AU Agriculture Update
Volume 12 | TECHSEAR-8 | 2017 | 2040-2043
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RESEARCH ARTICLE :

Influence of crop phenology on the activity of insect-pests of chilli (*Capsicum annuum* L.)

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ARTICLE CHRONICLE :
Received :
20.07.2017;
Accepted :
16.08.2017

SUMMARY : To know the influence of plant morphological characters on the activity of insect pests of chilli, ten genotypes *viz.*, T_1- Byadagi kaddi, T_2- Byadagi dabbi, T_3- Sankeshwar, T_4- Sarpan hybrid, T_5- Tejashwini, T_6- VN-2, T_7- Arunalu, T_8- S-112-1, T_9- S-112-4 and T_{10}- S-20-1 were procured from Department of Genetics and Plant breeding, UAS, Dharwad and sown at the MARS, Dharwad and later they were transplanted in main field. Among different morphological characters, significantly positive correlation was observed in relation to plant height (0.5935), leaf area (0.3565), number of leaves per plant (0.3161), petiole length (0.1381), internode length (0.1920), number of nodes per plant (0.4981) and number of branches per plant (0.2195) against aphids and thrips activity except number of trichomes (-0.1205) and leaf thickness (-0.1785) which recorded negative correlation, respectively. Whereas all morphological characters recorded significantly negative correlation (-0.0.0951, -0.2510, -0.3431, -0.4508, -0.5925, -0.3448, -0.2214, -0.3181 and -0.7535) against mite activity, while positive correlation was observed in relation to plant height (0.4688), leaf area (0.2017), number of leaves per plant (0.3400), internode length (0.1657), number of nodes per plant (0.2810), number of branches per plant (0.4389) and negative correlation showed in petiole length (-0.0858), number of trichomes (-0.1310) and leaf thickness (-0.4250) against *H. armigera*.

KEY WORDS :
Fruit borer, Leaf curl index, Morphological characters, Sucking pests

How to cite this article : Sujay, Y.H., Giraddi, R.S., Sridevi, O. and Goudar, S. (2017). Influence of crop phenology on the activity of insect-pests of chilli (*Capsicum annuum* L.). *Agric. Update*, **12** (TECHSEAR-8) : 2040-2043.

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BACKGROUND AND OBJECTIVES

Chilli (*Capsicum annuum* L.) is a tropical and subtropical crop grown all over India. It is an important versatile spice as well as vegetable crop. India is the largest consumer and exporter of chilli in the world with a production of 15.2 lakh tonnes from an area of 811 thousands ha and productivity 1.9 MT per ha during 2014 (NHB, 2015). The major chilli growing states are Andhra Pradesh, Maharashtra, Karnataka, Tamilnadu and Rajasthan. Chillies constitute about 20 per cent of Indian spice exports in quantity and about 14 per cent in value. One of the practical means of increasing chilli production is to minimize losses caused by major insect pests, the most important among them are green peach aphid (*Myzys persicae* Sulzer, *Aphis gossypi* Glover), thrips (*Scirtothrips dorsalis* Hood), yellow mite (*Polyphagotarsonemus*

latus Banks) and fruit borer (*Helicoverpa armigera* Hubner) (Berke and Sheih, 2000). In Karnataka thrips, mites, aphids and whiteflies have been identified as sucking pests of chilli of which chilli leaf curl caused by mite and thrips are serious (Puttarudriah, 1959). Besides, a number of viruses are transmitted by aphids, whiteflies etc which result into a complex murda (Gundannavar *et al*., 2007). The yield losses due to these pests are estimated to be 50 per cent (Kandasamy *et al*., 1990 and Hosmani, 2007). The loss caused by the thrips is reported to range from 50 to 90 per cent (Borah, 1987) and fruit borers is to an extent of 90 per cent (Reddy and Reddy, 1999). So, different strategies have to be involved for keeping the pest in check and stabilizing the productivity of cropping system.

Due to variation in the phenological characters of different germaplasms insects show varying trends in their incidence and extent of damage to the crop. Besides, some known and unknown factors also play a key role in determining the incidence and dominance of a particular pest or pest complex. Therefore, a screening oriented study on population build up of sucking pests and fruit borers in chilli was conducted which would give an idea about tolerance or susceptibility of their activity and may be helpful in developing pest management strategies. Host plant resistance options that are to be looked into, which have the potential to become viable components of a sound IPM programme.

RESOURCES AND METHODS

To know the influence of plant morphological characters on the activity of insect pests of chilli, ten genotypes *viz.*, T_1- Byadagi kaddi, T_2- Byadagi dabbi, T_3- Sankeshwar, T_4- Sarpan hybrid, T_5- Tejashwini, T_6- VN-2, T_7- Arunalu, T_8- S-112-1, T_9- S-112-4 and T_{10}- S-20-1 were procured from Department of Genetics and Plant breeding, UAS, Dharwad and sown at the MARS, Dharwad and later they were transplanted in main field. A spacing of 60 cm x 60 cm row to row and plant to plant was maintained for each genotype. Each genotype was transplanted in a single row of 6 meter length with 10 plants per row and was replicated twice. A distance of one meter was kept between the two replications. All the agronomic practices were followed except plant protection according to the package of practices. The biometric observations such as plant height (cm), leaf area (cm), number of leaves per plant, number of branches per plant petiole length (cm), internodes length (cm), number of nodes per plant, number of trichomes (cm^2) and leaf thickness (mm) were made on 90 days old plants after transplanting in the main field. These morphological characters were accounted for establishment of relationships with pest incidence and natural enemy abundance.

The population count of aphids, thrips and mites were taken at 90 days after transplanting (DAT). For counting the population, five plants were selected randomly in each plot and tagged. Six leaves on the top canopy of each selected plant were observed by using binocular microscope in laboratory following destructive sampling procedure. The mean population of aphids, thrips and mites per leaf was worked out. Ten plants were selected randomly in each plot and scored visually for leaf curling index (LCI) at 90 DAT following the 0-4 scale (Niles, 1980) and subjected to statistical analysis. The mean LCI was worked out. The observations on larval population of chilli fruit borer, *H. armigera* were made on five randomly selected plants from each treatment at 90 DAT. The mean larval population was worked out. The per cent fruit damage was worked out by counting total number of fruits per plant and number of damaged fruits per plant on five randomly selected plants in each treatment at every picking.

OBSERVATIONS AND ANALYSIS

Among different morphological characters, significantly positive correlation was observed in relation to plant height (0.5935), leaf area (0.3565), number of leaves per plant (0.3161), petiole length (0.1381), internode length (0.1920), number of nodes per plant (0.4981) and number of branches per plant (0.2195) against aphids and thrips activity except number of trichomes (-0.1205) and leaf thickness (-0.1785) which recorded negative correlation, respectively (Table 1). Whereas all morphological characters recorded significantly negative correlation (-0.0.0951, -0.2510, -0.3431, -0.4508, -0.5925, -0.3448, -0.2214, -0.3181 and -0.7535) against mite activity, while positive correlation was observed in relation to plant height (0.4688), leaf area (0.2017), number of leaves per plant (0.3400), internode length (0.1657), number of nodes per plant (0.2810), number of branches per plant (0.4389) and negative correlation showed in petiole length (-0.0858), number of trichomes (-0.1310) and leaf thickness (-

Table 1 : Phenotypic correlations with chilli pests in different genotypes

Particulars	Aphid	Thrips	Mites	*H. armigera*	Plant height (cm)	Leaf area (cm^2)	No. of leaves/ plant	Petiole length (cm)	Internode length (cm)	No. of nodes/plan.	No. of trichomes (cm^2)	No. of branches/ plant	Leaf thickness (mm)
Aphid	1.000												
Thrips	0.434418	1.000											
Mites	0.302956	0.122511	1.000										
H. amigera	0.62262	0.493437*	0.493572*	1.000									
Plant heigh. (cm)	0.593544*	0.404263*	-0.09514	0.468801*	1.000								
Leaf area (cm^2)	0.356515*	0.094459	-0.25109	0.220784	0.637623*	1.000							
No. of leaves/ plant	0.316117*	0.280905	-0.34312	0.340063*	0.891965*	0.593624*	1.000						
Petiole length (cm)	0.138142	0.063071	-0.45085	-0.08587	0.523298*	0.43157*	0.722567*	1.000					
Internode length (cm)	0.192057	0.15826	-0.59253	0.16771	0.77326*	0.469452*	0.923893*	0.622366*	1.000				
No. of nodes/plant	0.498179*	0.064304	-0.34489	0.281084	0.823052*	0.87336*	0.743005*	0.466019*	0.706771*	1.000			
No. of trichomes (cm^2)	-0.12053	0.018554	-0.22142	-0.13102	0.069598	-0.08676	0.336505	0.812348*	0.227903	-0.09445	1.000		
No. of branches/plant	0.219541	0.233044	-0.31814	0.436964*	0.583086*	0.739958*	0.579147*	0.334233	0.523342*	0.755796*	-0.0052	1.000	
Leaf thickness (mm)	0.094229	-0.17535	-0.75351	-0.42505	0.081205	0.235035	0.164828	0.533759*	0.3421	0.356971*	0.350477*	0.235894	1.000

* indicate significance of value at P=0.05, respectively

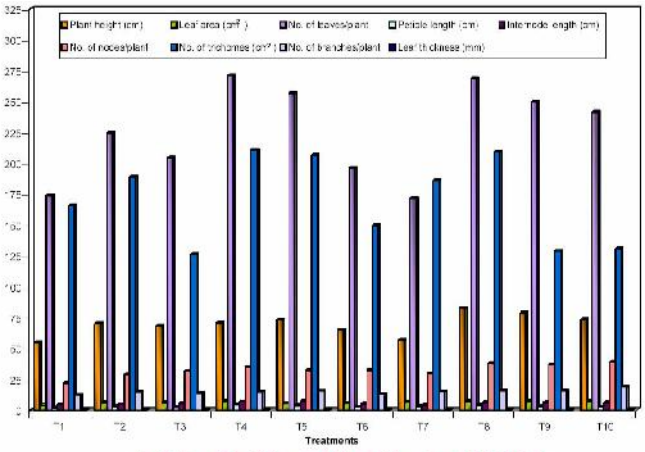

Fig. 1 : Plant morphological characters of different chilli genotypes at 90 DAT - Pooled

0.4250) against *H. armigera*. It seems crop characters such as lower leaf area, lower number of leaves per plant, lower number of branches per plant, lower petiole length, lower internode length, lower number of nodes per plant, lower number of trichomes and lower leaf thickness was seen in Byadagi kaddi and Byadagi dabbi which contribute to susceptibility. Whereas, in sarpan hybrid, Tejaswini and VN-2 which possessed higher leaf area, higher number of leaves per plant, higher number of branches per plant, higher petiole length, higher internode length, higher number of nodes per plant, higher number of trichomes and higher leaf thickness contributed to moderate resistance. The degree of susceptibility or resistance in chilli genotypes has been documented previously by Rajaram and Ramamurthy, 2001; Shankarnag and Madalagiri, 2005 and Shivaramu and Kulkarni, 2008 against *H. armigera*. In future studies there is a need to assess how phenological and biochemical characteristics determine resistance/ susceptibility against chilli pests.

Acknowledgement :

The senior author wishes to thank the University of Agricultural Sciences, Dharwad for providing necessary facilities and Indian Council for Agriculture Research, New Delhi for the financial support for the present study.

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REFERENCES

Berke, T. and Sheih, S.C. (2000). Chilli peppers in Asia. *Capsicum & Egg Plant Newslett.,* **19** : 38-41.

Borah, D.C. (1987). Bioecology of *Polyphagotarsonemus latus (*Banks) (Acari; Tarsonemidae) and *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) infesting chilli and their natural enemies. Ph. D Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA).

Gundannavar, K.P., Giraddi R.S., Kulkarni K.A. and Awaknavar, J.S. (2007). Development of Integrated Pest Management modules for chilli pests, *Karnataka J. Agric. Sci*., **20**: 757-760.

Hosamani (2007). Management of chilli murda complex in irrigated ecosystem. Ph.D Thesis, University of Agricultural Sciences Dharwad, KARNATAKA (INDIA).

Kandasamy, C., Mohanasundaram, M. and Karuppachamy, P. (1990). Evaluation of insecticides for the control of thrips. *Scirtothrips dorsalis* Hood in chillies (*Capsicum annuum* L.). *The Madras Agric. J.*, **77** : 169-172.

National Horticulture Board. Indian Horticulture Database (2016). 5

Niles, G.A. (1980). Breeding cotton for resistance to insect pests. In *Breeding plant resistance to insects*, Macwell. F. G and Jennings, (Eds) P.R John Wiley and Sons, New York, pp 337-369.

Puttarudriah, M. (1959). Short review on the leaf curl complex and spray programme for its control. *Mysore J. Agric. Sci.*, **34**: 93-95.

Rajaram, V. and Ramamurthy, R. (2001). Influence of morphological characters on the incidence of chilli thrips (*Scirtothrips dorsalis*) and mite (*Polyphagotarsonemus latus*). *Ann. Plant Protect. Sci.*, **9**(1) : 54-55.

Reddy, M.R.S. and Reddy, G.S. (1999). An eco-friendly method to combat *Helicoverpa armigera* (Hub.). *Insect Environ*., **4**: 143-144.

Shankarnag, B. and Madalageri, M.B. (2005). Screening in chilli against *Helicoverpa armigera* Hubner. *J. Phytological Res.*, **18** (2): 271-274.

Shivaramu, K.and Kulkarni, K.A. (2008). Crop loss assessment due to *Helicoverpa armigera* (Hübner) in **chilli.** *Pest Manag. Hortic. Ecosyst.*, **14** (1): 59-66.