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Insect-pests complex studies on Chrysanthemum in Pantnagar region

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Abstract
Insect pests complex studies on Chrysanthemum revealed that a total of 11 insect species associated with the crop at different growth stages of the crop. The sucking pests (thrips, aphids and mealy bugs) were associated with the crop right from the seedling stage to maturity stage of the crop, while the major dominating pests such as bud borer and leaf caterpillar recorded at vegetative stage and as well as bud formation and flowering stage of the crop. Defoliators such as Bihar hairy caterpillar and semilooper also recorded from vegetative stage to flowering stage and they damage the crop moderately. Other insect pests (looper, ash weevil, grasshopper and painted lady butterfly) were also noticed on the crop and the extent of damage caused by them does not cause much economic loss.

Keywords: Chrysanthemum, bud borer, pest association, sucking pests, damage

Introduction
Chrysanthemum (*Dendranthema grandiflora* L.) belongs to the Asteraceae family (Compositae) is one of the most important flower crops in India and it is also known as "Autumn flower". Chrysanthemum ranks second to Rose among top ten cut flowers in the world trade of flower crops [1]. Chrysanthemum is one among the five commercially important potential flower crops in India. Intensive cultivation involving large scale use of synthetic fertilizers and pesticides, drastically changed the crop-pest equilibrium. Profitable production are decreasing due to several factors, the most important constraint is arthropod pests such as mites, caterpillars, whiteflies, thrips, aphids and leaf miner [2]. Pest scenario varies from place to place with the variation in the agro-climatic conditions of the locality. Information on pest complex in a specific agro-ecosystem is very much important in planning pest management strategies which would not only be economically feasible but also ecologically sound. However, such information on Chrysanthemum crop is scanty particularly from Pantnagar region. Therefore, pest succession studies were conducted to take into account of the pest scenario of Chrysanthemum crop in Pantnagar region of Uttarakhand.

Materials and methods
The experiment was conducted at Floriculture Research Centre (FRC) of GBPUA&T, Pantnagar, Uttarakhand during *Kharif* season of 2019 (July to September). Thai Chen Queen variety was sown in 100 sq. meter area. Randomly ten plants (each plant 9 leaves three upper, three middle and three lower) from three central rows in each plot were tagged. An observation on population of insect pests of Chrysanthemum was recorded in early morning hours (7am to 10am) at weekly interval during the crop period. The nature and extent of damage caused by various insect pests was also recorded to assess the economic status of the pests. The insect pests were collected and reared up to adult stage wherever necessary. Adult insect were preserved and identified. The collected specimens were separated out to determine their orders and families.

Results and discussion
The insect pest species associated Chrysanthemum crop along with their damaging stage, nature of damage, economic status and seasonal incidence have been studied and shown in table1. Eleven species of insect pests reported during the period of study from 1 July 2019 to 30th September 2019 at various stages of the Chrysanthemum crop. Insect pest association in Chrysanthemum crop enlisted below,

Table 1: Pest complex on Chrysanthemum at Gbpua&t, Pantnagar during *Kharif*-2019

S. No.	Common name	Scientific name	Family and order	Damaging stage	Nature of damage and damage symptom	Period of activity	Economic status
1	Chrysanthemum bud borer	*Helicoverpa armigera*	Noctuidae Lepidoptera	Larva	Larvae feed on very young terminal shoots, young foliage and flower buds heads. Larvae feed look like round holes in buds and flower heads	Last July to last September	High
2	Leaf caterpillar	*Spodoptera litura*	Noctuidae Lepidoptera	Larva	Freshly hatched larvae feed gregariously, scraping the leaves from ventral side, later disperse, feeding voraciously at night on the foliage. Larvae making holes look like irregular shapes on leaves.	Starting August to mid September	Medium
3	Bihar hairy caterpillar	*Spilosoma obliqua*	Arctiidae Lepidoptera	Larvae	Initial stage of larvae feed gregariously on the under surface of leaves and causes defoliation. In severe cases only stems are left behind.	Starting August to mid September	Medium
4	Painted lady butterfly	*Vanessa cardui*	Nymphalidae Arthropoda	Larvae	Larvae feed on leaves, leaving the stem and midrib. Sometimes typically 2-4 leaves webbed together and ragged chewing injuries is there.	Mid August to starting September	Low
5	Semi looper	*Plusia orichalcea*	Noctuidae Lepidoptera	Larvae	The caterpillar feeds sparingly at first and during later stages feeds voraciously. Heavy defoliator, only mid rib and veins are left on the plant	Mid August to mid September	Medium
6	Looper	*Trichoplusia ni*	Noctuidae Lepidoptera	Larvae	Larvae mostly leaf feeders and initial instar they confine their feeding to the lower leaf surface and later stages larvae symptoms look like large holes do not feed at the leaf margin	Last July to mid September	Low
7	Grasshopper	*Chrotogonus sp*	Acrididae Orthoptera	Nymph and Adult	Nymph and adult feed on foliage results leaf margins as irregular cuttings.	Starting August to last September	Low
8	Ash weevil	*Mylloecerus subfasciatus*	Curculionidae Coleoptera	Grub and Adult	Adults feed on the leaves from border by making a characteristic 'U' shaped cuts and grub feed on the roots.	Last July to last August	Low
9	Mealybugs	*Maconellicoccus hirsutus*	Pseudococcidae Hemiptera	Nymph and Adult	Colonies of nymphs and adults suck sap from leaves and shoots and stem. Heavy clustering of mealy bugs usually seen under surface of leaves as a thick mat with waxy secretion	Mid July to last September	High
10	Aphid	*Macrosiphoniella sanborni*	Aphididae Hemiptera	Nymph and Adult	Greenish or black nymphs and chocolate brown adults suck the cell from growing shoots and lower surface of leaves. Those leaves curl downwards and discolored.	Mid July to last September	High
11	Thrips	*Microcephalothrips abdominalis, Frankiniella sp.*	Thripidae Hemiptera	Nymph and Adult	Nymphs and adults suck sap from leaves and flower buds and form a silvery streak on leaf surface.	Mid July to mid August	High

Leaf caterpillar: These are chief defoliators, wide spread in India. These pests infested on the crop from starting August to mid September.

Chrysanthemum bud borer: It is polyphagous and cosmopolitan pest and the incidence of this pest on crop started from the last July to last September.

Bihar hairy caterpillar: It is a polyphagous pest and the incidence of the pest on crop started from starting August to mid September.

Painted lady butterfly: It is cosmopolitan pest and were observed on the crop from mid August to starting September

Semi looper: It is a polyphagous pest and the incidence of the pest on crop started from mid August to mid September.

Looper: It is highly defoliator and infestation on the crop started from last July to mid September.

Aphids: Aphids are small sucking and polyphagous pest species and incidence of this pest noted on the crop from mid July to last September.

Mealybugs: Highly polyphagous pests recorded on the crop from mid July to last September.

Thrips: Thrips are small sucking pests of cosmopolitian distribution and were observed on the crop from mid July to mid August.

Ash weevil: Weevils with snout and grey colour, active feeder on the leaves. It found on the crop from last July to last August.

Grasshopper: Grasshoppers are polyphagous pests and infestation on the crop started from starting August to last September.

The present results are in agreement with Girish *et al.* [3] studies revealed that *S. litura* affects seedlings of chrysanthemum as it advances growth sucking pests mainly aphids infestation will be more. At the flowering stage, the lepidopteran insects *S. litura, H. armigera* and Cotton aphid infect flower bud and affect bud opening. Pal and Sarkar [4] reported that red spider mites, gram pod borer, leaf Webber and white spotted flea beetle as pests in chrysanthemum crop. According to Saicharan *et al.* [6] incidence of leafminer, aphids and thrips fluctuated from field to field significantly in chrysanthemum crop. Similar results also been reported by various workers Butani [2]; Srinivasa reddy and Pushpalatha [5]; Saicharan *et al.* [7].

Conclusion

On the basis of present investigation of insect pest complex studies on Chrysanthemum crop in Pantnagar region concluded that a total of eleven insect species were associated with this crop at different stages. Among the eleven insect pests Chrysanthemum bud borer (*Helicoverpa armigera* Hubner), leaf caterpillar (*Spodoptera litura*) and mealy bugs were the serious pests recorded to infest the Chrysanthemum along with other insect species viz. Bihar hairy caterpillar and semilooper were known to infest pest moderately.

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