CIBTech Journal of Zoology ISSN: 2319–3883
Online, International Journal, Available at http://www.cibtech.org/cjz.htm
2024 Vol.13, pp.33-39/Reeta and Deepa
***Research Article** (Open Access)*

OCCURRENCE OF VARIOUS INSECT PESTS ON KHARIF PULSE CROPS OF KAPKOTE VILLAGE OF BAGESHWAR DISTRICT, UTTARAKHAND

***Reeta Kapkoti and Deepa Kumari**
Department of Zoology Pt. B.D. Pandey Gov. P.G. College Bageshwar, Uttarakhand, India
**Author for Correspondence: riturjkapkoti@gmail.com*

ABSTRACT
The present study was conducted to study the occurrence of various insect pest diversity that exists in the Kapkote village of Bageshwar district. It was observed that the common Karif pulse crops like *Glycine max* (Black Soyabean, local name-Kalabhat), *Vigna mungo* (Black Gram, Urad, local name-Mash) and *Mycrotyloma uniflorum* (Horse Gram, local name-Kulath/Gahat) are infested by a total of 19 insects pest belonging to 5 order 16 Family and 19 species. The major orders of pests that were causing damage were hemiptera, coleoptera and lepidoptera and minor orders that were causing damage were neuroptera and orthoptera. The study aims to provide the information regarding diversity of insect pests, their damaging stage, nature and extent of damage etc. and to promote the traditional and organic farming of production of pulse crops in villages.

Keywords: *Diversity, Insect Pest, Kapkot, Pulses, Coleoptera, Hemiptera*

INTRODUCTION

The word ‘pulses’ is derived from the Latin word ‘puls’ meaning pottage, i.e. seeds boiled to make porridge or thick soup (Sardana *et al.*, 2010). Legumes plants belong to the family Fabaceae which is used directly or indirectly in the form of unripe pods, green grain and dry seeds as a source of nutrition. The connotation ‘legume’ is derived from the Latin word ‘*legere’* meaning ‘to gather’ which points to the traditional practice of seed collection by hand instead of being threshed from plants like cereals (Sardana *et al.* 2010). The term ‘grain legume’ often used to indicate the primary product for human consumption is the seed or grain rather than the pod leaves or any other part of leguminous plants, edible seeds of leguminous plants are also referred to as pulses. The grains of these pulses are used for human consumption as *daal*, as well as preparation of “*Birude*” (a traditional dish which is prepared on the occasion of “*Panchami*” a special festival of Uttarakhand).

In hilly areas of Uttarakhand terrace farming is done and traditionally important pulses such as *bhatt* (*Glycine max*), *mash* (*Vigna mungo*), *gahat* (*Mycrotyloma uniflorum*), *masoor* (*Lens culinaris*), Pea (*Pisum sativum*) etc. are grown in large extent in both regions of KUMAUN and GARHWAL. These pulses are cultivated as a major pulse crop in all districts and all villages including the villages of the Kapkote area of Bageshwar district.

The Kapkot region is situated in the Bageshwar district of Uttarakhand. It is situated at 29º 54 ` N latitude, 79º 51 ` E longitude and an altitude of 1041m. Above the mean sea level in a valley of the Kumaun Hills of the central Himalayan range. The region is characterized by relatively high temperatures in summer between 21º C-37º C. Winters are quite cold with temperatures ranging between 19º C and -2º C. Rainfall is maximum in August and September. Monsoon occurs from the third week of June to the middle of September in this valley the diversity of insect pests is problematic.

Pest infestation and management is an important issue when it comes to growing pulses. This is due to several factors, including the following: pests can cause significant damage to pulse plants if left unchecked, leading to reduced yields and quality-related issues that can cause high economic loss to farmers as available cultivable land is less**.** The yield loss by insects reaches as high as 60-70% in Indian pulse agriculture (Dhaliwal *et al*., 2010). This heavy crop loss causes the farmer to use huge amounts of

pesticides (Aktar *et al*., 2009). But, both the quantity of food lost to pests and the cost of pest control in terms of money and human health are significant (Pimentel and Greiner, 1997). 54.3% of losses are caused by insect pest complex in urdbean (Chhabra and Kooner 1985). Peak population was observed when the crop was at the full vegetative stage in the first week of October (Kharif). Leaf folder and stem borer were observed to be at significant level during survey of major rice growing countries of the world (Ane *et al*. 2016). Leaf folder, tobacco caterpillar, green semilooper, leaf webber and pod borer were major defoliator insect causing damage at various growth stage of the soybean crop (Brahman *et al*., 2018). Insects are damage mostly leaves pods and flowers which are most important parts of the plants (Faiz *et al*. 2018) Therefore, it becomes essential to know the insect pest diversity so that effective pest management measures could be implemented to reduce losses associated with insect's pests. Some common insect pests that infest pulses include cut worm, pea semilooper, pod borer, aphids, leaf minar, thrips, bihar hairy caterpillar, stem fly, pod borer weevil and black bug (Thakur *et al*., 2012). In addition to these, there are also fungal diseases such as powdery mildew and root fungus amongst many others that infect most pulse crops.

Several factors that control the insect pest infestation and plant diseases in pulse crops include

1- Climate conditions can impact pest populations, as different environments favor certain species over others. The direct effects of climate change are on reproduction, growth, Survival, dispersal while indirectly climate change can affect the relationship between pests and other pests and their environment (Skendzic *et al*., 2021).

2- The diversity in plants both genetic and phenotypic could be used to reduce the pest infestation in pulse production, and diversity would include nutritional quality, architecture, physical features, or ability to resist pest damage etc. (Rodriguez-Saona *et al*., 2022).

3- One of the ways to control pest infestation is crop rotation. The crop rotation actually affects the life cycle of the host- specific pest (Jalli *et al*., 2021).

4- Chemical intervention provides another solution in controlling agriculture-related pests as these chemicals or pesticides directly increase the pest mortality or decrease the fecundity of the target pest (Sanchez-Bayo *et al*., 2021).

MATERIALS AND METHODS

The study was conducted during 2022-23 under the open condition of Kapkote village in Bageshwar district. Fields were visited weekly; sampling was done at morning and evening hours (Sing *et al*. 2014). The study for insect diversity was conducted from July to October for crops of Soybean (*Glycine max*), Black gram bean (*Vigna mungo*), and Horse gram (*Marcotyloma uniflorum*). During the survey, 5 fields were observed for each pulse crop, and from each field, 5 plants were selected, four plants from the corner and one from the centre of the field were observed for the diversity of insect pests. Insect collection was done with hand picking, visual search, sweep net, plant shaking and light trap. The insect identification was done with the help of the Crop Protection division, Vivekanand Parvatiya Krishi Anusandhan Sansthan Almora. The data obtained were analyzed as depicted in the results.

RESULTS AND DISCUSSION

A range of insects with chewing or sucking mouthparts belonging to Lepidoptera, Hemiptera, Coleoptera, Isoptera and Diptera orders constitute major pests across diverse crops in hills (Dinesh *et al.,* 2015). These pests display a selective preference for specific host plants or plant parts. A total of 38 species of insect pests belonging to 26 families under 6 orders were observed in pulse crop (black gram, green gram, and pigeonpea) of these 12 species were foragers belonging to 6 families under 3 orders (Bora *et al.,* 2022).

During the study, insect diversity was observed in commonly cultivated Kharif pulses crop in the Kapkote village. A total of 19 species of insect pests belonging to 5 orders 16 Family were observed in pulses. Hemiptera that included 6 families and 7 species was the most common dominant order followed by

coleopetra (4 families and 5 species), lepidoptera (3 families and 4 species), orthoptera (2 families and 2 species) and Thysanoptera (1 family 1 species) (Table 1).
The graph of Diversity of insect pest (Number of species and orders of insect) given in figure no. 1.
Leaves, pods and flowers are most important parts of the plant and insects damage these parts mostly. Observation of Nature of damage, damaging stage and type of damaged caused by insect pests of Kharif pulse crop are listed in table no. 2.

Table 1: List of the diversity of major insect pests recorded on Kharif pulse crop (Kapkote village of Bageshwar District Uttarakhand).

S.N.	Order	Families	Scientific Name	Common Name	Kharif Pulse crop
1	Coleoptera	Chrysomelidae	*Altica oleracea (L.)*	Leaf beetle	Soybean
		Bruchidae	*Callosobruchus chinensis* (L.)	Pulse beetle	Soybean, Urad bean
		Apionidae	*Apion clavipes* (G.)	Pod weevil	Soybean, Urad bean
		Meloidae	*Epicauta vittata* (Fabricius)	Stripes blister beetle	Horse gram, Urad bean
		Meloidae	*Hycleus phaleratus* (Pallas)	Blister beetle	Horse gram
2	Hemiptera	Pentatomidae	*Nezara viridula* (L.)	Sting bug	Soybean
		Aphidae	*Aphis fabae* (Scopoli)	Black bean aphid	Soybean, Urad bean
		Cicadellidae	*Nephotettix nigropictus* (Stal)	Green leaf lopper	Soybean, Horse gram
		Aleyrodide	*Bemisia tabaci* (Gennadius)	White fly	Uradbean,
		Pseudococcidae	*Phenacoccus solenopsis* (Tinsley)	Mealybug	Soybean, Urad bean, Horse gram
		Coreidae	*Cletus trigonus* (Thunberg)	Rice slender bug	Soybean, Urad bean, Horse gram
		Cicadellidae	*Bothrogonia albidicans* (Walker)	Sharp shooter leaf hopper	Horse gram
3	Lepidoptera	Noctuidae	*Helicoverpa armigera* (Hubner)	Pod Borer	Soybean
		Noctuidea	*Chrysodeixix acuta* (Walker)	Green lopper	Urad bean
		Lycaenidae	*Lampides boeticus* (Linn.)	Blue butterfly	Soybean, Horse gram
		Arctiidae	*Amsacta lactinea* (Cramer)	Hairy caterpillar	Soybean
4	Orthoptera	Acrididae	*Oxya hyla* (Serville)	Short horn grasshopper	Horse gram
		Tettigoniidae	*Tettigonia viridissima* (L.)	Buss cricket	Horse gram
5	Thysanoptera	Thripidae	*Caliothrips indicus* (Bagnall)	Thrips	Soybean, Urad bean

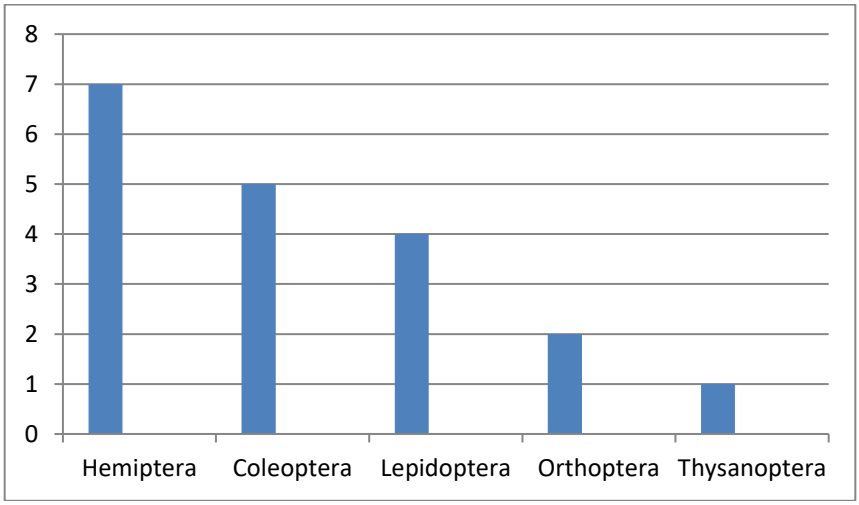


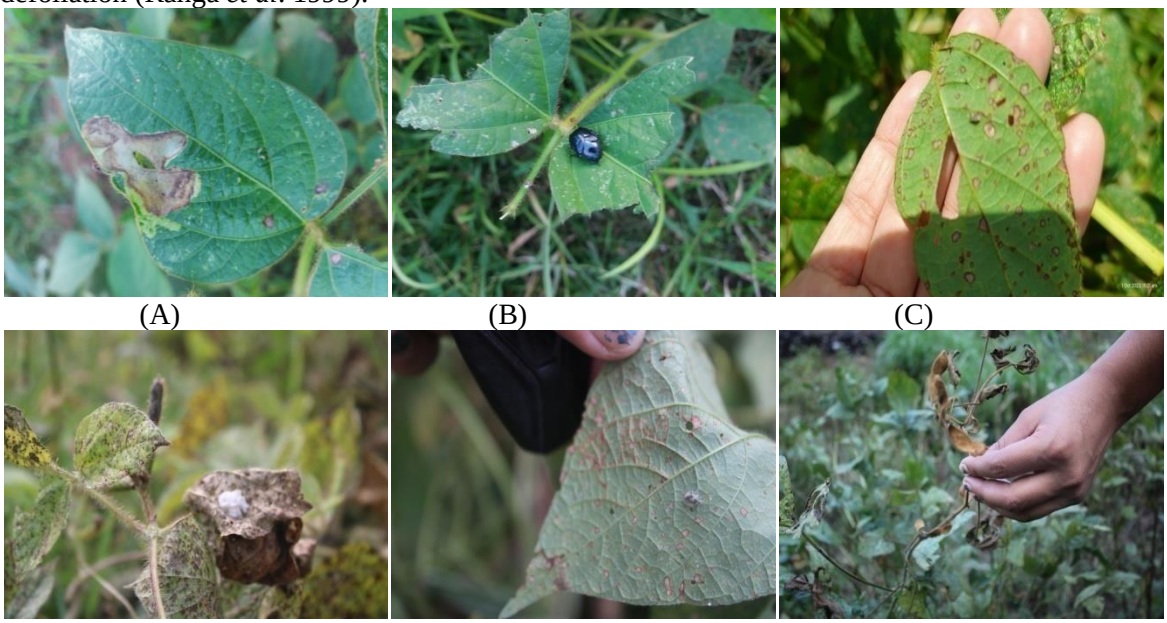
Figure 1: Diversity of Insect Pests

Table 2: Nature of damage, damaging stage and type of damaged caused by insect pests of Kharif pulse crop.

S.No.	Scientific Name	Damaging stage of pests	Nature Of Damage	Type of Damage
1	*Altica oleracea*	Adult	Leaves	Medium
2	*Callosobruchus chinensis*	Adult	Pods	Low
3	*Apion clavipes*	Larva, adult	Buds, flowers and pods	High
4	*Epicauta vittata*	Adult	Leaves	Medium
5	*Hycleus phaleratus*	Adult	Leaves	Medium
6	*Nezara viridula*	Adult	Leaves, Pods	Low
7	*Aphis fabae*	Adult	Leaves, stems, floral parts	Low
8	*Nephotettix virescens*	Adult	Leaves	Medium
9	*Bemisia tabaci*	Adult	Leaves	Medium
10	*Phenococcus solenopsis*	Adult	Leaves, branches	High
11	*Cletus trigonus*	Adult	Leaves	Low
12	*Bothrogonia albidicans*	Adult	Leaves	Medium
13	*Helicoverpa armigera*	Grub, Larva, Adult	Leaves, Floral part, Pods	High
14	*Chrysodeixix acuta*	Larva	Leaves	Medium
15	*Lampides boeticus*	Adult	Leaves, Floral parts	High
16	*Amsacta lactinea*	Larva	Leaves, floral part	High
17	*Oxya hyla*	Adult	Leaves	Medium
18	*Tettigonia viridissima*	Adult	Leaves, stem	High
19	*Caliothrips indicus*	Adult	Leaves, floral part, surface of fruits	High

OTHER MINOR INSECTS

Both nymph and adults of whiteflies, *Bemisia tabaci* (Homoptera: Aleyrodidae) spread the mosaic disease in Soyebean, due to attack of this insect causing the weakening and early wilting, yellowing, drying, and premature dropping of leaves and finally the plants death (Chandar *et al*. 2022). Attack of Jassids on soybean crop was observed in vegetative stage to pod maturity stage of crop (Brahman *et al*. 2018) Leaflets damaged by jassids are cup-shaped and have yellow edges and tips. The seedling that has sustained considerable feeding by jassids may be stunted and have red-brown leaflets followed by defoliation (Ranga *et al*. 1999).



(A) (B) (C)

(D) (E) (F)

Figure 2: Nature of Damage caused by Insects pests: (A) Brown spot on leaf of *Glycine max.* (B) Cutting of leaf and stem of *Glycine max.* (C) Back side leaf spot and leaf cutting of *Glycine max.* (D) Leaf curling and drying of *Vigna mungo.* (E) Back Side leaf dot spot of *Vigna mungo.* (F) Pod and leaf drying of *Glycine max.*

CONCLUSION

Insect pests are a formidable threat to agriculture across the ecologically fragile slopes and undulating terrains characterizing hill agro ecosystems. A range of chewing and sucking pests inflict enormous qualitative and quantitative crop losses annually across kharif pulse crops grown in hills. The major pest groups include borers, sucking bugs, defoliators, pod borers, white grubs and termites which display selectivity to crops or niches besides showing seasonal dynamics based on weather variables. Their rampant incidence relates to suitable cool climates for insect development coupled with year-round crop cultivation, imbalanced fertilizer use, lack of coordinated pest management across fragmented small holdings in hills and lack of knowledge of insect pests.

In the above discussion, we found that various pests are responsible for damage of pulse crop that are grown in hill areas of Uttarakhand. A total of 19 species of insect pests belonging to 5 orders 16 Family were observed in pulses. Insect Order hemiptera was most dominant in causing damage to the kharif pulse crops followed by order coleopetra, lepidoptera, orthoptera and thysanoptera. Mostly damaged was caused by the adults followed by larva. Plant parts that were mostly affected were leaves, floral parts and pods. The extent of damaged ranged from low, medium to high. This has happened due to the biodiversity of insect pests. But other factors are also responsible for this like diseases, and abiotic factors (climate, uncertainties of rainfall, excessive temperature, etc.). To enhance the production and

profitability of pulses, better quality, high-yielding and insects resistant varieties should be available to the farmers of the hill area of Uttarakhand. Eco-friendly pest management like indigenous methods is needed to encourage farmers in the Kapkote area of Uttarakhand to grow legumes to increase income and save the biocontrol agents of the fields so that insect pest infestation can be lowered. Hence, the present study about the diversity of insect pests of major pulses in the Kapkote area of Bageshwar district will help farmers to identify insect pests and take appropriate steps on time to manage their population to avoid reduction in yield at appropriate times.

REFERENCES

Aktar MW, Sengupta D and Chowdhury A (2009). Impact of pesticide use in Indian agriculture- Their benefits and hazards. *Interdisciplinary Toxicology*, **2**(1) 1-12.

Ane NU and Hussain M (2015). Diversity of insect pest in major rice growing areas of the world. *Journal of Entomology and Zoology Studies*, **4**(1) 36-41.

Bora MS, Kanwat M, Kalita H, Sasmal D, Rahman A and Ngangom B (2022). Diversity of Insects in pulses at Arunachal Pradesh. *Indian Journal of Entomology*, **84**(2) 409-411.

Brahman SK, Awasthi AK and Kerketta A *(*2018). Sucking insect- pest of soybean (*Glycine max* L.), their nature of damage and succession with the crop stages. *Journal of Pharmacognosy and Phytochemistry*, **7**(1) 1476- 1478.

Chandar SA and Tayde AR (2022). Management of Major Insect Pests in Soybean Crop. *Just Agriculture multidisciplinary e-Newspaper*, **3**(4).

Chhabra KS and Kooner BS (1985). Loss of Summer Mungbean due to Insect Pests in Punjab, *Indian Journal of Entomology*. **47**(1) 103-105.

Dhaliwal GS, Jindal V, and Dhawan AK (2010). Insect Pest Problem and crop losses: Changing Trends. *Indian Journal of Ecology*, **37**(1) 1-7.

Dinesh MR, Deepa S, Karthik T, Prasad YG, Mahesha B, Sheriff N, Naidu LGK and Zaidi PH (2015). Insect pest incidence influenced by diverse weather parameters: A case study on commercial vegetable crops from the Cameron Highlands of Malaysia. *International Journal of Biometeorology,* **59** 1863-1872.

Faiz A and Ahmed R (2018). Incidence of insect pest on Black gram. *Journal of Emerging Technologies and Innovative Research*. **5(**7) 266-271.

Jalli M, Huusela E, Jalli H, Kauppi K, Niemi M, Himanen S and Jauhiainen L (2021). Effects of Crop Rotation on Spring Wheat Yield and Pest Occurrence in Different Tillage Systems: A Multi-Year Experiment in Finnish Growing Conditions. *Frontiers in Sustainable Food Systems*. **5** 647335.

Pimentel D and Greinier A (1997). Environmental and socio- economic costs of pesticide use. In D. Pimentel (Ed.), Reducing Pesticides: Environmental and Economic Benefits, Chichester, UK: John Wiley & Sonspp. 51-78.

Ranga Rao GV, and Shanower TG (1999). Identification and Management of Pigeonpea and Chickpea Insect Pests in Asia. Information Bulletin no. 57. (In En. Summaries in En, Fr.) Patancheru, 502 324, A.P., India: *International Crops Research Institute for the Semi-Arid Tropics. ISBN 92–9066–412–6*

Rodriguez-Saona C, de Lange E and Dara SK (2022). Editorial: Advances in Crop Resistance for Insect Pest Control. *Frontiers in Agronomy*, **4** 845961.

Sanchez-Bayo F. (2021). Indirect Effect of Pesticides on Insects and Other Arthropods. *Toxics* **9**(8) 177.

Sardana V, Sharma P and Sheoran P (2010). Growth and Production of Pulses. *Soil, Plant growth and crop production*, **3**, 378-416.

Singh A and Sharma LA (2014). Agriculturally Important Insects Diversity in Kharif and Rabi crops of Talwandi sabo, Punjab. *International Journal of Scientific and Research Publication*. **4**(8), *Available at: https://www.researchgate.net/publication/328465465_Agriculturally_Important_Insects_Diversity_in_Kharif_and_Rabi_crops_of_Talwandi_sabo_Punjab*.

Skendzic S, Zovko M, Zivkovic IP, Lesic V, and Lemic D (2021). The Impact of Climate Change on Agricultural Insect Pests. *Insects*. **12**(5), 440.
Thakur NSA, Firake DM, Behere GT, Firake PD and Saikia K (2012). Biodiversity of Agriculturally Important Insects in North Eastern Himalaya: An overview. *Indian Journal of Hill Farming*. **25**(2) 37-40.