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Short Note

Population build-up of greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood) (Homoptera: Aleyrodidae) on tomato under mid hill conditions of Himachal Pradesh

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An essential component of pest population management is the knowledge of pest population ecology for formulating sound control strategies. Accordingly, the management programme must be concerned both with pest population and the environment within which this population exists. Evidently, a system approach based upon sound knowledge of the dynamics of pest population and the ecosystem they occupy is needed. Greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood) (Homoptera: Aleyrodidae) is a polyphagous pest of many herbaceous crops (Kim *et al.*, 1986) and is becoming an increasingly important pest in diverse agricultural systems especially under protected cultivation. However, recent reports reveal that this pest is fast emerging as a serious pest of vegetables including tomato in agroclimatic conditions of Himachal Pradesh under open conditions also (Dhillon, 1999, Sood and Sood, 2002)). The pest incurs losses by direct feeding and through production of honey dew on which sooty mould develops which interferes with photosynthesis. Severe infestation turns the leaves pale green which later fade and dry away. Therefore, it was thought pertinent to record the incidence and period of activity of the pest on the tomato crop under mid-hill conditions of Himachal Pradesh.

Present studies were carried out during summer seasons of 2004 and 2005 at Entomological Research Farm, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur situated at an altitude of 1290 metre above mean see level between 32°6'N latitude and 76°3'E longitude and farmers fields in village Sullah (District Kangra) situated at 1000 metre above mean sea level. The tomato crop was raised in the field following all agronomic practices as per the Package of Practices for the vegetable crops (Anonymous, 2003) in insecticide free environment. For the purpose, tomato variety Palam Pride was raised by transplanting 30 day old seedlings in the field during last week of April at Palampur during both the years and at Sullah during 2004 whereas the transplanting at Sullah during 2005 was done in the second week of April with a plant spacing of 90 cm x 30 cm. Observations on the population counts of immature stages (nymphs and pupae) and adults on tomato were recorded by examining undersides of three leaves, one each from lower, middle and upper canopy of the ten randomly selected plants as per the method suggested by Sangha *et al.* (1995) at weekly intervals. Relationship of population counts of the whitefly with abiotic factors of the environment viz., temperature (minimum and maximum) and relative humidity as well as rainfall was worked out.

The population of *T. vaporariorum* on tomato crop was first noticed in second to fourth week of May depending upon the location and crop season, which increased to its peak in third to last week of June with a peak population range of 15.6-27.6 per three leaves at 29.0-36.7°C maximum and 18.3-22.4°C minimum temperature, 46-68 per cent relative humidity, and 5.9-52.5 mm rainfall. The pest disappeared from the crop by end of July to second week of August as the crop season ended (Fig 1-4). Incidence of *T. varporariorum* has also been reported by David (1971), Paul and David (1975) and Mohan *et al.* (1988) from Nilgiri hills and Sood and Sood (2002) from Himachal Pradesh. The present findings are in conformity with those of Sood and Sood (2002) who observed the activity of the pest under a similar set of environment during May-June on tomato with a population range of 40.7 to 76.6 per three leaves.

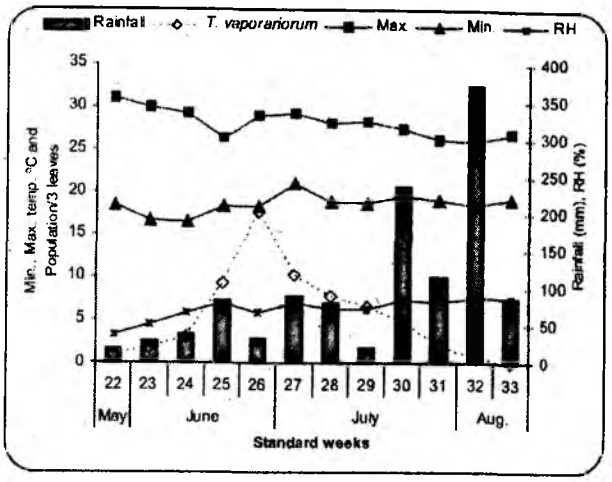


Fig. 1. Population build up of *T. vaporariorum* on tomato in relation to abiotic factors at Palampur during 2004

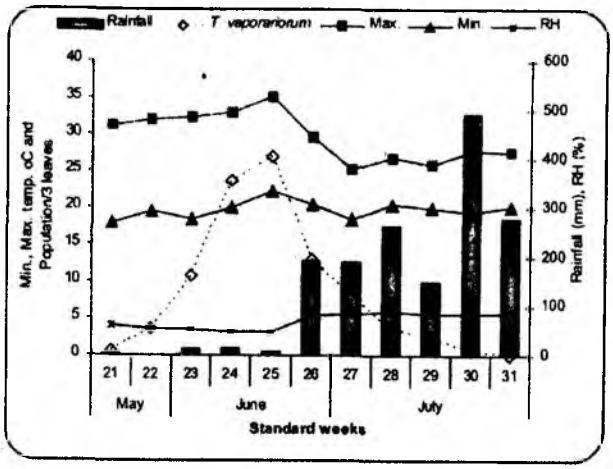


Fig. 2. Population build up of *T. vaporariorum* on tomato in relation to abiotic factors at Palampur during 2005

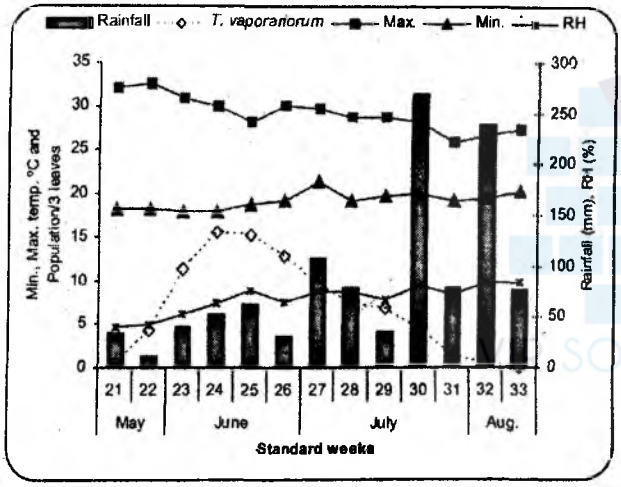


Fig. 3. Population build up of *T. vaporariorum* on tomato in relation to abiotic factors at Sullah during 2004

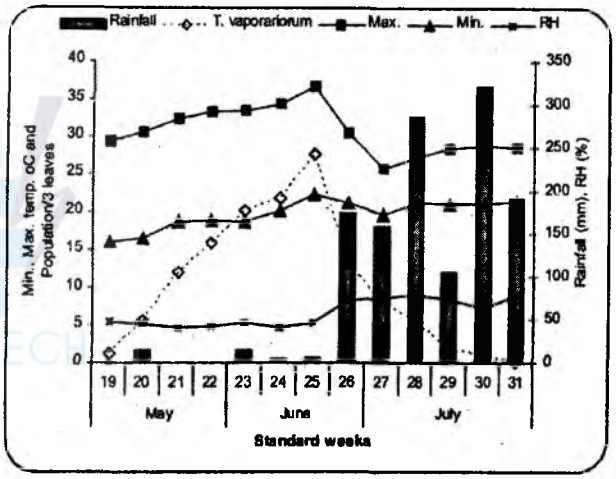


Fig. 4. Population build up of *T. vaporariorum* on tomato in relation to abiotic factors at Sullah during 2005

They also found May and June to be the period of peak activity of the pest on other vegetables, Frenchbean and brinjal during spring-summer season. The temperature range prevalent at peak activity of the pest during the present study was also found to be favourable by Sood (2002) who recorded the peak activity at 20.2°C (minimum temperature) and 32.5°C (maximum temperature).

The correlation analysis of abiotic factors and population of *T. vaporariorum* indicated a positive and significant relationship between maximum temperature and population of whitefly whereas relative humidity exerted a significant negative influence on the population only during 2005 at both the locations (Table 1). Minimum temperature exhibited varying but non-significant influence and rainfall had a slightly negative impact on the pest population. Such variations with respect to correlation analysis can be attributed to difference in weather conditions during different seasons as was also observed by Sood (2002) who could obtain a variable trend for correlation values between abiotic factors and population of *T. vaporariorum* during different seasons.

Table1. Correlation coefficient (r) between abiotic factors and population of *T. vaporariorum*

Factors	Palampur		Sullah	
	2004	2005	2004	2005
Temperature (°C)				
Maximum	0.1575	0.5987*	0.1716	0.8764**
Minimum	0.1865	0.2101	-0.2905	0.2851
RH (%)	0.0459	-0.6709*	-0.0127	-0.5409*
Rainfall (mm)	-0.3006	-0.3817	-0.3141	-0.5098

*Significant at 5% level of significance, **Significant at 1% level of significance

In addition, the present findings also found support from findings of Latha and Gopalakrishna (1995) who found the population of *B. tabaci* on pumpkin to be positively correlated with maximum temperature and negatively correlated with relative humidity and rainfall. Similarly, Palaniswami *et al.* (1996) found a significant positive correlation between maximum temperature and population of whitefly on cassava.

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