POPULATION DYNAMICS OF THRIPS (*Thrips tabaci* LINDEMAN) ON ONION IN RELATION TO WEATHER PARAMETERS

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ABSTRACT

Population dynamics of Thrips tabaci Lindeman in onion, Allium cepa Linnaeus was carried out at College Farm, ASPEE College of Horticulture and Forestry, NAU, Navsari, Gujarat during rabi 2014-15. The incidence of thrips started after 2nd week of transplanting during 3rd week of December (51st standard week) and remained in the field up to 2nd week of March (11th standard week) in the range of 2.55 to 15.49 thrips per plant with an average of 5.8 thrips per plant. The peak (15.49 thrips per plant) activity of thrips was noticed during 3rd week of February (8th standard week). The correlation studies revealed that thrips population had significant positive correlation with maximum temperature (r= 0.536*), bright sun shine hours (r= 0.799*) and mean vapour pressure (r= 0.717*).

KEY WORDS: Allium cepa, Correlation, Onion, Population dynamics, Thrips tabaci

INTRODUCTION

Onion (*Allium cepa* Linnaeus) belonging to family *Alliaceae* is one of the most important vegetable crops in India grown for more than 5000 years. Among the various factors, insect pests are one of the important factors which cause considerable losses in yield of onion. Of these insect pests, thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) is a serious pest of onion causing considerable damage and reduce the yield every season. The principal form of damage caused by onion thrips result from the piercing of cells and removal of cell contents by larva and adults. It causes economical loss if infestation starts at bulb initiation stage. In case of severe infestation, the bulbs remain undersized and distorted (Butani and Verma, 1976). In onions, this leads to an irregular or blotchy whitening of the leaves, a condition sometimes termed "blast." A heavy level of feeding injury causes the hormonal imbalance in the plant causing the leaves to curl and twist, and the foliage to be stunted (Kendall and Bjostad, 1990). Such damage decreases onion bulb size and may even lead to death of the plant. Silvering or whitening of the pods on edible-podded peas is also attributed to onion thrips (Shelton and North, 1987). Onion thirps is also implicated in the transmission of tomato spotted wilt virus to several vegetable crops and purple blotch disease in onion (Jones, 2005). Population dynamic is necessary before deciding the strategy for management of any insect pest. The objective of the present study was to determine the seasonal population abundance pattern and thrips

population dynamics with the aim of abiotic trends that would cause thrips outbreak in onion.

MATERIALS AND METHODS

In order to study the population dynamics and impact of weather parameters on incidence of *T. tabaci* on onion, a field experiment was carried out during *rabi* 2014-15 at College Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari. The seedling of onion variety Pilipatti were used during the study and transplanted in 10 m x 10 m size plot at 15 cm x 10 cm spacing. For recording the observations, 25 plants were selected randomly from the whole experimental plot and the observations on absolute thrips population were recorded at weekly interval in the morning hours as per the method suggested by Mote (1981). The observations were started from first week after transplanting and were continued till to the harvesting of the crop at the beginning of each standard meteorological week. The whole experimental plot was kept free from spraying of any insecticides. The population dynamics of *T. tabaci* was studied on the basis of number of thrips per plant. In order to find out the specific impact of different weather parameters on *T. tabaci* in onion, the data on number of thrips per plant recorded in the experimental plot of population dynamics were correlated with the different meteorological parameters *viz*., bright sunshine hours, temperature (maximum, minimum and mean), relative humidity (morning, evening and mean), vapour pressure (morning, evening and mean), evaporation and wind speed recorded at standard meteorological weeks by Department of Agricultural Meteorology, N. M. College of Agriculture, Navsari Agricultural University, Navsari. Correlation was worked out by standard statistical procedure (Steel and Torrie, 1980) at Department of Agricultural Statistics, N. M. College of Agriculture, Navsari Agricultural University, Navsari.

RESULTS AND DISCUSSION

Population dynamics

The periodical week-wise data on number of thrips per plant (Table 1 and Figure 1) revealed that the thrips population initiated after 2nd week of transplanting during 3rd week of December (51st standard week) and remained in the field up to 2nd week of March (11th standard week) in the range of 2.55 to 15.49 thrips per plant with an average of 5.87 thrips per plant. The thrips population gradually increased during 3rd week of December and slightly decline during 1st week of January. Then after the population remained in increasing order during 2nd and 3rd week of January and further reduced during 4th week of January. The population suddenly increased during 5th week of January and found increasing up to 3rd week of February and reached to the highest peak (15.49 thrips per plant) during 3rd week of February (8th standard week). The incidence of thrips gradually decreased then after up to the harvest of crop. Edelson *et al.* (1986) observed thrips incidence on onion from February to harvesting of the crop with a peak during early April. Patel (2011) observed the higher incidence of thrips during first week of February and remained in the field till to crop maturity at Anand. Ullah *et al.* (2010) reported that the activity of thrips in onion remained during on 3rd February to May. Looking to the work done by different researchers, the present finding is more or less agreement with the earlier reports.

Correlation

The results on correlation between thrips population and different weather parameters (Table 2) revealed that out of 12 weather parameters [maximum temperature (MaxT), minimum temperature (MinT), mean temperature (MeT), morning relative humidity (MoRH), evening relative

humidity (EvRH), mean relative humidity (MeRH), bright sun shine hours (BSS), wind speed (WS), evaporation (Evapo), morning vapour pressure (MoVP), evening vapour pressure (EvVP) and mean vapour pressure (MeVP)], the population of thrips had significant positive correlation with MaxT (r= 0.536*), BSS (r= 0.799*) and MeVP (r= 0.717*). It indicated that as MaxT, BSS and MeVP increased; the incidence of thrips also increased or *vice versa*. The population of thrips was positively correlated with MinT, MeT, MoRH, MeRH, Evapo, MoVP and EvVP, while, it was negatively correlated with EvRH and WS. However, the results were non-significant indicating the negligible role of above weather parameters on incidence of thrips population. Domiciano *et al.* (1993) observed negative correlation between thrips population and relative humidity and positive correlation between thrips population and maximum temperature. Waiganjo *et al.* (2008) concluded that there was significantly negative correlation between thrips population and both maximum and minimum relative humidity. Patel (2011) reported that thrips population on garlic significantly and positively correlated with bright sunshine hours and morning vapour pressure and significantly negative correlation with morning relative humidity, evening relative humidity, evening vapour pressure and mean vapour pressure. Thus, the above reports are more or less similar with the present study.

CONCLUSION

The incidence of thrips initiated after 2nd week of transplanting during 3rd week of December (51st standard week) and remained in the field up to 2nd week of March (11th standard week) in the range of 2.55 to 15.49 thrips per plant with an average of 5.87 thrips per plant. The population reached to the highest peak (15.49 thrips per plant) during 3rd week of February (8th standard week). The incidence of thrips gradually decreased then after up to the harvest of crop. The population of thrips had significant positive correlation with minimum temperature (r= 0.536*), bright sun shine hours (r= 0.799*) and mean vapour pressure (r= 0.717*).

REFERENCES

Butani, D. K. and Verma, S. (1976). Insect pests of vegetables and their control: onion and garlic. *Pesticides*, **10**(11): 33-35.

Domiciano, N. L.; Ota, A. Y. and Tedardi, C. R. (1993). Population fluctuation of thrips on onion, its association with climatic elements and control. *Anais da sociedade Entomologic do Brazil*, **22**(1): 77-83.

Edelson, J. V.; Cortwright, B. and Royar, T. A. (1986). Distribution and impact of *T. tabaci* on onion. *J. Econ. Ent.*, **79**(2): 502-505.

Jones, D. R. (2005). Plant viruses transmitted by thrips. *European J. Pl. Path.*, **113**: 119-157.

Kendall, D. M. and Bjostad, L. B. (1990). Phytohormone ecology; herbivory by Thrips tabaci induces greater ethylene production in intact onions than mechanical damage alone. *J. Chem. Ecol.*, **16**: 981-991.

Mote, U. N. (1981). Effect of time of application of few insecticides against onion thrips, *Thrips tabaci* Lind. *Indian J. Ent.*, **43**(2): 236-239.

Patel, H. C. (2011). Population dynamics, varietal susceptibility and management of thrips [*Thrips tabaci* Lindeman] in Onion (*Allium cepa* Linnaeus). M. Sc. (Agri.) Thesis (Unpublished) Submitted to Anand Agricultural University, Anand.

Shelton, A. M. and North, R. C. (1987). Injury and control of onion thrips (Thysanoptera: Thripidae) on edible

podded peas. *J. Econ. Ent.*, **80**: 1325-1330.

Steel, R. G. D. and Torrie, J. H. (1980). *Principles and Procedures of Statistics*. McGraw-Hill Book Company, New York.

Ullah, F.; Mulk, M.; Farid, A.; Saeed, M. Q. and Sattar, S. (2010). Population dynamics and chemical control of onion thrips (*Thrips tabaci*, Lindemann). *Pakistan J. Zool.*, **42**(4): 401-406.

Waiganjo, M. M.; Gitonga, L. M. and Mueke, J. M. (2008). Effects of weather on thrips population dynamics and its implications on the thrips pest management. *Africa J. Hort. Sci.*, **1**:82-90.

Table 1: Population dynamics of thrips, *T. tabaci* in onion

Month and Weeks		Weeks After Transplanting	Standard Meteorological Week	Number of thrips per Plant
December	II	1	50	0.00
	III	2	51	2.55
	IV	3	52	3.30
January	I	4	1	2.33
	II	5	2	4.10
	III	6	3	5.66
	IV	7	4	3.55
	V	8	5	8.68
February	I	9	6	10.87
	II	10	7	13.32
	III	12	8	15.49
	IV	13	9	3.22
March	I	14	10	7.55
	II	15	11	1.52
Mean				**5.87**

Table 2: Relationship between weather parameters and population of thrips in onion

Weather Parameters	Correlation Co-efficient
Maximum temperature, ^{0}C (MaxT)	0.536*
Minimum temperature, ^{0}C (MinT)	0.170
Mean temperature, ^{0}C (MeT)	0.492
Morning relative humidity, % (MoRH)	0.502
Evening relative humidity, % (EvRH)	-0.389
Mean relative humidity, % (MeRH)	0.288
Bright sun shine hours, hr/day (BSS)	0.799*
Wind speed, kmhr-1 (WS)	-0.300
Evaporation, mm/day (Evapo)	0.466
Morning vapour pressure, mm of hg (MoVP)	0.241
Evening vapour pressure, mm of hg (EvVP)	0.153
Mean vapour pressure, mm of hg (MeVP)	0.717*

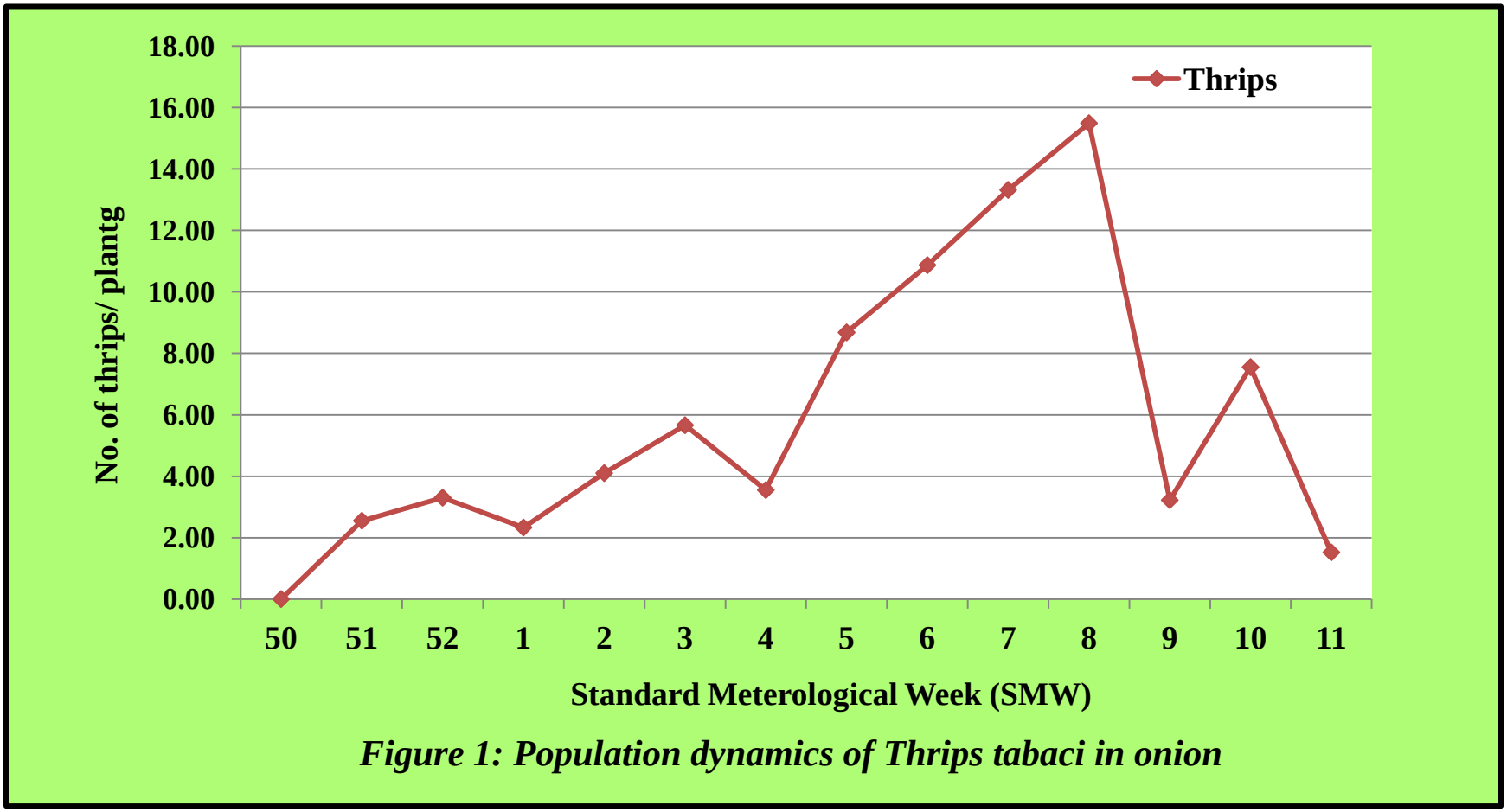

Figure 1: Population dynamics of Thrips tabaci in onion

[MS received : August 24, 2017] *[MS accepted : September 09, 2017]*