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Effect of different fertilizer levels and various mulches on okra shoot and fruit borer infesting okra

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ABSTRACT

The present studies were undertaken at Agronomy farm, College of Agriculture, Dapoli during rabi 2018-19 to evaluate the effect of different fertilizer levels and various mulches on okra shoot and fruit borer infesting okra in the rabi-summer. Results on effect of different levels of fertigation on fruit and shoot borer infesting okra at 10th and 13th picking showed that the treatment F_1 (120% RDF through fertigation in 14 splits) was found to be the effective treatment by recording 7.53 and 7.19 per cent fruit borer infestation per plot. Whereas, data on effect of different mulches on infestation of fruit borer showed that during 20th picking the infestation (8.70%) was found in the treatment M_3 (Paddy straw mulch) which was at par with treatment M_4 (no mulch) which recorded 10.29 per cent of fruits infested with fruit borer. While, the results on combination effect of fertigation and mulches on fruit borer infestation recorded during 12th picking was lowest (7.41%) in treatment F_3M_1 (80% RDF through fertigation + Black polythene mulch) which was at par with the treatments F_1M_2, F_1M_3, F_2M_1, F_2M_2, F_2M_3, F_3M_2, F_3M_3, F_4M_1 and F_4M_2 which recorded 9.97, 9.77, 8.68, 8.19, 9.04, 8.50, 9.77, 8.95 and 9.60 per cent fruit borer infestation, respectively. During 15th picking the lowest per cent infestation (6.69) was observed on the treatment combination F_3M_4 (80% RDF through fertigation + No mulch) which was at par with F_4M_2, F_1M_3, F_2M_4, F_2M_2, F_3M_1, F_4M_1, F_4M_3, F_1M_2, F_4M_4, F_2M_1, F_3M_2, F1M4 and F_2M_3 which recorded 8.06, 8.83, 9.00, 9.35, 9.48, 9.64, 9.82, 10.90, 11.10, 11.26, 12.08, 12.27 and 13.28 borer per cent infestation, respectively.

Key words: *Mulch, fertigation, fertilizer levels, okra shoot and fruit borer, Earias spp.*

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INTRODUCTION

Okra is widely cultivated as a summer season crop in North India and as a *kharif* and *summer* season crop in Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu. In India, it is grown over an area of 0.528 M ha with a production of 61.46 MT having productivity 11.6 t ha^{-1}. It contributes 5.8 per cent of the total vegetable area and 3.9 per cent of total country's vegetable production. In Maharashtra, area under this crop is 0.011 M ha with a production of 0.84 lakh MT and productivity is 10.26 t ha^{-1}[2].

The crop is attacked by a variety of pests throughout its growth stages [9]. Amongst them okra shoot and fruit borer (*Earias vittella* Fabricius, and *E. insulana* (Boisduval)Lepidoptera: Noctuidae) is of much significance [6]and causes extensive damage to fruits resulting in 69 per cent yield loss [4] and 8.40 to 73.20 per cent variation in fruit infestation [8]. It is an endemic pest and inflicts direct loss to the crop. It is an oligophagus pest and okra and cotton are its main host plants. It is also found feeding on a large number of malvaceous crop plants.

For the management of insect pests and diseases many options such as chemical, cultural, mechanical, biological *etc*. are available. Among available control methods, cultural method is considered to be the safest and environment friendly. The mulches are used to control pest, diseases, weeds and maintaining soil moisture. The benefits and importance of mulching in modern agriculture respective to the type of material used have been stressed by many authors [1].Fertilizers in general are one of the major inputs for increased agricultural productivity. The form of these inputs can influence pest populations in various agro-ecosystems, depending on the kind of fertilizers used, the crops grown, and the insect pests present. However, excessive nutrient application can also lead to pest problems by increasing the reproduction, longevity and overall fitness of certain pests [7].The information on impact of mulching and fertigation on

okra shoot and fruit borer infesting okra is scanty in Konkan region of Maharashtra. Therefore, keeping the background in view, the present investigation was undertaken to study effect of fertigation and mulching on okra shoot and fruit borer infesting okra.

MATERIAL AND METHODS

A statistically designed field experiment using Strip Plot Design having three replications and four main and four sub treatments was laid out at Department of Agronomy, College of Agriculture, Dapoli to evaluate the effect of fertigation and mulching on okra shoot and fruit borer infesting okra. The details of the experiment are given below:

Location	:	Department of Agronomy farm, College of Agriculture, Dapoli
Crop	:	Okra
Variety	:	Hybrid Mahyco-10
Design	:	Strip Plot Design
Replications	:	Three
Spacing	:	45 cm x 30 cm
Experimental Area	:	Gross area - 4.20 m x 3.6 m and Net area - 3.60 m x 2.70 m

Treatment details:

I. Main plots (fertilizers levels):
F_1: 120% RDF through fertigation in 14 splits
F_2: 100% RDF through fertigation in 14 splits
F_3: 80% RDF through fertigation in 14 splits
F_4: Soil application of 100%RDF at recommended time schedule
II. Sub plots (Mulches):
M_1:Black polythene mulch (25µ)
M_2:Silver polythene mulch (25µ)
M_3:Paddy straw mulch (5 tons ha $^{-1}$)
M_4:No mulch (Control)

Method of recording observations

During each picking the number of healthy and infested fruits were counted and the per cent infestation was worked out by using following formula;

$$\text{Per cent Pod damage} = \frac{\text{No. of infested fruits}}{\text{Total no. of fruits}} \times 100$$

Data thus obtained on per cent fruit infestation was converted into arc sine transformation and analyzed statistically.

RESULTS AND DISCUSSION

Effect of fertigation on shoot and fruit borer infesting okra

The observations of shoot and fruit borer on okra fruits were recorded as soon as the incidence was noticed. For shoot and fruit borer, per cent fruit infestation was calculated on number basis by recording healthy and infested fruits at each picking from each plot separately. The results are presented in Table 1.During the 1st to 7th pickings the infestation of shoot and fruit borer was meager therefore per cent fruit infestation could not be worked out.

The data on per cent infestation of shoot and fruit borer during 8thand 9th picking was found to be non-significant and that was in the range of 10.46 to 11.78 and 9.45 to 11.37 per cent.

The observations recorded at 10thpicking indicated that the treatment F_1(120% RDF through fertigation in 14 splits)was found to be the effective treatment by recording 7.53 per cent fruit borer infestation per plot and was at par with the treatment F_2(100% RDF through fertigation in 14 splits)which recorded 8.58 per cent fruit borer infestation. The maximum borer infestation (12.05%) was observed in the treatment F_4(soil application of 100% RDF at recommended time schedule)which was at par with treatment F_3 (80% RDF through fertigation in 14 splits) that recorded 9.94 per cent fruit borer infestation per plot.

Data on observation of shoot and fruit borer recorded in 11th and 12th picking showed that the mean fruit borer per cent infestation was non-significant and ranged between 9.40 to 10.66 and 9.04 to 10.81 per cent.

The observations recorded at 13thpicking indicated that the treatment F_1(120% RDF through fertigation in 14 splits) was found to be effective treatment by recording 7.19 per cent fruit borer infestation per plot.The next best treatment was F_4 (Soil application of 100% RDF at recommended time schedule) which recorded 9.30 per cent fruit borer infestation which was at par with the treatment F_2 (100% RDF through fertigation in 14 splits)which recorded 9.33 per cent fruit borer infestation per plot. The maximum per cent infestation of fruit borer (11.15) was observed in the treatment F_3(80% RDF through fertigation in 14 splits).

Data on observation of fruit borer recorded in 14th, 15th, 16th, 17th, 18th, 19th, 20th and 21thpicking results revealed that the there was no any significant difference between various treatments of fertigation on the per cent shoot and fruit borer infestation and it was in the range between 8.32 to 11.61, 9.63 to 11.69, 8.97 to 11.74, 9.49 to 10.91, 10.19 to 11.47, 8.03 to 11.41, 9.31 to 11.01 and 7.97 to 10.26 per cent, respectively.

The results obtained revealed that the increase in levels of N, P and K fertilizers in splits were found to be effective for minimizing shoot and fruit borer infestation in okra. The results of the present study are more or less similar with the results of Asiwe [3] who reported that damage of *Maruca vitrata* was significantly lower at higher levels of phosphorus in cowpea.

Effect of mulching on shoot and fruit borer infesting okra

The data on pertaining effect of mulching on shoot and fruit borer infesting okra at each picking results are presented in Table 2. During the 1st to 7th pickings the numbers of fruits infested by shoot and fruit borer were meager hence per cent infestation could not be worked out.

The data on fruit borer during 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th and 19thpicking, results revealed that there was no any significant difference between various treatments of mulching on the mean shoot and fruit borer infestation per cent and it was in the range of 10.19 to 11.93,9.26 to12.25,8.39 to 10.41,9.10 to 11.08,9.05 to 10.77,8.47 to 9.64,7.07 to 10.77,9.74 to 11.55,9.63 to 10.88,9.69 to11.50,10.29 to 10.77 and 7.93 to 10.7 per cent, respectively.

Data on observation of shoot and fruit borer recorded in 20th picking showed that the lowest fruit borer infestation(8.70) was found in the treatment M_3(Paddy straw mulch) which was at par with the treatment M_4(No mulch) which recorded 10.29 per cent fruits infested by fruit borer.The next best treatment was M_1 (black polythene mulch) by recording 11.04 per cent fruit borer infestation which was at par with the treatment M_2(Silver polythene mulch) that recorded 11.33 per cent fruit borer infestation.

The data on shoot and fruit borer infestation during 21st picking was found to be non-significant and the fruit borer infestation per cent was in the range of 8.12 to 10.24 per cent.

The present findings more or less confirm the results of Dahivalkar Shraddha *et al*. [5]. They reported that during *rabi*-hot season, effect of different mulches on per cent fruit infestation of okra shoot and fruit borer during 8th, 9th,10th, 11th and 12thweek after sowing indicated that the minimum (3.87%, 6.27%, 9.20%, 6.43% and 4.89%, respectively) fruit infestation was recorded in treatment M_2 (Silver polythene mulch). The maximum (11.62%, 15.28%, 17.09%, 15.59% and 12.49%, respectively) fruit infestation was recorded in treatment M_1 (No mulch).

Interaction effect of fertigation and mulching on shoot and fruit borer infesting okra

The data presented on the interaction effect of fertigation and mulching on shoot and fruit borer infesting okra at each picking each picking from each plot separately. The results are presented in Table 3.During the 1st to 7thpickings the number of fruits infested by shoot and fruit borer were less therefore per cent infestation could not worked out.

The data on shoot and fruit borer during 8th, 9th, 10th and 11thpicking was found to be non- significant and the fruit borerper cent infestation was in the range of 7.29 to 13.66, 5.99 to 14.32,5.80 to 12.38 and 5.77 and 12.45 per cent, respectively.

During 12th picking, data on shoot and fruit borer infestation recorded on different treatment combinations was found to be lowest (7.41%) in F_3M_1(80% RDF through fertigation +Black polythene mulch) which was at par with the treatments F_1M_2(120% RDF through fertigation + Silver polythene mulch), F_1M_3(120% RDF through fertigation + Paddy straw mulch), F_2M_1(100% RDF through fertigation + Black polythene mulch), F_2M_2(100% RDF through fertigation + Silver polythene mulch), F_2M_3(100% RDF through fertigation + Paddy straw mulch), F_3M_2(80% RDF through fertigation + Silver polythene mulch), F_3M_3(80% RDF through fertigation + Paddy straw mulch), F_4M_1(Soil application of RDF+ Black polythene mulch) and F_4M_2(Soil application of RDF+ Silver polythene mulch) which recorded 9.97 ,9.77 ,8.68, 8.19, 9.04, 8.50, 9.77,8.95 and 9.60 per cent fruit borer infestation, respectively. The highest fruit

borer(12.37%) infestation was recorded in the treatment combination F_1M_1(120% RDF through fertigation + Black polythene mulch).

Table 1: Effect of fertigation on shoot and fruit borer infesting okra

Treatments	Per cent of fruits damaged by fruit borer per picking													
	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21th
Main plot: Fertilizer levels														
F_1: 120% RDF through fertigation in 14 splits	10.46 (18.87)*	11.25 (19.60)	7.53 (15.93)	10.57 (18.97)	10.81 (19.20)	7.19 (15.56)	9.79 (18.23)	11.69 (19.99)	10.81 (19.19)	10.57 (18.97)	10.27 (18.69)	8.03 (16.46)	9.31 (17.77)	7.97 (16.40)
F_2: 100% RDF through fertigation in 14 splits	10.77 (19.16)	10.67 (19.07)	8.58 (17.04)	9.40 (17.85)	9.15 (17.61)	9.33 (17.78)	8.32 (16.77)	10.67 (19.06)	8.97 (17.42)	9.49 (17.94)	10.19 (18.62)	11.41 (19.74)	10.28 (18.70)	8.10 (16.53)
F_3: 80% RDF through fertigation in 14 splits	11.78 (20.07)	11.37 (19.71)	9.94 (18.38)	10.29 (18.71)	9.04 (17.50)	11.15 (19.51)	9.36 (17.82)	10.64 (19.04)	9.32 (17.78)	10.91 (19.29)	10.29 (18.71)	9.87 (18.31)	10.70 (19.09)	10.26 (18.68)
F_4: Soil application of 100% RDF at recommended time schedule	10.92 (19.29)	9.45 (17.90)	12.05 (20.31)	10.66 (19.05)	10.16 (18.59)	9.30 (17.75)	11.61 (19.92)	9.63 (18.08)	11.74 (20.04)	10.32 (18.74)	11.47 (19.80)	9.06 (17.52)	11.01 (19.38)	8.63 (17.09)
S.E. ±	**0.90**	**0.87**	**0.68**	**1.36**	**0.98**	**0.65**	**1.62**	**0.90**	**1.70**	**0.64**	**0.70**	**1.82**	**1.90**	**1.24**
C.D. at 5%	**NS**	**NS**	**2.01**	**NS**	**NS**	**1.94**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

*Figures in parentheses are arc sine transformed values

Table 2: Effect of mulches on shoot and fruit borer infesting okra

Treatments	Per cent of fruits damaged by fruit borer per picking													
	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21th
Sub plot: Mulches														
M_1: Black polythene mulch (25μ)	10.19 (18.62)*	9.89 (18.33)	8.39 (16.84)	10.38 (18.80)	9.28 (17.73)	8.47 (16.92)	10.77 (19.16)	11.28 (19.63)	10.39 (18.80)	11.50 (19.42)	10.52 (18.93)	7.93 (16.36)	11.04 (19.41)	8.12 (16.56)
M_2: Silver polythene mulch (25μ)	11.77 (19.51)	11.39 (19.73)	9.32 (17.77)	11.08 (19.44)	9.05 (17.51)	9.34 (17.79)	10.60 (19.00)	10.05 (18.48)	9.85 (18.29)	10.41 (18.82)	10.77 (19.16)	9.88 (18.32)	11.33 (19.67)	8.24 (16.68)
M_3: Paddy straw mulch (5 tons ha^{-1})	11.93 (20.21)	9.26 (17.72)	10.41 (18.82)	9.10 (17.56)	9.78 (18.22)	9.64 (18.09)	7.07 (15.42)	11.55 (19.87)	10.88 (19.26)	9.69 (18.13)	10.62 (19.02)	9.81 (18.25)	8.70 (17.16)	10.24 (18.67)

	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st
M$_4$: No mulch (Control)	10.67 (19.06)	12.25 (20.49)	9.78 (18.23)	10.38 (18.79)	10.77 (19.16)	9.34 (17.80)	10.77 (19.16)	9.74 (18.19)	9.63 (18.08)	10.14 (18.57)	10.29 (18.71)	10.71 (19.10)	10.29 (18.71)	8.35 (16.79)
S.E. ±	**0.79**	**1.32**	**0.96**	**0.94**	**0.57**	**1.13**	**1.76**	**0.77**	**0.92**	**0.72**	**1.40**	**1.17**	**0.68**	**0.96**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**2.01**	**NS**

*Figures in parentheses are arc sine transformed values

Table 3: Interaction effect of fertigation and mulches on shoot and fruit borer infesting okra

Treatment combinations : Main plot x sub plot	**Per cent of fruits damaged by fruit borer per picking**													
	8th	**9th**	**10th**	**11th**	**12th**	**13th**	**14th**	**15th**	**16th**	**17th**	**18th**	**19th**	**20th**	**21th**
F$_1$M$_1$	13.43 (21.50)*	7.12 (15.47)	10.05 (18.48)	10.64 (19.04)	12.37 (20.60)	7.28 (15.65)	14.18 (22.12)	15.12 (22.88)	10.15 (18.58)	11.72 (20.02)	10.58 (18.99)	8.52 (16.97)	8.52 (16.97)	6.87 (15.19)
F$_1$M$_2$	10.07 (18.50)	10.91 (19.28)	5.80 (13.93)	11.40 (19.46)	9.97 (18.41)	5.39 (13.43)	10.01 (18.44)	10.90 (19.28)	10.42 (18.83)	13.32 (21.41)	11.37 (19.70)	8.32 (16.77)	12.20 (20.45)	6.52 (14.80)
F$_1$M$_3$	8.46 (16.91)	12.27 (20.51)	7.47 (15.86)	5.77 (13.90)	9.77 (18.21)	8.26 (16.70)	7.29 (15.66)	8.83 (17.29)	12.48 (20.69)	7.16 (15.52)	10.10 (18.53)	7.78 (16.20)	6.81 (15.13)	12.15 (20.40)
F$_1$M$_4$	10.15 (18.57)	14.32 (22.24)	7.10 (15.45)	12.13 (20.38)	11.22 (19.57)	8.02 (16.45)	13.25 (21.35)	12.27 (20.51)	10.25 (18.67)	10.53 (18.93)	9.09 (17.54)	7.51 (15.90)	10.10 (18.53)	6.21 (14.44)
F$_2$M$_1$	7.29 (15.66)	11.26 (19.61)	8.44 (16.89)	11.33 (19.67)	8.68 (17.14)	7.50 (15.89)	8.60 (17.05)	11.26 (19.61)	8.50 (16.95)	10.38 (18.80)	6.89 (15.22)	7.86 (16.28)	13.95 (21.93)	6.90 (15.23)
F$_2$M$_2$	11.82 (20.11)	9.70 (18.15)	7.90 (16.32)	8.64 (17.09)	8.19 (16.63)	8.26 (16.71)	12.24 (20.48)	9.35 (17.81)	9.25 (17.70)	8.96 (17.42)	10.20 (18.63)	12.11 (20.37)	10.17 (18.59)	8.20 (16.64)
F$_2$M$_3$	13.66 (21.69)	12.01 (20.28)	8.30 (16.75)	7.71 (16.12)	9.04 (17.50)	9.23 (17.68)	8.69 (17.14)	13.28 (21.37)	9.81 (18.26)	8.78 (17.23)	13.15 (21.26)	10.22 (18.64)	6.99 (15.33)	9.21 (17.67)
F$_2$M$_4$	10.77 (19.16)	9.79 (18.23)	9.75 (18.19)	10.10 (18.53)	10.79 (19.18)	10.15 (18.57)	8.03 (16.46)	9.00 (17.46)	8.33 (16.78)	9.86 (18.30)	11.00 (19.37)	15.38 (20.42)	10.55 (18.95)	8.15 (16.59)
F$_3$M$_1$	11.88 (20.16)	14.28 (22.21)	6.01 (14.20)	9.73 (18.18)	7.41 (15.79)	9.79 (18.23)	9.99 (18.42)	9.48 (17.93)	8.42 (16.87)	10.43 (18.85)	9.98 (18.42)	6.42 (14.68)	13.88 (21.87)	12.34 (20.56)
F$_3$M$_2$	12.17 (20.42)	11.66 (19.97)	10.59 (18.99)	9.50 (17.96)	8.50 (16.95)	10.91 (19.28)	8.95 (17.41)	12.08 (20.34)	11.55 (19.87)	9.14 (17.60)	12.10 (20.36)	9.81 (18.26)	11.90 (20.18)	8.60 (17.05)

8.91 (17.37)	10.17 (18.59)	5.93 (14.10)	9.79 (18.23)	10.02 (18.46)	9.09 (17.55)	**2.30**	**NS**
8.63 (17.09)	8.77 (17.23)	8.41 (16.86)	11.10 (19.46)	12.94 (21.09)	11.84 (20.13)	**2.31**	**NS**
11.55 (19.87)	12.20 (20.45)	9.04 (17.50)	9.45 (17.90)	9.86 (18.30)	7.95 (16.37)	**1.99**	**NS**
8.59 (17.04)	10.61 (19.01)	12.17 (20.42)	9.49 (17.94)	10.87 (19.25)	10.51 (18.92)	**2.17**	**NS**
11.01 (19.38)	13.23 (21.33)	11.71 (20.01)	10.44 (18.85)	12.15 (20.40)	7.33 (15.71)	**2.05**	**NS**
9.09 (17.54)	8.38 (16.82)	12.27 (20.51)	8.30 (16.74)	12.34 (20.56)	11.74 (20.04)	**1.70**	**NS**
14.72 (22.56)	6.99 (15.33)	9.64 (18.09)	8.06 (16.50)	9.82 (18.26)	11.10 (19.46)	**2.39**	**7.11**
9.71 (18.16)	8.83 (17.28)	10.63 (19.03)	11.33 (19.67)	11.07 (19.44)	13.49 (21.55)	**2.76**	**NS**
10.58 (18.98)	8.41 (16.85)	7.87 (16.29)	10.28 (18.70)	10.59 (18.99)	8.58 (17.03)	**2.06**	**NS**
9.77 (18.21)	10.63 (19.03)	8.95 (17.41)	9.60 (18.05)	10.57 (18.97)	11.61 (19.92)	**0.96**	**2.84**
12.45 (20.66)	9.61 (18.06)	9.88 (18.32)	11.87 (20.16)	11.18 (19.54)	9.76 (18.20)	**2.32**	**NS**
11.87 (20.16)	10.24 (18.66)	9.34 (17.79)	11.82 (20.11)	10.07 (18.50)	12.38 (20.06)	**2.17**	**NS**
7.53 (15.92)	12.53 (20.73)	7.64 (16.05)	13.44 (21.51)	5.99 (14.17)	11.55 (19.87)	**2.80**	**NS**
11.68 (19.98)	11.41 (19.74)	8.69 (17.14)	10.60 (19.00)	12.53 (20.73)	10.37 (18.78)	**2.08**	**NS**
F_3M_3	**F_3M_4**	**F_4M_1**	**F_4M_2**	**F_4M_3**	**F_4M_4**	**S.E. ±**	**C.D. at 5%**

*Figures in parentheses are arc sine transformed values

Data on observation of shoot and fruit borer recorded in 13thand 14thpicking showed that the mean per cent fruit borer infestation was non- significant on different treatment combinations of fertigation and mulching and the mean fruit borer infestation per cent ranged between 5.39 to 14.45 and 7.29 to 14.18 per cent.

During 15th picking, data on interaction effect of fertigation and mulching on shoot and fruit borer infestation was found to be significant and the percent shoot and fruit borer infestation was in the range of 6.69 to 15.12.The lowest percent infestation (6.69) was observed in the treatment combination F_3M_4 (80% RDF through fertigation + No mulch) which was at par with F_4M_2 (Soil application of RDF+ Silver polythene mulch), F_1M_3(120% RDF through fertigation + Paddy straw mulch),F_2M_4 (100% RDF through fertigation + No mulch), F_2M_2(100% RDF through fertigation + Silver polythene mulch), F_3M_1(80% RDF through fertigation +Black polythene mulch),F_4M_1(Soil application of RDF+ Black polythene mulch),F_4M_3(Soil application of RDF+ Paddy straw mulch),F_1M_2(120% RDF through fertigation + Silver polythene mulch),F_4M_4(Soil application of RDF+ No mulch), F_2M_1(100% RDF through fertigation + Black polythene mulch), F_3M_2(80% RDF through fertigation + Silver polythene mulch),F_1M_4(120% RDF through fertigation + No mulch) and F_2M_3(100% RDF through fertigation + Paddy straw mulch) which recorded 8.06, 8.83, 9.00, 9.35, 9.48, 9.64, 9.82, 10.90, 11.10, 11.26, 12.08, 12.27 and 13.28 per cent borer infestation, respectively. The highest per cent of shoot and fruit borer infestation (15.12%) was recorded in the treatment combination F_1M_1(120% RDF through fertigation + Black polythene mulch).

During 16th, 17th, 18th, 19th, 20th and 21thpicking, results revealed that there was no any significant difference between various treatment combinations of fertilizer and mulching on the shoot and fruit borer infestation and it was in the range of 8.30 to 12.48, 7.16 to 13.32, 6.89 to 13.15, 6.42 to 15.38, 6.81 to 13.95 and 5.93 to 13.69 per cent, respectively.

The overall results of the present investigation revealed that the higher doses of N,P and K in different splits and paddy straw and silver polythene mulch were proved to be the best as single as well as in combinations for the management of shoot and fruit borer of *rabi*-summer okra.

No review of literature related to aspect the interaction effect of fertigation and mulching on shoot and fruit borer infesting okra is available. Hence, no review has been included and the obtained data remain uncomparable.

CONCLUSION

Mulching and balance application of fertilizers are the best cultural practice use by farmers to escape, avoided the pest infestation on the crop and get appropriate yield as well as income. From the present investigation, it can be concluded that the okra crop was cultivated at with balance dose of fertilizers as well as organic and synthetic mulching practices helps to minimize the okra shoot and fruit borer infestation in farmer's field.

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