

INFLUENCE OF ABIOTIC FACTORS ON INCIDENCE OF SUCKING PEST IN FRENCH BEAN

JAKHAR, B. L. AND CHAUDHARY, F. K.*

KRUSHI VIGYAN KENDRA
SARDARKRUSHINAGAR DANTIWADA AGRICULTURAL UNIVERSITY
DISA – 385 535, GUJARAT, INDIA

**Email : fk_43@yahoo.co.in*

ABSTRACT

Among various weather parameters studied for their influence on build up of the sucking pests' population in French bean, wind velocity played significant positive role in building up the population of aphid. Leaf hopper and whitefly had significantly positive correlation with relative humidity, which favoured populations build up of both the pests. There was no impact of abiotic factors on the occurrence of thrips population, but temperature had significant positive correlation with red spider mite population.

KEY WORDS : Biotic factor, french bean, sucking pest,

INTRODUCTION

India is the largest producer of pulse crops in the world with 25 per cent share in global production. The total production was estimated to be 14.76 million tones from an area of 23.63 million hectares with average productivity 625 kg/ha (Anonymous, 2011). French bean is grown in an area of about one lakh ha with a production of 1000 tones per year mainly in the states of Maharashtra, Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh, Tamil Nadu (Nilgiri), Kerala (Palni hills), Karnataka (Chickmangalur) and West Bengal (Darjeeling hills) (Prasad, 2005).

Both biotic and abiotic factors affect the production of French bean. The crop is attacked by a number of insect pests during its life span. About 30 species of insects have been reported damaging French bean (Srivastava and Butani, 1998). The important insect pests of French bean are viz., aphid

(*Aphis craccivora* Koch), leaf hopper (*Empoasca dolichi*), thrips (*Megalurothrips sjostedti* Trybom), whitefly (*Bemisia tabaci* Gennadius), red spider mite (*Tetranychus urticae* Koch), leaf miner (*Lyriomiza* spp.), pod borer (*E. zinckenella*), Bihar hairy caterpillar (*Spilosoma obliqua* Walk.), blister beetle (*M. phalerata*), and bean bug (*C. choprai*).

Among these, sucking pests cause considerable losses in the yield of French bean by sucking the sap from the ventral surface of leaves. As a result of their feeding, the affected plant parts become yellowish, the leaves wrinkle, curl downwards and ultimately shed. Besides the feeding damage, these insects exude huge amount of honey dew which favours the development of black sooty mould which hinders the photosynthesis of the plant resulting in stunted growth, reduce seed yield and also deteriorates fodder quality.

The aphid is black to dark brown or brownish in colour and winged or wingless and vary in size from 1.5 to 3.0 mm. Leaf hopper is small in size, slender mobile insects and green in colour. They move sideways when disturbed. Their feeding on plants causes leaves to curl down with yellowish margins. The whole plant may turn yellowish brown and dry up when the attack is pronounce. Both the nymphs and the adults of white fly pierce and suck the sap from leaves, which may cause reduced plant growth, yellowing of leaves, and wilting of the plant during severe attack. Thrip is less than 2 mm long and scares in the buds, flowers and on the tender pods. Heavy attack of pest causes abortion and malformation of flowers. Pods become scarred having a rough silvery surface and malformed which reduce the market value. Red spider mite feeds on bean plants causes reduction in plant growth, flowering, number and length of pods and number of seeds per pod. They cause heavy damage during dry season. Looking to the vital role of sucking pests on yield of French bean, the study was carried out to observe the effect of abiotic factors on the incidence various sucking pests.

MATERIALS AND METHODS

Observations on number of sucking pests' viz., aphid, leaf hopper, whitefly, thrips and red spider mite were recorded starting from two weeks after sowing at weekly interval from each tagged plants and mean number of pest per plant was worked out. Weekly meteorological data on different abiotic factors were obtained from the Agro-meteorological observatory at Agronomy Instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, where the experiment was carried out during *rabi* 2011-12. The correlation between abiotic (temperature, humidity, wind velocity, sunshine hours) and numbers of

sucking pests was worked out to study their effects on population build up of sucking pests in French bean.

RESULTS AND DISCUSSION

The results on effect of abiotic factors on various sucking pests are depicted in Table 1. The results revealed that among the different weather parameters studied maximum and minimum temperature as well as morning relative humidity showed non-significant negative association with the aphid population, while evening relative humidity and sunshine hours manifested non-significant positive correlation and wind velocity ($r = 0.59^*$) exhibited significant positive correlation with aphid population. Correlation coefficient values worked out for leaf hopper incidence indicated that morning relative humidity showed highly significant positive correlation with leaf hopper population ($r = 0.71^{**}$), while evening relative humidity showed significant correlation ($r = 0.65^*$). The population of leaf hoppers showed negative correlation with temperature and wind velocity. Sunshine hours revealed significant negative correlation ($r = -0.67^*$) with leaf hopper. Maximum temperature showed highly significant negative correlation ($r = -0.74^{**}$) with population of whitefly. Evening relative humidity exhibited significant positive correlation ($r = 0.62^*$), whereas minimum temperature and wind velocity had non-significant and negative correlation with whitefly. Sunshine hours showed significant ($r = -0.61^*$), but negative influence on whitefly population. Relationship between thrips incidence and weather parameters indicated that none of the parameter found playing significant role in buildup of the thrips population. The reports of Gupta and Singh (1990) regarding negative relationship between thrips population and relative humidity supported the results of present investigation. Maximum and minimum

temperature had significant positive influence on the red spider mite population ($r = 0.58^*$ and $r = 0.62^*$, respectively), while wind velocity and sunshine had no role in population build up of this pest. Relative humidity exerted not-significant negative effect on red spider mite population.

CONCLUSION

Among the various abiotic factors, wind velocity played significant positive role in building up the population of aphid. Leaf hopper and whitefly had significantly positive correlation with relative humidity, which favoured populations build up of both the pests. There was no impact of abiotic factors on the occurrence of thrips population, but temperature had significant positive correlation with red spider mite population.

REFERENCES

- Anonymous, (2011). "Pulses Production of India", *Agropedia*, IIT Kanpur, an ICAR, NAIP Initiative.
- Gupta, P. K. and Singh, J. (1990). Some observations on the population fluctuation in *M. distalis* Karny on the leaves of green gram. *Indian J. Ent.*, **52** (3): 470-474.
- Prasad, R. (2005). Field crops production, Directorate of Information and publication. Indian Council of Agricultural Research, Krishi Anusandhan Bhavan, Pusa, New Delhi- 110012.
- Srivastava, K. P. and Butani, D. K. (1998). Pest management in vegetables (Part- I), Published by Research Periodicals and Book Publishing House, P.O. Box 720728, Houston, Texas -77272, USA.

Table 1: Correlation between sucking pests population and weather parameters

Sr. No.	Pests	Weather Parameters					
		Temperature ($^{\circ}$ C)		Relative Humidity (%)		Wind Velocity (Km/hr)	Sunshine (hrs/day)
		Maximum	Minimum	Morning	Evening		
1.	Aphid	-0.32	-0.20	-0.47	0.07	0.59*	0.37
2.	Leaf hopper	-0.31	-0.23	0.71**	0.65*	-0.40	-0.67*
3.	Whitefly	-0.74**	-0.54	0.33	0.62*	-0.18	-0.61*
4.	Thrips	-0.35	-0.27	-0.37	0.09	0.51	0.27
5.	Red spider mite	0.58*	0.62*	-0.41	-0.46	0.33	0.53

* Significant at 5 per cent level ($r=0.57$), ** Significant at 1 per cent level ($r=0.71$)