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Influence Of Prevailing Weather Parameters On Population Dynamics Of Fruit Borer (*Helicoverpa armigera*, Hubner) In Okra During *Kharif* Season

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ABSTRACT
Field experiment was carried out with a view to study the fluctuations in the population of fruit borer Helicoverpa armigera in okra against prevailing weather conditions at student farm, college of Agriculture, Hyderabad, PJTSAU during Kharif-2015. The results recorded that the incidence of H. armigera was commenced in the 35th standard week , peak incidence were recorded in terms of per cent fruit damage on number and weight basis 33.67 and 56.34 per cent, respectively at temperature 31.9oc, Rh 73.5%, Rainfall 0.3 mm and sunshine 7.2 hr day-1. Maximum larval population was noticed in 41st standard week (13.8 larvae per plant) at maximum temperature 33.4oc, Rh 62.9% and sunshine 7.9 hrday-1. Maximum temperature and sunshine hours were positively correlated with larval population and fruit damage. Minimum temperature, relative humidity and rain fall were negatively correlated withlarval population and fruit damage. Maximum temperature was most influencing weather parameter on population dynamics of H. armigera.
KEY WORDS: *Helicoverpa armigera, okra, population dynamics, weather parameters and correlation*

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INTRODUCTION

Okra (*Abelmoschus esculentus* (L.) Moench) is an important vegetable crop of family Malvaceae. It plays an important role in human diet and has good nutritional value. The crop is attacked by more than 45 insect pests which infest the crop from seedling to harvest stage (Nair, 1984), one of the important limiting factor in the cultivation of okra is insect pests, many of the pests occurring on cotton are found to ravage okra crop. As high as 72 species of insects have been recorded on okra, of which the sucking pests comprising of aphids (*Aphis gossypii*, Glover), leafhopper (*Amrasca biguttula biguttula* Ishida), whitefly (*Bemisia tabaci* Gennadius) and mite (*Tetranuchus cinnabarinus* Boisduval) cause significant damage to the crop, while at later stage fruit borer like *Earias vittella* (Fabricius), *Earias isulana* and *Helicoverpa armigera* (Hubner) (Pareek and Bhargava, 2003). Among these pests fruit borers have gained major pest status on okra and other vegetables in recent years, of which recently *Helicoverpa* causing more damage at fruiting stage and considered as one of the major insect pest along with *Earias spp* (Dubey *et al.,* 1999). Chandel *et al.* (2005) observed that pest was migrating from tomato to okra in the month of June. Nath *et al.,*(2011) noticed that the maximum level of larvae 1.20 per plant during 37th standard weekin 2005 and 1.0 per plant during year 2006 in okra. Ravi *et al.,* (2005) reported that egg number of *Helicoverpa* was significantly higher on okra than cotton, but larval number was not significantly higher than cotton.However, no concrete attempts have been made to carry out a detailed study of fruit borer *Helicoverpa armigera*. Scanning of literature revealed that attempts made by earlier workers were scanty. Therefore present investigations are initiated to fill the lacunae for elucidating information on the population dynamics of pest population and their relationship with weather parameters.

MATERIAL AND METHODS

The field experiment was conducted at Prof. Jayashankar Telangana State Argicultutral University, Hyderabad,Telangana during *Kharif*-2015. The experimental field was located at Southern Telangana zone with longitude '78.415503', latitude '17.316171' and Mean Sea Level 546 m. A popular okra variety "Arka Anamika" was selected to conduct the experiment. Sowing was taken up on 15th July 2015 at 60 × 30 cm spacing. Seed rate followed was 4 kilograms per acre. The crop was raised as per the package and practices of PJTSAU. Ten plants from each plot were randomly selected and tagged. Ten plants from each plot were randomly selected and tagged. Weekly observations on was taken on entire tagged plants thought the season. Incidence of okra fruit borer *Helicoverpa* was recorded in terms of number of larva per ten plants, per cent fruit damage on number and weight basis. Incidence of fruit borer in terms of percentage of damaged fruits on number and weight was recorded by counting and weighing healthy and damaged fruits at each picking separately and calculated using formula "Per cent fruit damage on number/weight = Number/weight of damaged fruits/Total number/weight of fruits×100". The weekly meteorological data during the period of experiment were collected from Agro meteorological Observatory, Agricultural Research Institute, Rajendranagar, Hyderabad, Telangana. Weekly mean Maximum temperature, minimum temperature, mean relative humidity sun shine hr/day and total weekly rainfall were used to work out the association of weather parameters on infestation of the pest on okra. In order to study the influence of key abiotic factors on pest incidence, simple correlations were worked out between the pest incidence and meteorological factors.

RESULTS AND DISCUSSIONS

Population dynamics of fruit borer *Helicoverpa armigera* was conducted at student farm, department of Entomolology, College of Agriculture, PJTSAU, Telanagana. The results indicated that *Helicovrpa spp* infestation on okra was commenced in 35th standard week (3rd week of August) that continuously increased up to 40th standard week, then gradually decreased till the last picking in the 46th standard week (3rd week of November)(Table 1)(Figure 1). It was observed that the initially larvae population appeared in the 35th standard week with an average larval population 4.2 larvae per 10 plants in *Kharif*-2015. This larval population continuously increased and reached to the peak 13.8 larvae per 10 plants in 41st standard week at maximum temperature 33.4^{o}C (Figure 2), relative humidity 62.9% (Figure 3), rain fall 4.9 mm (Figure 4), sun shine 7.9 hr/day and thereafter decreased gradually upto 46thstandard week with average population of 5.8 larvae per 10 plants (Table 1)(Figure 1).The mean fruit damage on number was reported in 35th standard weekand continuously increased up to 39th standard week and maximum damage was recorded 6.43 and 33.67per cent, respectively. Damage was decreased from 39th standard week to 46th standard week (per cent damage was recorded 18.75). Mean damage on fruit weight was noticed in 36th standard week (per cent fruit damage 16.65) and gradually reached peak in 39th standard week with per cent fruit damage on weight 56.34. Similar results was noticed by Noth *et al.,* (2011), results indicated that the maximum level of 1.20 *H. armigera* larve per plant in 37th SW in 2005 and 1.0 per plant was observed in 38th SW during second year in okra.

Table 1. Seasonal incidence of fruit borer (*Helicoverpa armigera*, Hubner) against different standard weeks during *kharif*-2015

Standard week	Maximum temperature (^{o}c)	Minimum Temperature (^{o}c)	Relative humidity (%)	Rain fall (mm)	Sunshin hr/day	No.f larvae/10 plants	Fruit infestation number on basis	Fruit infestation on weight basis
34	30.4	22.43	79.35	4.29	6.33	0	0	0
35	31.5	22.71	77.57	7.06	3.9	4.2	6.43	0
36	33.4	22.9	73.75	4.4	7.2	3.65	8.58	16.65
37	28.4	21.9	90.8	13.1	1.7	5.35	15.98	26.63
38	30.4	22.2	75.3	6.2	4.4	5.1	23.67	39.74
39	31.9	22.3	73.5	0.3	7.2	7.5	33.67	56.34
40	31.4	21.1	75.7	4.9	5.8	6.5	30.34	54.53
41	33.4	19.6	62.9	0	7.9	13.08	26.56	47.54
42	32.4	19.1	66.85	0	8.4	7.85	25.4	42.56
43	32.4	18.1	66.45	0	8.9	6.65	24.46	35.46
44	31.4	20.7	71.3	2.6	7.3	6.1	28.57	39.46
45	31.4	17.4	82.1	0	7.3	6.6	22.85	25.53
46	30.8	15.8	69	0	6.7	5.8	18.75	37.43

Table 2. Correlation coefficient (r) of pest population and damage of *Helicoverpa armigera*(Hubner) with prevailing weather parameters

Weather parameters	No. of larvae per 10 plants	Per cent fruit infestation on number basis	Per cent fruit infestation on weight basis
Maximum temperature (°c)	0.456099	0.212683	0.205483
Minimum temperature	-0.39789	-0.3252	-0.2946
Relative humidity (%)	-0.54281	-0.3862	-0.44038
Rain fall (mm)	-0.43932	-0.42426	-0.38933
Sunshin hr/day	0.359544	0.348681	0.323491

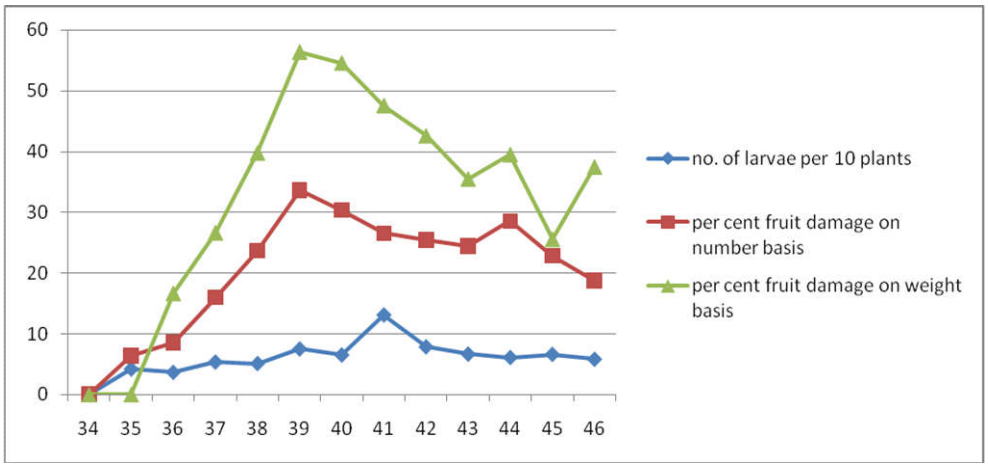

Figure 1. Seasonal incidence of fruit borer *H. armigera* (Hubner) in okra during *kharif* -2015

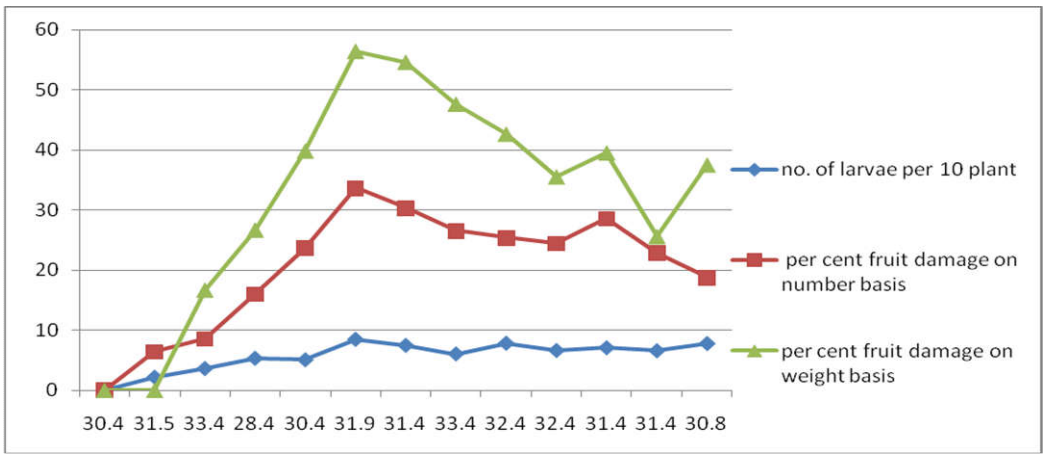

Figure 2. Population dynamics of fruit borer*Helicoverpa armigera* against prevailing maximum temperatures in different standard weeks (from standard week 34 to 46, respectively)

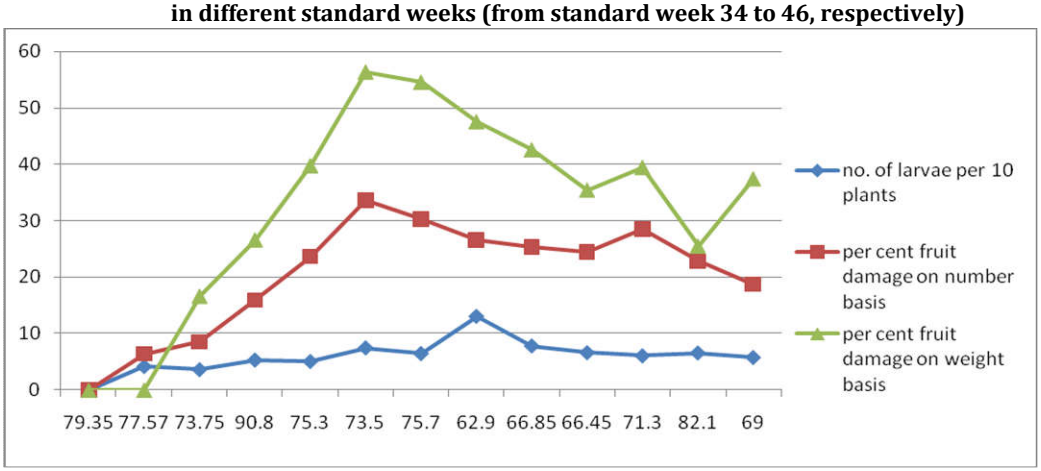

Figure 3. Population dynamics of fruit borer*Helicoverpa armigera* (Hubner) against prevailing relative humidity in different standard weeks (from standard week 34 to 46, respectively)

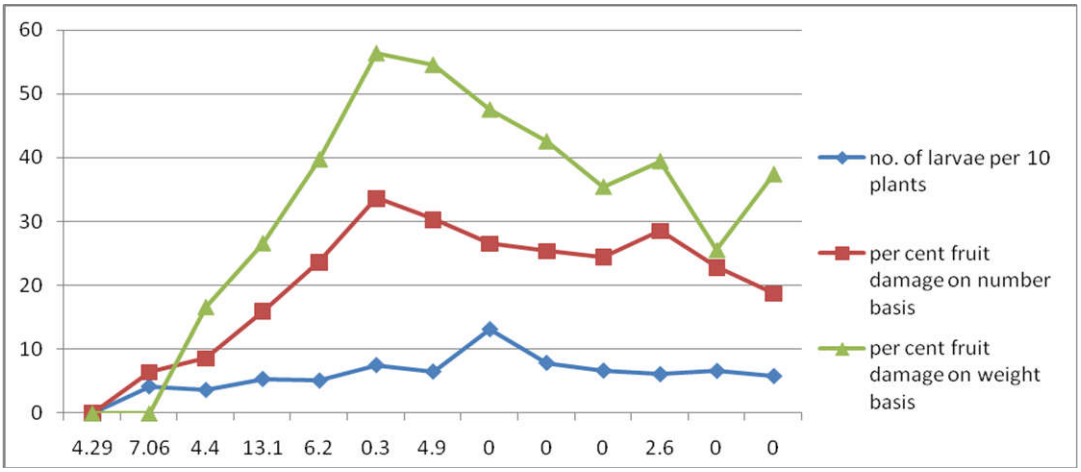

Figure 4. Population dynamics of fruit borer *Helicoverpa armigera* (Hubner) against prevailing rain fall (mm) in different standard weeks (from standard week 34 to 46, respectively)

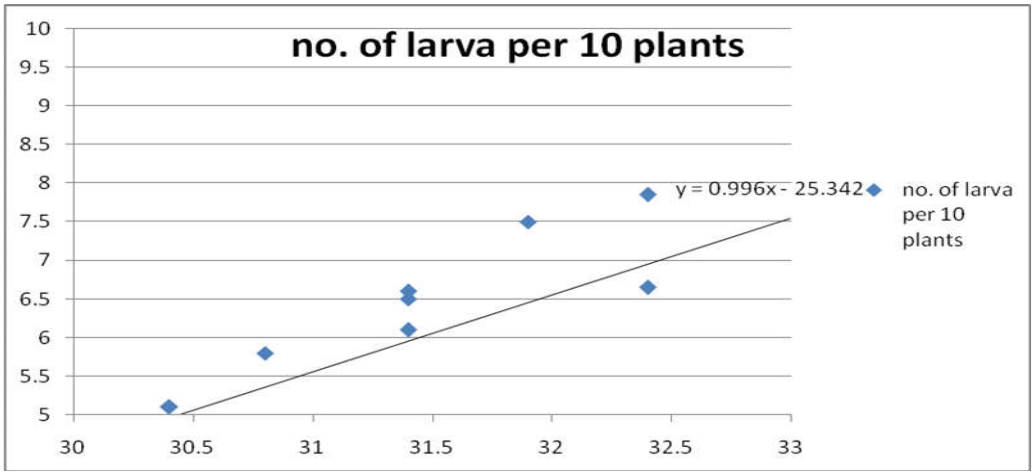

Figure 5. Relationship between larval populations due to *Helicoverpa armigera* and maximum temperature on okra crop. The equation formula is y= 0.996x-25.342.

Larval population was significantly positively correlated with maximum temperature (r=0.4561) and sunshine hours (r=0.3595), and significantly negatively correlated with minimum temperature (-0.3979), relative humidity (-0.5428) and rainfall (-0.4393). Fruit infestation on number was significantly positively correlated with maximum temperature (r=0.2127) and sunshine hours (r=0.3487), and significantly negatively correlated with minimum temperature (r=-0.3252), relative humidity (r=-0.3862) and rainfall (r=-0.4242), whereas fruit damage on weight basis was positively correlated with maximum temperature (r=0.2054) and sunshine hours (r=0.3235), and significantly negatively correlated with minimum temperature (r=-0.2946), relative humidity (r=-0.4403) and rainfall (r=-0.3893). Regression analysis indicates that maximum temperature (69.72) was major factor influence on population dynamics of *H. armigera* with regression equation Y=0.997x-25.342. Similar results were reported by Saini *et al*., (2017) results indicated that *H. armigera* larval population was non significantly positively correlated with temperature, negatively correlated with rain fall and relative humidity, and also revealed that the incidence of fruit borer, *H. armigera* (1.00 larvae per plant) was commenced in the fourth week of August (34 SMW) and touched its peak in the first week (40 SMW) of October (2.80 larvae per plant) at mean atmospheric temperature andrelative humidity during the peak incidence were 26.95 °C and 59.55 %, respectively.Umbarkar *et al.,* (2010) revealed that minimum temperature (r= -0.557) and evening relative humidity (r=-0.583) exhibited highly significant negative correlation with *H. armigera* population. Rest of the weather parameters were nonsignificantly correlated with the pest population.

CONCLUSIONS

The incidence of okra fruit borer *H. armigera* was commenced in the 35th standard week, peak incidence were recorded in 39th standard week, maximum fruit infestation on number and weight basis was recorded in 39th standard week with 33.67 and 56.34 per cent damage, respectively. Maximum larval population was noticed in 41ststandard week with 13.8 larvae per 10 plants. Larval population, fruit

damage on number and weight basis were significantly positively correlated with maximum temperature and non-significantly negatively correlated with minimum temperature, relative humidity and rain fall. Maximum temperature was majorly effecting weather factor.

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REFERENCES

1. Chandel, S.F.,Singh, P.K and Ahmad, R. 2005. Population Dynamics of *Helicoverpa armigera* (Hübner) andCampoletis chloridae on Different Crops. Annals of Plant Protection Science.13 (2): 379-383.
2. Dubey VK, Bhagat KP, Kaushik UK and Yadu YK (1999). Insectpest succession studies on okra. Journal of Applied Zoologist Researches.10 (2): 144-145.
3. Nair, K.K., Ananthakrishnan, A.N., and David, D.V. 1984. General and applied entomology. Tata McGraw Hill Publishing Co. Ltd., New Delhi, India. 589.
4. Nath, L., Prasad, C.S., Tiwari, G.N., and Kumar, A. 2011. Impact of weather parameters on major insect pests of okra prevailing in western Utter Pradesh. Vegetos. 24:152-156.
5. Pareek, L and Bhargava, P. 2003. Effect of abiotic factors on incidence of okra insect pests in semi-arid condition.Proceeding of National Conference on Plant Protection. Pp 22-2
6. Ravi, K.C., Mohan, K.S and Manjunath, T.M. 2005. Relative Abundance of *Helicoverpa armigera* (Lepidoptera: Noctuidae)on Different Host Crops in India and the Role of These Crops asNatural Refuge for *Bacillus thuringiensis* Cotton. Environment Entomology. 34(1): 59-69.
7. Saini, A., Ahir, K.C and Rana, S. 2017. Seasonal Incidence of Fruit Borer (*Helicoverpa armigera* Hubner) InfestingChilli (*Capsicum annum L.*). International Journal of Pure and Applied Bioscience.5 (2):272-276
8. Umbarkar, P.S., Parsana, G.J and Jethva, D.M.2010. Seasonal Incidence of Gram Pod Borer,*Helicoverpa Armigera* (Hubner) On Greengram.Legume Researh. 33 (2): 148 – 149.

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