

Population dynamics of thrips on summer groundnut

S.M. Mithapara¹, A.M. Bharadiya², D.J. Majithia³ and B.P. Baldaniya⁴

¹Research Scholar, Dept. of Entomology, Junagadh Agricultural University, Junagadh (India)

²Associate Research Scientist, Junagadh Agricultural University, Junagadh (India)

³Research Scholar, Dept. of Entomology, Junagadh Agricultural University, Junagadh (India)

⁴Research Scholar, Dept. of Entomology, Junagadh Agricultural University, Junagadh (India)

ABSTRACT

Population dynamics of thrips revealed that the incidence of thrips commenced in the 8th standard meteorological week *i.e.* 2nd week of sowing indicating 0.70 thrips per three terminal leaves per plant, which gradually increased and attained a peak of 11.44 thrips per three terminal leaves per plant during the 14th standard weather week *i.e.* 8th week of sowing. Thereafter, it started to decline slowly toward the maturity of the crop. The population of thrips showed significant negative correlation with minimum temperature ($r=-0.564^*$), morning and evening relative humidity ($r=-0.576^*$) and ($r=-0.587^*$) and positive significant correlation with bright sunshine hours ($r=0.580^*$).

Key words: Population dynamics, thrips, groundnut, summer

INTRODUCTION

Groundnut (*Arachis hypogaea* Linn.) is one of the world's most important leguminous oilseed crops. The word groundnut (*Arachis hypogaea* L.) is derived from the Greek word "Arachis" meaning legume and "hypogaea" meaning below ground. It is commonly known as peanut, monkey-nut and goobernut. Groundnut is native to South America. It was found in Brazil or Peru as early as 950 BC and later spread to Africa, North America, Europe and Asia. The major groundnut producing countries are China, Nigeria, U.S.A., Taiwan, Indonesia, Senegal, Ghana, Argentina and Brazil. It is the most important commercial crop mostly grown in semi-arid tropical regions like India. The crop can be grown successfully in areas receiving rainfall from 600 mm to 1200 mm. The best soil for the groundnut crop is sandy loam, loamy and medium black (1).

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of tropical and sub-tropical regions of the world. In India, groundnut is mostly grown in five states *viz.*, Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra which accounts for 70 per cent of the total area and 71 per cent of the total production of summer groundnut. In India, the total area under kharif groundnut cultivation was 40.684 lakh ha with a production of 66.152 lakh tonnes and a yield of 1626 kg/ha. However, during the summer season, it is grown in an area of 8.393 lakh ha with a production of 16.018 lakh tonnes and the yield was 1909 kg/ha. (2). Groundnut crop is grown as rain-fed in bulk during kharif season but it is also taken during the summer season, wherever, the irrigation facilities are available. The crop is grown as monoculture in the Saurashtra region of Gujarat. Junagadh, Rajkot, Amreli, Jamnagar, Bhavnagar and Kutch districts of Gujarat state contribute about 15% total production of summer groundnut of Gujarat state.

In Gujarat, the total area under kharif groundnut cultivation was 16.272 lakh ha with a production of 39708.76 million tonnes and a yield of 2440 kg/ha. However, during the summer season, it is grown in an area of 0.51 lakh ha with a production of 949.29 million tonnes and the yield was 1843 kg/ha. (3).

Among different insect pests infesting this crop in Gujarat, the thrips are considered a key pest. The damage caused by this pest depends on the population of damaging stage of an insect, crop growth stage, cropping pattern in the area and prevailing environmental conditions. (6). Among different insect pests, white grub cause yield losses up to 20-100%, tobacco caterpillar causes up to 15-30%, red hairy caterpillar causes up to 75%, leaf miner causes up to 49%, jassids causes up to 17% and thrips causes up to 17% yield losses (4).

MATERIALS AND METHODS

The field experiment was conducted at the Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh during summer 2019-20. Experiment was laid out in a Randomized Block Design (RBD).

Methodology

The population study of thrips was carried out on groundnut variety GJG-31 during summer 2020. The crop was sown in a plot size of 20 m x 20 m at the spacing of 30 cm x 10 cm. All other agronomical practices were followed as per the scientific recommendations. The crop under the experiment was free from any insecticidal sprays throughout the crop season. For recording the observations, ten equal quadrates each of size 1.0 m x 1.0 m were made and from, which 5 plants were randomly selected. The observation on a population of thrips was recorded at a weekly interval from three terminal leaves of the plant, starting from germination to harvest of the crop.

Method for recording observation

The observation on a population of thrips was recorded from five randomly selected plants from each quadrate by examining three terminal leaves per plant at weekly intervals. The data, thus, obtained were statistically analyzed and correlated with meteorological parameters.

To study the effect of various weather parameters *viz.*, temperature (maximum and minimum), relative humidity (morning and evening), wind velocity, bright sunshine hours and evaporation rate on a population of thrips, the weekly meteorological data were obtained from the meteorological observatory of College of Agriculture, Junagadh Agricultural University, Junagadh and simple correlation were worked out.

Statistical procedure

To study the influence of various meteorological parameters on the population of thrips infesting groundnut, a correlation co-efficient was worked out by the method suggested by (5). A simple correlation was worked out between the weekly average population of thrips and various weather parameters by using the following formula.

$$r_{X_1Y_1} = \frac{\sum X_1 Y_1 - \frac{(\sum X_1)(\sum Y_1)}{n}}{\left\{ \sum X_1^2 - \frac{(\sum X_1)^2}{n} \right\} \left\{ \sum Y_1^2 - \frac{(\sum Y_1)^2}{n} \right\}}$$

Where, $r_{X_1Y_1}$ = Simple correlation coefficient

X_1 = Various weather parameter

Y_1 = Weekly pest population

n = Number of observation

Correlation study

The weekly meteorological data were obtained from the meteorological observatory of Junagadh Agricultural University, Junagadh. To study the impact of different abiotic factors on pest incidence, a simple correlation between pest population and weather parameters was worked out.

Observations recorded

1. No. of thrips/three terminal leaves/plant

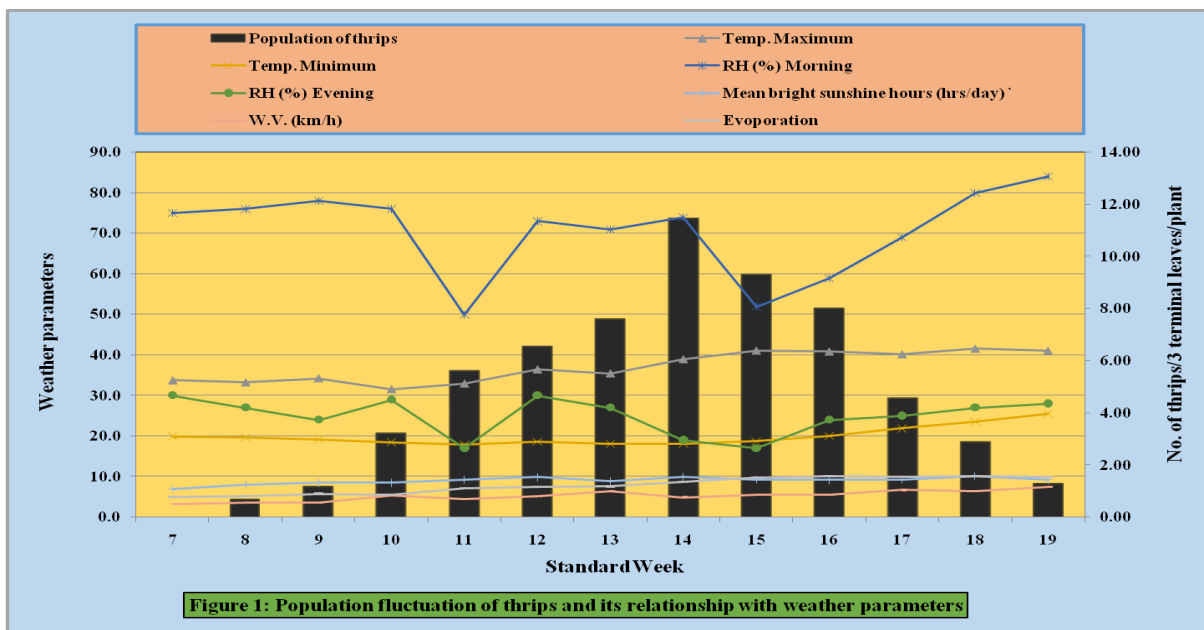
RESULTS AND DISCUSSION

A study was carried out to know the occurrence and abundance of thrips on GJG-31 variety of groundnut during summer 2020. The data obtained are summarized in Table 1 and depicted in Fig. 1.

Table 1: Population fluctuation of thrips on summer groundnut

Week after sowing	SMW	Month	Average no. of thrips per three terminal leaves
1	7	FEBRUARY	0.00
2	8		0.70
3	9		1.20
4	10	MARCH	3.22
5	11		5.60
6	12		6.50
7	13		7.60
8	14	APRIL	11.44
9	15		9.30
10	16		8.00
11	17	MAY	4.58
12	18		2.90
13	19		1.30
14	20		0.00

SMW: Standard Metrological Week



The result presented in Table 1 revealed that the population of thrips was ranging from 0.70 to 11.44 thrips per three terminal leaves per plant. The incidence of thrips commenced in the 8th standard weather week of February (2nd week of sowing) indicating 0.70 thrips per three terminal leaves per plant, which gradually increased and attained a peak of 11.44 thrips per three terminal leaves per plant during the 14th standard weather week of April (8th week of sowing). Thereafter, it started to decline slowly toward the maturity of the crop.

A study on the effect of various weather parameters on the fluctuation of thrips population in groundnut (Table 2) indicated that weather parameter viz., minimum temperature, morning and evening relative humidity

Table 2: Correlation matrix of population of groundnut thrips with weather parameters at Junagadh during summer 2020

Weather Parameters	2020
Maximum Temperature (0C) (Max T)	0.244
Minimum Temperature (0C) (Min T)	-0.564*
Morning Relative Humidity (%) (Mo RH)	-0.576*
Evening Relative Humidity (%) (Eve RH)	-0.587*
Wind Speed (km/hr) (WS)	0.128
Bright Sunshine (hr/day) (BSS)	0.580*
Evaporation (mm) (Evap)	0.344

Number of observations (week): 14

*significant at 5% (r=0.532)

**significant at 1% (r=0.661)

showed statistically negative significant correlation with thrips population. However, the thrips population has a positive non-significant correlation with maximum temperature, wind speed and evaporation and a positive significant correlation with bright sunshine hours. Thrips population exhibited significant negative correlation with minimum temperature (r=-0.564*), morning and evening relative humidity (r=-0.576*) and (r=-0.587*) and positive non-significant correlation with maximum temperature (r=0.244), wind speed (r=0.128) and evaporation (r=0.344), whereas positive significant correlation with bright sunshine hours (r=0.580*).

CONCLUSIONS

It can be concluded that thrips reach their peak activities (11.44 thrips per three terminal leaves per plant) during the 1st week of April (14th standard meteorological week).

ACKNOWLEDMENT

The authors are highly grateful to the Director of Research, Junagadh Agricultural University, Junagadh, Gujarat (India) for providing the facilities required to conduct this experiment.

REFERENCES

- [1]. Anonymous, (1990). *Annual Research Report of Oilseed Crops*, Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh. pp: 180-183.
- [2]. Anonymous, (2018a). Directorate of Agriculture. Gujarat state, Gandhinagar. District wise area, production and yield of groundnut 2009 to 2018. pp: 23-24. [<https://dag.gujarat.gov.in/images/directorofagriculture/pdf/APY-2015-16-2016-17-2017-18.pdf>], Retrieved on 18/5/2020.
- [3]. Anonymous, (2018b). Directorate of Economics and Statistics, Department of Agricultural and co-operation. Area, production and yield of principal crops. pp: 1-2. [https://agricoop.gov.in/sites/default/files/2ndadvest2018-19_E.pdf], Retrieved on 18/5/2020.
- [4]. Ghewande, M. P. and Nandagopal, V. (1997). Integrated pest management in groundnut with special reference to India (NRCG, Junagadh). *IPM Reviews*, 2(1): 1-15.
- [5]. Panse, V. G. and Sukhatme, P. V. (1985). *Statistical method for agriculture workers*, I.C.A.R., New Delhi, pp: 361.
- [6]. Patel, R. C. and Patel, J. R. (1983). Crops Losses due to insect pest in Gujarat state. *Indian Journal of Entomology*, 45(1): 27-32.