



ESTIMATION OF LOSSES DUE TO INSECT PESTS IN SORGHUM

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ABSTRACT

A field trial was conducted to estimate the losses caused by insect pests of sorghum at the Instructional Farm, Rajasthan College of Agriculture, MPUAT, Udaipur, during *Kharif* 2015. The insect-pest infestation adversely affected the plant height and other yield attributing characters. In the protected plots the mean plant height was 238.96cm, test weight of 1000 sorghum grains was 32.75g, grain yield per plant was 72.55g and grain yield per plot was 4.82kg; whereas, the corresponding figures in unprotected plots were 225.71cm, 28.34g, 62.25g and 4.15kg, respectively. The insect pests caused significant reduction in mean height of plant (5.53%), test weight of 1000 sorghum grains (13.41%), mean grain yield per plant (14.19%) and grain yield per plot (13.89%) in unprotected plots, which was equivalent to a loss of 4.13 q ha⁻¹.

Key words: Sorghum, estimation of losses, insect pests

INTRODUCTION

Sorghum [*Sorghum bicolor* (L.) Monch], commonly known as *jowar* though considered as a coarse grain cereal, is one of the important crops of dry land agriculture in semi arid tropics. In India, sorghum covers about 5.82 million hectare, area with an annual grain production of 5.39 million tonnes and productivity of 92 kg ha⁻¹ (Agriculture Statistics, 2015). Higher yield in sorghum cannot be realized under different agro climatic regions due to the economic damage caused by many insect pests. Nearly 32 per cent of sorghum crop is lost due to insect pests in India (Borad and Mittal, 1983). The sorghum crop is vulnerable to over 150 insect species from sowing to final harvest of the crop (Singh and Jotwani *et al.* 1980 and Sharma, 1985). Similarly, Garg and Singh (2002) recorded the shoot fly (*Atherigona soccata* Rondani), grasshopper (*Hieroglyphus banian* Bolivar), grey weevil (*Mylocerus undecimpustulatus* Bohemann), stem borer (*Chilo partellus* Swinhoe), aphid (*Melanaphis sacchari* Zehntner) and termite (*Odontotermes obesus* Rambur) as the major insect pests of sorghum. In order to prevent the losses caused by the insect pests for the production of a healthy crop, a sound and perfect pest management technique is essential. It is necessary to study the actual amount of the losses caused by the insect pests of sorghum; thus the present investigation to estimate the losses caused by insect pests in sorghum [*Sorghum bicolor* (L.) Monch]” was carried out.

MATERIAL AND METHODS

The experiment was conducted at the Instructional Farm, Rajasthan College of Agriculture, MPUAT, Udaipur, during *Kharif* 2015. The experiment was laid out in a paired plot design as suggested by Leclerg (1971). There were two sets of plots, the protected and unprotected sets that were replicated thirteen times. One set of plot referred as protected was provided complete protection by regular application of insecticides (before sowing phorate 10G granules @15 kg/ha followed by two sprayings of qunalphos 25EC @ 500 ml/ha at 20 day intervals). These plots were also inspected at frequent intervals to keep the crop free from the pests. In another set (unprotected) no insecticide was used and the crop was exposed to natural pest infestation. The sorghum variety, SPV-2165 was sown in the plots, each measuring 4.5 ×3.6 m², having row to row and plant to plant spacing of 45 cm and 15 cm, respectively.

The observations on various yield attributing characters like plant height, test weight of 1000 sorghum grains, grain yield (g) per plant and grain yield (kg) per plot were recorded. Five randomly selected plants from protected and unprotected plots were observed and mean losses in grain 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.

RESULT AND DISCUSSION

The study revealed that actual amount of quantitative loss caused by the natural infestation by the major insect pests together with their effects on yield attributing characters viz., plant height, test weight of 1000 sorghum grains, grain yield per plant and grain yield per plot; the data of the results have been presented in Table - 1.

Among the loss estimation parameters, plant height differed significantly between protected and unprotected plots. The mean plant height in protected and unprotected plots was 238.96 cm and 225.71 cm, respectively. The reduction in plant height in unprotected plots ranged from 2.68 to 8.08 per cent with the mean reduction of 5.53 per cent. Similarly, a significant difference in test weight of 1000 grains of sorghum was also observed between protected and unprotected plots. It was found that the reduction in weight of 1000 grains ranged from 9.00 to 16.87 per cent with the mean reduction of 13.41 per cent. The mean difference in grain yield/plant between protected and unprotected plants was

Table 1. Influence of insect infestation on plant growth and yield attributing characters during *kharif* 2015

S.No.	Parameters	Range		Mean		Mean reduction percentage
		Protected	Unprotected	Protected	Unprotected	
1.	Plant height (cm)	234.26-242.77	221.40-229.15	238.96	225.71	5.53
2.	Weight of 1000 grains (gm)	30.67-34.56	26.56-29.54	32.75	28.34	13.41
3.	Grain yield per plant (gm)	70.00-75.10	59.50-65.80	72.55	62.25	14.19
4.	Grain yield per plot (kg)	4.75-4.89	4.06-4.24	4.82	4.15	13.89
5.	Estimated Grain yield per hectare (q)	29.32-30.12	25.06-26.17	29.77	25.63	13.89

10.30 g. The reduction in grain yield in unprotected plots ranged from 9.71 to 16.55 per cent with the mean reduction of 14.19 per cent. The minimum and maximum grain yield/plot in protected plots were 4.75 kg. and 4.89 kg., respectively with a mean of 4.82 kg. in comparison to the minimum and maximum grain yield/plot 4.06 kg and 4.24 kg., respectively with mean of 4.15 kg. in unprotected plots. The mean difference in grain yield/plot between protected and unprotected plants was 0.67 kg and the mean reduction of grain yield/plot in unprotected plots was 13.89 per cent. The estimated yield equivalent (q/ha) in protected plot was 29.77 q/ha as against 25.63 q/ha in unprotected plot. The mean difference in grain yield of sorghum between protected and unprotected plots was 4.13 q/ha. Similar findings by Vyas (2002) reported that the insect pests of sorghum panicle caused 9.68 and 10.39 per cent loss in grain yield equivalent to a loss of 3.71 and 4.19 qha⁻¹ during 2001 and 2002, respectively. Dangi *et al.* (2005) reported that the losses in grain yield varied from 11.54 to 30.91 per cent in different paired plots with a mean of 18.83 per cent. The pest causes 18.83 per cent losses in grain yield equivalent to a loss of 6.74 q ha⁻¹.

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