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POPULATION DYNAMICS OF MAJOR PESTS OF OKRA IN RELATION TO WEATHER FACTORS

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ABSTRACT

Seasonal incidence of major insect pests of okra was studied during *kharif* 2017 on the basis of standard meteorological weeks (SMW) at the College of Agriculture Jabalpur, on variety GAO5. The jassid *Amrasca biguttula biguttula* and aphid *Aphis gossypii* were observed to be active from August to October with their peak during 40th SMW (2.3 jassid and 1.5 aphid/ leaf). The whitefly *Bemisia tabaci* occurred between second week of August and third week of October with peak in 38 SMW (7.4 whitefly/ plant). Red spider mite *Tetranychus urticae* was observed from 6th to 30th October with peak at 42 SMW (690.7 nymph+ adult mites/ leaf). The shoot and fruit borer *Earias vitella* was observed from second week of September (37 SMW) up to fourth week of August (43 SMW) with three peaks in 38, 41 and 43 SMW (5.61, 6.38 and 4.67% fruit infestation). Correlation and regression analysis of incidence with weather factors revealed that population of jassid (nymph+ adult/ leaf) had a significant positive relation with maximum temperature (r=0.68); and aphid (nymph+ adult/ leaf) had a significant positive correlation with number of rainy days and morning vapour pressure (r=0.64 and 0.62).

Key words: Jassid, aphid, whitefly, red spider mite, shoot and fruit borer, seasonal incidence, correlation, temperature, rainy days, vapour pressure

Okra *Abelmoschus esculentus* L. Moench) is an important vegetable crop grown in India, including Madhya Pradesh (Anonymous, 2015). The productivity of okra is low due to attack by pests. Aphid *Aphis gossypii* Glover shoot and fruit borer *Earias insulana* Boisduval/ *E. vitella* F. and jassids *Amrasca biguttula biguttula* Ishida are some of its serious pests; the fruit borer alone causing 45-57% damage to fruits (Srinivasan and Krishna Kumar, 1983; Nderitu et al., 2008). The sucking pest complex includes aphids, leafhoppers, whiteflies, thrips and mites that cause 54.04% yield loss (Chaudhary and Daderch, 1989; Anitha and Nandihalli, 2008). Mathur et al. (2012) observed that change in seasonal incidence with weather factors play a major role in the pest biology. Defining relation between pest activity and such factors helps in deriving predictive models that aid in forecast. The present study evaluates the seasonal incidence of major pests of okra and analyses the effect of weather factors on their population dynamics.

MATERIALS AND METHODS

Field experiment was carried out in the Horticulture farm, Maharajpur, Jabalpur, Madhya Pradesh during *kharif* 2017 to analyse the seasonal incidence of pests of okra in relation to weather parameters. Population of aphid, jassid and mites (nymph+ adult) were observed on six leaves/ plant from two each upper, middle and lower plant canopy and whiteflies observed on per plant basis using cage. Shoot and fruit borer (*Earias* spp.) was observed on the basis of shoot and fruit damage. All these observations were made under no plant protection. Observations of weather factors- maximum and minimum temperature, morning and evening relative humidity, wind speed, sun shine hours, total rainfall and number of rainy days/ week, morning and evening vapour pressure and evaporation were obtained from the JNKVV meteorological observatory. Correlation coefficients were worked out using MS Excel to analyse the population dynamics.

RESULTS AND DISCUSSION

Incidence of pests of okra during *kharif* 2017 and the correlation coefficients with weather factors are depicted in Tables 1, 2.

These results reveal that the population of jassid was observed from 34th to 44th SMW, with a peak during 40 SMW (2.32 jassid/ leaf), with maximum and minimum temperatures at this peak being 33.4 and 20.3°C,

Table 1. Seasonal incidence of pests on okra (Jabalpur)

SMW	Population (nymph + adult)/ leaf			Whitefly (adult/ plant)	% Shoot Damage by shoot and fruit borer	% Fruit infestation by shoot and fruit borer
	Jassid	Aphid	Mites			
34	0.53	0.61	0.00	0.55	0.00	0.00
35	0.8	0.78	0.00	1.5	0.00	0.00
36	1.13	0.84	0.00	3.6	0.00	0.00
37	1.51	1.13	0.00	5.1	2.65	3.33
38	1.75	1.25	0.00	7.4	4.12	5.61
39	1.94	1.38	0.00	6.4	2.96	4.7
40	2.32	1.46	88.55	5.15	1.32	3.01
41	2.25	1.24	372.74	2.65	0.00	6.38
42	2.03	1.21	690.71	1.15	0.00	3.27
43	1.79	0.00	423.41	0.00	0.00	4.67
44	0.00	0.00	88.48	0.00	0.00	0.00

respectively. Yadav et al. (2009) reported the activity of jassid from August to October; Yadav et al. (2007) observed this to be third week of September to October at Kanpur. A gradual decline in jassid population was observed to be up to 43 SMW. Correlation with weather parameters revealed a nonsignificant correlation except for maximum temperature (r=0.68*). These observations agree with those of Shah et al. (2009). Aphid population was observed from 34th to 44th SMW, with a peak population being in the 40th SMW (1.46 aphids/leaf) as in the case of jassids. The population was observed to be negatively correlated with the morning relative humidity (81 and 90%, respectively) (r = - 0.07*) and significantly positively correlated with number of rainy days (r=0.64*), and morning vapour pressure(r=0.62*). These observations corroborate with those of Kadam (2003), Dubey et al. (1999) and Jatav (2013).

Whitefly incidence started from 34th and lasted up to 44th SMW with peak being in the 38th SMW (7.4 whitefly/ leaf). Aarwe et al. (2016) observed its peak activity from August to October. Correlation analyses with weather factors gave non-significant values. Similarly, mites incidence was from 40th to 44th SMW, with the peak (690.71 nymph+ adult/ leaf) during 42nd SMW. Correlation analyses gave non-significant relationships with weather factors. The shoot and fruit borer was observed from 37th to 40th SMW, with peak observed during 38th SMW (4.12%). Correlation analyses gave statistically non-significant results even for the damage to fruits. The fruit damage was observed from 37th to 43rd SMW with a peak during 40th SMW (6.38%).

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Table 2. Correlation coefficients of pest incidence in okra with weather factors

Weather factors		Temperature		RH		Wind speed (Km./hr.)	Sunshine (hrs.)	Rainfall (mm)	No.of Rainy Days	Vapour pressure		Evaporation (mm)
Insects		Maximum	Minimum	Morning	Evening					Mor.	Eve.	
Jassid (nymph+ adult/leaf)	r	0.68 *	0.16 NS	0.31 NS	-0.12 NS	0.06 NS	0.003 NS	-0.24 NS	0.22 NS	0.07 NS	0.43 NS	-0.21 NS
	byx	0.89	-	-	-	-	-	-	-	-	-	-
Aphid (nymph+ adult/ leaf)	r	0.32 NS	0.59 NS	-0.07 *	0.19 NS	0.68 NS	0.55 NS	-0.18 NS	0.64 *	0.62 *	0.23 NS	0.17 NS
	byx	-	-	0.67	-	-	-	-	0.44	4.93	-	-
Whitefly (/plant)	r	0.02 NS	0.50 NS	-0.26 NS	0.39 NS	0.50 NS	0.56 NS	0.17 NS	0.53 NS	0.56 NS	-0.06 NS	0.19 NS
	byx	-	-	-	-	-	-	-	-	-	-	-
Mites (nymph+ adult/ leaf)	r	0.55 NS	-0.48 NS	0.52 NS	-0.45 NS	-0.45 NS	-0.6 NS	-0.52 NS	-0.46 NS	-0.55 NS	0.26 NS	-0.48 NS
	byx	-	-	-	-	-	-	-	-	-	-	-
%Shoot Damage (/plot)	r	-0.15 NS	0.30 NS	-0.37 NS	0.58 NS	0.32 NS	0.42 NS	0.09 NS	0.33 NS	0.38 NS	-0.35 NS	0.29 NS
	byx	-	-	-	-	-	-		-	-	-	-
%Fruit Damage (/plot)	r	0.33 NS	-0.01 NS	0.18 NS	0.09 NS	0.02 NS	-0.07 NS	-0.36 NS	0.05 NS	-0.06 NS	-0.01 NS	-0.12 NS
	byx	-	-	-	-	-	-	-	-	-	-	-

* Significant at p=0.05; NS=Non-significant; RH= Relative humidity; Max. = Maximum; Min. = Minimum; Mor. =morning; Eve. = evening

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