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Pest Population Dynamics of *Earias vittella* on Okra Varieties as Influenced by Different Sowing Windows

Gaikwad S. D.*, Kharbade S. B., Sthool V. A., Shaikh A. A., Kadam M. B. and Jadhav J. D.

Department of Agricultural Meteorology, Centre for Advanced Faculty Training (CAFT) in Agricultural Meteorology, College of Agriculture, Pune – 411 005 Maharashtra, India

*Corresponding Author E-mail: swati.gaikwad512@gmail.com

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ABSTRACT

An experiment "Effect of weather parameters on growth, yield and insect pest infestation on okra varieties under different sowing windows" was carried out at Faculty of Agriculture Department of Agricultural Meteorology Farm, Centre for Advanced Agricultural Meteorology, College of Agriculture, Pune during kharif seasons of 2014 and 2015.

The infestation activity of Earias vittella (weight basis) noticed during the all sowing windows with the varieties Parbhani kranti (V_1), Arka Anamika (V_2) and Phule Utkarsha (V_3) the incidence of Earias vittella (weight basis) was noticed (0.12%) during first week of August (33^{rd} MW) and reached to its peak infestation (24.76%) during the second week of September (39^{th} MW) during 2014 while initial infestation of the pest was (0.13%) during first week of August (33^{rd} MW) and reached to its peak (23.93%) during the second week of September (39^{th} MW) during 2015, whereas crop sown on 30^{th} MW (S_4) recorded the maximum incidence (0.60 to 28.29%).

Among the okra varieties, higher incidence of Earias vittella was recorded on variety Arka Anamika (V_2) and minimum was recorded on Phule Utkarsha (V_3). Timely sowing on 27^{th} MW (S_1) and 28^{th} MW (S_2) recorded lower incidence of Earias vittella whereas, crop sown delay during 30^{th} MW (S_4) recorded the maximum incidence.

Keywords: *Earias vittella (weight basis), MW, Infestation, Sowing windows.*

INTRODUCTION

Population dynamics of insect pest, study to know the most susceptible stage (s) of the pest provides a very good alternative. In such study, the life table is the most important technique, which provides a summary description of mortality, survivorship and life expectancy for a specified population. It shows organism's mortality (or survival) and reproduction rate (maternal frequency) as a function of age. In nature, such mortality and reproduction rate depends on numerous factors such as temperature, population density, natural enemies, and diseases.

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Life tables are the most important tools in the pest management revealed the most opportune periods and vulnerable stages of the insect species. Series of life tables of the pest increases the understanding about the pest dynamics and mortality factors such as predators, parasitoids and pathogen infection on the pest and we can use major key mortality factor in management of the pest.

The weather parameters which are directly responsible for the crop growth, yield and pest incidence under the climatic variability for the Pune region, Maharashtra, India due to the climate change. The increase in climatic variation associated with weather parameters like uneven rainfall distribution, sudden changes in day and night temperatures, relative humidity during the crop growing season and its impact on pest population dynamics. To avoid the losses caused by the insect pests, various control measures have been designed.

MATERIALS AND METHODS

The field experiment was conducted at Department of Agricultural Meteorology Farm, College of Agriculture, Pune during *kharif* seasons of 2014 and 2015. The experiment was conducted in a split plot design with three replications. The treatments were allotted randomly to each replication by keeping the gross plot size 3.0 m x 2.4 m^2 and net plot size 2.4 m x 2.1 m^2 with 30 x 15 cm spacing.

There were twelve treatment combinations. The treatments comprised of four okra varieties *viz.*, V_1: Parbhani kranti, V_2: Arka Anamika and V_3: Phule Utkarsha as main plot and four sowing windows *viz.*, S_1: 27^{th} MW (2 July-8 July), S_2: 28^{th} MW (9 July – 15 July), S_3: 29^{th} MW (16 July -22 July) and S_4: 30^{th} MW (23 July -29 July) as sub plot treatments.

RESULTS AND DISCUSSION

Seasonal incidence of major pests on okra

The study was conducted during both the years of *kharif* season of 2014 and 2015. During the course of study the incidence of major pests were recorded on okra crop sown at different sowing windows with three varieties, three pests, *viz.,* fruit and shoot borer (weight basis and number basis) were recorded as major pests associated with okra crop.

Population dynamics of *Earias vitella* (Fab.) (weight basis):

The seasonal incidence of okra shoot and fruit borer (*Earias vittella)* was recorded on okra starting from 33^{rd} MW to 48^{th} MW at weekly interval. Okra shoot and fruit borer remained active from vegetative stage to the last picking of fruits. The initial infestation of the pest was noticed (0.12%) during first week of August (33^{rd} MW) and reached to its peak infestation (24.76%) during the second week of September (39^{th} MW) during 2014 while initial infestation of the pest was noticed (23.93%) during the second week of September (39^{th} MW) during 2015.

The results indicated that *Earias vitella* infestation on okra plants commenced during the 1^{st} week of August (33^{rd} MW) that continuously increased till at the end of September (39^{th} MW) on weight basis. The highest per cent fruit infestation occurred in variety Arka Anamika (24.76 and 23.93 %) and on 30^{th} MW (28.19 and 23.56 %) sowing window and the lowest per cent of fruit infestation occurred in variety Phule Utkarsha (20.92 and 20.09 %) sown on 27^{th} MW (24.78 and 23.95 %) sowing window. Similar results reported by Nenavati and Kumar (2013).

Table 1: Per cent fruit damage of *Earias vittella* (weight basis) as influenced weekly weekly by different treatments in 2014

Treatment	33 MW	34 MW	35 MW	36 MW	37 MW	38 MW	39 MW	40 MW	41 MW	42 MW	43 MW	44 MW	45 MW	46 MW	47 MW	48 MW	Mean
A) Varieties																	
V_1 Parbhani Kranti	0.12	1.36	3.76	8.56	14.87	18.45	21.87	15.01	13.97	11.05	8.89	6.32	4.12	2.98	1.11	0.43	8.30
V_2 Arka Anamika	2.01	3.25	5.65	10.45	16.76	22.34	24.76	16.90	15.86	12.94	10.78	8.21	6.01	4.87	3.00	2.00	4.41
V_3 Phule Utkarsha	0.00	0.28	1.81	6.61	12.92	18.50	20.92	13.06	12.02	9.10	6.94	4.37	2.17	1.03	0.80	0.21	6.92
B) Sowing windows																	
S_1-27 MW	0.00	2.87	4.98	8.98	13.98	20.98	24.78	15.98	13.89	9.98	6.98	2.98	1.09	0.23	0.11	0.0	9.12
S_2-28 MW	0.0	0.23	4.10	6.21	10.21	15.21	22.21	26.01	17.21	15.12	11.21	8.21	4.21	2.32	0.46	0.15	10.21
S_3-29 MW	0.81	4.68	6.79	10.79	15.79	22.79	26.59	17.79	15.70	11.79	8.79	4.79	2.90	0.54	0.25	0.01	10.75
S_4 -30 MW	1.32	6.28	8.39	12.39	17.39	24.39	28.19	19.39	17.30	13.39	10.39	6.39	5.60	3.32	1.28	0.39	12.75
Mean	0.53	1.60	3.52	6.69	11.69	16.38	20.39	18.16	17.70	14.88	11.41	8.45	5.68	3.80	2.44	0.53	

Population dynamics of *Earias vitella (Fab.)* (number basis)

The results indicated that *Earias vitella* (Fab.) infestation on okra plants commenced at the third week of August (33rd MW) that continuously increased till 39th MW at the end of November. The highest per cent fruit infestation occurred in variety Arka Anamika (19.81 and 15.85 %) at 39th MW. The lowest per cent shoot infestation occurred in variety Phule Utkarsha (19.81 and 15.85 %) at 39th MW in both the seasons i.e. *kharif* 2014 and 2015 while the highest per cent fruit infestation occurred in 30th MW sowing window (22.55 and 18.04 %) during 42nd MW. The lowest per cent shoot infestation occurred in 27th MW sowing window (19.82 and 15.86 %) at 39th MW in both the seasons i.e. *kharif* 2014 and 2015These findings are similar with the findings of Aarwe et al. (2016) and Singh et al. (2015).

Table: 2 Per cent fruit damage of *Earias vittella* (weight basis) as influenced weekly weekly by different treatments in 2015

Treatment	33 MW	34 MW	35 MW	36 MW	37 MW	38 MW	39 MW	40 MW	41 MW	42 MW	43 MW	44 MW	45 MW	46 MW	47 MW	48 MW	Mean
A) Varieties																	
V_1 Parbhani Kranti	0.20	0.53	2.93	7.73	14.04	17.62	21.04	14.18	13.14	10.22	8.06	5.49	3.29	2.15	0.28	0.0	7.56
V_2 Arka Anamika	1.18	2.42	4.82	9.62	15.93	21.51	23.93	16.07	15.03	12.11	9.95	7.38	5.18	4.04	2.17	1.49	9.55
V_3 Phule Utkarsha	0.13	-0.55	0.98	5.78	12.09	17.67	20.09	12.23	11.19	8.27	6.11	3.54	1.34	0.20	0. 0	0.0	6.19
B) Sowing windows																	
S_1-27 MW	0.18	2.04	4.15	8.15	13.15	20.15	23.95	15.15	13.06	9.15	6.2	2.2	0.3	0.0	0.0	0.0	9.05
S_2-28 MW	0.01	0.56	3.27	5.38	9.38	14.38	21.38	25.18	16.38	14.29	10.4	7.4	3.4	0.5	0.1	0.0	10.14
S_3-29 MW	0.0	0.3	0.62	3.85	5.96	9.96	14.96	21.96	25.76	16.96	14.9	11.0	8.0	4.0	0.5	0.0	10.64
S_4 -30 MW	0.0	0.5	1.25	2.89	5.45	7.56	11.56	16.56	23.56	27.36	18.6	16.5	12.6	9.6	5.6	0.6	12.02
Mean	0.42	1.00	2.80	5.91	10.86	15.55	19.56	17.33	16.87	14.05	10.58	7.62	4.85	3.40	1.70	0.53	

Table 3: Percent fruit damage of *Earias vittella* (number basis) as influenced weekly by different treatments in 2014

Treatment	33 MW	34 MW	35 MW	36 MW	37 MW	38 MW	39 MW	40 MW	41 MW	42 MW	43 MW	44 MW	45 MW	46 MW	47 MW	48 MW	Mean
A) Varieties																	
V_1 Parbhani Kranti	0.10	1.09	3.01	6.85	11.90	14.76	17.50	12.01	11.18	8.84	7.11	5.06	3.30	2.38	0.89	0.34	6.64
V_2 Arka Anamika	1.61	2.60	4.52	8.36	13.41	17.87	19.81	13.52	12.69	10.35	8.62	6.57	4.81	3.90	2.40	1.86	8.31
V_3 Phule Utkarsha	0.00	0.22	1.45	5.29	10.34	14.80	16.74	10.45	9.62	7.28	5.55	3.50	1.74	0.82	0.64	0.17	5.54
B) Sowing windows																	
S_1-27 MW	0.00	2.30	3.98	7.18	11.18	16.78	19.82	12.79	11.11	7.98	5.58	2.38	0.87	0.18	0.00	0.00	7.30
S_2-28 MW	0.00	0.18	3.28	4.97	8.17	12.17	17.77	20.81	13.77	12.10	8.97	6.57	3.37	1.86	0.37	0.00	8.17
S_3-29 MW	0.00	0.00	0.65	3.74	5.43	8.63	12.63	18.23	21.27	14.23	12.56	9.43	7.03	3.83	2.32	0.43	8.60
S_4 -30 MW	0.00	0.00	0.00	1.06	5.02	6.71	9.91	13.91	19.51	22.55	15.51	13.84	10.71	8.31	5.11	0.48	10.2
Mean	0.43	1.28	2.81	5.35	9.35	13.10	16.31	14.53	14.16	11.91	9.13	6.76	4.55	3.85	2.27	0.71	0.43

Table 4: Percent fruit damage of *Earias vittella* (number basis) as influenced weekly by different treatments in 2015

Treatment	33 MW	34 MW	35 MW	36 MW	37 MW	38 MW	39 MW	40 MW	41 MW	42 MW	43 MW	44 MW	45 MW	46 MW	47 MW	48 MW	Mean
A) Varieties																	
V_1 Parbhani Kranti	0.08	0.87	2.41	5.48	9.52	11.81	14.00	9.61	8.94	7.07	5.69	4.04	2.64	1.91	0.71	0.28	5.31
V_2 Arka Anamika	1.29	2.08	3.62	6.69	10.73	14.30	15.85	10.82	10.15	8.28	6.90	5.25	3.85	3.12	1.92	1.48	6.64
V_3 Phule Utkarsha	0.00	0.18	1.16	4.23	8.27	11.84	13.39	8.36	7.69	5.82	4.44	2.80	1.39	0.66	0.51	0.13	4.43
B) Sowing windows																	
S_1-27 MW	0.00	1.84	3.19	5.75	8.95	13.43	15.86	10.23	8.89	6.39	4.47	1.91	0.70	0.00	0.00	0.00	6.28
S_2-28 MW	0.00	0.15	2.62	3.97	6.53	9.73	14.21	16.65	11.02	9.68	7.17	5.25	2.69	1.48	0.00	0.00	7.01
S_3-29 MW	0.00	0.00	0.52	3.00	4.35	6.91	10.11	14.59	17.02	11.39	10.05	7.55	5.63	3.07	1.86	0.00	7.38
S_4 -30 MW	0.00	0.00	0.00	0.84	4.02	5.37	7.93	11.13	15.61	18.04	12.41	11.07	8.57	6.65	4.09	0.38	8.16
Mean	0.34	1.02	2.25	4.28	7.48	10.48	13.05	11.63	11.33	9.52	7.30	5.41	3.64	3.08	1.82	0.57	

CONCLUSION

The incidence of shoot and fruit borer was recorded on all okra varieties during the year 2014 and 2015 across all sowing windows, higher shoot and fruit borer infestation on weight basis ranged between (24.76 and 21.04 per cent) on var. Arka Anamika. This was followed by var. Parbhani Kranti (21.87 and 21.04 per cent). The lowest shoot and fruit borer incidence was noticed on var. Phule Utkarsha (20.92 and 20.09 per cent). while the highest per cent fruit infestation occurred in 30th MW sowing window (22.55 and 18.04 per cent) while lowest per cent shoot and fruit borer infestation occurred in 27th MW sowing window (19.82 and 15.86 per cent) while the highest per cent fruit infestation occurred in variety Arka Anamika (19.81 and 15.85 %) and lowest per cent shoot infestation occurred in variety Phule Utkarsha (19.81 and 15.85 %) in both the seasons i.e. *kharif* 2014 and 2015 while the highest per cent fruit infestation occurred in 30th MW sowing window (22.55 and 18.04 %) and lowest per cent shoot

infestation occurred in 27th MW sowing window (19.82 and 15.86 %).

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