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Seasonal Incidence of Sucking Pests in Sesamum with Relation to Weather Parameters (Correlation and Regression Analysis)

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Abstract

A field experiment was conducted at Agricultural college, Naira during rabi, 2020-21 to assess the seasonal incidence of sucking pests of sesamum and its correlation with weather parameters. The incidence of leafhopper (*Hishimonus phycitis* Distant) and whitefly (*Bemisia tabaci* Gennadius) were started during 5th and 4th SMW attained their peaks during 11th an 12th SMW respectively. The correlation study revealed that the leafhopper showed significant positive correlation with maximum temperature (r = 0.623) and minimum temperature (r = 0.283) and significantly negatively correlated with morning and evening relative humidity (r = -0.165, r = -0.122) respectively. While the correlation study between whitefly population and weather parameters revealed that the it showed positive correlation with maximum (r = 0.821) and minimum (r = 0.120) temperature and negatively correlated with morning and evening relative humidity (r = -0.097, r = -0.182) respectively whereas, rainfall showed non-significant correlation(r = 0.00) with the both sucking pests. Weather parameters were able to cause variation in the incidence of leafhopper to the extent of 59.3 percent (R^2= 0.593) and in the incidence of whitefly to the extent of 44.6 percent (R^2= 0.446).

Key words : Sesamum, Correlation, maximum and minimum temperatures, relative humidity, leafhopper, whitefly.

Sesamum (*Sesamum indicum* L.) known as the "Queen of oil seeds". It is one of the most ancient oilseed crop in the world. In India, it is grown in the all crop growing season's *viz*., *kharif, late kharif, rabi*, and *summer* seasons. India ranks third in the world with 19.47 lakh ha area with 8.66 lakh tonnes of production with productivity of 470 kg ha^{-1}. (Directorate of Economics and Statistics, Government of India, 2018-2019). The main reasons for low productivity of sesamum are its rain fed cultivation in marginal and sub marginal lands under poor management practices. Damage due to insect pests is also one of the major factors causing low productivity. The crop is attacked by more than 67 species of insect pests in different stages of its plant growth (Ahirwar *et al*., 2009). Leafhopper (*H. phycitis* Distant) and whitefly (*B. tabaci* Gennadius) suck the sap from leaf, flower, and pods. This leads to curling of leaf margin downwards, stunted the growth of the plant and ultimately reduce the yield. Leafhopper and whitefly are also responsible to transmit phyllody and leaf curl diseases in sesamum respectively. Keeping these facts in view, present study on seasonal incidence leafhopper and whitefly was undertaken and their population estimated under natural condition at Agricultural college, Naira. Srikakulam district of North coastal zone of Andhra Pradesh.

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Material and Methods

The experiment was conducted during rabi, 2020-21.The periodical observations on the incidence of sucking pests were recorded in the variety YLM-66 at each meteorological week

Table 1. Mean weather parameters and incidence of sucking pests of sesamum during *rabi*, 2020-21

SMW	Temperature (°C)		RH(%)		Rainfall (mm)	Avg. no. of sucking pest population plant^{-1}	
	Max	Min	RH	RH		Leafhopper plant^{-1}	Whitefly plant^{-1}
4th	32.3	20.6	87.0	53.8	0.0	0.0	5.0
5th	30.0	18.2	86.2	50.8	0.0	2.0	7.0
6th	31.4	16.1	77.7	42.0	0.0	4.0	10.0
7th	32.7	18.7	85.4	48.5	0.0	5.0	12.0
8th	33.5	19.0	79.0	52.1	0.0	3.3	9.0
9th	36.7	21.7	83.5	47.4	0.0	6.0	12.0
10th	35.1	22.0	85.2	50.7	0.0	5.0	10.0
11th	36.0	22.5	82.2	50.7	0.0	6.5	16.0
12th	38.5	23.5	77.0	45.0	0.0	7.2	17.0

from the 1st week after sowing to harvest on 200m2 plot without any insecticidal treatment. The variety was sown in second fortnight of January spacing of 30 cm between rows and 10 cm between plants and other recommended agronomic practices. Observations on the Incidence sucking pests (leafhopper and white fly) were recorded by (2+1+2) method i.e. two upper leaves, one middle leaf and two lower leaves of randomly selected 10 plants from 10 spots of plot and mean pest population was computed per plant. In addition, a simple correlation was worked out between the pooled pest population (No. of pest population) and weather parameters (temperature, relative humidity and rainfall).The correlationand regression analysis were done by using XL STAT 2018.software

Results and Discussion

Pooled data of weather parameters and incidence of major sucking pests of sesamum during *rabi*, 2020-21 presented in Table 1 indicated that incidence of sucking pests i.e. leafhopper and whitefly were started during 5th and 4th SMW (2/plant, 5/plant) including both nymph and adult population respectively and they were peak at 11th and 12th SMW during (6.5 and 7.2 /plant, 16 and 17/plant)

Table 2. Correlation of suking pests population of sesamum with meteorological factors

Sucking pests	Temp. (°C)		RH(%)		Rainfall (mm)
	Max temp	Min temp	RH (AM)	RH (PM)	
Leafhopper	0.623	0.283	-0.165	-0.122	0.000
Whitefly	0.821	0.120	-0.097	-0.182	0.000

* Significant at 5 % level

Table 3. Multiple linear regression between abiotic factors and leaf hopper (*Hishimonus phycitis*) population in Sesamum crop during *rabi*, 2020-2021

Variable	Partial regression coefficient	Standard error	t-value
X_1 - Maximum temperature (°C)	0.923	0.526	1.448
X_2 - Minimum temperature (°C)	-0.183	0.356	-0.514
X_3 - Morning relative humidity (%)	-0.165	0.166	-0.991
X_4 - Evening relative humidity (%)	-0.122	0.087	-1.412
- Rain fall (mm)	0.000	1.759	0.000
Regression equation	4.542 + (0.923) X_1+ (-0.183) X_2 + (-0.165 + X_3(-0.122) X4 + (0.000) $X_5$1.759		
Intercept (A)	4.542		
R^2 value	0.593		
Adjusted R^2 value	0.166		

respectively where the temperatures were high in respective standard weeks. Correlation data of sucking pests leafhopper and whitefly population with abiotic factors *viz*., minimum, maximum temperature, relative humidity and rainfall is given in Table 2. There was a

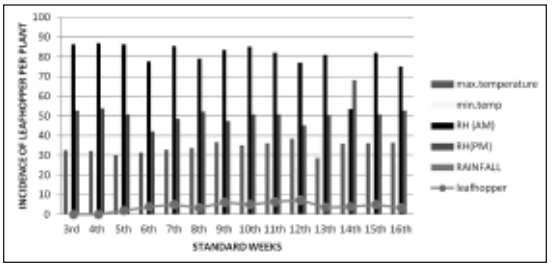

Fig. 1. Influence of weather factors on incidence of leafhopper (*Hishimonus phycitis*) in sesamum crop during *rabi*, 2020-2021

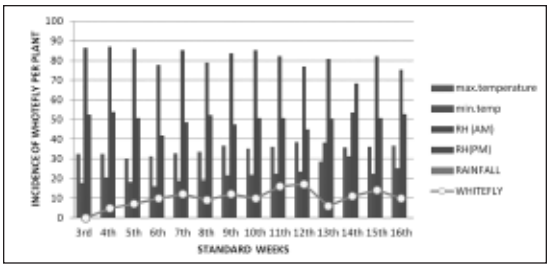

Fig. 2. Influence of weather factors on incidence whitefly (*Bemisia tabaci*) in sesamum crop during *rabi*, 2020-2021

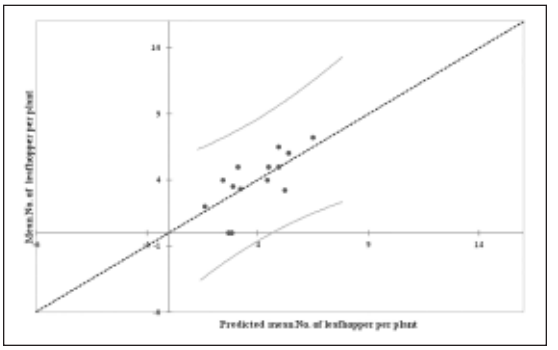

Fig. 3. Distribution plot depicting the mean leafhopper (*Hishimonus phycitis*) per plant

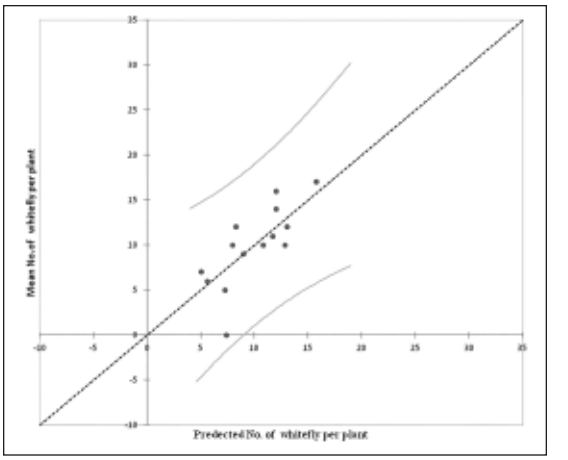

Fig. 4. Distribution plot depicting the mean whitefly (*Bemisia tabaci*) per plant

significant and negative correlation was observed between sucking pest population and relative humidity. However they had significant and positive correlation with maximum temperature and minimum temperature. Rainfall showed non-significant relation with the sucking pest population. Table 3 and 4 clearly indicated that the abiotic factors were able to cause variation in the incidence of leafhopper to the extent of 59.3 per cent (R^2= 0.593) out of which the maximum temperature (r = 0.923) showed significant positive correlation and the minimum temperature (r = - 0.183), morning and evening relative humidity (r = - 0.165), (r = - 0.122) showed significant negative influence on the population of leafhopper. As well as abiotic factors were able to cause variation in the incidence of *B. tabaci* to the extent of 44.6 per cent (R^2 = 0.446) out of which the maximum temperature (r = 0.821) and the minimum temperature = 0.120) showed significant positive correlation with the *B. tabaci* population. Whereas, morning and evening RH (r = - 0.097), (r = -0.182) showed significant negative influence on the population of whitefly.

The current results were affirmed by Rajasekhar *et al*. (2015) and Ramakrishna Rao

et al. (2015). Their study revealed that leafhoppers in cotton and thrips in groundnut were positively correlated with the maximum and minimum temperatures and while they showed significantly negative correlation with morning and evening relative humidity. The present results were also in line with the findings of Mishra *et al*. (2011), Kumar *et al*. (2012) and Saritha *et al*. (2020). Their study also revealed that the sucking pests *viz*., leafhopper and whitefly population in sesamum showed significant positive correlation with the maximum and minimum temperatures, where as negatively correlated with morning and evening relative humidity.

Conclusion

As per the field studies both sucking pests i.e., leafhopper and whitefly were noticed initially from seedling to peak flowering stage of the crop and became major constraint for crop growth by sucking the plant sap. Leafhopper (*H. phycitis* Distant) and white fly (*B. tabaci* Gennadius) were started during 5th and 4th SMW (2/plant, 5/plant) respectively and they were peak at 11^{th} and 12^{th} SMW during (6.5 and 7.2/plant, 16 and 17/plant) respectively. And there was a significant and negative correlation was observed between sucking pest population and relative humidity. While, they had significant and positive correlation with maximum temperature and minimum temperature. Rainfall showed non-significant relation with the sucking pest population. The abiotic factors were able to cause variation in the incidence of leafhopper to the extent of 59.3 per cent (R^2= 0.593) and in whitefly it is upto the extent of 44.6 per cent (R^2 = 0.446)

Authors Contributions

Conceptualization and Designing of the Research work (S.Dhurua and M.S.V.Chalam); Execution of Field/Lab Experiments and Data Collection (P. Divya); Analysis of Data and Interpretation (P.Divya, S. Govinda Rao and G.Chaitanya); Preparation of Manuscript (P. Divya and G.Chaitanya).

Declaration

The authors declared that they don't have any conflict of Interest

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References

Ahirwar, R. M., Banerjee, S. and Gupta, M. P. 2009. Seasonal incidence of insect pests of sesame in relation to abiotic factors. Ann. Plant Prot. Sci., 17 (2): 351-356.

Mishra, M. K., Gupta, M., Thakur, S. R. and Raikwa, R. S. 2011. Seasonal incidence of major insect pests of sesame in relation to weather parameters in Bundelkhand zone of Madhya Pradesh. J. Agrometeorol., 17 (2): 263-264.

Kumar, R., Shamshad, A. and Chandra, U. 2012. Seasonal incidence of sap feeders on sesame (*Sesamum indicum* L.) and correlation with abiotic factors. Ann. Plant Prot. Sci., 18(1): 41-48.

Rajasekhar, Y., Krishnayya, P. V., Prasad, N. V. V. S. D., Manoj kumar, Srinivasa Rao, V. 2015. Population dynamics and Influence of weather parameters on the Incidence of cotton leafhoppers, Amrasca biguttula biguttula (Ishida). The And. Agri.J., 62(1): 128-131.

Ramakrishna Rao, A., Rajendra Prasad, P., Murali Krishna, T., Eswar reddy, N.P., Sudhakar, P. and Devaki, K. 2015. Stuides on Field Incidence of Thrips on Kharif Groundnut in Realtion to Weather parameters. The And. Agri.J., 62(3): 625-632.

Saritha, R., Sirisha, A. B. M., Haseena, S. K. and Sujatha, V. 2020. Studies on Succession and Population Dynamics of Sap Feeders as Influenced by Weather on Sesame. Int. j. curr. Microbial. appl. sci., 9(7): 839-849.

http://eands.dacnet.nic.in. Government of India, 2018-2019.