



## SEASONAL INCIDENCE OF FALL ARMYWORM *Spodoptera frugiperda* (J.E. Smith) IN SWEET CORN

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**ABSTRACT**

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Seasonal incidence of *Spodoptera frugiperda* (J.E. Smith) on sweet corn was carried out during *Kharif*, 2019 at dry land farm, S.V. Agricultural College, Tirupati with three dates of sowing at fortnightly intervals starting from June 15<sup>th</sup>. Incidence of *S. frugiperda* was low in early sown crop (June 15<sup>th</sup>) when compared to the mid (July 1<sup>st</sup>) and late sown crop (July 16<sup>th</sup>). A significant negative correlation was observed between *S. frugiperda* incidence and rainfall in early sowing. In mid sowing *S. frugiperda* exhibited negative correlation with morning and evening relative humidity (R.H). The population of *S. frugiperda* in late sown crop exhibited significant negative correlation with rainfall. Per cent leaf damage and plant damage was low in early sown crop compared to mid and late sown crop. The present result revealed that early sowing (15 days) of sweet corn will reduce the incidence and damage of *S. frugiperda* in sweet corn.

**KEY WORDS:** Corn, fall armyworm, seasonal incidence, *Spodoptera frugiperda*.

### INTRODUCTION

Maize (*Zea mays* L.) is a miracle crop emerging as the third most important cereal crop next to rice and wheat. Maize is called “Queen of Cereals” because of its productivity potential (22 t ha<sup>-1</sup>) relative to any other cereal crop (Parihar *et al.*, 2011). Sweet corn (*Zea mays saccharata* Sturt) is one type of maize which contains 13 to 15 per cent sugar in immature grains is of short duration, picked when immature (milk stage) and eat as a vegetable rather than as a grain.

Among the insect pests attacking sweet corn *S. frugiperda* (J.E. Smith) is most important recent pest whose damage may extent from 20 per cent to 80 per cent. The fall armyworm (FAW), *S. frugiperda* is native to the tropical regions of the western hemisphere from the United States to Argentina. It is primarily a pest of maize but has a wide host range and is capable of feeding on over 80 plant species, periodically causing significant economic damage to maize, rice, sorghum, millet, soybean, wheat, alfalfa, cotton, turf, and fodder crops (Pogue, 2002).

The FAW was first noticed in the Indian subcontinent at Bangalore Rural and Chikkaballapur district during May and June 2018 (Ganiger *et al.*, 2018) and South Karnataka during the first fortnight of July 2018 (ICAR-

NBAIR pest alert, 2018) and it was also observed in Andhra Pradesh during august 2018 (Venkateswarlu *et al.*, 2018). FAW larvae can damage maize crop at various stages of development by feeding on leaf or ear tissues. The foliage damage is generally typical and feeding on ears can be noticed under heavy infestations. The larva can be found in the whorl feeding on young leaves at 13 days (Harrison, 1986), 14 to 21 days after sowing (Melo and Silva, 1987).

Depending on the growth stage of maize, fall armyworm larvae are found on young leaves, leaf whorls, tassels or Cobs (Goergen *et al.*, 2016). Infestation during the mid- to late-whorl stage of maize development caused yield losses of 15-73 per cent when 55-100 per cent of the plants were infested with *S. frugiperda* (Hruska and Gould, 1997).

According to the recent studies, fall armyworm can cause yield losses ranging from 8.3 to 20.6 million tonnes of maize in absence of management practices (Day *et al.*, 2017).

Temporal distribution of insect pests is often governed by complex interactions exerted by abiotic and biotic factors. As *S. frugiperda* is a new pest to Andhra Pradesh, there is every need to know the impact of dates of sowing on the population dynamics of the pest.

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Therefore, information pertaining to seasonal abundance of the *S. frugiperda* would be beneficial while combating with the pest, to keep its populations below damaging levels.

## MATERIAL AND METHODS

Field trails were conducted to know the seasonal incidence of fall armyworm on sweet corn at the dry land farm, S.V. Agricultural College, Tirupati during *Kharif*, 2019 with three sowing dates, at 15 days interval starting from June 15<sup>th</sup> (early) followed by July 1<sup>st</sup> (mid) and July 16<sup>th</sup> (late). Three plots of each 100 m<sup>2</sup> were raised with a spacing of 60 x 20 cm.

The data on incidence of fall armyworm, plant and leaf damage was collected from all plants in 5 randomly selected quadrants at weekly intervals during different phases of crop growth in the experimental plots. The data was correlated with the weather parameters *viz.*, maximum and minimum temperature, morning and evening relative humidity, rainfall and sunshine hours so as to infer the impact of abiotic factors on build-up of the pest.

## RESULTS AND DISCUSSION

The present results showed that incidence of *S. frugiperda* started from 12-17 days after sowing and attained peak at 25-45 days after sowing (Fig. 1) in all the three dates of sowing (early, mid and late) of sweet corn and remained on the crop till harvest. The present findings are in agreement with Vijaaakshaya *et al.* (2020) who reported that incidence of *S. frugiperda* was maximum in second fortnight of July (30-45 days after sowing). In early sowing, the *S. frugiperda* incidence started at 27 SW and continued till the 35 SW with peak incidence between 27 to 28 SW (0.54 larvae/plant) (Table 1) and then decreased gradually up to 31 SW and again increased after 31 SW (Fig. 1). In mid sowing, *S. frugiperda* incidence started from 28 SW and continued till the 37 SW with peak incidence at 30 SW 1.2 larvae/plant (Table 1), (Fig. 1). In late sowing, *S. frugiperda* incidence started from 30 SW and continued up to 38 SW with peak incidence at 35 SW 1.2 larvae/plant (Table 1), (Fig. 1). Similar results were also reported by Annandhi *et al.* (2020) with larval population peak at 27 SW. The present results are in line with the findings of Rojas *et al.* (2004) who reported that peak activity of *S. frugiperda* during June to September. The percent leaf damage was maximum at 30 SW in early sowing (67.20%)

(Table 1) followed by mid sowing (77.78) (Table 1) at 30 SW and late sowing (87.16%) at 35 SW (Table 1).

The percent plant damage was maximum at 34 SW in early sowing (89.13%) (Table 1), 31 SW in mid sowing (90.91%) (Table 1) and at 34 SW (89.58%) in late sowing (Table 1). The results of the correlation studies revealed that *S. frugiperda* incidence exhibited a significant and negative correlation with the rain fall in early sowing (Table 2). Increased temperature and sunshine hours might have favoured the higher rate of photosynthesis of sweet corn which in turn favoured the continuous and abundant food supply to fall armyworm larvae. Similar results were reported by Vijaaakshaya *et al.* (2020) who reported that *S. frugiperda* incidence had significant and negative correlation with the rainfall, relative humidity and positive correlation with maximum and minimum temperatures.

In mid sowing, *S. frugiperda* population exhibited a significant negative correlation with morning and evening R.H. (Table 2). In late sowing, *S. frugiperda* exhibited a significant negative correlation with rainfall (Table 2). Waddill *et al.* (1981) reported that heavy and light rainfalls kill significant number of early instar of *S. frugiperda* showing negative correlation with rainfall. The percent leaf and plant damage varied with different dates of sowing and lowest per cent leaf and plant damage was observed in early sowing compared to mid and late sowing.

## CONCLUSION

The low incidence of *S. frugiperda* in early sown crop resulted in less cob damage compared to mid and late sown crop. The correlation studies between *S. frugiperda* incidence and weather parameters revealed that population of *S. frugiperda* decreased with increase in rainfall and relative humidity. Increased temperature and sunshine hours in mid and late sown crops might have favoured the higher rate of photosynthesis of sweet corn which in turn favoured the continuous and abundant food supply to fall armyworm larvae resulting in higher incidence of larvae and higher leaf and plant damages. The percent leaf and plant damage varied with different dates of sowing and lowest per cent leaf and plant damage was observed in early sown corn. Hence early sowing of sweet corn can be recommended to avoid high incidence of *S. frugiperda* and to get higher yields.

Table 1. Incidence of *Spodoptera frugiperda* on sweet corn during *kharif* 2019.

Standard Week	Early sowing (15 <sup>th</sup> June)			Mid sowing (1 <sup>st</sup> July)			Late sowing (16 <sup>th</sup> July)		
	No. of larvae*/plant	Per cent leaf damage*/plant	Per cent damage*/plant	No. of larvae*/plant	Per cent leaf damage*/plant	Per cent damage*/plant	No. of larvae*/plant	Per cent leaf damage*/plant	Per cent damage*/plant
27	0.54	60.22	81.25	-	-	-	-	-	-
28	0.44	45.59	79.59	0.80	53.93	35.85	-	-	-
29	0.36	64.75	70.00	1.00	51.06	28.85	-	-	-
30	0.34	67.20	79.07	1.20	77.78	62.79	1.10	81.97	36.54
31	0.46	54.14	88.37	0.60	52.42	90.91	0.94	65.61	77.78
32	0.52	53.86	78.04	0.90	62.05	79.59	1.00	64.14	72.55
33	0.20	52.38	75.32	0.30	71.01	78.72	0.20	75.28	87.76
34	0.42	55.17	89.13	0.40	73.93	75.56	0.88	84.56	89.58
35	0.30	53.54	76.30	0.40	70.33	81.63	1.20	87.16	46.00
36	-	-	-	0.42	59.28	89.80	0.34	77.29	67.35
37	-	-	-	0.44	50.00	72.34	0.30	53.19	60.42
38	-	-	-	-	-	-	0.32	33.16	39.58

\* Mean No. of 50 observations

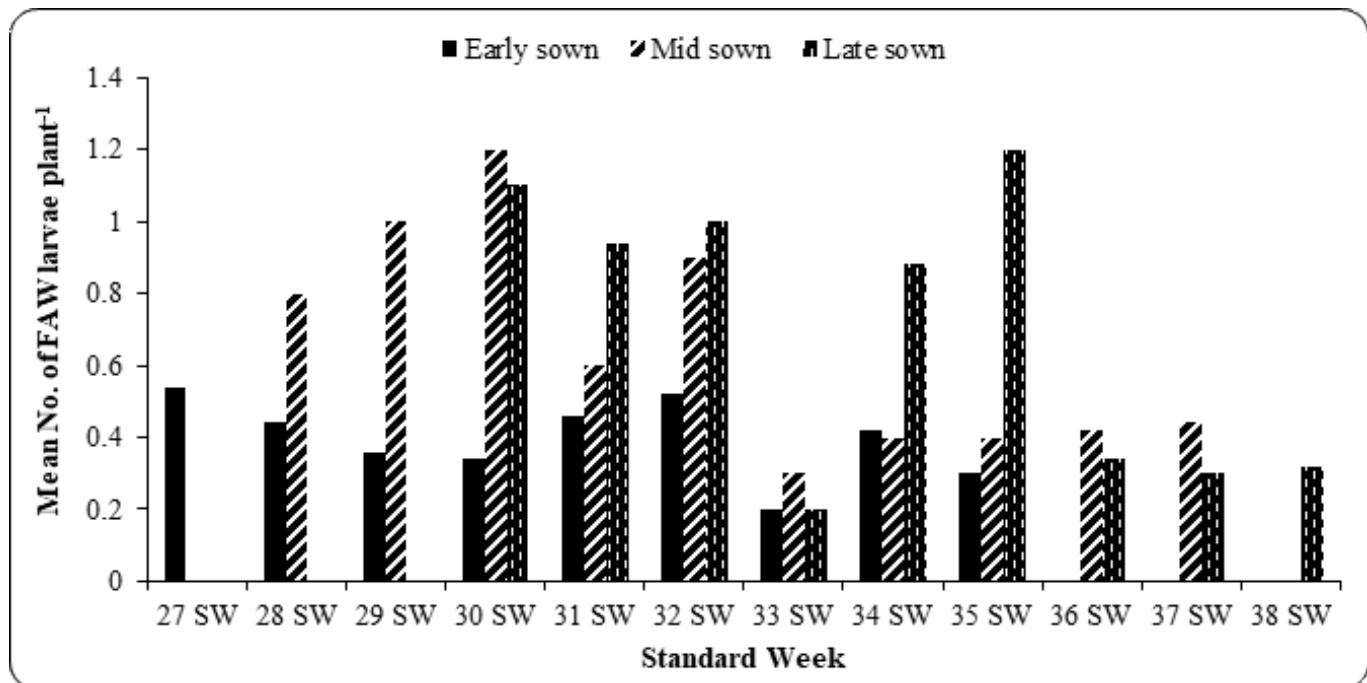
Table 2. Simple Correlations between weather parameters and *Spodoptera frugiperda* incidence on sweet corn during *kharif* 2019

Weather Parameters	Correlation coefficients (r)									
	Early sowing (15 <sup>th</sup> June)			Mid sowing (1 <sup>st</sup> July)			Late sowing (16 <sup>th</sup> July)			
	Larvae	Per cent leaf damage	Per cent plant damage	Larvae	Per cent leaf damage	Per cent plant damage	Larvae	Per cent leaf damage	Per cent plant damage	
Rainfall	-0.81**	-0.21NS	-0.21NS	-0.53NS	0.25NS	0.00NS	-0.75*	-0.39NS	0.04NS	
Min temp	0.65NS	-0.10NS	-0.75NS	0.53NS	-0.21NS	-0.67NS	0.46NS	0.13NS	0.20NS	
Max temp	0.49NS	0.13NS	-0.35NS	0.61NS	-0.43NS	-0.61NS	0.41NS	0.36NS	0.21NS	
Sunshine hours	0.19NS	-0.52NS	-0.14NS	-0.04NS	-0.36NS	-0.55NS	0.02NS	0.03NS	0.15NS	
Morning R.H.	-0.27NS	-0.35NS	0.35NS	-0.86**	0.12NS	0.50NS	-0.63NS	-0.45NS	0.04NS	
Evening R.H.	-0.29NS	-0.39NS	0.30NS	-0.86**	0.24NS	0.43NS	-0.59NS	-0.47NS	-0.05NS	
Rainfall	-0.81**	-0.21NS	-0.21NS	-0.53NS	0.25NS	0.00NS	-0.75*	-0.39NS	0.04NS	

\* : Correlation is significant at the 0.05 level (2-tailed).

\*\* : Correlation is significant at the 0.01 level (2-tailed).

NS : Non-significant



**Fig. 1. Seasonal incidence of *Spodoptera frugiperda* larvae on sweet corn during kharif 2019.**

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