



Research Paper

A FIELD STUDY OF PEST OF CAULIFLOWER CABBAGE AND OKRA IN SOME AREAS OF JAIPUR

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In the present study different insect pests of cauliflower, cabbage and okra crops were studied. Those pests who damage these crops are Diamondback moth (*Plutella xylostella*), Cutworm (Varies), Green peach aphid (*Myzus persicae* Sulzer), Corn earworm (*Helicoverpa zea*), Cabbage maggot (*Delia radicum*). Pest problem is one of the major constraints for achieving higher production in agriculture crops. India loses about 30% of its crops due to pests and diseases each year. Most vegetable crops are subjected to pest damage seeds, roots, leaves, stems and fruits are all susceptible damage range to plant vigor to plant depth and crop loss.

Keywords: *Plutella xylostella*, *Brassica oleracea*, metamorphosis, Riboflavin, Okra

INTRODUCTION

Human civilization and life is impossible to conceive without plant. Plants are diverse group of living things upon which all non photosynthetic organisms ultimately depends. They make beauty our surroundings, purify our air, act as sound barriers, manufacture precious oxygen and help us for saving energy through their cooling shade in summer and their wind reduction in winter. Plants

Provide a sheer inexhaustible source of widely varying materials i.e., timber, fibers, natural dyes, food, oil and soap etc. Vegetables are the important component of daily diet. Vegetables are eaten in a variety of ways, as part of main meals

and as snacks. The nutritional content of vegetables varies considerably, though generally they contain little protein or fat, and varying proportions of vitamins such as vitamin A, vitamin K and vitamin B6, provitamins, dietary minerals and carbohydrates. Vegetables contain a great variety of other phytochemicals, some of which have been claimed to have antioxidant, antibacterial, antifungal, antiviral and anti-carcinogenic properties. Some vegetables also contain fiber important for gastrointestinal (GI) function.

These crops provide a cheap source of protein vitamins and other elements essential for human health and well being.

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Cauliflower (*Brassica Oleracea*) is a cool season vegetable that is considered a delicacy. It is an annual plant that is grown in fields. The head is eaten while the stalk and surrounding thick, green leaves are used in vegetable broth or discarded. Cauliflower is grown on many different types of soil but does best in a rich, well drained soil with a high moisture-holding capacity. High humus content in the soil will provide better aeration and water penetration. If a soil is low in organic matter, stable or green manures can be supplied. Cauliflower grows best on a neutral or slightly acid soil (pH 6.0 to 6.5) (Girish et al., 2010)

Cabbage (*Brassica oleracea Capitata*) is a cold seasoned crop is a member of the Brassica family. As the cabbage plant grows its leaves increase in number, forming a ball-shaped head at the center of the plant. This cruciferous vegetable contains higher concentrations of vitamin C, minerals, and dietary fiber. Cabbage is low in saturated fat, cholesterol, high in dietary fiber, vitamin C, vitamin K, foliate, potassium, manganese, vitamin A, thiamin, vitamin B6, calcium, iron and magnesium (Mochiah et al., 2001)

Okra (*Hibiscus esculentus*), also termed as lady's finger, is a flowering plant belongs to Malvaceae family. This plant is known for its edible green fruits or long green pods.

It is low in sodium, saturated fat and cholesterol, thus, an ideal diet for human consumption. High in dietary fiber, vitamin A, vitamin C, vitamin K, thiamin, vitamin B6, foliate, calcium, magnesium, phosphorus, potassium, manganese, protein, riboflavin, niacin, iron, zinc and copper (P K Baidoo et al., 2011).

These vegetable crops are attacked in every season by number of fungal disease, bacteria,

virus, insects and pests caused high damage to the production. Insects and pests generally attacked because of their liking and to complete their life cycle. They damage and used every parts of the plant and ultimate causes high economic loss to the farmers.

Pest is an organism that effect vegetable crop. Most of the insects considered common vegetable pests undergo a developmental process known as metamorphosis, which simply means that the insect changes form during its life. Metamorphosis may be complete or incomplete. Complete metamorphosis consists of four stages—egg, larva, pupa, and adult. Increasing international trade and tourism have led to an increase in the introduction of exotic pests that pose a considerable economic threat to the agro-ecosystems. Thousand types of insects can affect vegetables (Bhat Deen Mohammed et al., 2011).

MATERIALS AND METHODS

To determine which pest effect on cauliflower, cabbage and okra crop, a field survey was conducted in Vidhania village and Jaisinghpura Khor nearby Jaipur, Rajasthan in India. The field survey was undertaken on September to October 2011. The selected areas are known to vegetable growing areas and has suitable environment for the production of vegetable specially cauliflower and okra. Out of these areas Vidhania and Jaisinghpura is famous for growing these vegetable crops. The field survey includes collection of information through farmer's interviews. The farmer tries to evert the potential insect pest damaged by restoring to the use of insecticide. Only those farmers interviewed who are actively involved in vegetable farming. On the basis of questionnaires, farmers were interviewed

and details were obtained concerning vegetable crop and their pest and pest induced changes in vegetable crops formal interview were conducted in farmer's field keeping in the view the convenience of the respondents. Before conducting an interview, the objective of the activity was briefly explain to the respondent highlighting the need, importance the possible outcome. A central systematic sampling system was used in Vidhania village that ranged between 3000sq. meter areas. Samples were collected from each vegetable from the field, and thoroughly inspected leaves, stem, fruits, bunches and area for identification of different pests. The samples were brought to the laboratory for identification of parts. The identification was done by an expert entomologist, Zoology department, University of Rajasthan, Jaipur.

MATERIALS USED FOR THE STUDY

The following vegetables are used for the present study

- a) Cauliflower (*Brassica oleracea*)
- b) Cabbage (*Brassica oleracea Capitata*)
- c) Okra (*Hibiscus esculentus*)

Observations

Field survey was done in Vidhania and jaisinghpura village situated in Jaipur in the month of September to October the whole survey was done in the morning session (before 7 am) since pests are sensitive to temperature so we can't notice their activity in sunlight. Initially damage is caused by larva which skeletonizes the foliage of host plant and renders it unfit for consumption. Firstly feeds on leaves and later on entire inside the curd thus causing damage to the crop. When

larvae are small, damage is evident as small irregular holes or "shot holes" in the leaves. If larvae are numerous, they may eat the entire leaf, leaving only the veins. When plants begin to flower, larger larvae often feed on the flower buds, flowers and young seed pods. Feeding damage during the early flowering stage can be extensive. Extensive feeding on the flowers will delay plant maturity, because the crop to develop unevenly and significantly reduce seed yields.

The climatic condition of these areas is favorable to the pest so this area is good for the reproduction for diamondback moth and other pests. The whole activity of pest from initial damage to final damage was observed for a month in the field. Farmers were asked how they manage the damage of pests. Considering this cause they use insecticide once in 7 days. Crop damage is usually first evident on plants growing on ridges and knolls in the field. Damage can only be prevented by early field monitoring and the application of insecticides, if larval numbers exceed the action threshold. The recorded observations are shown in Table 1.

RESULTS AND DISCUSSION

The samples of fresh and affected vegetables were collected from field and identified various pests like diamondback moth, green peach aphid and corn earworm by morphological method. These pests cause so many changes in vegetable plants and also affect crop production. Diamondback moth (Figure A) is particularly damage to seedlings and may disrupt head formation in cabbage, broccoli, and cauliflower. The presence of larvae of these pest cause in florets complete rejection of produce, even if the level of plant tissue removal is insignificant.

Table 1: Some Important Pests on Vegetable Crops to Complete Their Life Cycle

S. No	Plant Name	Pest	Effect
1	CAULIFLOWER (<i>Brassica oleracea</i>)	A) Diamondback moth (<i>Plutella xylostella</i>) B) Cutworm (Varies) (<i>Myzus persicae</i>) C) Green peach aphid	This gives the appearance of translucent windows on the leaf Caterpillars chew on stems and leaves of plants Aphids suck juices from plants and may be quite damaging.
2	CABBAGE (<i>Brassica oleracea capitata</i>)	A) Cabbage aphid (<i>Brevicoryne brassicae</i>) B) Cabbage maggot (<i>Delia radicum</i>)	Feeding damage results in curling and yellowing leaves, stunting plant growth, and deforming developing heads. Inoculations of eggs or first-instar larvae resulted in significant root damage.
3	OKRA (<i>Hibiscus esculentus</i>)	A) Corn earworm (<i>Delia radicum</i>) B) Green peach aphid (<i>Myzus persicae</i>)	They can destroy seedlings by feeding on the crown and they can affect mature okra by boring into mature pods where they are difficult to find or control. Aphids feed by piercing plant tissue with their needle-like mouthparts (stylets) and sucking out water and nutrients from the vascular system of the plant. Feeding damage and toxins in the saliva results in thickening, crumpling, and downward curling of leaves.

Diamondback moth (DBM), *Plutella xylostella* is an important pest of cruciferous crops and particularly cabbage and cauliflower (Devi N et al., 1995). *P. brassicae*, *P. canidia* and *P. rapae* were found to be major pests of cabbage and cauliflower (Nair, 1970; Butani and Jotwani, 1984; Gupta, 1990; Bhatia and Verma, 1994; Bhatia and Verma, 1995; Bhatia and Gupta 2003; Badenes-Perez and Shelton, 2006; Kumar et al., 2007; Sharma et al., 2008). Similarly crop damage caused by these pests also reported earlier (Hutchison et al, 2011). It is also reported that the diamondback moth (DBM) (*Plutella xylostella*) is the single most destructive pest of cabbage and leafy greens (Figure B) worldwide. It has been

observed that DBM has also developed resistance to numerous insecticides, including several *Bacillus thuringiensis* (BT) products. Initial damage results in small incomplete holes caused by young larvae and larger complete holes caused by mature larvae. The entire plant may become riddled with holes (Figure C) under moderate to heavy populations. Larvae also feed in the developing heads of cabbage, causing deformed heads and encouraging soft rots. Continuous feeding of beetle on okra leaf resulted in significant higher defoliation on plant at the same time also similar leaf damage reported by Obeng-Ofori et al., (2003). According to Clementine L et al., (2009) these pests bore hole into the leaves and as a consequence reduce the photosynthetic

Figure A to E: Diamond Back Moth on Host Plant
Figure B: Diamond Back Moth Chew Plant's Leaf
Figure C: Pest is Making Host Plant's Fruit Ruined
Figure D: Pest Affected Cauliflower
Figure E: Showing Okra's Pest



activity of the leaves. Therefore they may reduce okra and cauliflower fruit yield (Figure D and E).

CONCLUSION

Through the field studies in Vidhania and Jaisinghpura villages of Jaipur district, we observed that these districts are facing problems with pests on the various vegetable crops including cauliflower, cabbage and okra. We found Cauliflower is attacked by three types of pest; cabbage is by two types and okra with two types of pests generally. To estimate the damage on the crops caused by these pests needs detailed survey and study.

REFERENCES

1. Flint M L (1998), "Pests of the Garden and Small Farm", 2nd Edition, Univ. Calif. Agric, Nat. Res. Publ, p. 3332, Oakland.
2. Bhat O K, Kaul V and Bhagat K C (1994), "Incidence of pests associated with the rhizosphere of tomato in Jammu", *Annals of Plant Protection Sciences*, Vol. 2, No. 2, pp. 23-26.
3. Bhatia R and Gupta D (2003), "Insect and mite pest status of subtropical horticultural crops in Himachal Pradesh", *Journal of Insect Science*, Vol. 16, No. 2, pp. 1-8.

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4. Butani D K and Jotwani M G (Eds.), (1984), "Insects in vegetables", Periodical Expert Book Agency Delhi, India, pp. 356.
 5. Capinera J L (Eds.), (2001), "Handbook of vegetable pests", Academic Press, California USA, pp. 729.
 6. Chauhan U, Bhalla O P and Sharma K C (1997), "Biology and seasonality of the diamondback moth, *Plutella xylostella* L. (Lepidoptera:Yponomeutidae) and its parasitoids on cabbage and cauliflower", *Pest management in Horticultural Ecosystems*, Vol. 3, No. 1, pp. 7-12.
 7. Devi N and Raj D (1995), "Biology and parasitization of diamondback moth, *Plutella xylostella* L. infesting cauliflower in mid hill region of Himachal Pradesh (India)", *Journal of Entomological Research*, Vol. 19, No. 1, pp. 83-89.
 8. Badenes-Perez F R and Shelton AM (2006), "Pest management other agricultural practices among farmer growing cruciferous vegetable in central and western highland of Kenya and the western Himalaya India", *International journal of pest management*, Vol. 52, No. 4, pp. 303-315.
 9. Hutchison W D, Bolin P C and Hines R L (2011), "Dimondback moth". Department of Entomology, University of Minnesota.
 10. Obeng-Ofori D and Sackey J (2003), "Field evaluation of non-synthetic insecticides for the management of insect pests of okra *Abelmoschus esculentus* L. Moench in Ghana". *Ethiopian J. Sci*, Vol. 26, pp. 145-150.
 11. Clementine L, Dabiré-Binso and Malick N (2009), "Preliminary studies on incidence of insect pest on okra, *Abelmoschus esculentus* L. Moench in central Burkina Faso", *African Journal of Agricultural Research*, Vol. 4, No. 12, pp. 1488-1492.
 12. Bhat D M, Bhagat R C and Qureshi A (2011), "A survey of insect pests damaging vegetable crops in Kashmir Valley (India), with some new records", *Journal of Entomological Research*, Vol. 35, No. 1, pp. 85-91.
 13. Girish C, Verma T S and Sharma S (2010), "Nutrient Content of Cauliflower (*Brassica oleracea* L. var. botrytis) as Influenced by Boron and Farmyard Manure in North West Himalayan Alfisols", *Journal of the Indian Society of Soil Science*, Vol. 58, pp. 248-251.
 14. Baidoo P K and Mochiah M B (2011), "The influence of nutrient application on the pests and natural enemies of pests of okra *Abelmoschus esculentus* L. Moench", *Journal of Applied Biosciences*, Vol. 41 pp. 2765-2771.
 15. Mochiah M B, Baidoo P K, and Owusu-Akyaw M (2011), "Influence of different nutrient applications on insect populations and damage to cabbage", *Journal of Applied Biosciences*, Vol. 38, pp. 2564-2572.
 16. Ruggles Gates R (1953), "Wild cabbage and effect of cultivation". *Journal of genetics*, Vol. 51, No. 2.
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