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Population dynamics of whitefly Bemisia Tabaci (Gennadius) on chrysanthemum under polyhouse condition

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Abstract
Population dynamics of whitefly *Bemisia tabaci* (Gennadius) on chrysanthemum revealed that incidence of whitefly, *Bemisia tabaci* (Gennadius), commenced from the 23rd Standard Meteorological Week (SMW) with an initial population of 1.2 whiteflies per plant and persisted throughout the cropping period. The population gradually increased over time and attained its peak during the 30th SMW, recording 9.6 whiteflies per plant. Thereafter, a declining trend in whitefly population was observed during the subsequent weeks. The findings of experiment indicated that prevailing weather parameters had a considerable influence on the population fluctuation of whitefly under polyhouse conditions. Correlation studies revealed that the whitefly population exhibited a negative association with both maximum temperature (r = -0.352227) and minimum temperature (r = -0.254907). In contrast, a positive relationship was observed between whitefly population and morning relative humidity (r = 0.0917387) as well as afternoon relative humidity (r = 0.11079618). The results suggested that comparatively higher humidity levels favored the buildup of whitefly population, whereas increasing temperature exerted an adverse effect on its incidence under protected cultivation conditions.

Keywords: Population dynamics, whitefly, chrysanthemum, polyhouse

Introduction
Flowers is powerful means of expressing human emotions such as love, happiness, respect, and sympathy as well as used as universal symbols of peace, beauty, and harmony.
In India agrarian system has traditionally focused mainly on achieving food and nutritional security through self-sufficiency in food grains and horticultural crops. The word chrysanthemum is derived from the Greek words 'chrysos' (gold) and 'anthemon' or 'anthos' (flower). Whitefly is one of the most dangerous insect of chrysanthemums. Depending on the season and the plants in the field and greenhouse, the amount of damage caused by whiteflies varied from 20 to 100 per cent. Under polyhouse cultivation, chrysanthemum provides a highly favorable microclimate for the rapid multiplication of whitefly,

Materials and Methods
During the preliminary open field survey whitefly infestation in chrysanthemum was found to be infested chrysanthemum. These whiteflies were randomly collected (about 30-35 adults and nymphs) with the help of aspirator and then transfer by using fine camel hair brush in 70% alcohol in glass vessel. The experiment was carried out at Poly house of Main Sugarcane Research Station, N. M. College of Agriculture, Navsari Agricultural University, Navsari Gujarat during the year 2025.
During the period of experiment, the weather parameters recorded at meteorological observatory of College Farm, N.M. College of Agriculture, Navsari. Chrysanthemum (cv. Ajina purple) plant which is transferred from soil into plastic beg were collected from Horticulture Nursery, ASPEE college of Horticulture, NAU., Navsari. The plant is uniform age of 20 days. Then all plants transferred to Poly house and arranged as per lay out at distance of 30cm x 30cm. All recommended agronomical practices were followed.

Observation recorded
The observation on number of whiteflies per three leaves was recorded from 20 plants from both the surface of three leaves representing top, middle and lower plant part. The observations on number of whiteflies were recorded with the help of magnifying glass (10X) in the morning hours as per standard meteorological week (SMW) under polyhouse condition. The plants were carefully handled to avoid disturbing whiteflies to get actual population. Then mean number of whiteflies per three leaves was calculated and the data was correlated with wheather parameters.

Effect of weather parameters on whitefly population
Data on maximum and minimum temperature, morning and evening relative humidity was recorded at the meteorological observatory, college farm, NMCA, Navsari Agricultural University, Navsari, and thus available data was used to find out the effect of weather parameters on population dynamics of whitefly infesting chrysanthemum.

Study of Correlation
The data was utilized to work out simple correlation co-efficient between whitefly population and various weather parameters and was statistically analyzed. Simultaneously, meteorological data were also recorded during the entire experimental period.

Results and Dissection
The results pertaining to the mean number of whiteflies per three leaves per plant are presented in Table 1 and illustrated in Fig. 1. The observations on seasonal activity of whitefly were recorded on chrysanthemum at the Polyhouse Sugarcane Research Station, Navsari Agricultural University, Navsari, during the year 2025. Further, correlation coefficients were worked out to determine the

influence of various weather parameters on the activity of whitefly, which helped in understanding its population dynamics in relation to prevailing environmental conditions. The study of population dynamics, supported by correlation analysis, serves as a valuable tool in predicting pest outbreaks and formulating timely and effective management strategies. The findings of the present investigation thus contribute to a better understanding of the ecological behaviour of whitefly and its interaction with weather parameters under the specific agro-climatic conditions of Navsari, Gujarat.

The data indicated that whitefly incidence commenced during the 23th Standard Meteorological Week (SMW) and persisted up to the 39th SMW. At the initial stage, the population was low (0.8 whiteflies per three leaves per plant), but it exhibited a steady and progressive increase with the advancement of the season. The population reached its peak (9.6 whiteflies per three leaves) during the 31st SMW, after which a declining trend was observed, with values decreasing values of whiteflies per three leaves. The trend in population buildup appeared to be closely associated with the prevailing weather conditions. The highest population recorded during the 31st SMW coincided with a maximum temperature of 31.1°C and a minimum temperature of 24.1°C, along with high morning relative humidity (94%) and comparatively lower afternoon relative humidity (77%). These conditions seem to have favoured the rapid multiplication and establishment of whitefly population. The subsequent decline in population could be attributed to changes in environmental conditions as well as crop maturity. Overall, the findings suggest that whitefly population dynamics are strongly influenced by abiotic factors, and such information is useful for predicting pest incidence and devising timely management strategies under similar agro-climatic conditions. The findings are in agreement with the results of earlier workers Selvaraj and Ramesh (2012) [7] found that population of whitefly reached at the peak level in fourth week of July (31st SMW).

Table 1: Population dynamics of whitefly, *B. tabaci* on chrysanthemum in relation to abiotic factor

Standard Meteorological week	Temperature(ºC)		Relative Humidity (%)		Mean whitefly population /3 leaves
	Max.	Min.	Morning	Evening	
21	33.8	23.9	92	68	0.32
22	32.8	26.1	87	68	0.87
23	33.6	23.6	87	61	0.52
24	34	25	94	70	0.25
25	30.4	24.3	94	91	4.42
26	29.2	23.4	95	91	4.5
27	28.9	23.4	98	96	10.12
28	30.9	24.3	95	82	9.63
29	31.1	24.1	94	77	6.56
30	30.3	24.1	93	89	7.15
31	30.2	24.2	92	82	6.68
32	31.3	23.7	94	73	5.8
33	29.9	23.2	93	85	4.5
34	30.5	23.4	91	87	2.32
35	30.4	23.4	93	88	2.36
36	30.4	22.6	92	81	2.4
37	31.8	23.1	95	79	3.27

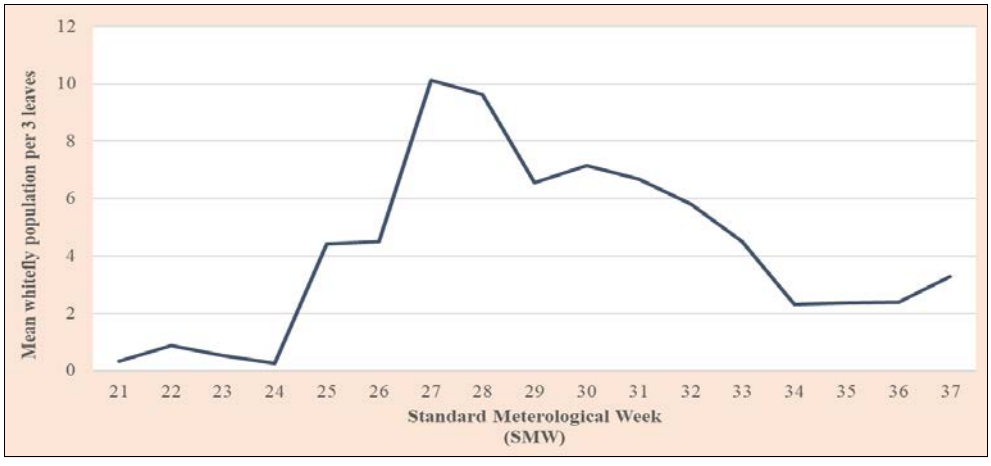

Fig 1: Population fluctuation of whitefly, *B. tabaci* in chrysanthemum during 2025

Correlation Between Weather Parameters and Population of Whitefly

To quantify the influence of abiotic factors namely maximum temperature, minimum temperature, morning and evening relative humidity on the population dynamics of whitefly, *B. tabaci* in chrysanthemum a simple correlation analysis was performed during the cropping season. The relationship between whitefly population and individual weather parameters was statistically evaluated using correlation coefficients (r), thereby elucidating the degree and direction of association. The computed correlation values are presented in Table 2 while their graphical representation is provided in Figures 2 for better visualization and interpretation of the trends.

Table.2: Correlation between weather parameters and population of whitefly, *B. tabaci* on chrysanthemum during 2025

Weather parameter	Correlation coefficient(r)
Maximum Temperature (ºC)	-0.691008**
Minimum Temperature (ºC)	-0.12917
Morning Relative Humidity	0.651414**
Evening Relative Humidity	0.60616519**

*Significant at 5% level of significance (r=0.481)
**Highly significant at 1% level of significance (r=0.6055)

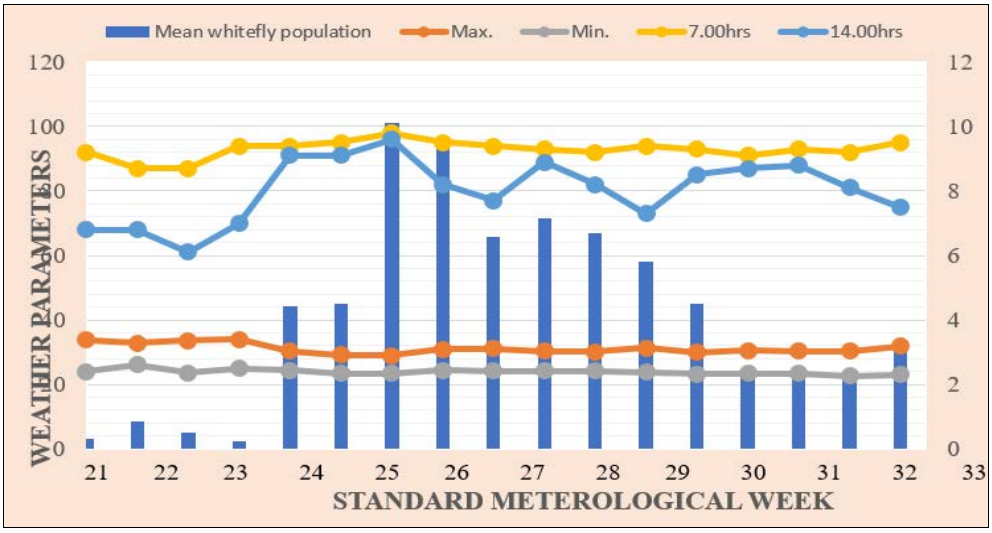

Fig 2: Correlation between weather parameters and population Whitefly *B. tabaci* on chrysanthemum.

The correlation analysis carried out between whitefly population and weather parameters revealed that maximum temperature exhibited highly significant negative correlation (r = -0.691008 **) with whitefly population. On the other hand, minimum temperature (r = -0.129173) exhibited negative but non-significant correlation and morning relative humidity (r = 0.651414**) and afternoon relative humidity
(r = 0.60616519**) showed positive and highly significant correlations with whitefly population.

The findings are in conformity with the findings reported by Chandrakumar *et al.* (2008) [2] who reported that maximum temperature showed highly significant positive correlation (r=-0.787**) and non-significant correlation with minimum temperature (r= -0.249). The findings are also accordance with Swati *et al.* (2017) [8] who revealed that whitefly adult population had a significant positive correlation with morning relative humidity (r=0.455) and a negative correlation with maximum temperature (r=-0.404), minimum temperature (r=-0.428).

The findings are in agreement with Bhowmik *et al.* (2018) [1] who reported that morning relative humidity, evening relative humidity showed a significant positive correlation (r = 0.50, 0.47) with whitefly population and with maximum and minimum temperature it showed non-significant negative correlation with whitefly population in chilli. The present findings are supported by Jha *et al.* (2018) [5], whitefly on okra showed a negative correlation with both maximum (r=-0.481) and minimum temperature (r=-0.483) while a positive correlation (r=0.514) with morning relative humidity and evening relative humidity (r=0.483).

The findings are in agreement with the results of earlier workers. Habiba *et al.* (2022) [4] who found that whitefly population had the maximum temperature (r=-0.521), minimum temperature (r= 0.66) and had a negative correlation with whitefly population while relative humidity in the morning @ 7.00 hrs. (r=0.358) had a positive correlation. This study is in conformity with Nissar *et al.* (2022) [6], who reported a positive and significant (r=0.594**) association between the whitefly population and maximum temperature in tomato. The present findings are in close association with Harsha *et al.* (2023) [3] who reported that maximum temperature having highly significant negative correlation (-0.557**) and highly significant positive correlation with relative humidity (0.495**) with whitefly population on chrysanthemum.

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