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Effect of meteorological parameters on abundance of flea beetle infesting ridge gourd

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Abstract
The present study was carried out on the effect of meteorological parameters on the abundance of flea beetle infesting ridge gourd during *kharif* season of 2017 at the Central Experimental Station, Wakawali, Dist. Ratnagiri. The results revealed that there were marked differences in infestation of flea beetle. The infestation of flea beetle (0.24 ± 6.67) was started in the 26th SMW (25 June - 01 July). Minimum flea beetle infestation (0.24 ± 6.67) was recorded in 26th SMW (25 June - 01 July), while maximum (27.56 ± 6.67) infestation was recorded during 40th SMW (01 - 07 October). The data on correlation between mean infestation of flea beetle with different meteorological parameters showed that the various meteorological parameters found to be non significant.

Keywords: Weather parameters, correlation, seasonal activity, flea beetle, ridge gourd

Introduction
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).
India is the second largest producer of vegetables in the world, after china, by producing around 175 million tonnes vegetables annually from an area of around 10 million hectors (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].
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 is serious at seedling stage *viz*., red pumpkin beetle, leaf miner, flea beetle, while fruit fly appears at fruiting stage (Ram *et al*. 2009) [5].
Damage caused by cucurbit pests depends mostly on the prevailing climatic conditions and the diversity of hosts in a particular agro ecosystem. Therefore, it is necessary to study the seasonal incidence of the pest species which helps in determining appropriate time of action and suitable method of management (Vignesh and Viraktamath, 2015) [6]. Though the crop is economically important, the information on the flea beetle and seasonal incidence and its correlation with weather factors are very much lacking particularly in Konkan region in Maharashtra. Hence, the present investigations were undertaken on effect of meteorological parameters on the abundance of flea beetle infesting ridge gourd.

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

Details of the field experiment
1.	Size of plot	:	10 m x 10 m (100 m^2)
2.	Method of planting	:	On small hills
3.	Spacing	:	1.50 m × 0.50 m
4.	Cultivar	:	Konkan 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 shot holes made by flea beetle were counted from top, middle and bottom leaf of vine for flea beetle damage. The average pest population per three leaves per plant was taken and standard deviation was worked out.

The observation of flea beetle infesting ridge gourd was recorded at weekly interval as per standard meteorological week. Data on incidence of mean infestation of flea beetle on ridge gourd and different weather parameters were correlated.

Results and Discussion

Seasonal incidence of flea beetle infesting ridge gourd

The data on seasonal incidence of flea beetle infesting ridge gourd are presented in Table 1 and graphically shown in Fig. 1.

Table 1: Mean infestation of flea beetle infesting ridge gourd in relation to weather parameters

SMW No.	Date of week	Temperature (^{0}C)		Relative Humidity (%)		BSS*	Rainfall (mm)	Mean infestation
		Tmax	Tmin	RH I	RH II			
26	25/06/17-01/07/2017	29.46	24.09	95.86	92.71	0.59	577.6	0.24
27	02/07/2017-08/07/2017	29.67	23.87	94.71	80.43	4.09	244.6	1.76
28	09/07/2017-15/07/2017	28.44	23.71	95.14	82.86	2.26	161.3	3.80
29	16/07/2017-22/07/3017	27.51	23.74	94.43	92.86	0.82	516.9	10.48
30	23/07/2017-29/07/2017	28.69	24.31	94.86	86.86	1.06	138.6	10.48
31	30/07/2017-05/08/2017	29.54	23.83	97.00	85.57	4.23	116.8	9.68
32	06/08/2017-12/08/2017	29.54	24.00	96.14	82.14	2.81	113.1	9.32
33	13/08/2017-19/08/2017	29.83	23.97	96.43	80.43	2.87	43.2	9.24
34	20/08/2017-26/08/2017	29.60	23.51	97.57	85.29	3.01	151.6	8.08
35	27/08/2017-02/09/2017	29.06	23.54	97.00	94.80	2.70	246.3	7.72
36	03/09/2017-9/09/2017	31.31	23.43	98.16	93.82	4.35	71.6	11.40
37	10/09/2017-16/09/2017	31.35	24.20	97.14	84.18	3.32	97.3	13.68
38	17/09/2017-23/09/2017	26.54	22.83	97.00	94.10	0.79	514.9	13.80
39	24/09/2017-30/09/2017	29.89	23.23	97.30	88.00	2.60	103.5	18.68
40	01/10/2017-07/10/2017	30.43	23.49	95.10	84.18	3.90	24.2	27.56
SD								**±6.67**

*BSS: Bright Sunshine Hours

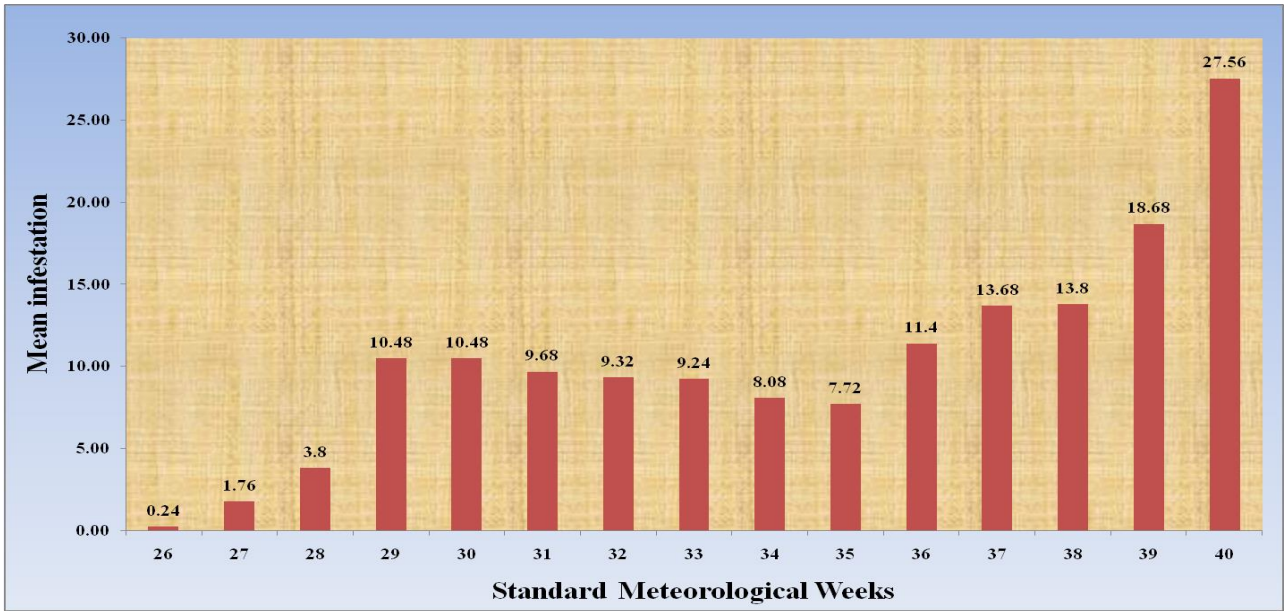

Fig 1: Seasonal incidence of flea beetle infesting ridge gourd

The infestation of flea beetle (0.24 ± 6.67) was started in the 26th SMW (25 June - 01 July). During the cropping season, the infestation was in the range of 0.24 to 27.56 shot holes per three leaves per plant. Minimum flea beetle infestation (0.24 ± 6.67) was recorded in 26th SMW (25 June - 01 July), while maximum (27.56 ± 6.67) infestation was recorded during 40th SMW (01 - 07 October). Flea beetle infestation gradually increased (10.48) up to the 29th SMW (16 - 22 July), then remains same up to the 30th SMW (23 - 29 July). Further infestation decreased (7.72) up to 35th SMW (27 August - 2 September) and then gradually increased till harvest and reaching peak (27.56 shot holes per three leaves per plant) during 40th SMW (01 - 07 October).

The present findings are more or less in conformity with the results of Billur (2017) [3]. He noticed that the number of shot holes per leaf due to flea beetle on cucumber were maximum in 2nd week of August, gradually decreased from week 2 (1st week of August) to week 5 (4th week of August) and then pest was observed to increase gradually in week 6 (5th week of September) to week 8 (2nd week of September). Overall number of shot holes per leaf in eight weeks was in the range of 2.91 to 7.88.

Correlation between mean infestation of flea beetle infesting ridge gourd and weather parameters

Data on correlation coefficient of mean infestation of flea beetle in relation to different weather parameters are given in Table 2.

Table 2: Correlation coefficient of mean infestation of flea beetle infesting ridge gourd in relation to different weather parameters

Climatic parameters	Correlation coefficient (*r*)
Maximum temperature (T_{max})	0.196
Minimum temperature (T_{min})	-0.394
Morning relative humidity (RH I)	0.136
Evening relative humidity (RH II)	0.011
Bright Sun Shine Hours (BSS)	0.222
Rainfall	-0.404

*Significant at 5 per cent level *r*= 0.514

The data on correlation between mean infestation of flea beetle infesting ridge gourd and different meteorological parameters revealed that all the meteorological parameters viz., maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, Bright Sun Shine Hours (BSS) and rainfall were found non-significant. The maximum temperature, morning relative humidity, evening relative humidity, Bright Sun Shine Hours (BSS) had positive correlation with a mean infestation of flea beetle (r = 0.196, 0.136, 0.011 and 0.222, respectively). While, minimum temperature and rainfall had negative correlation with flea beetle infestation (r = -0.394 and -0.404, respectively)

The present results are more or less in conformity with the results of Ghosh (2014) [4]. He revealed that the flea beetle population showed a positive correlation (p=0.05) with average temperature, relative humidity, whereas significant negative correlation with rainfall.

Conclusion

From the present study, it can be concluded that the infestation of flea beetle (0.24 ± 6.67) was started in the 26th SMW (25 June - 01 July). Minimum flea beetle infestation (0.24 ± 6.67) was recorded in 26th SMW (25 June - 01 July), while maximum (27.56 ± 6.67) infestation was recorded during 40th SMW (01 - 07 October). The data on the correlation between mean infestations of flea beetle with different meteorological parameters showed that the various meteorological parameters found to be non-significant.

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