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ESTIMATION OF LOSSES CAUSED BY INSECT PESTS OF TOMATO IN SOUTHWEST RAJASTHAN

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ABSTRACT

A field trial was conducted to estimate the losses caused by insect pests of tomato at the Instructional Farm, Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur, during *rabi* 2014-15. The insect-pest infestation adversely affected the plant height and other yield attributing characters. In the protected plots the mean plant height was 58.98cm, number of effective branches were 14.92, fruit yield per plant was 798.83g and fruit yield per plot was 55.92kg; whereas, the corresponding figures in unprotected plots were 52.58cm, 9.92, 616.18g and 43.10kg, respectively. The insect pests caused significant reduction in mean height of plant (10.81%), number of effective branches (33.41%), mean fruit yield per plant (22.19%) and fruit yield per plot (22.25%).

Key Words: Tomato, estimation of losses, insect pests.

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill: Solanaceae) is grown round the year and is cultivated on 882.03 million hectares in India with an annual production of 18735.91Mt and an average productivity of 21.24 Mt ha^{-1} (Anonyms 2013-14). Various factors have been attributed for low yields of tomato including poor quality seeds, incidence of pests and adverse climate. Among all the known factors, insect pest infestation is of significant importance, causing losses at any stage of crop growth and varies with location and time period. Butani (1977) has listed as many as 16 species of insect and non-insect pests infesting tomato crop from germination to harvesting. Among the insect pests, the tomato fruit borer, *Helicoverpa armigera* (Hub.), thrips, *Thrips tabaci* (Linn.) and whitefly, *Bemisia tabaci* (Genn.) occur regularly during the cropping season. Among them, *H. armigera* is the most destructive insect causing considerable losses in quantity as well as quality of tomato fruits (Reddy and Zehr, 2004); moreover, it makes fruits unfit for human consumption causing considerable crop loss up to 55 percent (Selvanarayanan, 2000).

Eventually, it is necessary to study the actual amount of the losses caused by the insect pests in order to prevent such losses and produce a quality crop for which a sound and perfect pest management technique is essential; thus the present investigation to estimate losses caused by major insect pests of tomato [*Lycopersicon esculentum Mill] in Southwest Rajasthan* was carried out.

MATERIAL AND METHODS

The experiment was conducted at the instructional farm of Department of Horticulture, Rajasthan College of Agriculture, Udaipur, during *rabi* 2014-2015.The experiment was laid out in a paired plot design as suggested by Leclerg (1971). The losses due to surface feeders in *"BSS-684 (Dhanraj)" variety of* tomato crop above ground level were estimated. There were two treatments with one set of plots being kept protected and the other set unprotected; each set was replicated thirteen times. The plots referred as protected were provided complete protection by application of insecticides at regular weekly intervals. The protected plots were inspected visually at frequent intervals to maintain them pest-free. In the unprotected plots no insecticide was used and the crop was exposed to natural pest infestation. Five plants were selected in each replicate of the protected and unprotected sets and observation pertaining to various yield attributing characters *viz,* plant height, number of effective branches, marketable fruit yield/plant and marketable fruit yield/plot were recorded. The yield from each protected and unprotected plots were recorded separately and subjected to statistical analysis and mean reduction in yield was computed. The losses in yield were worked out by using the following equation:

$$\text{Mean loss in yield (\%)} = \frac{X_1 - X_2}{X_1} \times 100$$

Where,

X_1 = Yield in treated (protected) Plot.

X_2 = Yield in untreated (unprotected) Plot

Table 1. Influence of insect infestation on plant growth and yield attributing characters during *rabi* 2014-15.

S.No.	Parameters	Range		Mean		Mean reduction percentage
		Unprotected	Unprotected	Protected	Unprotected	
1.	Plant height (cm)	54.8-63.4	50.2-55.8	58.98	52.58	10.81
2.	Effective branches (No.)	14-16	8-12	14.92	9.92	33.41
3.	Fruit yield per plant (g)	708.8- 902.0	548.8-683.2	798.83	616.18	22.19
4.	Fruit yield per plot (Kg)	49.62-63.14	38.42-47.42	55.92	43.10	22.25
5.	Estimated fruit yield per hectare (q)	262.53-334.07	203.28-250.90	295.86	227.97	22.27

RESULT AND DISCUSSION

The study revealed that actual amount of quantitative loss inflicted by the natural infestation by the major insect pests together with their effects on yield attributing characters viz, plant height, number of effective branches, marketable fruit yield per plant and marketable yield per plot; the data of the results have been presented in Table (1).

Plant growth was adversely affected due to insect pest infestation. During *rabi* 2014-15 in protected plots the height of plants ranged from 54.8 to 63.4cm with a mean of 58.98cm in comparison to a range of 50.2 to 55.8cm with a mean of 52.58cm in the unprotected plots. The mean reduction in plant height was 10.81 per cent. Significant differences in number of effective branches were also observed between protected and unprotected plots. The number of effective branches in protected plots ranged from 14 to 16 per plant with a mean of 14.92, while in unprotected plots it ranged from 8 to 12 per plant with a mean of 9.92. *A* perusal of data in Table (1) indicates that in the protected plots, the fruit yield per plant was significantly more than the unprotected plots. The minimum and maximum fruit yield (g) per plant in protected plots was 708.8 and 902g, respectively with a mean of 798.83g in comparison to the minimum and maximum fruit yield (g) per plant of 548.8g and 683.2g, respectively with mean of 616.18 g in unprotected plots. The reduction in fruit yield per plant ranged from 7 to 37.76 per cent with the mean reduction of 22.19 per cent. In the protected plots, the fruit yield per plot was significantly more than the unprotected plots. The minimum and maximum fruit yields per plot in protected plots were 49.62 kg and 63.14 kg, respectively with a mean of 55.92 kg in comparison to the minimum and maximum fruit yield per plot of 38.42 kg and 47.42 kg, respectively, with mean of 43.10 kg in unprotected plots. The estimated yield (q/ha) equivalent in protected plot was 295.86 q/ha as against 227.97 q/ha in unprotected plot, the mean difference in the marketable yield of tomato between protected and unprotected was 67.89 q/ha. The mean reduction in the marketable yield of fruits due to insect pests worked out to 22.27 per cent. The findings of present investigation are in close conformity with those of Sinha and Nath (2011), who reported that in various treatments, per cent damage on weight basis varied from 7.3-14.0; while, it was 23.7 per cent in control. Chaudhuri *et al.* (2001) reported that in winter, untreated and treated crops yielded 82.95 and 90.53 t ha^{-1}, respectively.

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