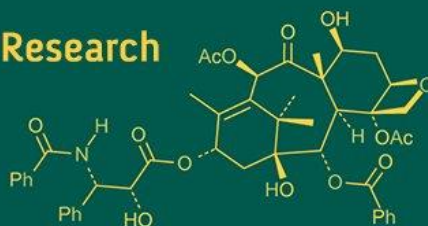


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Adhira T Jagtap
M.Sc. Scholar, Department of
Agricultural Entomology,
College of Agriculture, Dr.
Balasaheb Sawant Konkan
Krishi Vidyapeeth, Dapoli,
Ratnagiri, Maharashtra, India

Bapusaheb D Shinde
Professor (CAS), Maharashtra
Council of Agriculture
Education and Research,
Pune, Maharashtra, India

Santosh M Wankhede
Junior Entomologist, Regional
Coconut Research Station,
Bhatye, Ratnagiri,
Maharashtra, India

Prakash B Sanap
Director, Extension Education
and Resource Development,
Maharashtra Council of
Agriculture Education and
Research, Pune, Maharashtra,
India

Corresponding Author:
Adhira T Jagtap
M.Sc. Scholar, Department of
Agricultural Entomology,
College of Agriculture, Dr.
Balasaheb Sawant Konkan
Krishi Vidyapeeth, Dapoli,
Ratnagiri, Maharashtra, India

Seasonal incidence of pests infesting watermelon, *Citrullus lanatus* (Thunb.)

Adhira T Jagtap, Bapusaheb D Shinde, Santosh M Wankhede and Prakash B Sanap

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Abstract

The seasonal incidence of pests infesting watermelon, *Citrullus lanatus* (Thunb.), was studied under open field conditions. The incidence of aphids first appeared in the 6th Standard Meteorological Week (SMW) (0.27/three leaves) and peaked at 16.16/three leaves in the 11th SMW before declining. Leaf miner infestation began in the 6th SMW (18.90%) and peaked at 24.97% in the 13th SMW. Cucumber moth (*D. indica*) leaf infestation started in the 8th SMW, peaking at 15.32% in the 9th SMW. Correlation analysis showed aphid population significantly and positively correlated with maximum temperature ($r = 0.567^*$) and significantly negatively correlated with evening relative humidity ($r = -0.766^{**}$); *D. indica* showed similar significant correlations ($r = 0.598^*$ and $r = -0.698^{**}$, respectively); Maximum temperature and evening relative humidity thus governed aphid and cucumber moth build-up under Konkan conditions of Maharashtra.

Keywords: Watermelon, seasonal incidence, aphid, leaf miner, Cucumber moth

Introduction

Watermelon (*C. lanatus*) is an economically important cucurbit crop, valued worldwide for its refreshing fruit and rich nutritional profile, including high lycopene content and substantial amounts of vitamin C, vitamin A and B-vitamins (Quek, Chok and Swedlund, 2007) [9]. The fruit is composed of approximately 55.3% juice, 31.5% rind and 10.4% pomace, indicating that a considerable proportion of the fruit constitutes non-edible or processing by-products (Romdhane *et al.*, 2017) [11]. Believed to have originated in Africa, the Middle East and Egypt (Huh, 2008) [5], it is now cultivated extensively across India, which produced an estimated 8,722.26 thousand tonnes during 2023-24, with Uttar Pradesh, Andhra Pradesh and Tamil Nadu as the leading producing states (NHB, 2023). The Konkan region of Maharashtra, characterized by a warm humid climate, red lateritic soils and high annual rainfall, provides favourable conditions for watermelon cultivation, particularly as a profitable crop grown immediately after paddy harvest under the region's rice-based cropping system (Singh, 2014) [13].

However, watermelon productivity is severely constrained by a complex of insect pests attacking the crop from the seedling stage to fruit maturity, including aphid (*A. gossypii*), serpentine leaf miner (*L. trifolii*) and leaf-eating caterpillar (*D. indica*). Their incidence and severity vary with agro-climatic conditions and unmanaged infestations can cause substantial losses sucking pests alone may reduce yield by 30-70% (Dhillon *et al.*, 2005). *L. trifolii*, in particular, can damage up to 37% of foliage through mesophyll mining, causing chlorosis and yield decline (Patnaik, 2000) [8].

Since pest build-up is strongly weather-dependent, location-specific studies on seasonal incidence are essential for developing reliable forecasting models and timely management strategies. Such information remains limited for the Konkan agro-climatic zone. The present study was therefore undertaken to investigate the seasonal incidence of major insect pests infesting watermelon (*C. lanatus*) in relation to prevailing weather parameters in the Konkan region.

Materials and Methods:

The present investigation was conducted at the Vegetable Improvement Scheme (VIS), Central Experiment Station, Wakavali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth,

Dapoli, during the *rabi-summer* season of 2024-25 to study the seasonal incidence of pests infesting watermelon. The experiment was conducted under open field conditions using the watermelon variety Augusta. The crop was planted at a spacing of 2.4 m × 0.6 m. The experimental plot measured 0.91 m × 48.46 m. Observations on the incidence of major insect pests were recorded on ten randomly selected tagged vines at regular intervals throughout the crop growth period. The aphid population was recorded weekly intervals on the upper, middle and lower portion of canopy of vines. The mean aphid population per three leaves was calculated for each observation. The leaf miner and cucumber moth infestation was recorded the number of healthy and infested leaves at weekly intervals. The percentage of leaf miner and cucumber moth infestation was calculated using the following formula:

Per cent leaf miner and cucumber moth infestation on leaves = $\frac{\text{No. of infested leaves}}{\text{Total no. of leaves}} \times 100$

The data of pest infestation was correlated with the prevailing meteorological parameters to determine the seasonal occurrence of major pests infesting watermelon.

Results

1. Seasonal incidence of aphids, (*Aphis gossypii* Glover)

The aphid populations fluctuated markedly across SMWs, with younger plants showing heavier infestation than mature

ones. Aphids were first recorded in the 6th SMW (5-11 February, 2025) with a mean population of 0.27 aphids per three leaves. Numbers rose consistently from the 7th SMW onward and reached a peak of 16.16 aphids per three leaves in the 11th SMW (12-18 March, 2025), coinciding with the crop maturity stage; at this peak the maximum and minimum temperatures were 38.60 °C and 18.40 °C, and morning and evening relative humidity were 87.00 and 42.00 per cent, respectively. Over the season, the population ranged from 0.27 to 16.16 aphids per three leaves, declining gradually thereafter and remaining detectable through the 15th SMW.

These results agree with Sunil *et al.* (2017) ^[14], who reported that *A. gossypii* incidence on bitter gourd was low during early crop growth, increased progressively from January onward, peaked in March, and declined toward the end of the season a trend closely mirrored in the present study on watermelon.

Aphid population showed a significant positive correlation with maximum temperature (r = 0.567*) and a significant negative correlation with evening relative humidity (r = -0.766**); other parameters were non-significant. This indicates that rising temperature favoured aphid build-up, while higher evening humidity suppressed it. Similar results were reported by Sunil *et al.* (2017) ^[14] in bitter gourd, confirming that warm, comparatively drier conditions favour aphid multiplication on cucurbits.

Table 1: Seasonal incidence of pests infesting watermelon, *Citrullus lanatus* (Thunb.)

SMW*	Period	Temperature (°C)		Relative humidity(%)		BSS** (Hrs)	Aphid population/ 3leaves	Per cent leaf miner infestation	Per cent leaf infestation of <i>D. indica</i>
		T. max	T. min	Morning	Evening				
5	29/01/2025 to 04/02/2025	35.00	13.90	92.00	53.00	8.10	0.00	0.00	0.00
6	05/02/2025 to 11/02/2025	36.40	15.50	88.00	50.00	7.80	0.27	18.90	0.00
7	12/02/2025 to 18/02/2025	37.90	14.30	89.00	46.00	8.60	2.10	19.00	0.00
8	19/02/2025 to 25/02/2025	38.30	14.70	90.00	46.00	8.20	4.29	21.14	6.73
9	26/02/2025 to 04/03/2025	38.30	16.70	84.00	42.00	7.70	8.93	17.81	15.32
10	05/03/2025 to 11/03/2025	39.30	15.10	86.00	37.00	7.90	9.88	16.51	14.30
11	12/03/2025 to 18/03/2025	38.60	18.40	87.00	42.00	7.50	16.16	20.20	11.81
12	19/03/2025 to 25/03/2025	36.90	16.40	89.00	43.00	7.90	9.70	22.11	10.40
13	26/03/2025 to 01/04/2025	36.30	20.30	91.00	54.00	4.20	5.53	24.97	8.60
14	02/04/2025 to 08/04/2025	37.60	20.60	90.00	56.00	5.80	2.09	22.20	6.29
15	09/04/2025 to 15/04/2025	37.50	20.80	87.00	54.00	8.00	0.52	19.80	3.03
16	16/04/2025 to 22/04/2025	36.80	20.50	89.00	63.00	8.30	0.00	12.64	1.59
17	23/04/2025 to 29/04/2025	37.40	21.30	88.00	57.00	2.57	0.00	0.00	0.00
SD(±)							5.15	7.93	5.69

*SMW- Standard Meteorological Week

**BSS- Bright Sunshine Hour

2. Seasonal incidence of leaf miner, (*Liriomyza trifolii* Burgess)

Leaf miner infestation was first observed in the 6th SMW with 18.90 per cent infestation and persisted throughout the

cropping period, fluctuating slightly in the early weeks before rising steadily from the 11th SMW onward. Infestation peaked at 24.97 per cent in the 13th SMW (26 March-1 April, 2025), when temperatures ranged between

36.30 °C and 20.30 °C and morning/evening relative humidity were 91.0 and 54.0 per cent, respectively. Thereafter, infestation declined progressively, falling to 12.64 per cent by the 16th SMW, a period corresponding to the late fruiting stage.

These findings are consistent with Saha *et al.* (2018) [12], who reported that leaf miner infestation on cucumber persisted throughout the season and peaked during the later growth stages. Similarly, Tamilnayagan *et al.* (2017) [15] recorded peak *L. trifolii* damage (23.7%) in the third week of March, closely matching the present peak period. Archana *et al.* (2024) [1] further reported that *L. trifolii* was the first pest to colonize watermelon, appearing within four days of transplanting and peaking during the 11th SMW broadly corroborating the persistence and seasonal build-up pattern observed here.

Leaf miner infestation showed no significant correlation with any weather parameter studied, suggesting its seasonal build-up was governed more by crop phenology than by weather. This agrees with the non-significant trends reported by Archana *et al.* (2024), Dubale *et al.* (2018), and Ramesh *et al.* (2020) [1, 4, 10], indicating that *L. trifolii* incidence is comparatively less weather-dependent than that of aphid or *D. indica*.

3. Seasonal incidence of cucumber moth, *Diaphania indica* (Saunders)

Leaf infestation: The cucumber moth leaf infestation was first observed in the 8th SMW (19 to 25 February, 2025) and built up gradually, peaking at 15.32 per cent in the 9th SMW, when average maximum and minimum temperatures were 38.30 °C and 16.07 °C, and morning/evening relative humidity were 84.00 and 42.00 per cent, respectively. Infestation then declined steadily but remained active until the 16th SMW, with the season-wide range being 3.03 to 15.32 per cent (lowest value, 1.59%, recorded in the 16th SMW).

D. indica infestation showed a significant positive correlation with maximum temperature ($r = 0.598^*$) and a significant negative correlation with evening relative humidity ($r = -0.698^{**}$), with other factors non-significant. Thus, higher temperature favoured *D. indica* incidence while high evening humidity curtailed it. These findings are partially supported by Saha *et al.* (2018) [12] and corroborated by Archana *et al.* (2024) [1], who reported significant positive correlations of *D. indica* with temperature in watermelon.

Conclusion

The seasonal incidence of major pests infesting watermelon was closely associated with weather conditions. Maximum temperature significantly favoured the build-up of aphid and cucumber moth (*D. indica*) populations, while evening relative humidity significantly suppressed both, indicating that warm, comparatively drier conditions favour these pests, whereas humid evenings act as a natural check.

Leaf miner infestation showed no significant correlation with any weather parameter, suggesting its fluctuation is governed more by crop growth stage than by weather.

These findings indicate that maximum temperature and evening relative humidity can serve as useful indicators for forecasting aphid and cucumber moth incidence, aiding timely, need-based plant protection in watermelon.

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