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# Incidence of spiralling whitefly, *Aleurodicus dispersus* Russell in King Chilli, *Capsicum chinense* Jacq. and its correlation with abiotic factors

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**Abstract**
The investigation on the incidence of spiralling whitefly on king chilli was recorded on 24th Standard Meteorological Week in both 2017 and 2018 with 2.40 adults and nymphs per leaf and 2.20 adults and nymphs per leaf respectively, while the highest mean abundance of spiralling whitefly was recorded on 34th SMW with 14.20 adults and nymphs per leaf on 2017 and 14.20 adults and nymphs per leaf on 32nd SMW on 2018. The correlation of spiralling whitefly with abiotic factors revealed a positive significant correlation effect with maximum temperature and negative significant correlation with maximum relative humidity but a positive non significant effect with minimum temperature and rainfall and a negative non significant effect with minimum relative humidity in both the years of investigations.

**Keywords:** Spiralling whitefly, King chilli, correlation, rainfall, temperature, relative humidity

## 1. Introduction
Spiralling Whitefly, *Aleurodicus dispersus* Russell (Hemiptera: Aleyrodidae) is a highly polyphagous pest and a native of the Caribbean region and Central America (Russell, 1965) [6]. It was first reported in 1993 from Kerala and later from other parts of peninsular India and the Lakshadweep islands. The pest is highly polyphagous and is a threat to many crops as 280 plants species are host and the cause of 53% yield loss of tapioca and heavy losses also observed in groundnut, banana, guava, chilli, coconut, rubber in Indian (Mani, 2010) [3].
India is the leading producer of chilli in the world and contributes to 25% of the total production and also leads in the export of chilli, supplying one fourth of the chilli exported globally (Saima A., 2019) [7]. There are more than 20 taxa of *Capsicum* found around the world out of which India host five *viz.*, *Capsicum annuum* L., *Capsicum frutescens* L., *Capsicum baccatum* L., *Capsicum pubescens* L. and King chilli, *Capsicum chinense* Jacq. (Chewiz and Thrope, 1996) [2]. King chilli is indegineous to Nagaland and has obtained Geographical Indication rights in 2008. King chilli was reported to be one of its host plant and observed that the infestation by spiralling whitefly in king chilli is most severe in this region of Northeast (Rallen 2016) [5]. As this region focuses on organic food production it is important to understand the biology of the pest and its correlation with abiotic factors to initiate management practices.

## 2. Materials and Method
The investigation was conducted in experimental farm of Department of entomology, School of Agricultural sciences and Rural Development, Nagaland University, Medziphema campus during the year 2017 and 2018. The meteorological data was collected from Indian Council of Agricultural Research, Jharnapani. The experiment was carried out using Randomized Block Design (RBD) with 3 replications of ecological plots. Six leaves (2 each from top, middle and bottom part of the plant) were selected from five randomly selected plants per plot and both adult and nymphs were counted. The observation was initiated with the incidence of the spiralling whitefly and thereafter the observations were taken at 15 days interval.

### 2.1. Statistical analysis
Simple linear correlation analysis was performed to find out the relationship of weather parameters like temperature, relative humidity and rainfall with the population of spiralling whitefly.

## 3. Results and Discussion

The incidence of spiralling whitefly, *Aleurodicus dispersus* during the year 2017 appeared on 24th SMW i.e., from 17th June 2017 with 2.40 per plant. The highest mean population of *Aleurodicus dispersus* was recorded to be 14.20 on 34th SMW i.e., 26th August 2017 followed by 32nd SMW i.e., from 12th August 2017 with 12.67 per leaf and 30th SMW i.e., from 29th July 2017 with 10.33 per leaf as depicted in table 1.

The incidence of Spiralling whitefly, *Aleurodicus dispersus* on the second year of investigation was also recorded on the 24th SMW i.e., starting from the 17th of June 2018 with 2.20 per leaf (Table 2). The highest mean population of *Aleurodicus dispersus* was recorded to be 14.20 per leaf on 32nd SMW i.e., from 12th of August 2018 followed by 34th SMW i.e., from 26th August 2018 with 12.67 per leaf and 30th SMW i.e., from 29th July 2018 with 12.33 per leaf.

Similar finding was reported by Muhammad *et al*., 2006 [4] who observed that the peak of whitefly population was found during the 4th week of August and continue till the 1st week of September from the experiment held in Punjab, Pakistan.

The correlation coefficient (Table 3) of Spiralling whitefly, *Aleurodicus dispersus* with the abiotic factors for the year 2017 revealed a positive significant correlation effect with the maximum temperature and negative significant correlation with maximum relative humidity but showed a positive non significant effect with minimum temperature and rainfall and a negative non significant effect with minimum relative humidity. On the data recorded on the period of investigation, 2018, showed a similar result with a positive significant correlation with the maximum temperature and positive non significant correlation with the minimum temperature, minimum relative humidity and rainfall while it showed a negative non significant relation with maximum relative humidity.

Similar finding was also reported by Baskaran *et al*., 2004 [1] from an experiment held at Barkas, Hyderabad in which the maximum and minimum temperatures were positively correlated with the incidence level of spiralling whitefly. Relative humidity was negatively correlated with the spiralling whitefly incidence, low incidence was recorded during January to February, 2002, when the relative humidity was maximum (62.5%). The results are further supported by Thriveni in 2019 [8] from their experiment conducted at Indore, Madhya Pradesh found that the population exhibited positive significant correlation with maximum temperature, positive non-significant correlation with minimum temperature, negative non-significant correlation with the relative humidity.

**Table 1:** Abiotic factors and the abundance of Spiralling whitefly in King chilli in 2017

| Standard Meteorological week | Date of observation | Temperature (ºC) | | Relative humidity (%) | | Rainfall (mm) | Mean no. of adults and nymphs per plant |
|---|---|---|---|---|---|---|---|
| | | Maximum | Minimum | Maximum | Minimum | | |
| 24 | 17 June 2017 | 31.13 | 24.14 | 94.57 | 82.71 | 127.90 | 2.40 |
| 26 | 01 July 2017 | 31.84 | 24.39 | 92.71 | 74.71 | 134.40 | 6.20 |
| 28 | 15 July 2017 | 29.87 | 23.60 | 94.57 | 73.71 | 104.50 | 3.20 |
| 30 | 29 July 2017 | 31.90 | 24.67 | 93.14 | 73.14 | 61.50 | 10.33 |
| 32 | 12 August 2017 | 31.80 | 25.06 | 93.14 | 73.71 | 81.20 | 12.67 |
| 34 | 26 August 2017 | 32.34 | 24.13 | 92.71 | 74.14 | 271.90 | 14.20 |
| 36 | 09 September 2017 | 33.04 | 24.80 | 94.14 | 65.14 | 4.50 | 8.67 |
| 38 | 23 September 2017 | 31.19 | 24.77 | 95.57 | 75.86 | 8.80 | 6.20 |
| 40 | 7 October 2017 | 31.83 | 23.69 | 95.86 | 77.86 | 33.90 | 4.20 |
| 42 | 21 October 2017 | 30.91 | 23.70 | 95.29 | 76.29 | 17.90 | 3.60 |

**Table 2:** Abiotic factors and the abundance of Spiralling whitefly in King chilli in 2018

| Standard Meteorological week | Date of observation | Temperature (ºC) | | Relative humidity (%) | | Rainfall (mm) | Mean no. of adults and nymphs per plant |
|---|---|---|---|---|---|---|---|
| | | Maximum | Minimum | Maximum | Minimum | | |
| 24 | 17 June 2018 | 31.43 | 24.07 | 97.57 | 79.14 | 72.90 | 2.20 |
| 26 | 01 July 2018 | 33.31 | 24.73 | 93.29 | 72.29 | 107.30 | 4.60 |
| 28 | 15 July 2018 | 33.79 | 25.27 | 90.86 | 69.14 | 30.00 | 6.47 |
| 30 | 29 July 2018 | 32.59 | 24.56 | 93.29 | 77.57 | 90.10 | 12.33 |
| 32 | 12 August 2018 | 34.24 | 25.17 | 92.71 | 67.86 | 55.20 | 14.20 |
| 34 | 26 August 2018 | 34.49 | 24.94 | 95.86 | 71.86 | 98.60 | 12.67 |
| 36 | 09 September 2018 | 34.01 | 24.41 | 93.29 | 69.14 | 32.40 | 10.33 |
| 38 | 23 September 2018 | 34.03 | 23.77 | 92.71 | 65.71 | 44.80 | 8.67 |
| 40 | 7 October 2018 | 32.21 | 21.69 | 94.14 | 62.86 | 0.00 | 6.33 |
| 42 | 21 October 2018 | 29.56 | 18.61 | 96.57 | 61.86 | 0.20 | 4.00 |

**Table 3:** Correlation coefficient (r) of Spiralling whitefly, *Aleurodicus dispersus* with abiotic factors in King chilli during 2017 and 2018

| Year | Temperature (ºC) | | Relative humidity (%) | | Rainfall (mm) |
|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | |
| 2017 | 0.637* | $0.608^{NS}$ | -0.715* | $-0.483^{NS}$ | $0.407^{NS}$ |
| 2018 | 0.663* | $0.471^{NS}$ | $-0.385^{NS}$ | $0.042^{NS}$ | $0.259^{NS}$ |

## 4. Conclusion

The finding of the experiment provides us information on the effect of the weather parameters *viz.*, temperature, relative humidity and rainfall on the population of the spiralling whitefly. And it can be concluded that abiotic factors plays an important role in determining the population build up of spiralling whitefly, this information can be used as a tool for timely intervention for sustainable management of spiralling whitefly.

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