

**IMPACT OF DIFFERENT LEVELS OF NITROGEN ON INCIDENCE OF MITES,
Tetranychus urticae KOCH IN BRINJAL**

PATEL, J. J., KAVAD M. B. AND MUCHHADIYA, D. V.

**COLLEGE OF AGRICULTURE
NAVSARI AGRICULTURAL UNIVERSITY
BHARUCH – 392 012 ,GUJARAT, INDIA**

****E-mail: jjpatel2764@gmail.com***

ABSTRACT

An experiment was conducted to study the impact of different levels of nitrogen on incidence of mites in brinjal under field condition at College Agronomy Farm, Navsari Agricultural University, Navsari during kharif 2014-15. Of the different five nitrogen levels (50, 75, 100, 125 and 150 kg N₂/ha) evaluated, the lowest dose of nitrogen (50 kg/ha) recorded significantly the minimum mite population in comparison to 100, 125 and 150 kg N₂/ha. The highest dose of nitrogen (150 kg/ha) harbored higher mite population. The lowest dose of nitrogen (50 kg/ha) yielded significantly higher fruit yield (349.5 q/ha) in comparison to 100, 125 and 150 kg N₂/ha.

KEY WORDS: *Brinjal, fruit yield, mite, fertilizer, Tetranychus urticae*

INTRODUCTION

Brinjal (*Solanum melongena* Linnaeus) also known as eggplant is considered as a “King of vegetables”, originated from India, where a wide range of wild types and land races occur (Thompson and Kelly, 1957) and is now grown as a vegetable throughout the tropical, sub-tropical and warm temperate areas of the world. In world, the production of brinjal is about 4.9 crore Metric Tonnes (MT). India is the second largest producer of brinjal after China (Anonymous, 2014). The crop is cultivated in about 7.2 lakh hectares with a production of 134 lakh MT in India. In Gujarat, the total area under brinjal cultivation is 0.72 lakh hectares with annual production of 13.4 lakh MT (Anonymous, 2014).

Various insect pests found to attack on brinjal at vegetative and fruiting stage. Patel *et al.* (1970) recorded 16 pest species attacking brinjal crop in Gujarat. Of which, shoot and fruit borer, *Leucinodes orbonalis* Guenee; jassid, *Amrasca biguttula biguttula*

(Ishida); whitefly, *Bemisia tabaci* Gennadius; aphid, *Aphis gossypii* Glover and mites, *Tetranychus urticae* Koch are the major and important insect pests. Of these, red spider mite, *T. urticae* poses serious threat as a major pest next to shoot and fruit borer to the cultivation of brinjal (Basu and Pramanik, 1968). The reduction in yield due to mite infestation was upto 14 per cent at Bangalore and 31 per cent at Varanasi (Anonymous, 1996). Patil and Nandihali (2008) estimated the yield losses in the range of 12.18 to 32.21 per cent due to infestation of mite at Dharwad. Palanisamy and Chelliah (1987) noticed the reduction of 28.00 per cent in fruit yield due to spider mite infestation in brinjal. On an average 16.16 per cent yield loss in brinjal due to *T. urticae* was noticed in India (Anonymous, 2007).

Mites producing injury primarily by removing cell contents by penetrating stylet into leaf tissues resulting into appearance of yellowish spots. Both nymphs and adults of mites suck the sap usually from the lower surface of leaves producing small white

specks, which gradually dry and drop off. Infested plant become yellowish, wilted and droop rapidly particularly during dry periods. The dense web produced by spider mite often covers the plant where dust particles adhere in windy weather which in turn affects the physiological activity of the plant, making it stunted. The entire plant becomes yellowish giving poor unhealthy look. Infested leaves wither and eventually fall off. The decreased vitality and leaf drop adversely affects the plant growth, flowering and fruiting. In severe infestation, it webs profusely and may form a thick sheath of webbing that covers the entire plant (Butani and Mittal, 1992).

Fertilizers provide plants with more nutrient (Bogenschutz and Konig, 1976 and Bentz *et al.*, 1995), 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 (Natarajan, 1986) and its impacts also observed on the life style of the insect pests (Dowell and Steinberg, 1990). By adjusting proper dose of fertilizers, the population of phytophagous insects could be managed which can be used as a good tool in the IPM programme. Hence, the present investigation was carried out to study the impact of different levels of nitrogen on incidence of mites in brinjal.

MATERIALS AND METHODS

In order to study the effect of nitrogen levels on incidence of mites, *T. urticae* on brinjal, a field experiment was conducted during *kharif* season of 2014-15 at College Agronomy Farm, Navsari Agricultural University, Navsari. Brinjal seedlings (cv. Pant Bahar) were transplanted on 15th July in a plot size of 20 x 10 m in spacing of 90 x 60 cm and raised successfully by adopting recommended suitable agronomical practices. The impact of different nitrogen levels was evaluated on the basis of number of mites/4 cm² leaf area and brinjal fruit yield. The half dose of nitrogen was applied at the time of transplanting in respective treatments and

half dose of nitrogen was applied after 30 days of transplanting. For recording observations of mites, five plants were randomly selected and tagged in each net plot area. The observations on mite population was recorded from 2 x 2 cm² area of three leaves (upper, middle and lower) of same selected plants. The fruit yield was recorded picking wise from each plot. The observations were made at weekly interval starting from the third week after transplanting till to the harvesting of the crop. The whole experimental plot was kept free from any acaricides. The periodical data on number of mites/4 cm² leaf area recorded at weekly interval were subjected to analysis of variance (ANOVA) after transforming them to square root. However, the data on fruit yield were analyzed without any transformation. The data on mites were analyzed periodically as well as pooled over periods.

RESULTS AND DISCUSSION

Mite population

The periodical data (Table 1) on effect of different nitrogen levels on incidence of mites was significant. The order of effect of different levels of nitrogen pooled over periods (Table 1 and Figure 1)) on mite (with number of a mite/4 cm² leaf given in brackets after each treatments) was N₂ @ 50 kg/ha (8.76) < N₂ @ 75 kg/ha (10.79) < N₂ @ 100 kg/ha (15.13) < N₂ @ 125 kg/ha (20.29) < N₂ @ 150 kg/ha (25.84) < Control (44.12). The difference among the treatments was significant. All the levels of nitrogen recorded lower mite infestation when compared with control (without nitrogen). The data also indicated that as the nitrogen level increased, mite population also increased in the field. The lowest dose of nitrogen (50 kg/ha) recorded significantly the minimum mite population in comparison to 100 kg N₂/ha, 125 kg N₂/ha and 150 kg N₂/ha, while it was at par with 75 kg N₂/ha. Treatment of 100 kg N₂/ha was at par with 75 kg N₂/ha on one hand and with 125 kg N₂/ha on other hand of chronological order. The highest dose of nitrogen (150 kg/ha)

registered significantly the higher mite population, but was at par with 125 kg N₂/ha.

It was indicative from the available literature that work on effect of different levels of nitrogen on mites infesting brinjal is very scanty. Archer *et al.* (1990) recorded significantly more mites on plants at 180 kg nitrogen/ha than at 0 or 45 kg nitrogen/ha in sorghum. As per the report of Sudoi *et al.* (2001), increase in nitrogen rates resulted in the increase in leaf nutrient content and protein content, consequently supporting the development of mite pests feeding on leaves. Patil (2005) found that increase in nitrogen level, the mite incidence increased. According to Jadav (2006), as nitrogen level increased, the mite incidence in brinjal also increased. Nitrogen @ 200 kg/ha recorded significantly highest mite population as compared to nitrogen applied @ 50 and 100 kg/ha. According to Parihar and Upadhyay (2011), increasing nitrogen rates resulted in increasing incidence of mites in potato. Patel (2006), Patel (2011a) and Patel (2011b) also found that increased dose of nitrogen helped in population build up of thrips in chilli, onion and garlic, respectively at Anand, Gujarat. Thus, the above all reports are in accordance with the results of present investigation.

Brinjal fruit yield

The data on brinjal fruit yield are presented in Table 2 and Figure 2. The order of impact of different levels of nitrogen (Table 2) on fruit yield (q/ha) was N₂ @ 50 kg/ha (349.5) > N₂ @ 75 kg/ha (309.7) > N₂ @ 100 kg/ha (252.3) > N₂ @ 125 kg/ha (212.5) > N₂ @ 150 kg/ha (172.8) > Control (150.6). The difference among the treatments was significant. All the levels of nitrogen yielded significantly more fruits when compared with control except the highest dose (150 kg N₂/ha), which was at par with control. The lowest dose of nitrogen (50 kg/ha) yielded significant higher fruit yield in comparison to 100 kg N₂/ha, 125 kg N₂/ha and 150 kg N₂/ha while, it was at par with 75 kg N₂/ha. Treatment of 100 kg N₂/ha was at par with 75 kg N₂/ha on one hand and with

125 kg N₂/ha on other hand of chronological order. The highest dose of nitrogen (150 kg/ha) registered significantly lower fruit yield and was at par with 125 kg N₂/ha as well as control.

Overall, it is to be concluded that as the level of nitrogen increased, the population of mite also increased, while the brinjal fruit yield decreased. It might be due to that the nitrogenous fertilizers provide plants with more nutrient 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.

CONCLUSION

Of the different five nitrogen levels (50, 75, 100, 125 and 150 kg N₂/ha) evaluated, all the levels of nitrogen recorded lower mite infestation when compared with control. The lowest dose of nitrogen (50 kg/ha) recorded significantly the minimum mite population in comparison to 100, 125 and 150 kg N₂/ha. The highest dose of nitrogen (150 kg/ha) registered significantly higher mite population but was at par with 125 kg N₂/ha. The lowest dose of nitrogen (50 kg/ha) yielded significantly higher fruit yield (349.5 q/ha) in comparison to 100, 125 and 150 kg N₂/ha. The highest dose of nitrogen (150 kg/ha) registered significantly lower fruit yield (172.8 q/ha) and was at par with 125 kg N₂/ha as well as control.

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Table 1: Impact of different nitrogen levels on incidence of *T. urticae* in brinjal

Treatments	Number of Mites/4 cm ² Leaf Area at Indicated Weeks After Transplanting*						
	III	IV	V	VI	VII	VIII	IX
50 kg N₂/ ha	1.98 (3.54)	1.75 (2.62)	2.17 (4.37)	2.50 (5.99)	2.45 (5.76)	3.17 (9.85)	3.59 (12.95)
75 kg N₂/ ha	2.18 (4.36)	1.92 (3.23)	2.40 (5.37)	2.77 (7.38)	2.72 (7.09)	3.52 (12.13)	4.00 (15.94)
100 kg N₂/ ha (RDF)	2.56 (6.11)	2.23 (4.53)	2.82 (7.53)	3.27 (10.34)	3.21 (9.94)	4.17 (17.01)	4.75 (22.34)
125 kg N₂/ ha	2.94 (8.19)	2.56 (6.07)	3.25 (10.09)	3.78 (13.86)	3.71 (13.32)	4.82 (22.81)	5.50 (29.95)
150 kg N₂/ ha	3.30 (10.43)	2.87 (7.74)	3.65 (12.86)	4.25 (17.65)	4.17 (16.97)	5.43 (29.06)	6.20 (38.15)
Control (Without N)	4.28 (17.81)	3.70 (13.21)	4.73 (21.94)	5.53 (30.13)	5.42 (28.96)	7.08 (49.62)	8.09 (65.12)
S. Em. ± N	0.16	0.12	0.17	0.21	0.20	0.24	0.31
N x P	-	-	-	-	-	-	-
C.D. at 5% N	0.47	0.35	0.52	0.62	0.61	0.71	0.93
N x P	-	-	-	-	-	-	-
C. V (%)	10.81	9.28	10.98	11.20	11.17	10.09	11.53

Table 1: Contd.....

Treatments	Number of Mites/4 cm ² Leaf Area at Indicated Weeks After Transplanting*							
	X	XI	XII	XIII	XIV	XV	XVI	Pooled over periods
50 kg N ₂ / ha	3.80 (14.31)	4.26 (18.0)	3.97 (16.0)	3.64 (13.55)	2.65 (6.74)	2.37 (5.25)	2.02 (3.74)	2.99 (8.76) ^a
75 kg N ₂ / ha	4.22 (17.63)	4.74 (22.18)	4.43 (19.68)	4.07 (16.66)	2.94 (8.3)	2.62 (6.47)	2.23 (4.6)	3.32 (10.79) ^{ab}
100 kg N ₂ / ha (RDF)	5.01 (24.73)	5.61 (31.14)	5.27 (27.59)	4.85 (23.33)	3.47 (11.65)	3.08 (9.07)	2.62 (6.45)	3.94 (15.13) ^{bc}
125 kg N ₂ / ha	5.79 (33.18)	6.49 (41.8)	6.10 (36.99)	5.62 (31.27)	4.01 (15.62)	3.55 (12.18)	3.02 (8.65)	4.55 (20.29) ^{cd}
150 kg N ₂ / ha	6.53 (42.29)	7.33 (53.29)	6.89 (47.11)	6.33 (39.82)	4.51 (19.9)	4.00 (15.52)	3.39 (11.01)	5.12 (25.84) ^{de}
Control (Without N)	8.52 (72.23)	9.57 (91.05)	8.99 (80.4)	8.27 (67.94)	5.87 (33.98)	5.19 (26.5)	4.39 (18.8)	6.68 (44.12) ^e
S. Em. ± N	0.25	0.24	0.34	0.35	0.19	0.15	0.16	0.23
N x P	-	-	-	-	-	-	-	0.29
C.D. at 5% N	0.75	0.72	1.04	1.07	0.59	0.45	0.48	0.69
N x P	-	-	-	-	-	-	-	NS
C. V (%)	8.85	7.58	11.58	12.95	9.94	8.53	10.85	10.30

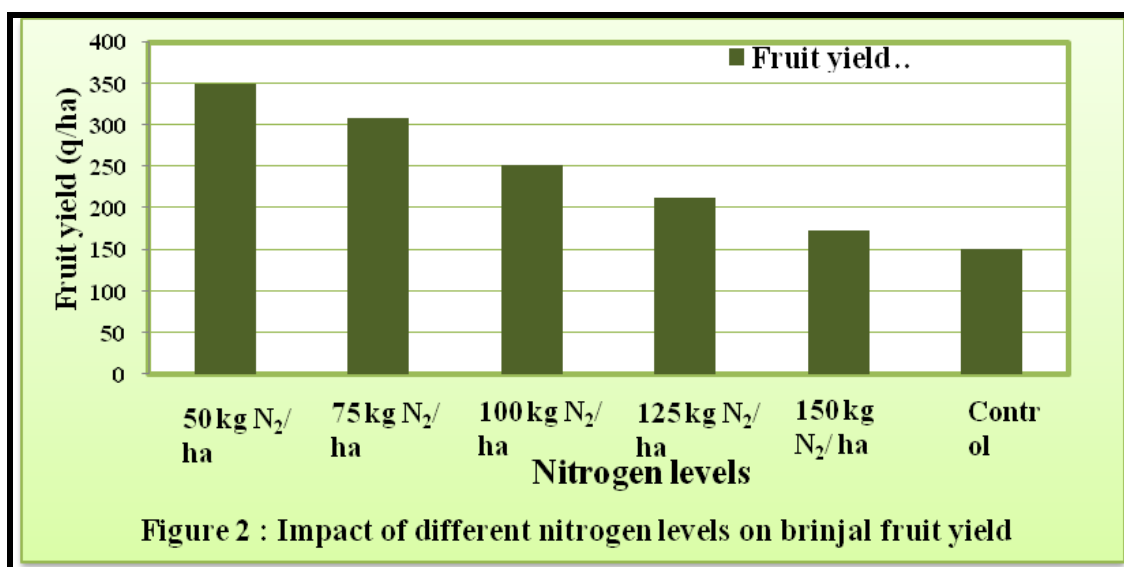
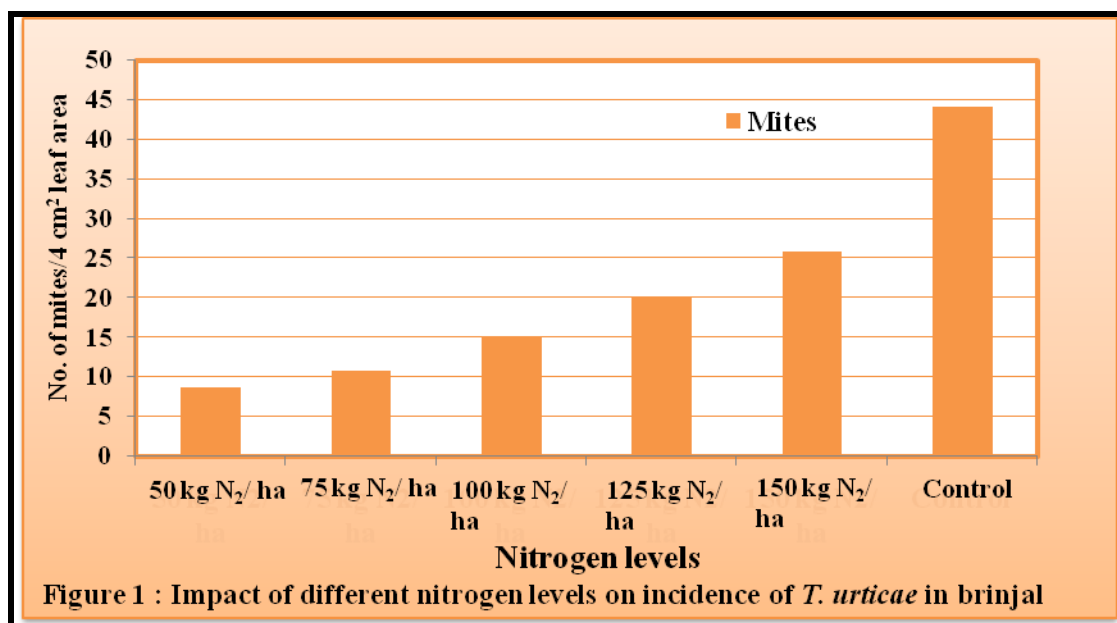
Note: 1. Treatment means with letter(s) in common are not significant at 5 % level of significance

2. Figures in parentheses are retransformed values; while, those outside are $\sqrt{X+0.3}$ * transformed values

Table 2: Impact of different nitrogen doses on brinjal fruit yield

Treatments	Fruit yield (q/ha)
50 kg N₂/ ha	349.5 ^a
75 kg N₂/ ha	309.7 ^{ab}
100 kg N₂/ ha (RDF)	252.3 ^{bc}
125 kg N₂/ ha	212.5 ^{cd}
150 kg N₂/ ha	172.8 ^{de}
Control	150.6 ^e
S. Em₊	14.01
C. D. at 5%	42.22
C. V. (%)	11.61

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



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