



**Short communication**

**Seasonal incidence of insect pests of cauliflower in Kullu valley of Himachal Pradesh**

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**Abstract**

Seasonal incidence of insect pests of cauliflower was studied by carrying out a field trial at experimental farm of Krishi Vigyan Kendra, Bajaura, Kullu in the main season crop grown during February-June, 2023. The data revealed that major activity period of the cabbage aphid was observed from 8<sup>th</sup> to 22<sup>nd</sup> Standard meteorological week with peak incidence in 12<sup>th</sup> SMW and the cabbage butterfly was observed from 10<sup>th</sup> to 22<sup>nd</sup> SMW with peak incidence in 15<sup>th</sup> SMW, while the diamondback moth appeared from 9<sup>th</sup> to 21<sup>st</sup> SMW with its peak activity in 13<sup>th</sup> SMW. The cabbage semilooper was observed from 15<sup>th</sup> to 21<sup>st</sup> SMW with peak incidence in 19<sup>th</sup> SMW. The correlation between insect pest population and weather parameters (maximum, minimum temperature, morning, evening relative humidity and rainfall) was found to be non-significant.

**Key words:** Cauliflower, seasonal incidence, insect pests, correlation

Cole crops are important group of winter vegetables consumed worldwide belonging to genus *Brassica* in family Brassicaceae. However, cauliflower (*Brassica oleracea* var. *botrytis*) and cabbage (*Brassica oleracea* var. *capitata*) are the two main crops grown in this group (Mishra *et al.* 2018). In Himachal Pradesh, cauliflower is grown as a main season as well as an off-season crop in mid and high hills, providing profitable return to the growers (Ghosh 2017). The ability of state to produce cauliflower is impeded by a number of insect pests, the most significant of which are the cabbage aphid, *Brevicoryne brassicae* (L.), the cabbage butterfly, *Pieris brassicae* (L.), the diamondback moth, *Plutella xylostella* (L.), the tobacco caterpillar, *Spodoptera litura* (F.), the painted bug, *Bagrada cruciferarum* (K.) and the cabbage head borer, *Hellula undalis* (F.) (Bhatia and Gupta 2003; Kumar *et al.* 2014; Meghna *et al.* (2018). In Himachal Pradesh, *B. brassicae* was reported as a key pest of cauliflower and cabbage along with *P. Brassicae* and *P. xylostella* as major and minor pest, respectively (Bhalla 1990; Barwal 1997). The quality and quantity of the crop are both negatively impacted by insect pest damage. The incidence of insect pest varies from region to region

due to variation in cropping season and climatic conditions. Understanding the seasonal occurrence of insect pests at various cauliflower crop growth stages will help in development of an effective management schedule as it gives an idea of their peak activity period.

The field experiment was conducted in the main season (February-June) during, 2023 at Krishi Vigyan Kendra, Bajaura (Kullu). Geographically, it is situated between 31.83p North latitude and 77.17p East longitude an altitude of 1090 meter above mean sea level (AMSL). The seedlings of variety Madhuri (Clause company) were transplanted in 100 m<sup>2</sup> area having a plot size 4.5m × 2.25m with a row to row and plant to plant spacing of 45cm × 45cm. The observations were recorded at weekly intervals during the morning hours starting from 10 days after transplanting till the maturity of the crop. The population of aphid was recorded from random row, plant and leaf coordinates to determine aphid density per plant by counting the number of nymphs and adults per three leaves (one each from top, middle and bottom)/ plant, by visual count method using a magnifying lens. Thirty leaves were taken for counting aphids from 10 randomly selected plants and expressed

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as number of aphids per plant. The population of lepidopteran insects was recorded by counting the actual number of larvae per plant from 10 randomly selected plants. Simple correlation was worked out between population of major insect pests and abiotic factors. For recording plant infestation at weekly intervals, 20 plants were randomly selected and data on infested and healthy plants were recorded. The per cent plant infestation was worked out by using the following formula:

$$\text{Per cent infestation} = \frac{\text{Number of infested plants}}{\text{Total number of plants observed}} \times 100$$

Infestation index was calculated by using the following formula given by Bhalla and Verma (1991).

$$\text{Infestation index} = \log \left( \frac{\text{Mean larval population} \times \text{Per cent plant infested}}{100} + 1 \right)$$

The seasonal abundance of population (Individual insects/ plant), plant infestation (%) and infestation index have been given in Table 1 and Table 2.

**(i) Cabbage aphid (*Brevicoryne brassicae*)**

The mean population of cabbage aphid varied from 6.8-101.9 aphids per plant and the damage of the

**Table 1. Seasonal abundance of different insect pests associated with cauliflower in main season during 2023**

SMW	<i>Brevicoryne brassicae</i>	<i>Pieris brassicae</i>	<i>Plutella xylostella</i>	<i>Thysanoplusia orichalcea</i>
8	6.8±4.6	0.0±0.0	0.0±0.0	0.0±0.0
9	11±3.2	0.0±0.0	0.2±0.1	0.0±0.0
10	49.2±7.6	2.2±1.2	1.9±0.7	0.0±0.0
11	67.9±6.6	6.8±2.7	3.4±0.9	0.0±0.0
12	101.9±5.2	8.4±2.4	5.5±1.1	0.0±0.0
13	91.2±5.7	10.5±3.6	8.3±1.1	0.0±0.0
14	48.7±7.6	12.6±3.7	7.2±0.9	0.0±0.0
15	50.6±7.0	15.7±4.4	7.8±0.9	0.1±0.1
16	21.2±6.9	12.6±3.0	4.3±1.4	0.1±0.1
17	36.7±6.4	12.1±2.9	3.1±0.7	0.3±0.2
18	24.9±5.9	11.9±2.6	1.4±0.4	0.2±0.2
19	21.2±7.1	10.2±2.4	1.0±0.3	0.4±0.1
20	19.6±6.1	9.8±2.0	0.7±0.3	0.2±0.2
21	17.2±3.5	5.5±2.0	0.1±0.1	0.1±0.1
22	14.8±4.6	2.9±1.1	0.0±0.0	0±0.0

SMW- Standard meteorological week

**Table 2. Plant infestation (%) and infestation index of different insect pests associated with cauliflower in main season during 2023**

SMW	Plant infestation (%)				Infestation index			
	<i>B. brassicae</i>	<i>P. brassicae</i>	<i>P. xylostella</i>	<i>T. orichalcea</i>	<i>B. brassicae</i>	<i>P. brassicae</i>	<i>P. xylostella</i>	<i>T. orichalcea</i>
8	10	0.0	0.0	0.0	0.23	0.00	0.00	0.00
9	25	0.0	5.0	0.0	0.57	0.00	0.00	0.00
10	45	10.0	15.0	0.0	1.36	0.09	0.11	0.00
11	55	10.0	20.0	0.0	1.58	0.23	0.23	0.00
12	70	15.0	35.0	0.0	1.86	0.35	0.47	0.00
13	50	25.0	45.0	0.0	1.67	0.56	0.68	0.00
14	40	40.0	40.0	0.0	1.31	0.78	0.59	0.00
15	35	60.0	45.0	5.0	1.27	1.02	0.65	0.00
16	25	40.0	35.0	5.0	0.80	0.78	0.40	0.00
17	15	40.0	30.0	10.0	0.81	0.77	0.29	0.01
18	15	35.0	25.0	10.0	0.68	0.71	0.13	0.01
19	20	30.0	20.0	20.0	0.72	0.61	0.08	0.03
20	15	15.0	15.0	15.0	0.60	0.39	0.04	0.01
21	10	15.0	5.0	5.0	0.43	0.26	0.00	0.00
22	10	5.0	0.0	0.0	0.39	0.06	0.00	0.00

SMW- Standard meteorological week

pest was noticed from seedling stage to maturity of the crop. The cabbage aphid population emerged during the 8<sup>th</sup> Standard Meteorological Week (SMW), initially recorded at 6.8 aphids per plant with 10 per cent plant infestation and an infestation index of 0.23. Over time, the population steadily increased, and reached its peak during the 12<sup>th</sup> SMW at 101.9 aphids per plant, with 70 per cent plant infestation and an infestation index of 1.86. However, by the 13<sup>th</sup> SMW, the population experienced a decline to 91.2 aphids per plant, marking the beginning of a downward trend. Rainfall played a significant role in reducing the aphid population by washing them off. Present observations are more or less similar with the results of earlier workers Pal and Singh (2012) who reported that aphid population initiated in the 7<sup>th</sup> SMW and reached their peak mean population during 11<sup>th</sup> SMW at Uttar Pradesh. In contrary, Kishore *et al.* (2024) found that aphid population initiated in the 45<sup>th</sup> SMW and reached its peak in 48<sup>th</sup> SMW at Telangana, India. The differences in the findings may be due to variation in growing season of cauliflower.

#### **(ii) Cabbage butterfly (*Pieris brassicae*)**

The population of *P. brassicae* larvae ranged from 2.2-15.7 larvae per plant, during crop production. The pest was first recorded in the 10<sup>th</sup> SMW with larval mean of 2.2 larvae per plant with corresponding 10 per cent plant infestation and infestation index of 0.09. The pest was found active from March-May. The population showed an increasing trend and reached its peak in the 15<sup>th</sup> SMW with 15.7 larvae per plant, 60 per cent plant infestation and 1.02 infestation index. The population dwindled to 12.6 larvae per plant in the 16<sup>th</sup> SMW and then started to decline. The results are in conformity with Sood (2007) who also recorded peak incidence of cabbage butterfly in the month of April and May at Palampur and Sangla valley (H.P.) respectively.

#### **(iii) Diamondback moth (*Plutella xylostella*)**

The population count of *P. xylostella* fluctuated between 0.1-8.3 larvae per plant during main season cauliflower crop. The pest initially appeared in the 9<sup>th</sup> SMW with 0.2 larvae per plant and 5 per cent plant

infestation which further showed a gradual increase in number and reached its peak in the 13<sup>th</sup> SMW with 8.3 larvae per plant and corresponding plant infestation of 45 per cent. The population thereafter fluctuated and finally declined to zero till harvesting of the crop. The present findings are more or less in conformity with Kumar *et al.* (2023) & Anitha and Kalasariya (2024) who also reported diamondback moth as a major pest of cauliflower. Venugopal *et al.* (2017) observed that diamondback moth is active throughout the year with a varying degree of infestation at Allahabad. The pest initially appeared in the 6<sup>th</sup> SMW and reached its peak in 13<sup>th</sup> SMW.

#### **(iv) Semilooper (*Thysanoplusia orichalcea*)**

The population density of *T. orichalcea* remained very low (0.1-0.4 larvae per plant) in the main season cauliflower crop. The maximum population was recorded in 19<sup>th</sup> SMW with 0.4 larvae per plant, 20% plant infestation and 0.03 infestation index. No larva of this pest was found in the 22<sup>nd</sup> SMW. In present investigation the mean population of *T. orichalcea* remained low throughout the growing season whereas Bhat (2018) reported that semilooper is present in abundance in Srinagar of J&K, India which contradicts the present findings. The results may vary due to different weather conditions, locations and growing of the crop at different time of the year.

#### **Conclusion**

From the present studies it can be concluded that cauliflower crop was found abundantly and majorly infested with *B. brassicae* followed by *P. brassicae*, *P. xylostella* and *T. orichalcea* throughout the growing season and reached their peak population in 12<sup>th</sup> SMW, 15<sup>th</sup> SMW, 13<sup>th</sup> SMW and 19<sup>th</sup> SMW, respectively. The correlation between insect pest population and weather parameters (maximum, minimum temperature, morning, evening relative humidity and rainfall) was found statistically non-significant. The study of seasonal incidence will be helpful in planning effective management strategies against major insect pests of this crop.

**Conflict of interest:** The authors declare that there is no conflict of interest in this research paper.

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