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Influence of Weather Parameters on Pest of Okra in Parbhani Kranti Variety

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A B S T R A C T

The study on influence of weather parameters on pest of okra in Parbhani Kranti variety showed that the peak period of incidence of *Earias vitella* was observed during 15th MW (45 per cent), whitefly was during 21st MW (25 whiteflies / 3 leaves) and Jassid was observed during 21st MW (20 Jassids / 3 leaves). The correlation of *Earias vitella* with weather parameters maximum and minimum temperature, evaporation and wind velocity was positively significant and morning and evening relative humidity was negatively significant but rainfall, rainfall and bright sunshine hours were positive non-significant. The correlation of whitefly with weather parameters maximum and minimum temperature and evaporation was positively significant and morning and evening relative humidity was negatively significant but bright sunshine hours was non significant. The correlation of jassid with weather parameters maximum and minimum temperature, evaporation and wind velocity was positively significant and morning relative humidity negatively significant but bright sunshine hours and rainfall were non significant.

Introduction

Okra (*Abelmoschus esculentus* L.) is a warm season annual crop of the family *malvaceae* originated in South Africa and is one of the most common and popular vegetable grown in tropical and subtropical regions in India. It is cultivated throughout the year except one or two cold months due to favorable climatic conditions for its cultivation. Okra is cultivated particularly in states of Uttar Pradesh, Madhya Pradesh, Karnataka and Maharashtra. In India, it is grown in almost all parts, mainly in rainy and summer season. In 2011-12 total area under okra in India was 432.00 thousand hectares with annual production of 4528 MT in Maharashtra. It is cultivated on an area of 27.30 thousand hectares with annual production of 175.5 thousand tones (Anonymous, 2011).

The meteorological parameters play an important role in deciding the success or failure of the crop, because these factors strongly influence the physiological expression of genetic potential of the crops. It is well known that yield from any given crop or variety depends on the availability of certain optimum condition of solar radiation, temperature, heat units, soil moisture, relative

humidity etc. during different stages of crop growth.

The pest problem in okra is more or less similar to that of cotton crop. It is usually attacked by sucking pests right from the early seedling stage to last fruit harvest. The losses in the yield of okra by fruit borer were 69.0 per cent (Rawat and Sahu, 1973) reported that losses in okra due to leaf hopper and fruit borer were 50 to 52 and 49 to 74 percent respectively. The losses in fruit yield of okra by *Earias spp*. Were Found to be lowest (22.79 percent) in crop sown in July and maximum (50.58 per cent) in crop sown in may (Brar *et al.*, 1994). The maximum damage by *Earias spp*. to the fruit and buds of okra was reported to be 67.7 and 52.2 per cent in the late October and 54.04 percent net yield loss of okra due to pest in summer (Krishnaih, 1980). Hence study on Influence of Weather Parameters on Pest of Okra in Parbhani kranti variety was undertaken which would give an idea about peak period of their activity and may be helpful in developing pest management strategy.

Materials and Methods

The investigation was carried out during summer season 2011-2012, on the experimental farm, Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, (19^{o} 16'N latitude, 76^{o} 47'E longitude and 409 m MSL) with an objectives to find out influence of weather parameters on pest of okra. The experiment was conducted under unprotected condition which was non replicated. Observations were recorded on population counts of *Earias vitella*, Whitefly and jassids from sowing to harvest at weekly interval with five randomly selected plants without employing any plant protection measure. The different weather parameters recorded were collected from central agromet observatory located at VNMKV, Parbhani. Simple correlation and regression of weather parameters *viz.*, rainfall (RF), rainy days (RD), maximum and minimum temperature (T_{max} and T_{min}), relative humidity during morning and evening (RH-I and RH-II), Evaporation (EVP), bright sunshine hours (BSS) and wind velocity (WV) with *Earias vitella*, Whitefly and jassids was worked out.

Results and Discussion

Population dynamics of *Earias vitella*

The data on population dynamics of *Earias vitella* (Table 1) revealed that the incidence of pest was observed in 10th MW of the year. The range of attack was 0-45 per cent and the meteorological condition at this time were RF (0.0), T_{max} (37.0 ^{0}C), T_{min} (17.2 ^{0}C), relative humidity (RH-I 71 and RH-II 20 per cent). The highest incidence was recorded in 15th MW (45 per cent) when crop was up to 52-55 days and meteorological conditions were RD (01), T_{max} (38.4^{0}C), T_{min} (23.3^{0}C), relative humidity (RH-I 63 and RH-II 23 per cent). These findings are in argument with Dhamdhere *et al* (1985) and Balsubramimyn *et al* (1982) who also reported that the damage by *Earias vitella* increased correspondingly with advancing crop stage and that the maximum damage was found around the mean temperature of 30^{0}C with lower humidity.

Population dynamics of whiteflies

The data on population dynamics of whiteflies (Table 1) revealed that the incidence of pest observed from sowing to harvesting period. The incidence of whiteflies observed in 10th MW in which the weather parameters were RF (0.0 mm) T_{max} (37.0 ^{0}C), T_{min} (17.2 ^{0}C), relative humidity (RH-I 71 and RH-II 20 per cent) The maximum incidence was recording at 21st MW i.e., 25 whiteflies / 3 leaves at this time weather parameters were RF (0.7 mm), T

$_{max}$ (40.7 ^{0}C), T_{min} (27.0^{0}C), relative humidity (RH-I 55 and RH-II 24 per cent) and BSS (10.6 hrs). The present finding regarding peak incidence of whitefly are discussed here with those reported earlier by Daware *et al* 2003 that the first appearance of whitefly from first week of August (31st MW) and peak in first week of October to second week of November (40th to 46th MW). Mohapatra (2008) reported that the peak population of *B. tabaci* attained during 44th MW (Oct. 29 to Nov. 04).

Population dynamics of jassid

The data on population dynamic of jassid is presented in Table 1 revealed that the incidence of pest was observed from sowing to the harvesting period. The incidence of pest observed in 9th MW (2 jassids / 3 leaves) when weather parameters were RF (0.0 mm), T_{max} (33.1^{0}C), T_{min} (17.5^{0}C), Humidity (RH I 74, RH II 34 per cent) and BSS (9.0 hrs). The highest incidence of jassid was in the MW 21st when RF (0.7 mm), T_{max} (40.7^{0}C), T_{min} (27.0^{0}C), relative humidity (RH-I 55 and RH-II 24 per cent) and BSS (10.6 hrs) The present findings are in agreement with Hedge *et al*, (2004) noticed the incidence of jassid during 2nd fortnight of August and peaked during the first fortnight of September and declined later.

Simple correlation and regression between weather parameters and *Earias vitella* on okra

The data (Table 2) showed that the correlation of *Earias vitella* with weather parameters T_{max} (r = 0.753**), T_{min} (r = 0.689**), EVP (r = 0.707**), WV (r = 0.543*) were positively significant and relative humidity RH-I and RH-II were negatively significant but RF and BSS were non significant.

The simple regression was worked out between weather parameters and incidence of *Earias vitella* with regression coefficient (b) and constant (a). The regression equations were Y = 77.60 – 0.9194x, Y = 45.55 – 1.060x which indicated that for every unit increase in RH-I and RH-II decrease *Earias vitell*a by 0.9194 and 1.060 respectively. Also Y = -11.51 + 3.594x, Y = -24.69 + 2.260x, Y = -19.88 + 4.564x, Y = -6.851 + 5.384x which indicated that every unit increase in T_{max}, T_{min}, EVP and WV increased *Earias vitella* by 3.594, 2.260, 4.564 and 5.384 respectively. Similar results were observed by Gupta *et al.,* (1998).

Simple correlation and regression between weather parameters and whitefly on okra

The data presented in Table 2 showed that correlation of whiteflies population on okra with weather parameters, T_{max} (r = 0.880**), T_{min} (r = 0.634**), EVP (r = 0.847**), WV (r = 0.579*) was positive and significant. Relative humidity RH-I (r = -0.767**) and RH-II (r = -0.695**) were negatively significant. The association of whitefly population with RF and BSS was positive non significant.

The simple regression was worked out between weather parameters and incidence of whitefly population along with the regression coefficient (b) and constant (a) their equation were set up. The regression equation were Y = 52.45-0.6167x, Y = 34.32 -0.8684x which indicated that for every unit increase in relative humidity RH-I and RH-II decreased whitefly by 0.6167 and 0.8684, respectively. Also Y = -79.17 + 2.472x, Y = -10.03 + 1.225x, Y = -14.42 + 3.219x, Y = -2.930 + 3.381x which indicated that every unit decrease in T_{max}, T_{min}, EVP and WV decreased by 2.472, 1.225, 3.219, 3.381 respectively. Similar results were observed by Dhaka *et al.,* (2008), they reported that the T_{max} had positive significant and RH-II was negative significant effect on whitefly population.

Table.1 Seasonal abundance of *Earias vitella*, whitefly and jassid on Okra

MW	Rainfall (mm)	Rainy day	Temperature (°C)		Humidity (%)		EVP (mm)	BSS (hrs)	W. V. (Kmph)	Damage by *Earias Vitella* (%)	No of White Flies /3 leaves	No of Jassids /3 leaves
			Max.	Min.	RH-I	RH-II						
8	0.0	0.0	31.6	15.7	72	36	5.9	9.2	4.7	00	00	00
9	0.0	0.0	33.1	17.5	74	34	6.0	9.0	4.1	00	00	02
10	0.0	0.0	37.0	17.2	71	20	7.6	10.5	3.7	05	06	04
11	0.0	0.0	36.5	14.0	69	19	7.5	11.0	4.3	08	14	05
12	1.0	0.0	38.2	18.6	47	14	8.4	10.7	4.2	20	21	06
13	0.7	0.0	38.5	17.1	69	13	8.4	10.7	4.4	22	20	07
14	0.0	0.0	38.1	19.8	54	17	9.3	10.8	6.3	40	16	08
15	18.6	1.0	38.4	22.3	63	23	8.7	10.3	4.6	45	18	07
16	4.2	1.0	39.3	24.0	64	24	9.0	10.7	6.0	26	09	03
17	0.6	0.0	39.4	21.6	55	19	10.5	10.6	5.2	30	20	12
18	15.2	2.0	40.5	22.8	57	20	10.8	10.9	6.2	22	19	06
19	0.5	0.0	41.2	24.4	42	16	11.7	9.5	6.7	32	21	13
20	0.0	0.0	42.0	26.7	45	17	12.4	8.2	6.3	35	24	18
21	0.7	0.0	40.7	27.0	55	24	12.0	10.6	8.5	30	25	20
22	3.0	1.0	41.3	26.9	56	25	12.3	9.2	7.6	28	23	19

Table.2 Simple correlation and regression of weather parameter with pest of Okra

Parameter	*Earias vitella*			Whitefly			Jassids		
	Intercept (a)	Slope (b)	'r' value	Intercept (a)	Slope (b)	'r' value	Intercept (a)	Slope (b)	'r' value
RF	20.13	0.9224	0.383	15.07	0.2220	0.155	9.017	-0.1182	-0.109
RD	21.07	5.375	0.237	15.95	1.750	0.131	8.812	-0.4375	-0.043
T_{max}	-11.51	3.594	0.753**	-79.17	2.472	0.880**	-55.78	1.679	0.780**
T_{min}	-24.69	2.260	0.689**	-10.03	1.225	0.634**	-16.16	1.180	0.717**
RH-I	77.60	-0.9194	-0.673**	52.45	-0.6167	-0.767**	33.32	-0.4141	-0.672**
RH-II	45.55	-1.060	-0.499**	34.32	-0.8684	-0.695**	14.92	-0.292	0.305
EVP	-19.88	4.564	0.707**	-14.42	3.219	0.847**	-15.99	2.632	0.904**
BSS	8.843	1.385	0.086	3.875	1.171	0.123	29.16	-2.024	-0.277
WV	-6.851	5.384	0.543*	-2.930	3.381	0.579*	-10.69	3.507	0.784**
									N=15

Simple correlation and regression between weather parameters and Jassid on okra

The data on correlation coefficient showed that the correlation of jassid with weather parameters T_{max} (r = 0.780**), T_{min} (r = 0.717**), EVP (0.904**) and WV (0.784**) were positively significant and RH-I was negatively significant but BSS and RF were non significant.

The regression equations on okra were Y = 33.32 – 0.4141x which indicated that for every unit increase in morning relative humidity decreased Jassid attack by 0.4141. Also Y = -55.78 + 1.679x, Y = -16.16 + 1.180x, Y = -15.99 + 2.632x, Y = -10.69 + 3.507x which indicated that every unit increased in T_{max}, T_{min}, EVP and WV increased incidence of jassid by 1.679, 1.180, 2.632 and 3.507 respectively. Similar result were reported by Patel *et al.*, (1997) that significant positive relationship was observed among *Amrasca biguttulla* population level and maximum temperature (r = 0.82) as well as hours of bright sunshine (r = 0.82). The population of *Amrasca biguttulla* was increased during monsoon when temperature remained around 37.0^0C along with at least 10 hours of bright sunshine.

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References

Anonymous. (2011). Economic survey of Indi a (2010-11) www.India.org.in.

Balasubramanian, G, Balasubramanian, M. and Khulandikula, R. 1982. Seasonal incidence of bollworms on cotton. *Madras Agril. J*., 69: 124-125

Brar, K.S.; Arora, S.K. and Ghai, T.R. (1994). Losses in fruit yield of okra due to *Earias spp.* as influenced by dates of sowing and varieties. *J. Insect. Sci*., 7(2): 133-135.

Daware, D.G., Kurtadikar, J.S., Lavekar, R.C. and Bhosale, B.B. (2003). Achievement in insect pests management in cotton. Research highlight for 1972-2002. Department of Entomology, Marathwada Krishi Vidhyapeeth, Parbhani, Pp. 4-6.

Dhaka, S.R. and Pareek, B.L. (2008). Weather factors influencing population dynamics of major insect pests of cotton under semi arid agro system, *Indian J. Ento*., 70 (2):157-163.

Dhamdhere, S.V.; Bahadar, J. and Misra, U.S (1985). Studies on occurrence and succession of pest of okra. *Indian J. Pl. Prot*. 12(1): 9-12.

Gupta S.C. Prasad, G.S., Surface, A and

Ahemad, S. (1998). Weather factors and incidence of *Earias vittella* fab in okra (*Abelmoschus esculentus* L. Moench) *J. Res. Birsa Agril Univ*. 10 (1): 12-15.

Hegde, M., Nidagundi, J.M., Biradar, D.P., Udikeri, S.S. and Khadi, B.M. (2004). Performance of Bt and non Bt cotton hybrids against insect pests under irrigated condition. International symposium on "Strategies for Sustainable Cotton Production – A Global Vision – 3" An In House *J. Agric. Finance – Op Ltd.,* 135-138, Ltd., 143-143.

Krishnaih, K. 1980. Methodology for assessing crop losses due to pest of vegetables, In Assessment of crop losses due to pests and disease, UAS Bangalore, India. Eds H.C. Govinda G.K. Veeresh P.T. Walker and J.H. Jakun. proceeding of the workshop held from September 19-30 1977 at *University of Agril. Sci. Baglore, India, pp.* 259-267.

Mohapatra, L.N. (2008). Population dynamics of sucking pests in hirsutum cotton and influence of weather parameters on its incidence in western *Orissa. J. Cotton Res. Dev*., 22 (2): 192-194.

Patel, K. L., Patel, J. R., Jayani, D. B., Shekh, A. M. and Patel, N. C. (1997). Effect of seasonal weather on incidence and development of Major Pest of okra. (*Abelmoschus esculentus* L.). *J. Agric. Sci*., 67 (5): 181-183.

Rawat, R.R. and Sahu, H.R. (1973). Efficacy of some new insecticides for the control of okra shoot and fruit borer, *Earias vittella* (F.). *Guj. agric. Univ. Res. J.*, 15(1): 99-100.

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