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STUDIES ON SEASONAL INCIDENCE OF INSECT PESTS ON CAULIFLOWER (*BRASSICA OLERACEA* VAR. *BOTRYTIS* L.) CROP

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ABSTRACT

A roving survey of District Gurugram, Haryana was carried out in the infested area covering four different blocks *viz.* Pataudi (Uncha Majra, Bhora Kalan, Narhera, Khanpur, Mamtajpur, Baspadmka villages) Farukhnagar (Fazilpur Tajnagar, Farukhanagar, Kaliavas villages) Sohna (Baluda, Garhimurli, Sohna ki Dhani, Badshahpur villages) and Gurugram (Chandu, Garhi Harsaru, Garhi Gopalpur, Sardana villages) during two years (2017-19). During the present study Cauliflower crop was damage by many insects such as tobacco caterpillar, *Spodoptera litura* (Fab.), diamondback moth, *Plutella xylostella* (Linn.), Stem borer, *Hellula undalis (*Fabricius), cauliflower aphid, *Brevicoryne brassicae* (Linnaeus), Mustard aphid, *Lipaphis erisimi (*Kaltenbach), Leaf webber, *Crocidolomia binotalis* (Zeller), Painted bug, *Bagrada cruciferum* (Kirk.). Tobacco caterpillar, *Spodoptera litura* and Diamondback moth, *Plutella xylostella* are major insect pests of Cauliflower responsible for major losses in crop yield in this area.

***Keywords*:** Cauliflower, Cole crops, Vegetable, Insect, Pests, Haryana, Survey

Introduction

Cauliflower (*Brassica oleracea* var. *botrytis* L.) is one of the important vegetable crop grown in India i.e., Uttar Pradesh, Karnataka, Maharashtra, Bihar, West Bengal, Punjab, Haryana, Orissa, Assam and Tamil Nadu. It is cultivated extensively in both tropical and temperate regions of the world *viz.*, India, Nepal, China, Indonesia, Japan, Taiwan Korea, Poland, Germany, France, Italy, Spain, Russia, Ukraine, Turkey, USA, Australia, Uzbekistan and several other countries. During the last decade, there was about 25 percent substantial increase in the area of cauliflower in India. It contains proteins and minerals such as potassium, sodium, iron, phosphorous, calcium and magnesium. It is low in fat, high in dietary fiber and water content. (Zhao *et al.*, 2002). Two major cruciferous vegetables, viz. Cauliflower (*Brassica olearaceae* var. *botrytis* L.) and Cabbage (*Brassica olearaceae* var. *capitata* L.) are cultivated as major crop throughout the district Gurugram, Haryana. However, with the development of new hybrid varieties that can grow well under varied temperatures, cultivation of these crops gained popularity in this state. Though some information on pests of these crops in the other parts of the country is available but there is dearth of knowledge about the pest complex in Gurugram, Haryana area. Hence, in the present investigation study on the pests complex occurring on Cauliflower was undertaken at four different blocks i.e., Farukhnagar, Patudi, Sohna and Gurugram, Haryana, India during *Rabi* season from 2017 to 2019.

Materials and Methods

A roving survey of District Gurugram, Haryana was carried out in the infested area covering four

different blocks *viz.* Pataudi (Uncha Majra, Bhora Kalan, Narhera, Khanpur, Mamtajpur, Baspadmka villages) Farukhnagar (Fazilpur, Tajnagar, Farukhanagar, Kaliavas villages) Sohna (Baluda, Garhimurli, Sohna Ki Dhani, Badshahpur villages) and Gurugram (Chandu, Garhi Harsaru, Garhi Gopalpur, Sardana villages) during 2017-18 and 2018-19.

The insect pests associated with Cauliflower were recorded from planting to the harvesting of the crop at weekly intervals. Field observations were recorded from five randomly selected tagged plants and control plots. The larvae were collected whenever required and reared up to adult stage. Adult insects were identified from Entomology department of IARI, New Delhi. The nature and extent of damage caused by different insect pests were also recorded for assessing the economic status of the insect pests.

Result and Discussion

Studies on the insect pests complex associated with Cauliflower were studied in two years i.e., 2017-2018 and 2018-2019 and presented in Table -1 and 2. The insect pests complex was recorded from starting of the nursery to harvesting of crop. The insects abundance, occurred most consistently and causing serious damage to be categorized as 'major' pests. However, those insects which appeared for short duration or in fairly low numbers considered as 'minor' and the 'stray insects' which were very few in numbers and appeared after considerable time lag was also recorded. The insect pests with their scientific, common name, infestation stage, systematic position and their economic status were studied. The various insect pests recorded in both the year shows almost similar trend of pests occurrence. During the present study Cauliflower crop was damaged by many insects such as Tobacco caterpillar, *Spodoptera litura* (Fab.), Diamondback moth, *Plutella xylostella* Linn., Stem borer, *Hellula undalis* Fabricius, Cauliflower aphid, *Brevicornea brassicae* Linnaeus, Mustard aphid, *Lipaphis erisimi* Kaltenbach, Leaf webber, *Crocidolomia binotalis* Zeller, Painted bug, *Bagrada cruciferum* Kirk. Tobacco caterpillar, *Spodoptera litura* (Fab.) and Diamondback moth, *Plutella xylostella* Linn. are major insect pests of Cauliflower and responsible for major yield losses in Gurugram (Haryana) area. Tobacco caterpillar, *Spodoptera litura* particularly damages the seedlings and many disrupt head formation in Cauliflower. Seven insect species from three different insect orders were recorded during study period viz. Aphididae, (Hemiptera), Noctuidae, Plutellidae (Lepidoptera), Alticidae (Coleoptera) and Pyrgomorphidae (Orthoptera) and are as follows :

Hemipteran insects

Green peach aphid, *Myzus persicae* (Sulzer) (Hemiptera: Aphididae) - Commonly known as the green peach Aphid. It is pale yellow green or pink in colour. The diagnostic characters are:

a. Inner faces of antennal tubercles convergent,
b. Siphunculi (cornicles) are long, cylindrical and are slightly to moderately swollen on distal half,
c. Siphunculi almost twice the length of cauda. In the winged form, a dark patch can be seen on the abdomen.

The study revealed that stray population of Aphid was associated with vegetative stage of Cauliflower crop. Both adult and nymph of aphid were damaging plant by sucking sap. The activity of aphid was started from December month and found constant up to February month of growing season of crop.

Mustard aphid, *Lipaphis erysimi* (Kaltenbach) (Hemiptera: Aphididae)

Mustard aphid is globular, pear shaped, small and delicate insects with fragile body. It has wide range of colours i.e. pale yellow, brown, gray, black, light or dark green. Wingless adult aphid is 2mm long in size and colour mostly green or pale green. Winged form is transparent and homogenous. Young ones (nymphs) are like wingless forms but smaller in size. The incidence of aphids was observed from last week of November and continued till harvest of the crop.

Cabbage aphid, *Brevicornye brassicae* (Linnaeus) (Hemiptera: Aphididae)

Cabbage aphid is an important insect pest and causes significant yield losses to crops and belongs to family Brassicaceae which includes Mustard and Cole crops. Moreover, green peach aphids mainly attack Cabbage and Cauliflower before heading stage begins but Cabbage aphids may attack at any stage of crop growth. In aphids, there are two pipe-like appendages called cornicles or siphunculiat at the posterior end. Cornicles of most of the cabbage aphid are relatively shorter than other aphids except turnip aphid, *Lipaphis erysimi* (Kaltenbach). These short cornicles and waxy coating found on Cabbage aphids are important features of identification.

Coleopteran insects:

Flea beetle, *Phyllotreta sp. (*Coleoptera: Alticidae*)*

The larvae of flea beetle live in soil and are slender, whitish and about 0.25 inch long when mature. Adult beetles are greenish brown metallic to black in color and from 0.06 to 0.12 inch long. It is a chewing pest and causes small holes in leaves and

gives silver like appearance. The emerging seedlings are highly susceptible to flee beetle damage.

Orthopteran insects:

Grasshopper, *Atractomorpha sp.* (Orthoptera: Pyrgomorphidae)

Grasshoppers causes irregular holes in Cauliflower leaves and defoliation occurs in high numbers especially when swarming. However, damage tends to be greatest to those fields situated on the edges of grassland areas or on roadsides because grasshoppers migrate to irrigated crop lands when wild grasses and other plants become dry. Nymphs before molting into the adult stage feed on vegetation for 40 to 60 days and later on adults of Grasshopper disperse to host during summer and remain active on crop from October to December.

Lepidopteran insects:

Cutworm, *Agrotis ipsilon* (Hufnagel) (Lepidoptera: Noctuidae)

Cutworms are sporadic pest, cosmopolitan and polyphagous in nature. They are active from October to April in plains and during summer in hills. The tender sprouts/ shoots of 20-40 days old are highly susceptible to Cutworm damage. The stray population of Cutworm was also recorded during November and December months in Cauliflower crop.

Tobacco Caterpillar, *Spodoptera litura* (Fab.) (Lepidoptera: Noctuidae)

The young larvae of tobacco caterpillar first feed on leaves gregariously and scrap the leaves. The mature larvae completely devour the leaves resulting in poor growth of plants**.** The population of tobacco caterpillar, *Spodoptera litura* was also observed from October to January months on Cauliflower crop growing season. (Fig.1)

Fig. 1 : Tobacco caterpillar, *Spodoptera litura* damage on Cauliflower

Diamondback moth, *Plutella xylostella* (Linnaeus) (Lepidoptera: Plutellidae)

Diamondback moth mature larvae are smaller than most other insect pests in Cole crops and about 0.31 inch. The larval body tapers at both ends, middle portion wider, two legs (prolegs) on the last segment forming distinctive shape of alphabet 'V' at the rear end. The adult moths are small, slender and grayish brown in colour. Male moths having unique characteristic i.e three 'diamond-shaped' markings on their back. The larvae wiggle frantically or rapidly attach a silken line to leaf and drop over the edge when disturbed. DBM larvae chewing out on outer or older leaves of plants or at the growing points of young plants and make small holes on leaves. Cauliflower is the preferred host but it also attacks all Cole family crops. There may be two to four overlapping generations in a year. (Fig 2)

Fig. 2 : Diamondback Moth (DBM) *Plutella xylostella* damage on Cauliflower

Semilooper, *Plusia sp.* (Lepidoptera: Plutellidae)

Semilooper larvae can be up to 1.5 inches long and are pale green with narrow white stripe along each side and several dark spots on the back. Adults are brownish with silvery figures on the front wings. The distinctive looping movement of Semilooper can be distinguished from most other common caterpillars. During feeding, Semilooper larvae causes ragged-edge holes on the leaf blade and on its margins. Major damage caused by larvae on the heads of Cole crops.

Table 1: Insect pests complex associated with Cauliflower crop during the year: 2017-2018 and 2018-2019

Order and family	Scientific name	Common name	Damaging stage of the pest	Associated with crop stage	Economic status
Hemiptera					
Aphididae	*Myzus persicae*	Green peach aphid	Adult & Nymph	All stages	Minor
Aphididae	*Lipaphis erysimi* (Kaltenbach)	Mustard aphid	Adult & Nymph	All stages	Minor
Aphididae	*Brevicornye brassicae* (Linnaeus)	Cabbage aphid	Adult & Nymph	All stages	Minor
Lepidoptera					
Plutellidae	*Plutella xylostella* (Linnaeus)	Diamondback moth	Larva	Leaves, head, curd	Major
Noctuidae	*Spodoptera litura* (Fab.)	Tobacco Caterpillar	Larva	Leaves, head, curd	Major
Noctuidae	*Plusia signata (*Fab.)	Semilooper	Larva	Leaves, curd	Minor
Noctuidae	*Agrotis ipsilon*	Cutworm	Larva	Leaves	Minor
Coleoptera					
Alticidae	*Phyllotreta sp.*	Flea beetle	Adult	Seedling, leaves	Minor
Orthoptera					
Pyrgomorphidae	*Atractomorpha sp.*	Grasshopper	Adult & Nymph	Leaves	Minor

Table 2: Occurrence of insect pests incidence during different months of Cauliflower crop growing season during the year: 2017-2018 and 2018-2019

S.No.	Order and Common name	Scientific name	October	November	December	January	February
	Hemiptera						
1.	Aphid	*Myzus persicae*	**X**	**X**	✓	✓	✓
2.	Aphid	*Lipaphis erysimi*	**X**	✓	✓	✓	✓
3.	Aphid	*Brevicornye brassicae*	✓	✓	✓	✓	✓
	Lepidoptera						
4	Diamondback moth	*Plutella xylostella*	✓	✓	✓	✓	**X**
5.	Tobacco Caterpillar	*Spodoptera litura*	✓	✓	✓	✓	**X**
6.	Semilooper	*Plusia signata*	✓	✓	✓	✓	**X**
7.	Cutworm	*Agrotis ipsilon*	✓	✓	✓	**X**	**X**
	Coleoptera						
8.	Flea beetle	*Phyllotreta sp..*	✓	✓	✓	**X**	**X**
	Orthoptera						
9.	Grasshopper	*Atractomorphasp*	✓	✓	✓	**X**	**X**

Cauliflower is subject to be attacked by number of insect pests i.e., Tobacco caterpillar (*Spodoptera litura*), diamondback moth (*Plutella xylostella* L.), cabbage butter fly (*Pieris brassicae* L.), cabbage leaf webber (*Crocidolomia binotalis* Zell.), cabbage semi lopper (*Trichoplusia ni* Hubner), painted bug (*Bagrada hallaris* burmeister and *Bagrada cruciferarum* Kirk.), mustard saw fly (*Athalia lugens proxima* Klug.), flea beetle (*Phyllotreta cruciferae* Goeze), aphids (*Lipaphis erysimi* Kalt. and *Brevicoryne brassicae* L.) as reported by Chaudhary *et al.*, 2001. In India, a total of 37 insect pests have been reported to feed on Cabbage and Cauliflower. The diamondback moth (DBM), *Plutella xylostella* (Linnaeus); Cut worm, *Spodoptera litura* (Fabricius); Cabbage butterfly *Pieris brassicae* L; Head borer, *Hellula undalis* Fabricius cause appreciable loss as reported by Bhalani, 1989. Incidence of all these pests varies from season to season (Sachan and Gangwar, 1990) and region to region (Chaudhuri *et al.*, 2001). Among insects pests the most notorious were diamondback moth, *Plutella xylostella*, cabbage aphids, *Brevicoryne brassicae* and cabbage white butterfly, *Pieris brassicae* which cause leaf damage up to 31 percent as reported by Mochiah *et al.*, 2011. However, Cauliflower crop is also attacked by Cabbage semi-looper, *Thysanoplusia orichalcea*, tobacco caterpillar, *Spodoptera litura*, cabbage leaf Webber, *Crocodolomia binotalis* and cabbage flea beetle, *Phyllotreta cruciferae* as reported by Atwal and Dhaliwal (2002) and also studied in the present study from Gurugram area.

Diamond back moth are major insect pests causing significant loss in North India and also found in this study. The diamondback moth (DBM), *Plutella xylostella* (Linnaeus) is one of the most destructive insect pests that affects cruciferous plants worldwide (Ojha *et al.*, 2004) because of its enormous appetite, lack of natural enemies and high reproduction potential

of up to twenty generations per year. It was first reported in India by Fletcher, 1914. Now diamondback moth, *Plutella xylostella* has been noticed all over India where plants belonging to Family Brassicaceae are grown by Devi *et al.,* 2004. From Himachal Pradesh, Bindra, *et al.,* 1974 reported this pest on Cruciferous crops in temperate regions where Cabbage and Cauliflower are grown. Later the pest was found as a regular and serious pest of Cabbage and Cauliflower (Bashir *et al.,* 2015). Diamondback moth (*Plutella xylostella* Linn.) is a major cosmopolitan defoliating caterpillar that hampers the successful cultivation of Cauliflower in the world. It damages the crop by feeding on the foliage and attacked by large number of larvae which affect the growth of the plant and leading to significant reduction in crop yield.

Conclusion

Diamondback moth (*Plutella xylostella*) and Tobacco caterpillar (*Spodoptera litura*) were found to be the major dominating insect pest species in Gurugram (Haryana) district and hence further studies need to be done on these two species only.

References

Atwal, A.S. and Dhaliwal, G.S. (2002). Pests of vegetables in agricultural pests of South Asia and their management. *Kalyani Publishers*, 248-253

Bashir, A., Saljoqi-Ur-Rahman, A., Muhammad, S., Farman, U. and Imtiaz, A.K. (2015). Population dynamics of *Plutella xylostella* (L.) in Cauliflower and its correlation with weather parameters at Peshawar, Pakistan. *J of Ent and Zoology Studies*, 3(1), 144-148.

Bhalani, P.A. (1989). Suitability of host plants for growth and development of leaf eating caterpillar, *Spodoptera litura* (F.) *Indian J of Ent*. 51(3), 427- 430.

Bindra, O.S., Singh, D. and Ramzan, M. (1974). Seasonal abundance of insect pests of Cauliflower at Ludhiana (Punjab). *J. Res. of Punjab Agric. Univ*., 14: 66-69.

Chaudhuri, N., Ghosh, J. and Senapati, S.K. (2001). Incidence of insect pest of Cauliflower in relation to prevailing climatic conditions of Tarai region. *Indian J of Ent.*, 63(4), 421-429.

Devi, N. and Raj, D. (1995) Biology and parasitization of Diamondback moth, *Plutella xylostella* (L.) infesting Cauliflower in mid hill region of Himachal Pradesh. *Indian J of Ent.* 19(1), 83-86.

Fletcher, T.B. (1914). Some south Indian insects. Superintendent Govt. press, Madras, 565.

Mochiah, M.B., Baidoo, P.K. and Akyaw, M.O. (2011**).** Influence of different nutrient applications on insect populations and damage to *B. oleracea*. *J of Applied Biological Science* 38, 2564-2572.

Ojha, P.K., Singh, I.P. and Pandey, N.K. (2004). Seasonal incidence of insect-pests of Cauliflower and population build-up under agro-climatic zone-1 of Bihar. *Pestology*, 28(3), 16-18.

Sachan, J.N. and Gangwar, S.K. (1990). Seasonal incidence of insect pests of Cabbage, Cauliflower and knol-khol. *Indian J. Ent*., 52(1), 111-124.

Zhao, J.Z., Li, Y.X., Collins, H.L., Gusukuma-Minuto, L., Mau, R.F.L., Thompson, O.D. and Shelton, A.M. (2002). Monitoring and characterization of Diamondback moth (Lepidoptera: *Plutellidae*) resistance to spinosad. *J of Eco Ent.*, 95, 430-436.