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Insect Fauna Associated With Chick Pea (*Cicier Arietinum* L.) Crop at Pantnagar Tarai Region Of Uttarakhand

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ABSTRACT
Present investigations were conducted to study the insect fauna associated on chick pea, variety PG-186 sown on 1st December and 2nd December during Rabi seasons of 2009-10 and 2010-11 respectively, along with their nature of damage, seasonal incidence, relative abundance and economic status at Pantnagar Tarai region of Uttarakhand, revealed that 13 species of insects were found attacking the chickpea crop at different stages of crop growth. Among them order Lepidoptera constituted the largest number of 5 species viz., cutworms, Agrotis ipsilon (Hfn.), Agrotis sp., semiloopers, Trichoplusia ni (Hub.) and Thysanopulsia orichalcea (Fab.), gram pod borer, Helicoverpa armigera (Hub.) belonging to family Noctuidae, which constituted 38.46% and 50% of the total insect fauna in 2009-10 and 2010-11 respectively followed by order Diptera, Hemiptera, Coleoptera and Isoptera were recorded serious to the Chickpea crop. Among all the insect pests chickpea pod borer, Helicoverpa armigera was observed as the most prevalent species as evidenced by its population and relative abundance and therefore, appeared to be a major pest of chickpea causing severe damage.
Keywords: *Insect Pests of Chickpea, Pests complex of Chick Pea*

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INTRODUCTION

Chickpea (*Cicer arietinum* L.) is the premier pulse crop of Indian subcontinent. India is the largest chickpea producer as well as consumer in the world. Chickpea is grown in tropical, subtropical and temperate regions. Kabuli type is mostly grown in temperate regions while the desi type chickpea is grown in semi-arid and tropics [8, 7, 5]. The main chickpea producing areas are Central India *viz.,* Madhya Pradesh, Rajasthan, and Maharashtra and the upper basin Ganga and Yamuna, *viz.,* Uttar Pradesh, Punjab, Haryana, and Bihar [2]. Of the various ecological factors, responsible for low yield of chickpea in India, the insect pests are most important. Reed *et al.,* [11] listed 54 species of insect pests on chickpea of these the gram pod borer, *Helicoverpa armigera* (Hub), a pest of national importance in India, is one of the limiting factor in the successful cultivation of chickpea [12]. Keeping in view the economic importance of the crop, an attempt has been made to study the insect fauna associated with chickpea crop at different growth stages and their nature of damage, seasonal incidence, relative abundance and economic status at Pantnagar Tarai region of Uttarakhand.

MATERIAL AND METHODS

The present investigation were carried out on chick pea, variety PG-186 sown on 1st December and 2nd December during *Rabi* seasons of 2009-10 and 2010-11 respectively, in Randomized Block Design (RBD) having three replications and ten treatments with control treatment at Crop Research Centre of G.B. Pant University of Agriculture and Technology, Pantnagar, District U.S. Nagar, Uttarakhand, India. Insect fauna associated with chickpea crop at Pantnagar was explored right from germination of crop till the harvestation at weekly intervals. Observations were taken randomly at ten spots. In case of larvae attacking the crops, they were collected first and then reared in laboratory for adult emergence. Adult insects were identified, mounted and preserved for record. The nature and extent of damage caused by

various insect pests along with their period of incidence and relative abundance were also recorded to assess the economic status of pest.

RESULTS AND DISCUSSION

During the investigation, 13 species of insects were found attacking the chickpea crop at different stages of crop growth (Table 1 and Fig 1 and 2). Considering the species spectrum of the insect fauna associated to chickpea it was revealed that the order Lepidoptera constituted the largest number of 5 species viz., cutworms, *Agrotis ipsilon* (Hfn.), *Agrotis* sp., semiloopers, *Trichoplusia ni* (Hub.) and *Thysanopulsia orichalcea* (Fab.), gram pod borer, *Helicoverpa armigera* (Hub.) belonging to family Noctuidae, which constituted 38.46% and 50% of the total insect fauna in 2009-10 and 2010-11 respectively (Fig. 1 and 2). The order Diptera appeared to be next in position which represented 3 species viz., stem-miner, *Ophiomyia cirervicola* (Frogatt) and leaf-miners, *Chromatomyia horticola* (Gourear), and *Liriomyza cicerina* (Rond.) belonging to family Agromyzidae and constituted 23.07% and 20% in 2009-10 and 2010-11, respectively of the total insect fauna associated to chickpea crop followed by Hemiptera: Aphididae 23.07% and 30% in 2009-10 and 2010-11, respectively (3 species viz., pod aphid, *Acyrthosiphon pisum* (Harris), bean aphid, *Aphis fabae,* (Scop), black aphid, *Aphis craccivora* (Koch), Coleoptera: Melolonthinae 7.69% in 2009-10 while in 2010-11 it was absent and Isoptera: Termitidae 7.69% in first year and it was absent in the second year, respectively constituting one species each (*Holotrichia* sp. and *Odontotermes obesus* (Rambur), respectively).

Out of 13 species of insects, recorded in the present study, the larvae of 10 species were noticed attacking various stages of crop growth whereas the aphids attacked the crop at both nymph and adult stages.

Out of 5 species of Lepidoptera recorded here, *Helicoverpa armigera* was observed as the most prevalent species as evidenced by its population and relative abundance and therefore, appeared to be a major pest of chickpea causing severe damage. Several workers have reported the chickpea pod borer as a severe pest in various parts of India [1, 13] causing 8.15 to 92.5 percent damage to the crop and yield losses upto 400 kg/ha in chickpea crop [9].

The incidence of insect pests on chickpea in the present study was recorded from 3rd week of December (after18 Days of sowing) till the maturity of the crop i.e. 4th week of April irrespective to different species. Significantly, among all the pests recorded, the larvae of pod borer and cut worms appeared to be the first to infest the crop (3rd week of Dec.) where as the species marked their first appearance from 1st week of Jan. to 3rd week of Jan. irrespective to different species. The yellowish green caterpillars of chickpea pod borer feed on the leaves at the vegetative stage of the crop and bore inside the flower buds and pods at reproductive phase which resulted in grainless pods during maturity phase.

Gram cutworms, *Agrotis ipsilon* (Hfn.) and *Agrotis* sp. were observed other potentially important pests of chickpea crop in the present study. The incidence of *Agrotis ipsilon* (Hfn.) was recorded in fair population from 3rd week of December to 1st week of March in 2009-10 and 3rd week of Dec to 2nd week of March in 2010-11; while the incidence of *Agrotis* sp. was marked from 3rd week of Dec. upto 1st week of March in 2009-10 and from 3rd week of Dec. upto 1st week of March in 2010-11. The attack of *Agrotis ipsilon* on chickpea crop has also been reported from different parts of country [10, 3, 6]. Lal [4] reported the peak activity of this insect from mid Feb to June end on chickpea crop. The damage by cutworm has been also reported by Atwal and Dhaliwal [1] on various agricultural crops.

The light yellowish-grey coloured larvae of cutworms came out of their hiding places at night and damaged the plants under the cover of darkness. The larvae were observed to attack the crop at two stages of its growth, at seedling stage by cutting the tender plants at an average height of 5 cm from the ground surface, so that the plants failed to regenerate and ultimately perished. During the later stage of growth the tender shoots were also damaged by cutting them at an average height of 14 cm from the ground surface, resulting retardation of growth which ultimately appeared to have adverse effect in the yield.

Other lepidopteran pests observed to attack chickpea crop in the present study were 2 species of semiloopers viz., *Trichoplusia ni* and *Thysanopulsia orichalcea*. However, the relative abundance of these insects was considerably lower as compared to chickpea pod borer and cut worms in both the years.

The larvae of *Trichoplusia ni* and *T. orichalcea* were found attacking on leaves and leaflets by making round holes and sometimes by cutting the leaf margins. The larvae were also observed attacking the pods by making irregular cuts from the upper side of pods so as to feed the young seeds inside. The incidence of *T. ni* was recorded from the 2nd week of Feb. upto 3rd week of March in 2009-10 and from 2nd week of Feb upto 2nd week of March in 2010-11 whereas *T. orichalcea* exhibited its incidence from 1st week of Feb. till 3rd week of March in 2009-10 and from 1st week of Feb. upto 2nd week of March in 2010-11. The abundance of these pests was recorded to be fairly common during the crop seasons 2009-10 and 2010-11 except *T. orichalcea* which exhibited its rare incidence during 2010-11.

The larvae of stem-miner, *Ophiomyia cirervicola* was found attacking the stem of chickpea by making zig-zag tunnels. The period of incidence of this pest was marked from 3rd week of Jan. up to 2nd week of March during 2009-10. The insect showed its rare incidence during 2009-10 while during the crop season 2010-11 the pest did not appeared at all. The full grown larvae pupated inside the tunnels and the adults emerged out from the pupae within a week.

Two species of leaf-miners viz., *Chromatomyia horticola* and *Liriomyza cicerina*, the well known polyphagous pests, damaging the leaves of various agricultural crops by making tunnels [3, 4, 1] were also observed to attack chickpea in the presented study. Quantitatively, both the species appeared to be common on chickpea crop in both the crop seasons i.e. 2009-10 and 2010-11. The incidence of leaf-miners, *Chromatomyia horticola* was marked from 2nd week of January till 3rd week of March in 2009-10 and from 1st week of Jan. upto 3rd week of March in 2010-11; while the incidence of *Liriomyza cicerina* was marked from 2nd week of Jan upto 3rd week of March in 2009-10 and from 1st week of Jan. upto 3rd week of March in 2010-11. The larvae were noticed to feed on the mesophyll tissue, present between the lower and upper epidermis of the leaves by making characteristic zig-zag tunnels. When full grown, the larvae pupated inside the tunnels for adult emergence.

Three species of aphids viz., Pod aphid, *Acyrthosiphon pisum;* Bean aphid, *Aphis fabae* and Black aphid, *A. craccivora* were observed as the minor pest on chickpea crop during the course of present study. Out of these the black aphid, *Aphis craccivora* exhibited higher abundance as compared to the other two aphid species, exhibiting fair abundance. Earlier several workers [3, 4] reported that the aphid species on chickpea crop caused minor damage as compared to *H. armigera*.

Pod aphid, *Acyrthosiphon pisum* first appeared in the 2nd week of Jan. and showed its incidence upto 4th week of Feb. in 2009-10, whereas at was found from 2nd week of Jan upto 1st week of March in 2010-11 on foliage of chickpea. The bean aphid, *Aphis fabae* on the other hand marked its first appearance during 1st week of Jan. and was observed upto 2nd week of March in both the year 2009-10 and 2010-11; while the black aphid, *Aphis craccivora* marked its first appearance from 1st week of Jan. and showed its incidence upto 2nd week of March in 2009-10 and from 1st week of Jan. and upto 3rd week of March, in 2010-11. The period of incidence of aphids on chickpea crop in the present study somewhat differed from the observations of Atwal and Dhaliwal [1], who reported the incidence of this pest on chickpea crop from December to February. Both the nymphs and adults of aphids caused damage by sucking cell-sap from the leaves, stems and flower buds. Though the abundance of the pest was fairly common but vitality of the plant was not much affected. However, at some occasions the flowers bearing appreciable population of aphids caused their drying.

White grub, *Holotrichia* sp. a well known polyphagous pest was also observed to attack chickpea crop in the present study. The pest exhibited its incidence from 3rd week of March upto 4th week of April during 2009-10 in poor abundance while during the crop season 2010-11, it was found absent. The subterranean grub of this pest caused damage by nibbling the root hairs, rootlets and even the tap root which resulted in wilting of plants followed by their death. Several workers Manjunath *et al.,* [6], Yadav [14] and Atwal and Dhaliwal [1] also reported the white grub as a minor pest of chickpea crop.

The termite, *Odontotermes obesus* was also found to attack the chickpea crop. During the crop season 2009-10 the pest first appeared in 2nd week of December and remained active upto 2nd week of Feb in fair incidence. While no incidence of this insect was recorded during 2010-11. Termites caused damage the roots of seedlings and young plants, causing the growing shoot to wither and die. Earlier the attack by termites on chickpea crop has been reported by many workers in India [11, 4,1].

Table 1. Insect fauna of chickpea crop at Pantnagar during *Rabi* season (2009-10 and 2010-11).

1	2	3	4	5	6	7	8	9	10
Noctuidae	Chickpea pod borer	*Helicoverpa armigera* (Hb.)	Larvae	Larvae defoliate young crop and cut round holes in pod wall and devour the seed inside.	3rd week of Dec to 4th week of April.	3rd week of Dec to 4th week of April.	++++	++++	Major
Diptera									
Agromyzidae	Stem-miner	*Ophiomyia cirervicola* (Frogatt)	Larvae	Make tunnel in stem	3rd week of Jan. to 2nd week of March.	-	+	-	Minor
	Leaf-miner	*Chromatomyia horticola* (Gourear)		Make tunnel in leaf	2nd week of Jan. to 3rd week of March.	1st week of Jan. to 3rd week of March	++	++	Minor
				Make tunnel in	2nd week of Jan. to	1st week	++	++	Minor

	Leaf-miner	*Liriomyza cicerina* (Rond).	Larvae	leaf	3rd week of March.	of Jan. to 3rd week of March.			
Hemiptera									
Aphididae	Pod aphid Bean aphid	*Acyrthosiphon pisum* (Harris), *Aphis fabae* (Scop.),	Nymph and Adult -do-	Suck the cell sap -do-	2nd week of Jan. to 4th week Feb. 1st week of Jan. to 2nd week of March.	2nd week of Jan. to 1st week March. 1st week of Jan. to 2nd week of March.	++ ++		
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Black aphid	*Aphis craccivora* (Koch).	Nymph and Adult	Suck the cell sap	1st week of Jan. to 2nd week of March.	1st week of Jan. to 3rd week of March.	+++	+++	Minor
Coleoptera									
Melolonthinae	White grub	*Holotrichia sp.*(Blanch)	Grubs	Cut the plant at ground level	3rd week of March to 4th week of April.	-	+	-	Minor
Isoptera									
Termitidae	Termite	*Odontotermes obesus* (Romb)	Workers	Feed on root hairs and rootlets of plants	2nd week of Dec to 2nd week of Feb.	-	++	-	Minor

Abbreaviations: ++++ = Abundant; +++ = Common; ++ = Fairly common; + = Rare and - = Absent

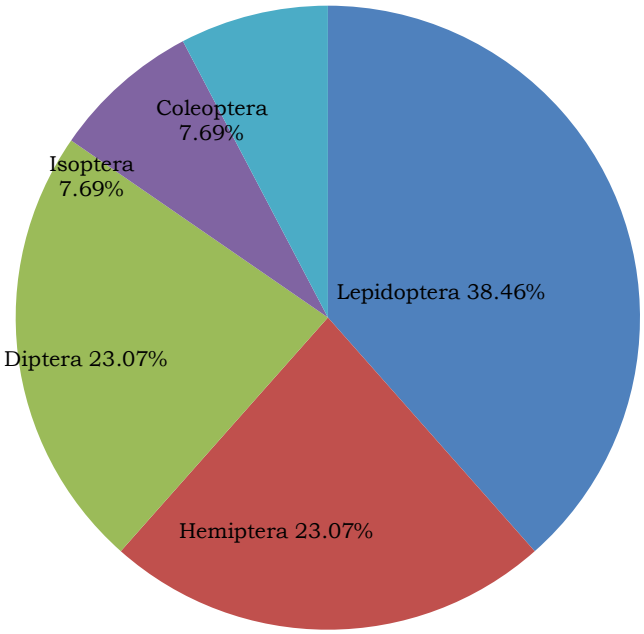

Figure 1. Insect Pest complex of chickpea crop at Pantnagar during 2009-10.

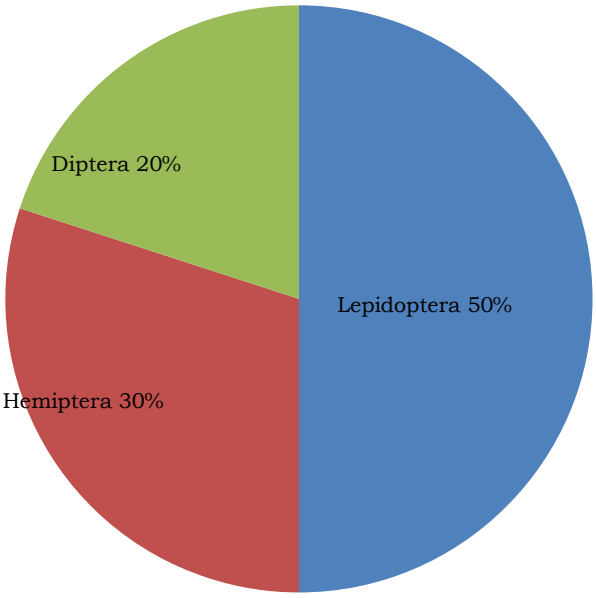

Figure 2. Insect Pest complex of chickpea crop at Pantnagar during 2010-11.

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