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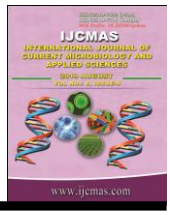

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Seasonal Incidence of Major Sucking Insect Pests of Groundnut in Relation to Weather Parameters of Semi-Arid Region of India

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A B S T R A C T

The study had been carried out in the semi-arid region of India at Agronomy farm, S.K.N. College of Agriculture, Jobner (Rajasthan) during *Kharif* 2018. The insect pests, aphid (*Aphis craccivora* Koch) and leafhopper (*Empoasca kerri* Pruthi) were observed as major sucking insect pests infesting on groundnut crop. The aphid and leafhopper population commenced in the last week of July and reached to its peak in the second week of September, when the maximum temperature, minimum temperature, relative humidity and rainfall were 30.0 ^{o}C, 21.0 ^{o}C, 78% and 1.6 mm, respectively. The population of aphid and leafhopper showed significant negative correlation with maximum temperature and significant positive correlation with relative humidity. The population of predators and maggot of Syrphid fly were appeared in the first week of August and reached to maximum in the third week of September. The populations of both the predators were significant positively correlated with aphid and leafhopper populations. Both predators had non-significant correlation with weather parameters except Lady bird beetle which showed significant positive correlation with relative humidity.

Introduction

Groundnut (*Arachis hypogaea* L.) is an annual legume crop also known as peanut, grown in the semi–arid tropics and is the principle oilseed crop in India (Kandakoor *et al.*, 2012). Groundnut oil is considered as stable and nutritive as it contains right proportion of Oleic and Linoleic acids (Mathur and Khan, 1997). The seed contains upto50 per cent of a non-drying oil, 40-50 per cent fat, 20-50 per cent protein and 10-20 per cent carbohydrate (Mehta, 2002). More than 100 species of insect and mites are known to attack groundnut (Nandagopal, 1992). Among the various insect pests attacking this crop,

leafhopper (*Empoasca kerri* Pruthi) and aphid (*Aphis craccivora* Koch), causes extensive damage and found to be serious on groundnut crop (Mer *et al.,* 2016). The indiscriminate and injudicious use of synthetic pesticides have lead to pest build up and cause an imbalance of natural enemies, resulting into problems of pest resurgence and secondary pest out breaks progressively (Ahir *et al.,* 2017). The knowledge of incidence of sucking pest *viz* aphid (*Aphis craccivora* Koch) and leafhopper (*Empoasca kerri* Pruthi) and their natural enemies *viz* Lady bird beetle (*Coccinella septempunctata* L.) and Syrphid fly (*Syrphid spp.*) at different growth stages of groundnut crop will be helpful in evolving proper management schedule. The present study will provide the necessary information to understand the dynamics of the population buildup of sucking insect pest and natural enemies at semi-arid region of India.

Materials and Methods

The present investigation was conducted at the Agronomy farm of S.K.N. College of Agriculture (S.K.N. Agriculture University, Jobner, Rajasthan) during *Kharif*, 2018.

The climate of this region is typically semi-arid which is characterized by extremes of temperature both in summer and winter with low rainfall and moderate humidity. Variety RG 382 (Source: Rajasthan Agriculture Research Institute, Durgapura, Jaipur) was used in the study and sown on in five plots. The plot size was 2.4 m x 3.0 m with row to row and plant to plant distance of 40 cm x 15 cm, respectively. The population of major sucking insect's pest's *viz.,* leafhopper and aphid were recorded at weekly interval early in morning hours from initiation of pests till harvesting of the crop. The aphid and leafhopper population were counted on three leaves per plant from the five selected and tagged plants form each plot as per method suggested by Satpathy (1973). The population of natural enemies *viz.,* lady bird beetle and syrphid flies were also recorded on the same selected five plants. For statistical analysis OPSTATE software was used which is available online at HAU, Hisar web site.

Results and Discussion

Mean population of Aphid and Leafhopper along with natural enemies Lady bird beetle and Syrphid fly has been presented in Table 1 and graphically represented in Figure 1. Correlation coefficient of sucking insect pests with weather parameters and their natural enemies of groundnut depicted in Table 2.

Aphid (*Aphis craccivora* Koch) and Leafhopper (*Empoasca kerri* Pruthi)

The incidence of aphid and leafhopper commenced in the last week of July (31th SMW) and reached to peak in the second week of September (37th SMW) *i.e*. 9.89 aphid/ three leaves and 5.12 leafhopper/ three leaves at 30.0°C maximum temperature, 21.0°C minimum temperature, 78.0 per cent relative humidity and 1.60 mm rainfall. Thereafter, the population started declining up to last observation (22nd October) and only trace population of aphid (0.40/ three leaves) and leafhopper (0.86/ three leaves) were observed. The infestation of aphid and leafhopper on groundnut crop showed significant negative correlation (r = -0.742 and -0.561, respectively) with maximum temperature and significant positive correlation with relative humidity (r = 0.766), while non-significant correlation with minimum temperature (r = 0.474 and 0.274, respectively) and rainfall (r = 0.399 and 0.278 respectively) were observed in both the cases. These results were corroborating with Chodhary (2015) and Ahir *et al.,* (2017) who reported that aphid population had non-significant negative correlation with higher

temperature, while positively correlated with relative humidity and rainfall. Similar results for leafhopper have been reported by Nigude *et al.,* (2018) and Sharma and Sharma (1997). The present results were partial corroborate with that of Yadav *et al.,* (2007) and Kandakoor *et al.,* (2012) who reported that the incidence of aphid on groundnut remains throughout the crop period with peak population in the fourth week and first week of September, respectively. They also observed that the aphid population had non-significant negative correlation with maximum temperature. Amarshibhai (2004) revealed that incidence of aphid was commenced in the last week of July (four week after sowing). The aphid population increased very fast during next week and reached at peak level in the second week of August supports the present findings. The ambient temperature and high relative humidity favored to increase the leafhopper population whereas, high temperature and heavy rainfall decreased the pest population Singh *et al.,* (1990).

Table.1 Seasonal incidence of major sucking insect pests and their natural enemies on variety RG 382 of groundnut

S. N.	SMW*	Date of observation	Temperature (^{o}C)		RH (%)	Rainfall (mm)	Mean population /3 leaves		Mean population /5 plants	
			Max.	Min.			Aphid	Leafhopper	*C. septum*	Maggot of Syrphid spp.
1.	31	30/07/2018	34.0	32.2	62	24.8	0.82	1.20	0	0
2.	32	06/08/2018	32.8	24.9	77	13.6	2.96	2.38	0.42	0.24
3.	33	13/08/2018	34.4	24.7	72	14.6	4.68	2.00	1.26	0.86
4.	34	20/08/2018	31.2	23.8	80	48.4	7.26	3.26	1.80	1.36
5.	35	27/08/2018	31.5	24.0	77	34.0	7.82	3.10	2.14	1.60
6.	36	03/09/2018	30.5	22.9	81	33.0	9.20	4.16	2.40	1.90
7.	37	10/09/2018	30.0	21.0	78	1.6	9.89	5.12	2.82	2.20
8.	38	17/09/2018	34.2	20.2	63	0.0	7.12	4.00	3.00	2.80
9.	39	24/09/2018	32.8	19.1	64	19.8	5.42	3.20	2.20	2.00
10.	40	01/10/2018	36.7	18.9	51	0.0	3.80	3.18	1.40	1.24
11.	41	08/10/2018	35.7	15.4	47	0.0	2.42	2.40	0.60	1.00
12.	42	15/10/2018	35.0	14.5	42	0.0	1.26	1.96	0.40	0.60
13	43	22/10/2018	34.1	12.8	43	0.0	0.40	0.86	0	0.20

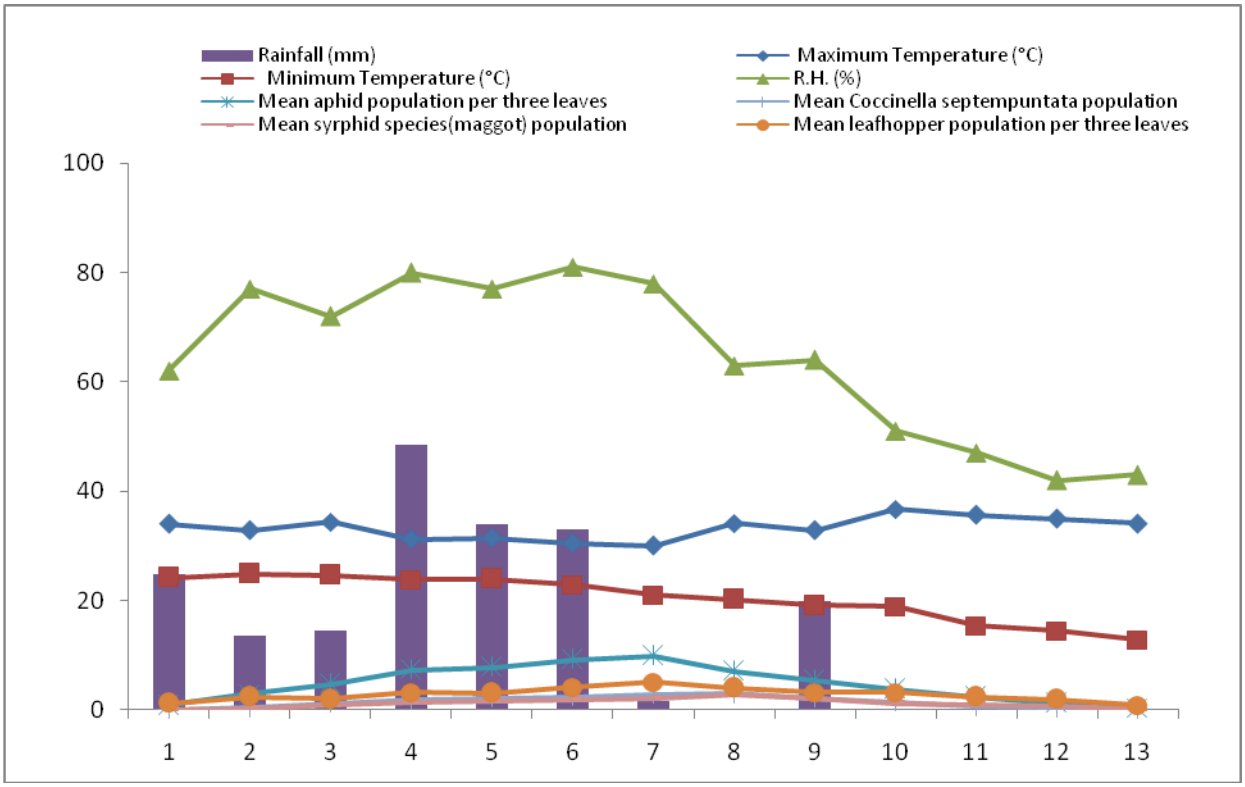
* Standard Meteorological Week number

Table.2 Correlation coefficient of sucking insect pests with weather parameters and natural enemies of groundnut

Parameter	Temperature (^{o}C)		Relative humidity (%)	Rainfall (mm)	*C. septum*	Maggot of syrphid spp.
	Max.	Min.				
Aphid	-0.742*	0.474	0.766*	0.399	0.931*	0.835*
Leafhopper	-0.561*	0.274	0.564*	0.278	0.914*	0.881*
C. septum	-0.538	0.308	0.570*	0.202	-	-
Maggot of syrphid spp.	-0.390	0.110	0.378	0.049	-	-

*Significant at 5% level

Fig.1 Effect of weather parameters on the incidence of major sucking insect pests of groundnut



Natural enemies

The population of Lady bird beetle (*Coccinella septempunctata* L.) and Syrphid fly (*Syrphid spp.*) were appeared in the first week of August (32th SMW) and increased with the increase in aphid and leafhopper population which was maximum in the third week of September (38th SMW) *i.e.* 3.00 and 2.80 per five plants, respectively at 34.2°C maximum temperature, 20.2°C minimum temperature, 63 % relative humidity and 0.0 mm rainfall. The population of both the predators were significant positively correlated with aphid (r= 0.931 and r= 0.835) and leafhopper (r= 0.914 and r= 0.881) population. The data of correlation also showed that both the predators had non-significant correlation with weather parameters however, lady bird beetle had significant positive correlation with relative humidity (r= 0.570). The peak populations of predators were observed just next week of the peak population of sucking pests. Similar results have been observed by Srikanth and Lakkundi in 1990. They also reported highly significant positive correlation between aphid and predator populations. The results are further conformity with those of Bhede *et al.*, 2018 who reported that population of ladybird beetle and maggot of syrphid fly showed significant positive correlation with aphid population. Jangu, 2005 partially corroborates with results who observed that the population of *C. septempunctata* was appeared in the fourth week of August and reached to maximum in the first week of September.

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