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Studies on the succession of major insect pests of okra and their correlation with weather parameters

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ABSTRACT

An experiment was conducted to observe the studies on the major insect pests of okra during *Kharif* season of 2011 at Department Of Entomology, Live Stock Farm, Adhartal, J.N.K.V.V. Jabalpur (M.P.). Jassids and whitefly incidence was observed from 27 DAS (16 September 2011) to 90 DAS (18 November 2011) with one distinct peak, respectively during 44 SMW with mean population (nymph + adult) per 30 leaf was 26.11 for jassids and 25.6 for whitefly. While initation of fruit infestation by shoot and fruit borer recorded at 41 % SMW (01-07 Oct 2011) and epidemic at 41 SMW (08-14 Oct. 2011) with 35.35 per cent.

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INTRODUCTION

Okra (*Abelmoschus esculentus* L.), commonly known as Bhindi or Ladies finger is one of the most popular and commercially cultivated vegetable crops in India. It is polyppploid, belong to family Malvaceae with 2n = 8x= 72, 144 chromosome, it is an often cross pollinated crop, occuerence of out crossing to an extent of 4-19 per cent with the maximum of 42.2 per cent is noticed with insect assisted pollination (Dutta and Naug, 1968). It is mainly consumed in finger stage of 5 to 7 cm length with tender fruits. It is mainly cultivated to produce the fruits that are consumed as a vegetable in a variety of ways. Okra is a rich source of carbohydrate, protein, fats, vitamins and minerals (Akintoye *et al*., 2011). It is one of the major vegetable crops being widely grown throughout the year by the farmers of Jabalpur. Incidences of many insect pests on okra have been reported by many workers from different parts of the Country and some of which are responsible for considerable yield loss (Dhamdhere *et al.*,1985; Dubey *et al.*,1999 and Kumar *et al.,* 2014). However, insects, occupying vital positions in food webs, play an important role in maintaining ecological balance. Moreover, the species diversity of insects and their pest status varies from region to region with the variation in agro climatic conditions. Before an intelligent decision can be made about management of the insect pests, it is necessary to be able to properly identify which species of insects are major pests. Information on the occurrence of pests of

okra in Jabalpur is lacking. So the present work was carried out to study the biodiversity of insect pest complex infesting okra in Madhya Pradesh state.

MATERIAL AND METHODS

The present investigation was carried out in the experimental field of Department of Entomology, Live Stock Farm, Adhartal, J.N.K.V.V. Jabalpur (M.P.) during *Kharif* 2011-2012. Jabalpur is situated on Kymore plateau agro-climatic region of Madhya Pradesh at between 22^0 49" and 24^0 8" North latitude and 78^0 21" and 80^0 58" East longitude and at an altitude of 411.78 m above the mean sea level.

The climate of the region is typically semi-humid and sub-tropical. Jabalpur comes under Satpura Hills and lies in the rice-wheat crop zone of the Madhya Pradesh state. The mean annual rainfall is nearly 1423 mm, which is received mostly between mid - June to mid-September. The mean maximum temperature during the hottest months of May and June varies from 45.5 to 46.4^0C. January is the coldest month with mean maximum and minimum temperature of 24.4^0C and 7.3^0C, respectively.

Regular observations starting immediately after sowing was carried out once in a standard week to record different insects of okra (Table 1). The insects appearing on the crop right from sowing upto harvest were recorded. The crop was kept unprotected for this purpose. The sequence in which the insects appeared was also noted. The status of different insect pests recorded was determined on the basis of the damage caused by them. For observations 25 plants were randomly selected and population of different insect pests and mites were recorded. Correlation and regression of the abiotic factors on major insect pests were worked out by using the formula as suggested by Snedecor and Cochran (1967). The significance among different treatment means was judged by critical difference (C.D) at 5 per cent level of significance for comparison among the treatments, the marginal means of each treatment was considered.

RESULTS AND DISCUSSION

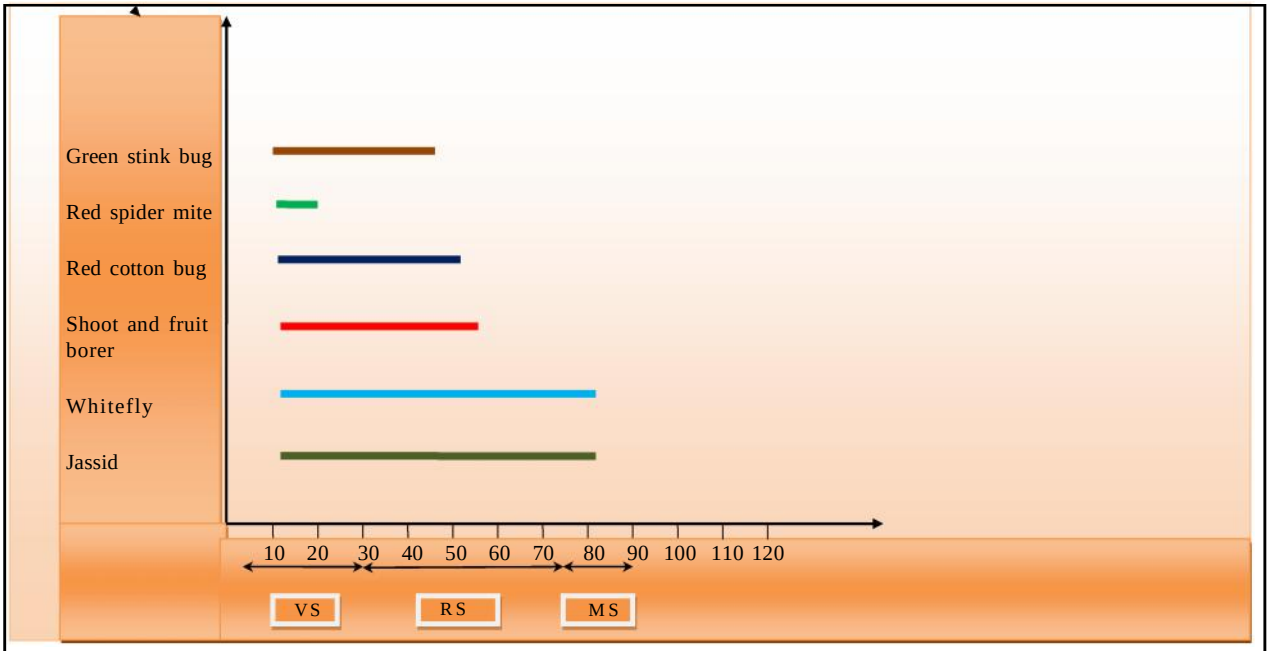
The result obtained in the study clearly indicated that okra was attacked by two groups of insects. In first group green stink bug, red spider mite, whitefly and jassid were observed which suck the cell sap of the leaves and stem resulting in the loss of vegetative vigour of plant. The second group of insect included red cotton bug and okra shoot and fruit borer, the most important and pre dominant pest and was available till maturity of the crop.

Jassid, *Amrasca biguttula biguttula (Ishida)* (Hemiptera: Cicadellidae):

Jassid was first observed when the crop age was about 27 days old (after germination) (Table 1). It is evident that the pest was present on the crop during the entire cropping season and remained available upto the crop maturity stage *i.e.* 3rd week of November (Fig. 1). It is seen that the jassid population started increasing from 37th SW (16th September 2011) and reached at its peak (26.11 jassid / 30 leaf) during 44th SW. During this period maximum and minimum temperature were 31.0 ^{0}C and 11.0 ^{0}C, respectively, whereas, morning and evening relative humidity were 86 and 24 per cent, respectively. Further sunshine, wind speed, 9.0 hrs, 2.4

Table 1: Incidence of insect pest complex on okra at Jabalpur during *Kharif* 2011

Period	Standard weeks	Mean population (nymph + adult) per 30 leaf		Fruit infestation by shoot and fruit borer %
		Jassid	White fly	
10- 16 Sept.	37	8.26 L	8.21L	0
17-23 Sept.	38	8.36	17.24	0
24-30 Sept.	39	8.91	14.78	0
01-07 Oct.	40	20.46	16.68	29.19
08-14 Oct.	41	18.94	12.91	35.35 H
15-21 Oct.	42	19.06	13.55	33.03
22-28 Oct.	43	25.03	24.91	25.35
29-04 Nov.	44	26.11 H	25.46 H	27.74
05-11 Nov.	45	24.06	11.39	23.96
12-18 Nov.	46	16.96	23.61	22.4 L



Crop stage: VS = Vegetative stage, RS = Reproductive stage, MS = Maturity stage

Fig. 1: Succession of insect pests and mites on okra (after germination) at Jabalpur during *Kharif* 2011

km/hr., respectively. However, no rainfall was recorded during this period. After 45th SW there was a decline in the jassid population available upto harvest of the crop.

Correlation studies revealed that Minimum temperature, wind velocity, evening RH (%) and rain fall showed significant negative correlation (r= -0.83, -0.87, -0.89 and -0.65) and sunshine showed significant positive correlation (r=0.82), respectively with jassid population (Table 2). From the above equation it may be expressed that with every unit increase in minimum temperature, wind velocity, evening RH, No. of rainy days there was negatively increase of -1.36, -4.52, -0.39 and -3.17 jassid population per 30 leaf, respectively (Fig. 1). Correlation studies further revealed that sunshine showed significant positively correlation (r =0.82) with jassid population (Table 2). It expressed that with every unit increase in sun shine, there was a positively increase of 3.32 jassid population per 30 leaf, respectively. Maximum temperature, morning RH, rainfall were found non-significant (r = -0.33, -0.49, -0.62), respectively with jassid population. Correlation studies further revealed that sunshine showed significant positively correlation (r

Table 2: Correlation (r) and regression co-efficient (b_{yx}) of abiotic factors on insect pests infesting okra crop (2011)

Weather factors	Name of insect					
	Jassid		Whitefly		Shoot and fruit borer	
	r	b_{yx}	r	b_{yx}	r	b_{yx}
Max. temp. (^{0}C)	0.33 NS	---	-0.39 NS	---	0.57 NS	---
Min. temp. (^{0}C)	-0.84**	40.34	-0.62 NS	---	-0.64*	62.99
Morning RH (%)	-0.49 NS	---	-0.56 NS	---	-0.24 NS	---
Evening RH (%)	-0.87**	32.30	-0.55 NS	---	-0.81**	54.36
Wind velocity (km/hr)	-0.89**	30.53	-0.40 NS	---	-0.94**	54.60
Sunshine (hrs)	0.82**	-4.11	0.46 NS	---	0.90**	-30.22
Rainfall (mm)	-0.63 NS	---	-0.46 NS	---	-0.67*	27.55
No. of rainy days	-0.66**	19.71	-0.28 NS	---	-0.69*	28.59

* and ** indicate significance of values at P=0.05 and 0.01, respectively, NS=Non-significant

=0.82) with jassid population (Table 2). From the above equation it may be expressed that with every unit increase in sun shine, there was a positively increase of 3.32 jassid population per 30 leaf, respectively. Maximum temperature, morning RH, rainfall were found non-significant (r = -0.33, -0.49, -0.62), respectively with jassid population.

Whitefly, *Bemisia tabaci* (Genn.) (Hemiptera: Aleyrodidae):

The whitefly activity was first observed when the crop age was about 27 days (after germination) (Table 2). From the figure, it is evident that the pest was present on the crop during the reproductive stage and remained available upto crop maturity stage *i.e.* third week of November. It was recorded that the whitefly population started increasing from 37th SW (16th September 2011) and reached at its peak (25.46 whitefly/30 leaves) during 44th SW (*i.e.* 29th to 04th November 2011). During this period maximum and minimum temperature were 31.0 ^{0}C and 11.0 ^{0}C, respectively, whereas, morning and evening relative humidity were 86 and 24 per cent, respectively.

Shoot and fruit borer, *Earias vittella* F. (Lepidoptera: Noctuidae):

Seasonal activity of shoot and fruit borer was observed when the crop age was about 48 days old (after germination) (Table 2). From the figure it is evident that the pest was present on the crop during the fruiting stage and remained available upto the crop maturity stage *i.e.* third week of November *i.e.* 46th standard week. Observations revealed that both the species of fruit and shoot borer *i.e. Earias insulana* and *Earias vittella* were available on okra. Hence, observations were recorded on *Earias vittella* only. First appearance of the pest was recorded during the 40th standard week (SW) *i.e.* 01 October 2011. The fruit infestation was worked out as weekly per cent fruit damage and data are presented in (Table 2). The fruit borer population started increasing from 40th SW (01st to 07th October 2011) and reached at its peak (35.35%) during 41th SW (*i.e.* 08th to 14th October 2011). During this period maximum and minimum temperature were 32.4 ^{0}C and 19.1^{0}C, respectively, whereas, morning and evening relative humidity were 92 and 43 per cent, respectively. Further sunshine, wind velocity were 8.3 hrs, 2.3 km/hr, respectively. However, no rainfall was recorded during this period After 42th SW there was a decline in the fruit borer population and was available upto 46th SW (*i.e.*12th to 18th November 2011).

Correlation studies:

Correlation studies revealed that minimum temperature, evening relative humidity, wind velocity, rain fall and no. of rainy days showed negative correlation with shoot and fruit borer population (-0.64,-0.81,-0.94,-0.67 and -0.69), respectively and found negative significant (Table 2). Sunshine showed positive correlation with shoot and fruit borer population (0.82) and found positive significant. While maximum temperature, morning relative humidity showed correlation (0.57 and -0.25), respectively but found to be non significant.

Green stink bug, *Nezara viridula* L. (Hemiptera: Pentatomidae):

On the crop sown during last week of August (*Kharif* 2011), the incidence of the pest started from the first week of September (35 standard week) *i.e.* 13 days after sowing in vegetative stage of crop and pest (Table 1) was noticed till last week of September (39 standard week).

Red spider mite, *Tetranychus urticae* K. (Trombidiformes):

The activity of red spider mite (Table 1) on okra crop sown during first week of September (*Kharif* crop) and population was observed till 36th standard week *i.e.* 9 September 2011.

Red cotton bug, *Dysdercus cingulatus* F. (Hemiptera: Pyrrhocoroidae):

The incidence of red cotton bug on the crop sown during *Kharif* was noticed in reproductive stage 48 days (after germination) (Table 1) from first week of October and population was continue in field till 41st standard week. During the course of study from September 2011 to November 2011, incidence of different insect pests okra was recorded regularly at different stages of the crop *i.e.* vegetative stage, flowering stage, maturity stage and at harvest. All the insect pests Red spider mite, *Tetranychus urticae* K. Appeared on 2nd September, Red cotton bug, *Dysdercus cingulatus* F. Appeared on 7th October, Green stink bug, *Nezara viridula* L. Apperared on 2nd September 2011, respectively rcorded

on different stages of the crop. Dhamdhere *et al*. (1985). The jassides appeared after germination when the crop age was about 27 days old and their activity continued till the maturity of the crop. Thus, the pest was not only present throughout the growing stage of the crop but it casued leaf curl, eading to stunted growth of plants and was also considered to be one of the major sucking pest of okra. Dubey *et al*. (1999) reported jassid to be an important sucking pest of okra which was present throughout the growing period the crop.

Whitefly:

Whiteflies appeared after germination when the crop age was about 27 days old and their activity continued till the maturity of the crop. Thus, the pest was not only present throughout the growing stage of crop, but it caused leaf curl, premature shedding of flowers, respectively and was considered tobe one of the most important sucking pest of okra. The present findings are in accordance with those Mehata and Varma, 1968; Pruthi, 1969 and Butani and Jotwain (1983). The whitefly, B. Tabaci is a polyphagous pest and infests cotton, okra, cauliflower, brinjal, potato, tomato and chilli, Dubey *et al*. (1999) and Kumawat *et al*. (2000) also reported whitefly to be an important sucking pest of okra which was present throughout the growing period the crop.

Shoot and fruit borer:

The fruit borer appeared during the reproductive stage of the crop when the crop age was about 48 days old and their activity continued till the maturity of the crop. Thus, the pest was not only present during the entire reproductive stage of the crop, but it caused circular/ irregular holes on the surface of the fruit and bored inside it. Dubey *et al*. (1999) reported that the shoot and fruit borer, to be an important fruit borer pest of okra and was present in the reproductive stage of the crop.

REFERENCES

Akintoye, H. A., Adebayo, A. G. and Aina, O. O. (2011). Growth and yield response of okra intercropped with live mulches. *Asian J. Agril. Res.,* **5** (2) : 146-153.

Butani, D.K. and Jotwain, M.G. (1983). Insect as a limiting factor in vegetable production. *Pesticides,* **17**(9):6-13.

Dhamdhere, S.V., Bahadur, J. and Mishra, U. S. (1985). Studies on occurrence and succession of pests of okra at Gwalior. *Indian J. Plant Protec.*, **12**(1):9-12.

Dubey, V. K., Bhagat, K.P., Kaushik, U.K. and Yadu, Y. K. (1999). Insect pest succession studies on okra. *J. Appl. Zoological Res.,* **10** (2):144-145.

Dutta, P. C. and Naug, A. (1968). A few strains of *Abelmoschus esculentus* their relation to phylogeny and development. *Beitr, Biol, Pflanzen*., **45** :113-126.

Kumar, U., Singh, D. V., Sachan, S. K., Bhatnagar, A. and Singh, R. (2014). Insect pest complex of okra and biology of shoot and fruit borer, *Earias vittella* (F.). *Indian J. Ent.,* **76**:29-31.

Mehata, P. R. and Varma, B.K. (1968). Plant protection farm information unit. Directorate of Extension, Ministry of Food, Agriculture, Community Development and Cooperation, Shashtri Bhavan New Delhi, India.

Pruthi, H. S. (1969). *Taxi book on Agricultural entomology*. Indian Council of Agricultural Research, New Delhi, pp. 997.