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Original Research Article

Impact of Abiotic Factors on Population Dynamics of Sucking Pests in Chilli

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A B S T R A C T

Investigations on "Impact of Abiotic Factors on Population Dynamics of Sucking Pests in Chilli" were carried out at Samajik Vigyan Kendra, Dr. B. R. Ambedkar University Rehti, (Village Bordi) Tehsil- Nasrullaganj, Distt- Sehore (M.P.) Pincode-466 331 The two pests *viz.*,Mites (*Polyphagotarsonemus latus* Banks) and aphid (*Aphis gossypii* Glover). Results revealed that the incidence of sucking pests *viz.*, Mites (*Polyphagotarsonemus latus* Banks) initiated from 1st WAT *i.e.* the last week of September (3.40 mites/leaf) and reached to a peak level (17.23 mites/leaf) during 8th WAT *i.e.* third week of November. The incidence of aphid, (*Aphis gossypii* Glover) started from 5th WAT *i.e.* fourth week of October and peak population of aphid (13.6 aphids/leaf) was recorded at 7th WAT *i.e.* Fourth week of November. Among various weather parameters, mites had highly significant positive correlation with maximum, minimum and average temperature and highly negative significant correlation with wind velocity. Aphid incidence and weather parameters revealed that highly significant positive relationship existed with maximum, minimum and average temperature whereas significant negative correlation was found with wind velocity.

Keywords

Chilli, Population, Week, Mites, Aphid

Introduction

Chilli (*Capsicum annuum* L.) belongs to the family Solanaceae and is an important spice cum vegetable crop commonly used in Indian dietary. It is grown throughout the year as a cash crop and used in green and red ripe dried stage for its pungency, colour and other ingredients in all culinary preparations of rich and poor alike to impart taste, flavour and colour. It is also called as sweet pepper, bell pepper or green pepper. Nutritionally, it is a rich source of vitamin A, B and C. Capsaicin an alkaloid responsible for pungency in chillies has medicinal properties and it prevents heart attack by dilating the blood vessels (Gill, 1989). Various factors are responsible for low productivity and production of chilli that include adverse climate, poor quality seeds, diseases, insect and mite pests. The insects and mites are of prime importance which significantly affects both the quality and production of chilli. About 51 insects and 2 mite species, belonging to 27 families and 9 orders were found infesting chilli (Reddy and Puttaswami, 1988). Among these thrips, *Scirtothrips dorsalis* Hood, whitefly, *Bemisia tabaci* Genn., aphid, *Aphis gossypii* Glover, jassid, *Amrasca biguttula biguttula* (Ishida), fruit borer, *Helicoverpa armigra* (Hubner) and mites, *Polyphagotarsonemus latus* Banks are important pests contributing 60 to 75 per

cent yield loss in green chilli. Due to variation in the agro climatic conditions of different regions insects show varying trends in their incidence, nature and extent of damage to the crop. Available scientific literature showed that not much information is available especially on population dynamics and influence of various environmental factors on the fluctuation of sucking pests on chilli crop in semi arid region of Rajasthan specially in *Zaid* crop. Suitable understanding of the population dynamics of major sucking insect pests is important due to variation in the weather condition and changing pest status. The study would give an idea about their peak period of pests activity which may be helpful in developing pest management strategy against them. For effective pest management, study on the influence of the various factors responsible for population fluctuation on a particular crop might assist in prediction of its occurrence in a given area (Subharani and Singh, 2007). Thus the knowledge of the influence of weather parameters on the incidence of insect pests on chilli will help to develop a forecasting system to implement timely plant protection measures.

Materials and Methods

The experiment was conducted during *Rabi*, 2018-19 and 2019-20 at Samajik Vigyan Kendra, Dr. B. R. Ambedkar University Rehti, (Village Bordi) Tehsil- Nasrullaganj, Distt- Sehore (M.P.) on "population dynamics of major sucking pests of chilli, *Capsicum annum* and comparative bio-efficacy of synthetic and biopesticides" variety HPH-12 (Hybrid) was transplanted under natural conditions without spraying the insecticides.

The population of sucking pests *viz.,* Mites (*Polyphagotarsonemus latus* Banks) and aphid (*Aphis gossypii* Glover). Were recorded at weekly intervals during morning hours between 7.00 am to 9.00 am on five randomly selected and tagged plants in each plot from one lower, one middle and one upper leaves till the maturity by using sampling techniques, population was counted on three leaves and expressed as number per three leaves.

Statistical analysis

Average insect population received at each 07 days interval, will be tabulated and analyzed by the method of "Correlation Coefficient" as suggested by Karl Pearson's (1990). Insect population will be correlated with different weather parameters and regression studies will be undertaken.

Results and Discussions

The mean population of mites (*Polyphagotarsonemus latus* Banks) and aphid (*Aphis gossypii* Glover). are presented in Table 1 and Fig. 1. During the course of investigation, mites and aphid were recorded as major insect pests of chilli.

Mites (*Polyphagotarsonemus latus* Banks)

The data on mites population are presented in Table 1 and graphically depicted in Fig. 1 The results showed that the population of mites was started from 1st WAT *i.e.* the 2nd week of November, in 2018 & 2019 (3.40 & 4.80 mites/leaf) and reached to a peak level (17.23 & 19.73 mites/leaf) during 8th WAT *i.e.* 5th week of December in 2018 & 7th WAT *i.e.* 4th week of December in 2019. Thereafter, the mite population was gradually declined and disappeared by 18th WAT in 2018 & 14th WAT in 2019.

In past, Meena *et al.,* (2013) revealed that mite population observed from fourth week of July to continue up to fourth week of

November and peak population found in the second week of September. Lingeri (1998) studied the investigation on the seasonal incidence of chilli mite *Polyphagotarsonemus latus* (Banks) during 1993-94 at Dharwad. *P. latus* were noticed throughout the cropping period on all five dates of transplanting and peak activity of chilli mite was noticed in the month of November and February and the mite population was favored by higher temperature, lower humidity and lesser intensity of rainfall. Nandini *et al.,* (2012) studied the population dynamics of *P. latus* during *Kharif* season 2009-10 at Dharwad. During the 1st fortnight of July when the crop was young *i.e.* 60 days old significantly less mite incidence was observed (0.71 mites /5 leaves) and the peak incidence appeared during 2nd fortnight of September (22.32 mites/5 leaves) when the crop became 180 days.

Aphid (*Aphis gossypii* Glover)

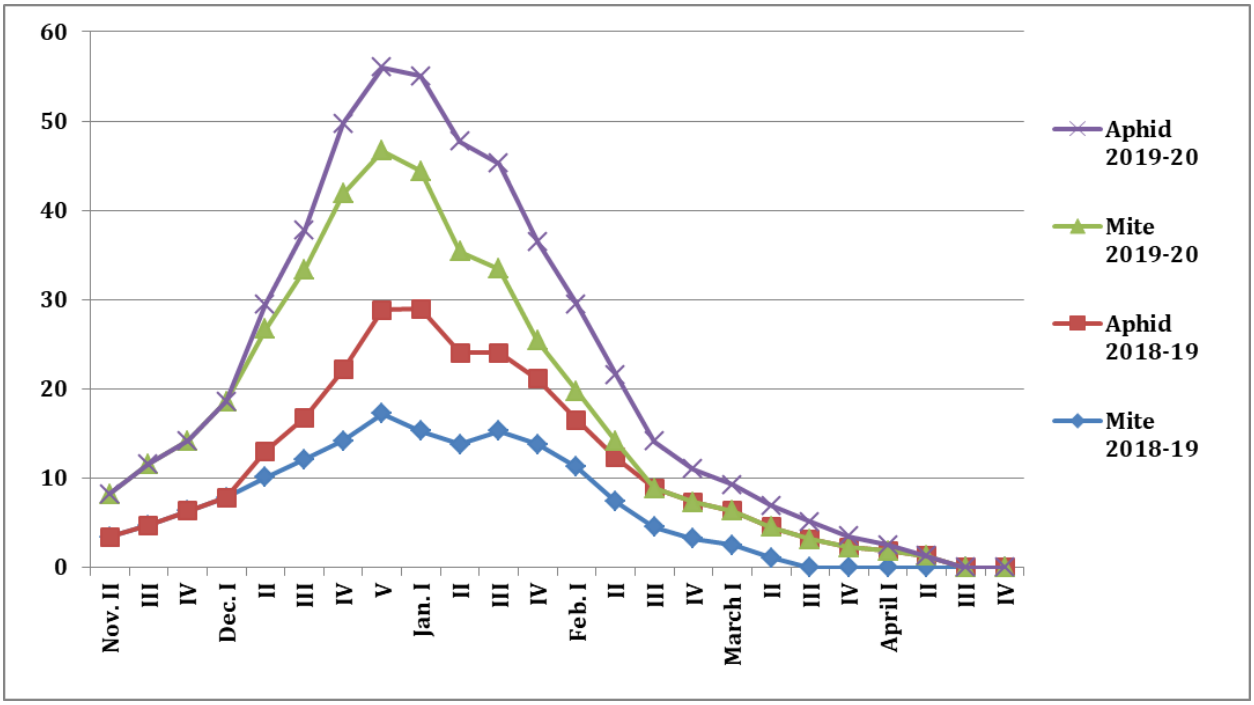
It is evident from the data (Table 1 and Fig. 1) that the population of aphid was started from the 5th WAT *i.e.* the 2nd week of December both the year (2.92 & 2.74 aphid/leaf). The incidence was increased gradually and reached the peak level (13.67 & 12.33 aphids/leaf) at 9th WAT coinciding with 1st week of January in 2019 10th WAT coinciding with 2nd week of January in 2020. Thereafter, population was steadily declined and finally disappeared.

The results of present investigation are in close confirmation with past report where in Bhardiya and Patel (2005) reported that the peak activity of aphid, *Aphis gossypii,* during third week of November. Meena *et al.,* (2013) observed that the aphid appeared little late during both the years in chilli crop. Roopa and Kumar (2014) reported the incidence of chilli aphid was observed throughout the cropping season. Debaraj and Singh (2004) recorded that the population variation of cabbage aphid in relation to abiotic and biotic factors at three different zones in Manipur showed that the aphids were prevalent from late autumn to late spring but less abundant during summer the peak population varied from one place to another. Maximum density of the pests were recorded at Mao (12 57.67 aphids/3 leaves) followed by Kangpokpi (1110.69 aphids/3 leaves) and Imphal (345.56 aphids/3 leaves) during peak period.

Table.1 Experiment details and layout

•	Season and year	: *Rabi*, 2018-2019 & 2019-2020
•	Crop	: Chilli
•	Veriety	: HPH-12 (hybrid)
•	Plots	: 04
•	Plots size	: 2.0 X 2.0 m.
•	Plot to plot spacing	: 0.5 m.
•	Plant to plant spacing	: 45 cm.
•	Date of sowing	: 12-09-2018 & 08-09-2019
•	Date of transplanting	: 10-11-2018 & 05-11-1019
•	Fertilizer Dose	: 20:60:50 NPK kg/ha

Fig.1 Population dynamics of pests infesting chilli during *Rabi*, 2018-19 & 2019-20.



In conclusion, mites and aphid were recorded as major sucking pests of chilli crop during both the years of study. The population of mites, *Polyphagotarsonemus latus* commenced in the second week of November both the year and reached to its peak in the fifth week of December and fourth week of December during 2018-19 and 2019-20, respectively. The population of aphid, *Aphis gossypii* commenced in the second week of December both the year and reached its peak in the first week of January and second week of January during 2018-19 and 2019-20, respectively.

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References

Bharadia, A. M. and Patel, B. R. (2005). Succession of insect pests of brinjal in north Gujarat. *Pest Management and Economic Zoology*, 13(1): 159-161. (Fide: http://www. cabdirect.org).

Debaraj, Y. and Singh, T. K. (2004). Population dynamics of cabbage aphid *Brevicoryne brassicae (*Linn.) in relation to abiotic and biotic factors at different altitudes of Manipur. *Indian Journal of Entomology*, 66(2): 172-175.

Gill, H.S. 1989. Improved technologies for chilli production. *Indian Cocoa Arecanut and spices Journal*. 12: 118-119.

Lingeri, M. S., Awaknavar, J. S., Lingappa, S. and Kulkarni, K. A. (1998). Seasonal occurrence of chilli mites (*Polyphagotarsonemus latus* (Banks) and thrips (*Scirtothrips dorsalis*

Hood). *Karnataka Journal Agriculture Science*, 11(2): 380-385.

Meena, R. S., Ameta, O. P. and Meena, B. L. (2013). Population dynamics of sucking pests and their correlation with weather parameters in chilli, *Capsicum annum* L. crop. *The Bioscan*, 8(1): 177-180.

Nandini, Giraddi, R. S., Mantur, S. M., Patil, R. K., Mallapur, C. P. and Ashalatha, K. V. (2012). Population dynamics and extent damage of pests of capsicum under protected cultivation. *Karnataka Journal of Agricultural Science*, 25: 150-151.

Reddy, D.N.R. and Puttaswami, 1988. Pests infesting chilli (*Capsicum annum* L.) in the nursery. *Mysore Journal of Agricultural Sciences*, 18(2): 122-125

Roopa, M. and Kumar, C. T. A. (2014). Seasonal incidence of pests of capsicum in Bangalore conditions of Karnataka, India. *Global Journal of Biology, Agriculture and Health Sciences*, 3(3): 203-207.

Subha Rani, S. and Singh, T.K. 2007. Influence of meteorological factors on population dynamics of pod fly, *Melanogromyza obtusa* Malloch (Diptera: Agromyzidae) in pigeon pea under agro-climatic conditions of Manipur. *Indian Journal of Entomology*, 69(1): 78-80.