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Distribution pattern of major insect pests of cabbage in Udham Singh Nagar District of Uttarakhand

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ABSTRACT: The present investigation facilitated to witness a total of seventeen species of insects that have been damaging (pests) and protecting (natural enemies) the cabbage crop at different villages of Udham Singh Nagar during *Rabi* 2020. Out of these, five species of defoliators, viz., *Spodoptera litura*, *Helicoverpa armigera*, *Plutella xylostella*, *Phyllotreta cruciferae* and *Attractomorpha similis* and one sucking pest, i.e., *Brevicoryne brassicae* (aphid) were recorded to cause noticeable damage to the crop. Among the various insect pests of cabbage *S. litura*, *B. brassicae* and *H. armigera* were more in numbers and had relatively higher abundance as compared to other species and hence considered the major pest of economic importance. Considering the pest complex of cabbage in the present study the order Lepidoptera occupied the largest number of species followed by Hemiptera, Coleoptera and Orthoptera.

Key words: *Brevicoryne brassicae*, distribution pattern, *Spodoptera litura*

There are certain important vegetables of winters grown in India, cabbage being one among them. India comes second to China in world-wide cabbage production however the productivity is lesser as compared to other countries (Anonymous, 2018). The cabbage production in Uttarakhand is about 69.35 thousand tonnes (APEDA, 2021). There are various constraints in cabbage production, insects accounting for about 60-80% of yield loss on an average for all crucifers (Mpumi *et al.*, 2020). Important insects among them being *Brevicoryne brassicae*, *Pieris brassicae*, *Plutella xylostella*, *Hellula undalis*, etc. (Gautam *et al.*, 2018; Tran and Nguyen, 2019). These along with some other insects account for about 5 to 100 % damage to the crop (Jankowski *et al.*, 2007). Distribution of these pests are important to apply the control measures timely and effectively.

MATERIALS AND METHODS

The present study was conducted in a form of a survey from November 2020-March 2021 to check the population of various insect pests in Udham Singh Nagar district of Uttarakhand, India. Some important cabbage growing areas were taken under the study including- Khatima, Sitarganj, Kichha, Pantnagar, Gadarpur, Kashipur and Jaspur (Sharma,

2011). The specimens of insects including the adults or any immature stages were collected from several locations to check the status of pest in different regions (Yadav *et al.*, 2015).

RESULTS AND DISCUSSION

Seventeen insects were found to infest the cabbage during the course of study out of which six species like- *B. brassicae*, *S. litura*, *H. armigera*, *P. xylostella*, *P. cruciferae* and *Attractomorpha similis* belonging to Hemiptera, Lepidoptera, Coleoptera and Orthoptera orders of class- insecta were more prominent in the field and caused significant damage to the crop.

Distribution pattern of *B. brassicae* on cabbage

It was realized that out of all the villages under the study it was a serious pest in 18 villages namely Lalpur, Pantnagar, Bara, Bari, Uttamnagar, Nagla (Kichha), Nayagaon (Sitarganj), Pratappur, Sisaikheda (Khatima), Kalinagar, Gularbhoj, Panchananpur, Buksaura (Gadarpur), Bhewa Nagla, Lakhanpur (Bajpur), Nandrapur, Kundeswari and Hampur Ismail (Kashipur) 7 out of which- Lalpur, Pantnagar, Bari, Nagla (Kichha), Nayagaon (Sitarganj), Lakhanpur (Bajpur) and Kundeswari (Kashipur) were highly infested with this insect

Table 1: Distribution of insect-pests of cabbage in different villages of Udham Singh Nagar during Rabi 2020

Block/ Sub-division	Villages	Status of presence of Insect-pests in Cabbage crop					
		Cabbage aphid (<i>B. brassicae</i>)	Tobacco caterpillar (<i>S. litura</i>)	Gram pod borer (<i>H. armigera</i>)	Diamond back moth (<i>P. xylostella</i>)	Cabbage flea beetle (<i>P. cruciferae</i>)	Grasshopper (<i>A. similis</i>)
Rudrapur	Lalpur	✓	✓	×	✓	×	×
	Pantnagar	✓	✓	✓	✓	✓	✓
Kichha	Bara	✓	✓	×	✓	✓	×
	Bari	✓	✓	×	×	✓	×
	Uttamnagar	✓	✓	✓	✓	×	×
Sitarganj	Nagla	✓	✓	✓	×	✓	×
	Bishti	×	✓	✓	×	×	×
	Nayagaon	✓	✓	✓	×	×	×
Khatima	Pratappur	✓	✓	×	×	×	×
	Sisaikheda	✓	✓	×	×	×	×
	Jhankat	×	×	✓	×	×	×
Gadarpur	Kalinagar	✓	✓	✓	×	×	×
	Gularbhoj	✓	✓	✓	×	×	×
	Panchananpur	✓	✓	✓	×	×	×
Bajpur	Buksaura	✓	✓	✓	×	×	×
	Bhewa Nagla	✓	✓	×	✓	×	×
	Lakhanpur	✓	×	×	✓	✓	×
Kashipur	Nandrampur	✓	✓	✓	×	×	×
	Kundeswari	✓	✓	✓	×	×	×
	Hempur Ismail	✓	×	×	✓	✓	×
Jaspur	Hariawala	×	✓	×	✓	×	×
	Tila	×	✓	×	✓	×	×
	Jaspur	×	✓	×	✓	×	×
Number of villages where pest was present		18 out of 23	20 out of 23	12 out of 23	10 out of 23	6 out of 23	1 out of 23

[Where '✓' denotes the presence of pest and '×' denotes the absence of the pest.]

(Table 1 and Figure 1). The aphid population was moderately present in Bara, Pratappur, Panchananpur, Buksaura and Hempur Ismail and showed medium level of infestation followed by Uttamnagar, Sisaikheda, Kalinagar, Gularbhoj, Bhewa Nagla and Nandrampur which showed least infestation of *B. brassicae* (Table 2).

Distribution pattern of *S. litura* on cabbage

It was seen that 20 villages Lalpur, Pantnagar, Bara, Bari, Uttamnagar, Nagla (Kichha), Bishti, Nayagaon (Sitarganj), Pratappur, Sisaikheda (Khatima), Kalinagar, Gularbhoj, Panchananpur, Buksaura (Gadarpur), Bhewa Nagla (Bajpur), Nandrampur, Kundeswari (Kashipur), Hariawala, Tila and Jaspur (Jaspur) in Udham Singh Nagar district were infested with the tobacco caterpillar (Table 1 and Figure 2). Out of them most severe damage was seen in 11 villages- Pantnagar, Bara, Bari, Uttamnagar, Nagla

(Kichha), Bishti, Nayagaon (Sitarganj), Kalinagar, Gularbhoj, Panchananpur, Buksaura (Gadarpur) and Nandrampur (Kashipur), followed by Nayagaon, Bhewa Nagla, Kundeswari, Hariawala, Tila and Jaspur. Villages Lalpur, Pratappur and Sisaikheda showed the minimum infestation by the insect (Table 2).

Distribution pattern of *H. armigera* on cabbage

It was found that 12 villages Pantnagar, Uttamnagar, Nagla (Kichha), Bishti, Nayagaon (Sitarganj), Jhankat (Khatima), Kalinagar, Gularbhoj, Panchananpur, Buksaura (Gadarpur), Nandrampur, Kundeswari (Kashipur) showed infestation of gram pod-borer (Table 1 and Figure 3). The only village Pantnagar (Kichha) was highly infested with the insect followed by Kichha which showed medium infestation and least infestation was seen by Nagla, Bishti, Nayagaon, Jhankat, Gularbhoj,

Table 2: Status of occurrence of insect-pests of cabbage in different villages of Udham Singh Nagar during Rabi 2020

Block/ Sub-division	Villages	Status of occurrence of Insect-pests in Cabbage crop					
		Cabbage aphid	Tobacco caterpillar	Gram pod borer	Diamond back moth	Cabbage flea beetle	Grasshopper
Rudrapur	Lalpur	++++	++	-	++++	-	-
	Pantnagar	++++	++++	++++	++	+	+
Kichha	Bara	+++	++++	-	++++	++	-
	Bari	++++	++++	-	-	++	-
	Uttamnagar	++	++++	+++	++++	-	-
Sitarganj	Nagla	++++	++++	++	-	+++	-
	Bishti	-	++++	++	-	-	-
	Nayagaon	++++	+++	++	-	-	-
Khatima	Pratappur	+++	++	-	-	-	-
	Sisaikheda	++	++	-	-	-	-
	Jhankat	-	-	++	-	-	-
Gadarpur	Kalinagar	++	++++	+	-	-	-
	Gularbhoj	++	++++	++	-	-	-
	Panchananpur	+++	++++	++	-	-	-
	Buksaura	+++	++++	++	-	-	-
Bajpur	Bhewa Nagla	++	+++	-	++++	-	-
	Lakhanpur	++++	-	-	+++	++	-
Kashipur	Nandrampur	++	++++	++	-	-	-
	Kundeswari	++++	+++	++	-	-	-
	Hempur Ismail	+++	-	-	++++	++	-
Jaspur	Hariawala	-	+++	-	++	-	-
	Tila	-	+++	-	++	-	-
	Jaspur	-	+++	-	++	-	-

[Where '++++' denotes high infestation, '+++' denotes medium level of infestation, '++' denotes low level of infestation, '+' denotes the extreme low (rare) level of infestation for the respective pest (Yadav *et al.*, 2015)]

Panchananpur, Buksaura, Nandrampur and Kundeswari (Table 2).

Distribution pattern of *P. xylostella* on cabbage

Out of 10 villages Lalpur, Pantnagar, Bara, Uttamnagar (Kichha), Bhewa Nagla, Lakhanpur (Bajpur), Hempur Ismail (Kashipur), Hariawala, Tila and Jaspur showing DBM infestation (Table 1 and Figure 4) highest infestation by the insect was found in 5 villages Lalpur, Bara, Uttamnagar (Kichha), Bhewa Nagla (Bajpur) and Hempur Ismail (Kashipur) followed by Lakhanpur showing comparatively less infestation. The least infestation was present in Pantnagar, Hariawala, Tila and Jaspur (Table 2).

It was seen that *S. litura* followed by *B. brassicae* were present in 20 and 18 villages out of 23 villages respectively, gaining the status of major pests in these areas. *H. armigera* was present in 12 villages which was less as compared to the above two. The

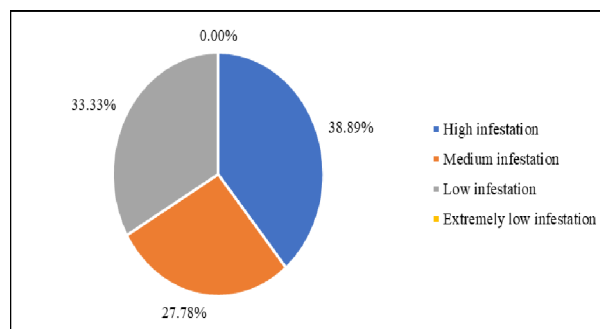
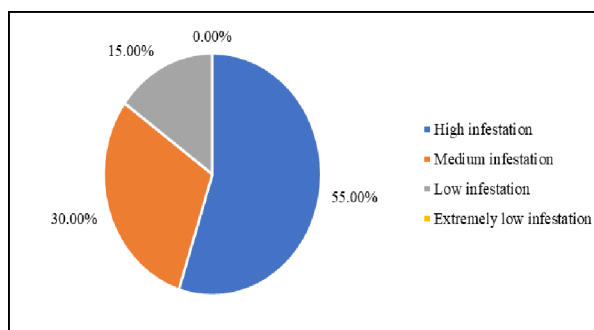
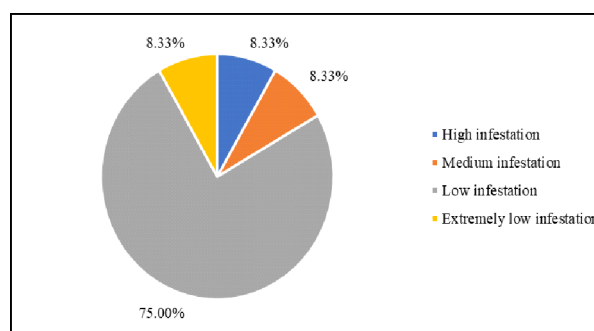
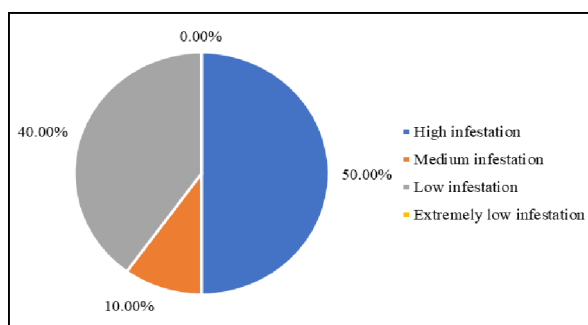
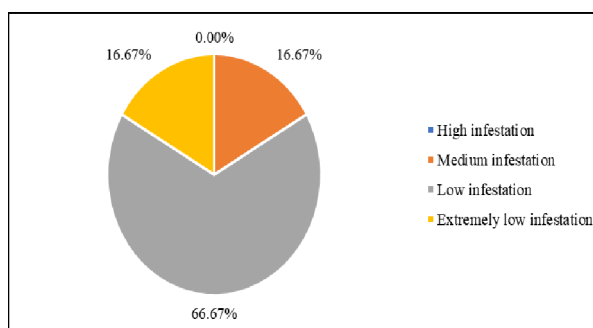


Fig. 1: Pest status of cabbage aphid among the affected villages

other species like *P. xylostella*, *P. cruciferae*, *A. similis* were present in less villages (Table 1) and had lower population (Table 2) therefore were considered as minor pests. Mandal and Patnaik (2006) also reported that *B. brassicae*, *S. litura* and *P. xylostella* as major pests in sub-tropical climatic conditions. Ratnasari (2012) and Thakur *et al.* (2012) presented in their research work that *S. litura* and *B. brassicae* were agriculturally dominant pests of cabbage.

Table 3: Per cent infested villages by the various insect pests of cabbage

Level of infestation	Cabbage aphid		Tobacco caterpillar		Gram pod borer		Diamond back moth		Cabbage flea beetle		Grasshopper	
	Number of villages	Percentage of villages	Number of villages	Percentage of villages	Number of villages	Percentage of villages	Number of villages	Percentage of villages	Number of villages	Percentage of villages	Number of villages	Percentage of villages
High infestation	7	38.89	11	55.00	1	8.33	5	50.00	0	0.00	0	0.00
Medium infestation	5	27.78	6	30.00	1	8.33	1	10.00	1	16.67	0	0.00
Low infestation	6	33.33	3	15.00	9	75.00	4	40.00	4	66.67	0	0.00
Extremely low infestation	0	0.00	0	0.00	1	8.33	0	0.00	1	16.67	1	100.00
Total villages affected	18		20		12		10		6		1	

**Fig. 2: Pest status of tobacco caterpillar among the affected villages.****Fig. 3: Pest status of gram pod borer in the affected villages****Fig. 4: Pest status of DBM in the affected villages****Fig. 5: Pest status of cabbage flea beetle in the affected villages**

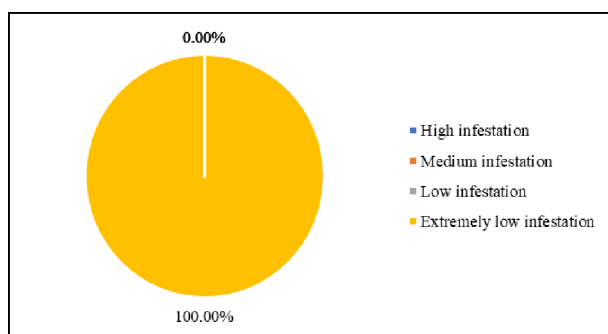


Fig. 6: Pest status of grasshopper in the affected villages

CONCLUSION

The present investigation facilitated to witness a total of six species of insect-pests that have been attacking cabbage crop at different villages of Udham Singh Nagar during Rabi 2020. Of these, five species of defoliators, viz., *S. litura*, *H. armigera*, *P. xylostella*, *P. cruciferae* and *Attractomorpha similis* and one sucking pest, i.e., *B. brassicae* (aphid) were recorded. Different species were present in different geographic regions and in different populations which depend on several factors like climate, agricultural activities, etc. this causes diverse diversity distribution of insects in different villages of the district.

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