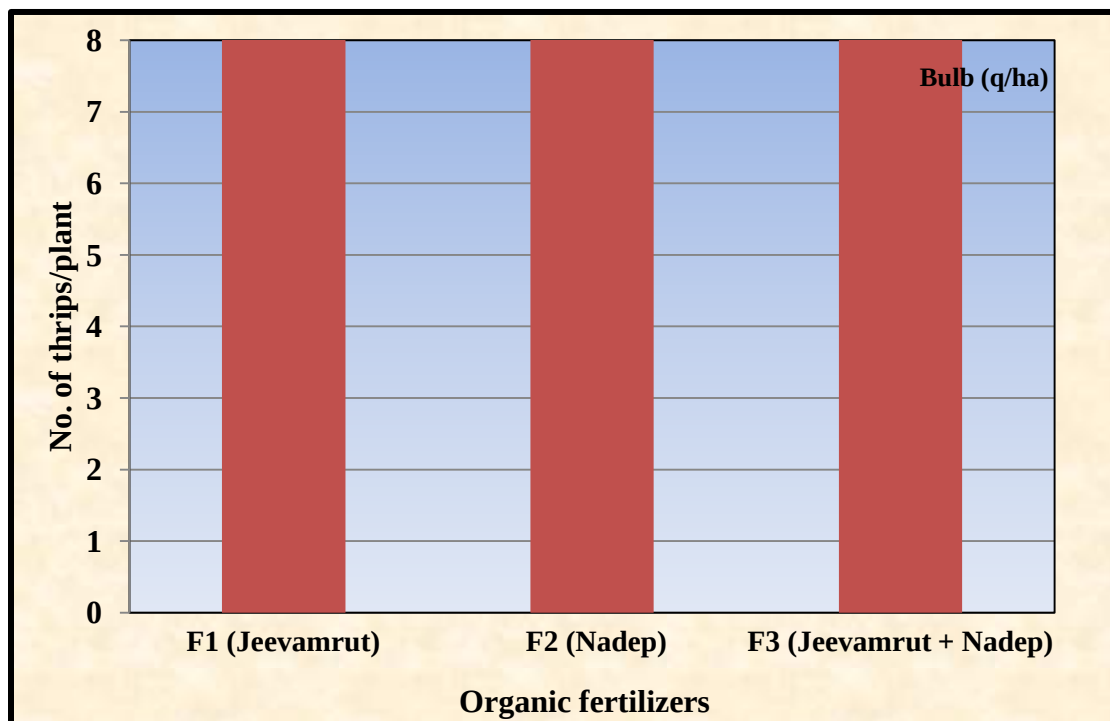
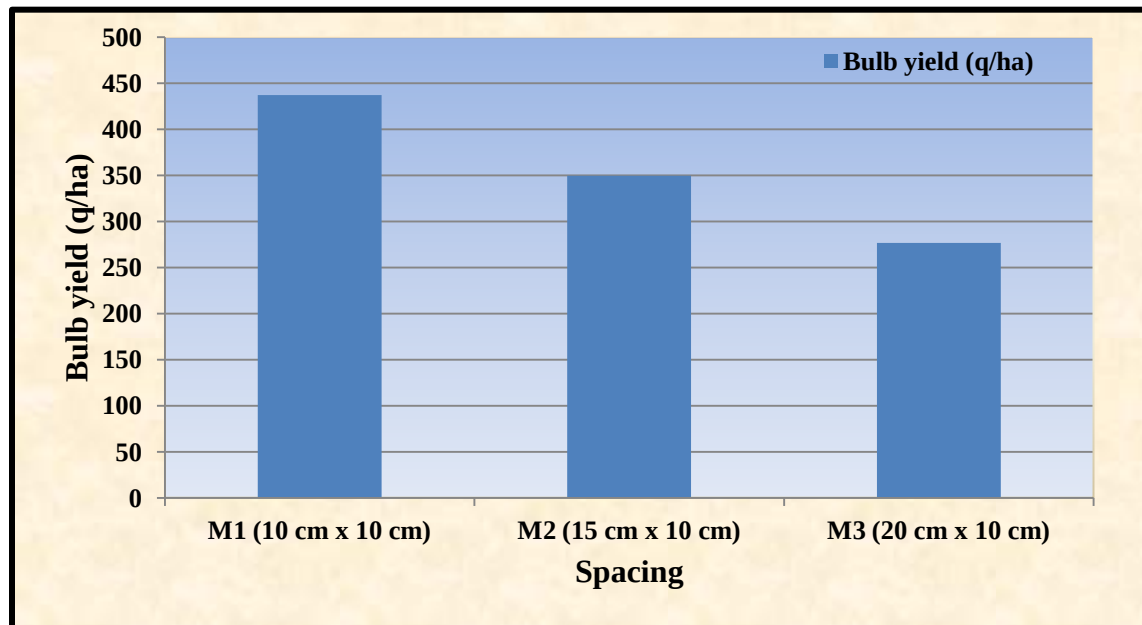


Figure 1: Impact of spacing and organic fertilizers on incidence of *T. tabaci* in onion

2A) Spacing



2B) Organic fertilizers

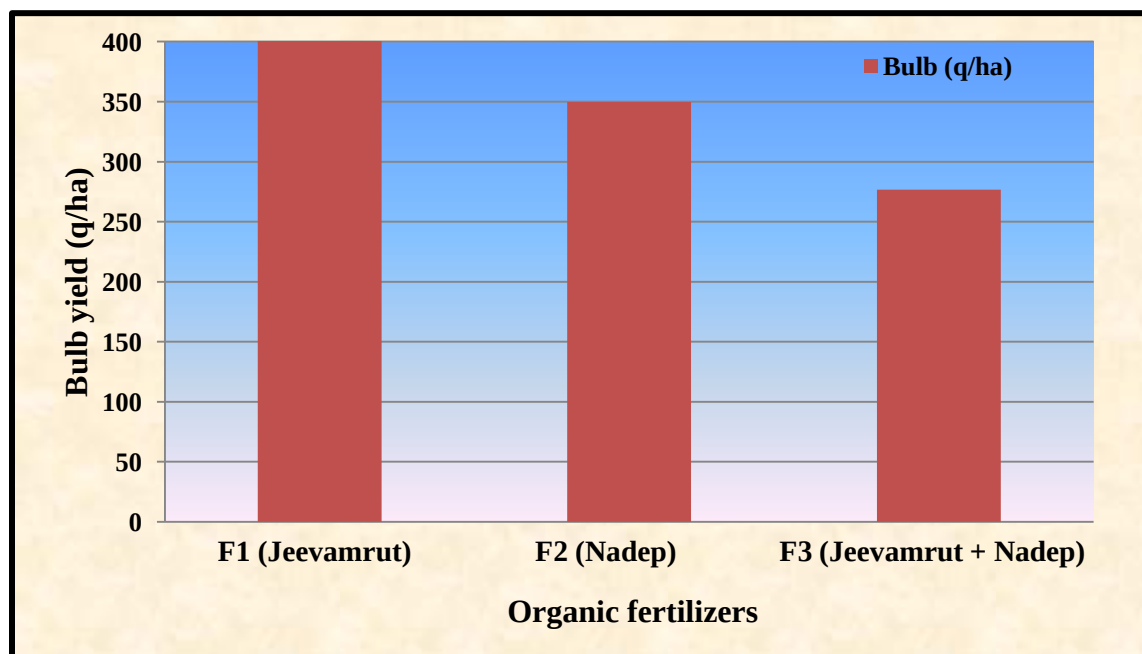


Figure 2: Impact of spacing and organic fertilizers on onion bulb yield

[MS received : August 28, 2017]

[MS accepted : September 07, 2017]