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MM Dubale

Department of Agril.
Entomology, College of
Agriculture, Dr. Balasaheb
Sawant Konkan Krishi
Vidyapeeth, Dapoli, Ratnagiri,
Maharashtra, India

VN Jalgaonkar

Department of Agril.
Entomology, College of
Agriculture, Dr. Balasaheb
Sawant Konkan Krishi
Vidyapeeth, Dapoli, Ratnagiri,
Maharashtra, India

KV Naik

Department of Agril.
Entomology, College of
Agriculture, Dr. Balasaheb
Sawant Konkan Krishi
Vidyapeeth, Dapoli, Ratnagiri,
Maharashtra, India

AY Munj

Department of Agril.
Entomology, College of
Agriculture, Dr. Balasaheb
Sawant Konkan Krishi
Vidyapeeth, Dapoli, Ratnagiri,
Maharashtra, India

GM Golvankar

Department of Agril.
Entomology, College of
Agriculture, Dr. Balasaheb
Sawant Konkan Krishi
Vidyapeeth, Dapoli, Ratnagiri,
Maharashtra, India

Correspondence

MM Dubale

Department of Agril.
Entomology, College of
Agriculture, Dr. Balasaheb
Sawant Konkan Krishi
Vidyapeeth, Dapoli, Ratnagiri,
Maharashtra, India

Studies on incidence of fruit flies in relation to weather parameters on ridge gourd in Konkan region

MM Dubale, VN Jalgaonkar, KV Naik, AY Munj and GM Golvankar

Abstract

The present experiment was carried out on studies on incidence of fruit flies in relation to weather parameters on ridge gourd in Konkan region during *kharif* season of 2017 at Central Experimental Station, Wakawali, Dist. Ratnagiri. The results on seasonal incidence revealed that there were marked differences in infestation of fruit flies. The infestation of fruit flies was started after fruit setting in the third week of August (33th SMW). Minimum (16.67 ± 18.25) per cent infestation of fruit flies was recorded in 36th SMW (03 - 09 September), while maximum (50.00 ± 18.25) per cent infestation was observed during 40th SMW (01 - 06 October). The data on correlation between per cent infestation of fruit flies with different meteorological parameters showed that the significant negative correlation ($r = -0.720$) with morning relative humidity, while remaining various meteorological parameters were found to be non-significant.

Keywords: Seasonal incidence, weather parameters, correlation, Fruit flies

Introduction

India is producing around 175 million tonnes vegetables annually from an area of around 10 million hectares in the world and second largest producer of vegetables (Anon., 2017)^[2]. Ridge gourd is cultivated in approximately 24,800 acres in India with total production about 3, 16,925 tonnes (Anon., 2015)^[1]. Maharashtra produced vegetables with annual production of 103.60 lakh tonnes from an area of 6.93 lakh ha (Anon., 2017)^[2].

Ridge gourd (*Luffa acutangula* L.) is considered to be old species with its native to the tropical Africa and South East Asian region including India. It is widely grown in tropical and subtropical parts of the country. It belongs to family Cucurbitaceae and genus *Luffa*. It is one of the important crops belonging to cucurbits and locally called as *Shiral*, *Dodka* (Marathi), *Turai* (Gujrat) and *Koshataki* (Sanskrit).

Cucurbits are attacked by several pests which affect the quality and quantity of produce adversely. Most of the insect-pests cause damage at any stage of plant growth, but some of them are serious at seedling stage *viz.*, red pumpkin beetle, leaf miner, flea beetle, while fruit fly appears at fruiting stage (at crop maturity) (Ram *et al.*, 2009)^[8].

Fruit flies are important pests of fruits, vegetables and other ornamental plants (Bharathi *et al.* 2004)^[4]. Extend of yield loss caused by the pest to cucurbitaceous vegetables ranging from 30- 100 per cent depending upon cucurbit species and the season in different parts of the world as noted by Dhillon *et al.* (2005)^[6]. It is very much difficult to manage the pest simply through the application of chemical pesticides due to their peculiar biological features. Again, it is also established that before developing insect pest management programme for a specific agro-ecosystem, it is necessary to have basic information on the incidence of the pest in relation to weather parameters which help in determining appropriate time of action and suitable method of control. Monitoring pest population round the year is one of the most important basic information in formulating IPM concept for sustainable agriculture. In view to determine the appropriate time of action and suitable management practices to be adopted regular crop pest surveillance and monitoring needs to be developed. Keeping these facts in mind, study was carried out on periodicity of occurrence of melon fruit fly in relation to various abiotic factors as a help to evolve an effective and economical strategy of management.

Materials and methods

The field experiment was carried out at Central Experiment Station, Wakawali, from June 2017 to September 2017. The details of experiment are given in below.

Details of the field experiment

- 1 Size of plot : 10 m x 10 m (100 m²)
- 2 Method of planting : On small hills
- 3 Spacing : 1.50 m x 0.50 m
- 4 Cultivar : Konkani Harita
- 5 Date of sowing : 12th June, 2017

Method of recording observations

The experimental plot was kept unsprayed throughout the crop season. The observations were recorded as soon as the incidence is noticed. Twenty vines were selected randomly and marked permanently to record the observations. The observations were recorded at weekly interval throughout the

crop season. The damaged and healthy fruits were recorded at each picking for recording fruit infestation by fruit flies by following formula. The mean per cent infestation was taken and standard deviation was worked out.

$$\text{Per cent fruit infestation} = \frac{\text{No. of infested fruits}}{\text{Total no. of fruits}} \times 100$$

The observations of fruit fly infesting ridge gourd were recorded at weekly interval as per standard meteorological week. Data on mean per cent incidence of pest infesting ridge gourd and different weather parameters were correlated.

Results and Discussion

Seasonal incidence of fruit flies infesting ridge gourd

The data on seasonal incidence of fruit flies infesting ridge gourd are presented in Table 1 and graphically represented in Fig. 1.

Table 1: Mean per cent infestation of fruit flies infesting ridge gourd in relation to weather parameters

SMW No.	Date of week	Temperature (°C)		Relative Humidity (%)		BSS*	Rainfall (mm)	Mean per cent infestation
		T max	T min	RH I	RH II			
26	25/06/17-01/07/2017	29.46	24.09	95.86	92.71	0.59	577.6	0
27	02/07/2017-08/07/2017	29.67	23.87	94.71	80.43	4.09	244.6	0
28	09/07/2017-15/07/2017	28.44	23.71	95.14	82.86	2.26	161.3	0
29	16/07/2017-22/07/3017	27.51	23.74	94.43	92.86	0.82	516.9	0
30	23/07/2017-29/07/2017	28.69	24.31	94.86	86.86	1.06	138.6	0
31	30/07/2017-05/08/2017	29.54	23.83	97.00	85.57	4.23	116.8	0
32	06/08/2017-12/08/2017	29.54	24.00	96.14	82.14	2.81	113.1	0
33	13/08/2017-19/08/2017	29.83	23.97	96.43	80.43	2.87	43.2	33.33
34	20/08/2017-26/08/2017	29.6	23.51	97.57	85.29	3.01	151.6	37.5
35	27/08/2017-02/09/2017	29.06	23.54	97.00	94.80	2.70	246.3	27.27
36	03/09/2017-9/09/2017	31.31	23.43	98.16	93.82	4.35	71.6	16.67
37	10/09/2017-16/09/2017	31.35	24.20	97.14	84.18	3.32	97.3	20.83
38	17/09/2017-23/09/2017	26.54	22.83	97.00	94.10	0.79	514.9	31.57
39	24/09/2017-30/09/2017	29.89	23.23	97.30	88.00	2.60	103.5	40
40	01/10/2017-06/10/2017	30.43	23.49	95.10	84.18	3.90	24.2	50
SD								±18.25

*BSS: Bright Sunshine Hours

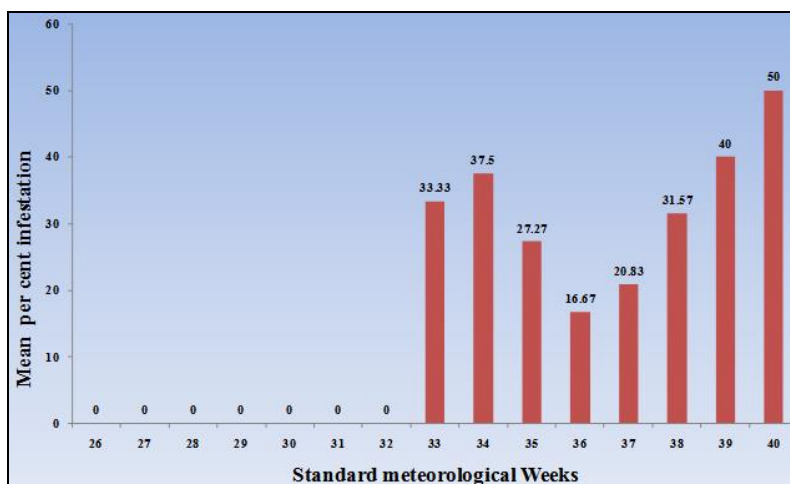


Fig 1: Seasonal incidence of fruit flies infesting ridge gourd

The infestation of fruit flies was started after fruit setting in the third week of August (33rd SMW). During cropping season, the infestation varied from 16.67 to 50.00 per cent on number basis. Minimum per cent fruit flies infestation (16.67 ± 18.25) was recorded in 36th SMW (03 - 09 September), while maximum (50.00 ± 18.25) per cent infestation was recorded during 40th SMW (01 - 06 October). It was evident from the results that fruit flies infestation started (33.33%)

during the 33rd SMW (13 - 19 August), further increased (37.50%) up to the 34th SMW (20 - 26 August) and again infestation declined (16.67%) up to 36th SMW (03 - 09 September), after that infestation gradually increased and reaching peak (50%) during the 40th SMW (01 - 06 October). The present findings are in accordance with Banerji *et al.* (2005) [3]. They reported that the activity of melon fruit fly was observed during first week of August, however, the

highest incidence was noticed during middle of October and then infestation started declining at Kalyani, West Bengal during *Kharif*.

Similarly, Raghuvanshi *et al.* (2012) [7] revealed that during 2003–2004, the peak damage occurred in the *kharif* crop. More than 40 per cent mean fruit damage was recorded from 35 SW to 48 SW with the maximum damage (62.70%) in the 45 SW.

Correlation between mean per cent fruit infestation of fruit flies infesting ridge gourd and weather parameters

Data on correlation coefficient of mean infestation of fruit flies in relation to different weather parameters are presented in Table 2.

Table 2: Correlation coefficient of mean per cent fruit infestation of fruit flies infesting ridge gourd in relation to different weather parameters

Climatic parameters	Correlation coefficient (<i>r</i>)
Maximum temperature (T_{max})	-0.217
Minimum temperature (T_{min})	-0.265
Morning relative humidity (RH I)	-0.720*
Evening relative humidity (RH II)	-0.426
Bright Sun Shine Hours (BSS)	-0.113
Rainfall	-0.133
*Significant at 5 per cent level	$r = 0.707$

During cropping season, the data on correlation between mean per cent infestation of fruit flies exhibited significant negative correlation ($r = -0.720$) with morning relative humidity. While remaining meteorological parameters *viz.*, maximum temperature, minimum temperature, evening relative humidity, Bright Sunshine Hours (BSS) and rainfall were found to be non-significant. The maximum temperature, minimum temperature, evening relative humidity and Bright Sunshine hours (BSS) and rainfall had negative correlation with infestation of fruit flies ($r = -0.217, -0.265, -0.426, -0.113$ and -0.133 , respectively).

The present findings are more or less in conformity with Datkar (2016) [5] and the results revealed that the morning relative humidity, BSS and evapotranspiration showed positive correlation with fruit fly infestation. The other parameters like evening relative humidity, wind speed, rainfall and rainy days showed significantly negative correlation with fruit fly infestation. This indicated that when this parameter increases, the fruit fly infestation decreases.

Conclusion

From the present investigation, it can be concluded that the infestation of fruit flies was started after fruit setting in the third week of August (33th SMW). Minimum (16.67 ± 18.25) per cent infestation of fruit flies was recorded in 36th SMW (03 - 09 September), while maximum (50.00 ± 18.25) per cent infestation was observed during 40th SMW (01 - 06 October). The data on correlation between per cent infestation of fruit flies with different meteorological parameters showed that the significant negative correlation ($r = -0.720$) with morning relative humidity, while remaining various meteorological parameters were found to be non-significant.

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