



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(8): 2458-2460
© 2023 TPI

www.thepharmajournal.com

Received: 19-06-2023

Accepted: 25-07-2023

Chandra Kant

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology, Meerut, Uttar
Pradesh, India

DV Singh

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology, Meerut, Uttar
Pradesh, India

Gaje Singh

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology, Meerut, Uttar
Pradesh, India

Hem Singh

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology, Meerut, Uttar
Pradesh, India

Kamal Khilari

Department of Plant Pathology,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology, Meerut, Uttar
Pradesh, India

Corresponding Author:

DV Singh

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology, Meerut, Uttar
Pradesh, India

Insect Pests complex on cabbage in Western Uttar Pradesh

Chandra Kant, DV Singh, Gaje Singh, Hem Singh and Kamal Khilari

Abstract

The current research was led out by using a Randomized Block Design (RBD) at the Crop Research Centre, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, during the *rabi* seasons of 2021-22 and 2022-23, with three replications. The study identified a total of fourteen species of insect pests including natural enemies. There were six orders of insects observed, along with Lepidoptera being the most predominant accounting for approximately 43 percent of the total insect species. In contrast Orthoptera and Arachnida had the lowest percentage of insect pests and natural enemies contain about 7 percent in both the order. The orders Coleoptera, Hemiptera and Hymenoptera were responsible for about 14 percent each comprising both insect pests and natural enemies.

Keywords: Insect-pest, natural-enemies, pest complex. *Plutella xylostella*

1. Introduction

Cabbage (*Brassica oleracea* var. capitata Linn.) is a highly popular and economically significant vegetable crop cultivated during the winter season across the world. It falls under the category of cole crops, which are widely consumed globally. These crops belong to the Cruciferous or Brassicaceae family. Cabbage and cauliflower have become the most widely cultivated cole crops on a global commercial level. China holds the top position as the largest country that grows cabbage and is accountable for 47% of cabbage production globally, with India coming next in line nation that cultivates cabbage responsible for 47 percent of global production, followed by India, contributing 12 percent ^[1].

India holds the second position in cole crop production both in terms of output quantity and productivity. In *Ravi* season 2023, the volume of cabbage production in India is estimated to have amounted to about 9.95 million metric tonnes. An area of about 428 thousand hectares was used for the cultivation of cabbage in 2023 ^[2]. Despite the widespread and uncontrolled usage of insecticides, there has been a rise in pest infestations within regions cultivating cole crops. Some most important insects are listed particularly diamond back moth, *Plutella xylostella* (L.), common cutworm, *Spodoptera litura*(F.) cabbage aphids, *Brevicoryne brassicae* L., cabbage butterfly, *Pieris brassicae* (L.) and *Lipaphis erysimi*, head borer, *Hellula undalis* (F.), cabbage looper, *Trichoplusia ni* H., cabbage leaf webber, *Crociodolomia bionotalis* (Zell), fleabeetle, *Phyllotreta cruciferae* (Goeze) and paintedbug, *Bagrada cruciferarum*(Kirk.) etc. ^[3].

These, caterpillar larvae belonging to the Lepidoptera order and certain insects from the Hemiptera group pose the greatest threat to cabbage plants and are frequently managed using insecticides. Out of these, the diamondback moth, *P. xylostella* and aphid, *L. erysimi* are most popular as a major pest in all world as well in India. causing severe yield losses to the cole crops every year ^[4, 5]. Besides its culinary uses cabbage has also been traditionally used for its medicinal properties. Sauerkraut extracts enriched with selenium display potent antioxidant and anti-inflammatory characteristics. Cabbage possesses anti-cancer attributes that safeguard against colorectal cancer due to its content of indole-3-carbinol. Historical usage includes cabbage juice as a remedy for mushroom poisoning ^[6, 7].

2. Materials and Methods

The field experiment was conducted at the Crop Research Centre (CRC), Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. The cabbage variety "Golden Acre" was laid down in Randomized Block Design (RBD) having eight treatments including one control and three replications.

The nursery was raised in the bed of 3x1 m² during the first week of October 2021 and 2022, respectively after the seed treatment with Thiram@ 2. g/kg seed for protection against fungal disease. The 5-week-old seedlings were transplanted to the main field at a spacing of 60x50 cm. row-to-row and plant-to-plant and all the recommended agronomical practices were followed to raise during the crop. We monitored the population of insect pests and their natural predators on five identified plants every week, starting from the appearance of pests and predators until the plants were harvested.

3. Results and Discussion

Incidence of insect pests and their natural predators and parasitoids on the 'Golden Acre' cabbage variety in the years 2021-22 and 2022-23. The pests found on the cabbage plants during field observations belonged to various orders such as Lepidoptera, Hemiptera, Orthoptera, Coleoptera, Hymenoptera and Arachnida. The six orders of insect pests that were identified including natural enemies represented in (Table 1) and figure no. 1. Lepidoptera had the highest percentage of insects among these orders, approximately 43 percent while Orthoptera and Arachnida had the lowest population percentage of insect pests about 7 percent in both the order. The orders Coleoptera, Hemiptera and Hymenoptera were responsible for about 14 percent each insect pests as well as natural enemies respectively. Out of these, same were discovered in a significant number and some orders had a very low number infestation respectively and were categorized as major and minor pests and some others are beneficial insects. Certain orders exhibited moderate decline over the research of the experiment.

The Yadav *et al.*, (2015) [7] reported the similar findings Yadav reported seven order and 23 insect pest including natural enemies. The recent findings corroborate the results of

Rao and Lal (2004) [8], who documented 19 insect pests and 4 natural enemies during the *rabi* season. Among these the two primary pests were identified that is mustard aphid, *Lipaphis erysimi* (Kalt) and the diamondback moth (DBM), *Plutella xylostella* (L.). Thakur *et al.*, (2008) [9]. Reported the Similar patterns in various crops and locations of the India. Bhat, D. M. (2020) [10]. provided a summary of lepidopteron pests and the biological agents that control them, impacting vegetable crops within the Jammu and Kashmir (J&K) region. They founded demonstrate that a total of 28 lepidopteron pest species are responsible for causing damage to vegetable crops in Jammu and Kashmir. Moreover, the research establishes the existence of 40 natural biological control agents, encompassing parasitoids, predators, and pathogens, which effectively regulate the population of primary lepidopteron pests found in vegetable fields.

The six orders were recorded *i.e.*, Lepidoptera, Hemiptera, Orthoptera, Coleoptera, Hymenoptera and Arachnida. Out of these there was fourteen insect pests and natural enemies were reported *i.e.*, diamondback moth, *plutella xylostella* (L.), cabbage butterfly *peris bressicae*, cabbage head borer, *Hellula undalis*, cabbage aphid, *Brevicoryne brassicae* has high infestation. The leaf webber, *Crociodolomia pavonana*, and cabbage looper, *Trichoplusia ni* (Hubner) has medium infestation and the tobacco caterpillar, *Spodoptera litura*, painted bug, *Bagrada cruciferarum* spp, surface grasshopper *Chrotogonus trachypterus* Blanchard), fleabeetle (*Phyllotreta cruciferae*) and Mustard sawfly, *Athalia proxima* (Klung) were observed lowest incidence. Among the three natural enemies, *ie.* Coccinellids, *Coccinella septempunctata* one larval parasitoid, *Cotesia plutellae* one unidentified spider was observed during crop period. These data have sown in tabular and figure form in (Table 1) and (figure no.-1).

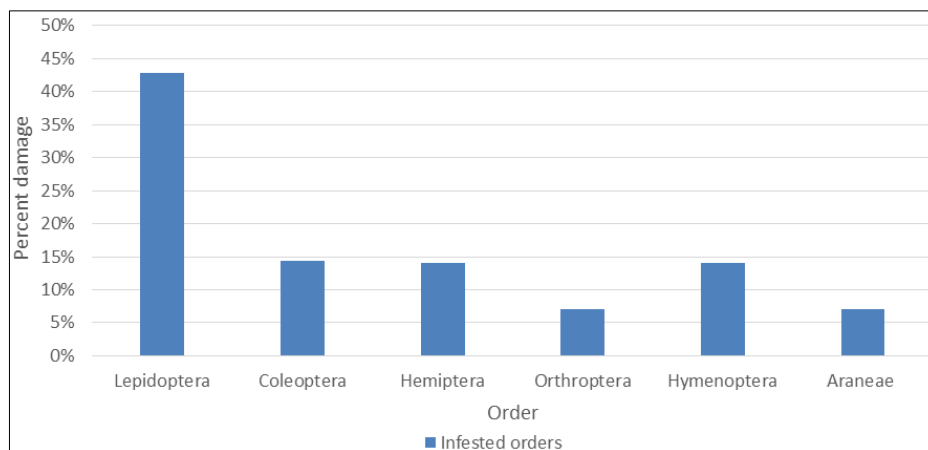


Fig 1: Graph shows the percentage infestation of different orders of insect pest complex on cabbage (*Brassica oleracea* var. capitata Linn.)

Table 1: Insect pest complex on cabbage (*Brassica oleracea* var. capitata Linn.).

S. NO.	Var. "Golden Acre" during 2021-22 and 2022-23 Common name	Scientific Name	Order: Family	Level of incidence	Period of activity
1.	Diamondback moth	<i>Plutella xylostella</i> (L.)	Lepidoptera: Plutellidae	High	November - February
2.	Cabbage butterfly	<i>Pieris bressicae</i> (L.)	Lepidoptera: Pieridae	High	December - February
3.	Leaf Webber	<i>Crociodolomia pavonana</i> (F.)	Lepidoptera: Pyralidae	Medium	January - February
4.	Cabbage head borer	<i>Hellula undalis</i>	Lepidoptera: Crambidae	High	December - February
5.	Cabbage looper	<i>Trichoplusia ni</i> (Hubner)	Lepidoptera: Noctuidae	Medium	December - February
6.	Tobacco caterpillar	<i>Spodoptera litura</i>	Lepidoptera: Noctuidae	Low	December - February
7.	Cabbage aphid	<i>Brevicoryne brassicae</i> (L.)	Hemiptera: Aphididae	High	November - February
8.	Painted bug	<i>Bagrada cruciferarum</i> Krik	Hemiptera: Penttomidae	Low	December - February
9.	Surface grasshopper	<i>Chrotogonus trachypterus</i> (Blanchard)	Orthoptera: Acrididae	Low	November - February

10.	Flea beetle	<i>Monolepta signata</i> Oliv.	Coleoptera: Chrysomelidae	Low	December - February
11.	Ladybird beetle	<i>Coccinella septempunctata</i> L.	Coleoptera: Coccinellidae	Medium	December - February
12.	Mustard sawfly	<i>Athalia proxima</i> (Klung)	Hymenoptera: Tenthredinidae	Low	December - February
13.	Larval Endoparasitoid	<i>Cotesia plutellae</i>	Hymenoptera: Braconidae	Low	January-March
14.	Spider	(Unidentified)	Arachnida: Araneae	Low	Late January- February

4. Conclusion

In conclusion, during the field monitoring six orders were recorded *i.e.*, Lepidoptera, Hemiptera, Orthoptera, Coleoptera, Hymenoptera and Arachnida. Out of these there was fourteen insect pests and natural enemies reported out of these the order Lepidoptera was most dominant order which had most damage to the crop followed by Hemiptera, Orthoptera, Coleoptera, Hymenoptera and Arachnida. Out of these some harmful and beneficial both insects had reported *i.e.*, diamondback moth, *Plutella xylostella* (L.), cabbage butterfly, *Pieris brassicae*, cabbage head borer, *Hellula undalis*, cabbage aphid, *Brevicoryne brassicae* has high infestation. The leaf webber, *Crociodomia pavonana*, and cabbage looper, *Trichoplusia ni* (Hubner) has medium infestation and the tobacco caterpillar, *Spodoptera litura*, painted bug, *Bagrada cruciferarum* spp, surface grasshopper *Chrotogonus trachypterus* Blanchard), flea beetle (*Phyllotreta cruciferae*) and Mustard sawfly, *Athalia proxima* (Klung) were observed lowest incidence. Among the three natural enemies, *ie.* Coccinellids beetle, *Coccinella septempunctata*, one Hymenopteran larval parasitoid, *Cotesia plutellae* and one unidentified spider was observed during crop period. These findings provide valuable insights into changes in the populations of insect pests and their corresponding natural predators help in devising effective strategies for managing pests in cabbage cultivation.

5. Acknowledgments

The authors are highly thankful to the chairmen advisory committee, committee members, head and technical staff of Department of Entomology, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, (Uttar Pradesh) for providing knowledge and necessary facilities.

6. References

- Sharma P, Kumawat KC, Jhumar L. Seasonal abundance of diamondback moth and natural enemies on cabbage. J Entomol. Zool. Stud. 2017;5(3):176-179.
- Anonymous. Department of Agriculture and Farmers Welfare <https://agricoop.nic.in/en/StatHortEst> Chaudhuri N, Ghosh S, Senapati SK. Incidence of insect pests of cabbage in relation to prevailing climate conditions of terai region. Indian Journal of Entomology. 2001;63(4):421-428.
- Rao SRK, Lal OP. Seasonal incidence of mustard aphid, *Lip aphis erysimi* (Kalt.) and diamondback moth, *Plutella xylostella* Linn., on cabbage. Journal of Insect Science. 2005;18(2):106.
- Shukla A, Kumar A. Seasonal incidence of diamond backmoth, *Plutella xylostella* (L.) in relation to abiotic factors in cabbage. Plant Protection Bulletin. 2004;56(3&4):37-38.
- Penas E, Martinez-Villaluenga C, Frias J. Se improves indole glucosinolate hydrolysis products content, s-methyl selenocysteine content, antioxidant capacity and potential anti-inflammatory properties of sauerkraut. Food Chem. 2012;132:907-914
- Keck AS, Finley JW. Cruciferous vegetables: cancer protective mechanisms of glucosinolate hydrolysis products and selenium. Integr Cancer Ther. 2004;3(1):5-12.
- Yadav RS, Kumar D, Singh U, Singh DK. Insect-pests complex of cabbage in eastern Uttar Pradesh. Vegetable Science. 2015;42(2):90-92.
- Rao SRK, Lal OP. Insect pest complex of cabbage under Delhi condition. J Applied Zool. Res. 2004;15(1):67.
- Thakur A, Singh NK, Singh J. Biodiversity of lepidoptrous insects in the field crops under Varanasi climatic conditions. Journal of Applied Zoological Researches. Table Insect pests complex of cabbage, *Brassica oleracea* var. *capitata* in Varanasi, U.P. 2008;19:127-131
- Bhat DM. Biodiversity of lepidopteron pests (Insecta) and their Natural Bio-Control agents associated with vegetable crops in J&K. Journal of entomology and zoology studies. 2020;8(3):31-42.