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"The Study of Diversity of Insect Pest in Agricultural field of Gangolihat Village, District Pithoragarh (Uttarakhand State, India)."

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Abstract:- The field research of insect pest diversity was done in the year 2023-24 from agricultural field of Gangolihat Village. In this study 12 insect pest were noticed from Agricultural field which majorily belong to 5 orders of class Insecta. Most of the insect pests found were from Order Lepidoptera, Hymenoptera, Coleoptera, Hemiptera and Odonates. Hence, this study will provide baseline information on the insect pest of the study area. Insects are the largest and most diverse group of organisms in the world. During present study, different Agricultural fields of Gangolihat Village were sampled for the assessment of diversity and relative abundance of insect fauna. Collection of insects was carried out by the sweep net technique. A total of 5 Orders and 11 families and 15 insect species were collected. Order Coleoptera was found to be most dominant having 5 species which belonged to 3 families namely Chrysomelidae, Meloidae and Scarabidae followed by Order Lepidoptera having 4 species belonging to family Noctuidae, Papilionidae and Sphingidae. The least species were recorded from Order Orthoptera with only 1 species that belonged to family Acrididae. The present study would be helpful in future for the application of species-specific biological control in Agricultural field that will lead towards sustainability of agro-ecosystem.

Keywords: Pests, Insects, Diversity, Lepidoptera, Hymenoptera, Coleoptera, Hemiptera, Odonates.

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Introduction

Insect feed on every plant part (Leaves, Stem, Tuber) and also it serve as vectors of plant pathogen (Radcliffe and Ragsdale, 2002; Munyaneza et al., 2006; Hansen et al., 2008). Insects make up the majority of all living species on Earth, accounting for at least 80% of their diversity. Most insects are venomous, predatory, and destructive. Insect Pest and their relative importance vary from region to region with highest number of economically important pest species occurring in potato agro-ecosysytem of the neotropics in countries of potato origin (Kroschel et al., 2009). Insect pests account for 16% of the crop losses of potato (Solanum tuberosum L.) worldwide (Oerke et al., 1994), and reductions in tuber yield and quality can be between 30% and 70% for various insect pests (Raman and Radcliffe, 1992). Agriculture or allied practices employ more than 75% of the total population, which is substantially dominated by the subsistence mode of farming (Vandana Mehrwar et al., 2021).Insect pests seriously impair agriculture that produces food for people to eat and animal feed. The primary pests connected with wheat are aphids, thrips, dipterans, and other insects. Worldwide, crop losses from insect pests are enormous, and the use of broad-spectrum chemical pesticides to manage them also threatens pollinators and contaminates the environment. It is reckoned that globally, food crops are harmed by over 10,000 insect species, 30,000 weed species, 100,000 diseases, and 1,000 nematode species (Dhaliwal et al., 2007). Field crops are severely harmed by many aphid species, and under natural circumstances, their populations can grow quite quickly. The aphid Myzus persicae (Sulzer), which has a wide range of hosts, causes significant losses to the rapeseed crop. It sucks on the phloem of different plant parts including inflorescence and seed pods resulting in substantial yield hammering (Sarwar et al., 2011). It causes distortion of young leaves and shoots, and subsequently yields failure (Sarwar et al., 2009).

Losses due to insect pests in the context of Indian agriculture have also been reviewed in the past (Pradhan 1964; Krishnamurthy Rao and Murthy, 1983; Atwal, 1986; Dhaliwal and Arora, 1996, 2002; Dhaliwal et al., 2003, 2004), and crop losses after the green revolution era were relatively higher than those recorded globally (Pradhan 1964; Dhaliwal et al, 2004). Two hundred and sixty species have been identified in rice ecosystems (DAE, 2011).Of these, 42 species are considered to be pest (Srivastava et al., 2004). Pest insects can be categorized as either major or minor pest. Only 20 to 30 of the more than six million bug species are significant pests for vital crops. The need for this kind of information is currently important, since many of the cultivated products cannot

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be exported readily to other countries due to the high level of insecticide contamination and visible damage to the products (Nicholls and Altieri, 1997).

Farmers continue to use chemical pesticides as a result, which exacerbates issues with resistance, environmental pollution, degradation of crucial ecosystem services like natural enemy control, and significant risks to human health. Alternative control measures that are easy and inexpensive to implement have not been properly developed. Crop monitoring procedures are crucial for effective pest control. Many storage losses that result in significant economic losses are caused by insect pests, microbiological illnesses, and deterioration. These pests can be controlled using a variety of techniques, including physical, chemical, biological, cultural, and hygienic measures. Pest insects that consume fruit internally are harder to find and eradicate, making them a bigger issue for quarantine efforts. In some Lepidoptera, Diptera, and Coleoptera taxa, this style of feeding is most well developed and productive.

We will be able to appreciate insects' significance in the long-term sustainability of our agricultural systems and their contribution to future food security once we have a better understanding of how they function in ecosystems. In this study field investigation of insect pest diversity was done in the year 2023-24 from agricultural crops of Gangolihat Village.

Materials and Methods

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Gangolihat is located at 29.48°N 80.05°E.[9] It has an average elevation of 1,760 metres (5,773 feet). It is 78 km from Pithoragarh. The main town is at a hill top. The region is surrounded by two rivers Saryu and Ramganga. Which meet at Ghat at the foothill of the region. These two rivers make it like a Garland on the shoulders of mighty Himalaya. These two rivers gave the name to the region Gang (River in Kumaoni) + Awali (Garland) making Gangawali which became Gangoli later on. and Hat were the main markets/ gathering place for local people in past. Which made the name of Gangolihat.

The View Of Gangolihat Town

Insect collected and surveyed in year 2023-24 from different agricultural crops of Gangolihat Village.. Study area is situated at an elevation of about 2200 m above the sea level, covered with dense forest and lies between 30°42.69N and 80°118.82E. For the collection of insects Hand picking and Net sweeping method were employed for the collection of insect pest. . The insects collected from each replicate were identified, counted and recorded.

Results

The result showed that Coleopteran are the major and dominant crop pest of the study area followed

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Table 1: Orders, family and common name of insect pests found in agricultural crops of Gangolihat Village.

S. No.	ORDER	COMMON NAME	CROPS	FAMILY	PLANT PART
1.	HEMIPTERA	Bug	Potato	Solanaceae	Roots, Tuber
2.	HEMIPTERA	Aphid	Potato	Solanaceae	Leaves
3.	HEMIPTERA	Aphid	Cabbage	Brassicaceae	Leaves, Buds
4.	COLEOPTERA	Beetles	Finger Millet	Poaceae	Roots, Stem
5.	COLEOPTERA	White Grub	Finger Millet	Poaceae	Roots
6.	COLEOPTERA	Beetles	Potato	Solanaceae	Leaves
7.	LEPIDOPTERA	Moth	Potato	Solanaceae	Tuber, Leaves
8.	LEPIDOPTERA	Cabbage Moth	Cabbage	Brassicaceae	Leaves
9.	LEPIDOPTERA	Cabbage Butterfly	Mustard	Brassicaceae	Leaves
10.	DIPTERA	Leaf Miner	Mustard	Brassicaceae	Leaves, Pods
11.	ODONATA	Grasshopper	Finger Millet	Poaceae	Stem

Caterpillar

Infected leaves cause by Pest

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Table 2: Orders family and number of species of insect pest found in agricultural crops of Gangolihat village.

S. No.	ORDER	FAMILY	No. of Species
1.	COLEOPTERA	1.Chrysomelidae	02 species
		2.Meloidae	01 species
		3.Scarabidae	02 species
2.	LEPIDOPTERA	1.Noctuidae	02 species
		2.Papilionidae	01 species
		3.Sphingidae	01 species
3.	HEMIPTERA	1.Aphididae	01 species
		2.Pentatomidae	01 species
		3.Flatidae	01 species
4.	DIPTERA	1.Tipulidae	01 species
5.	ORTHOPTERA	1. Acrididae	01 species

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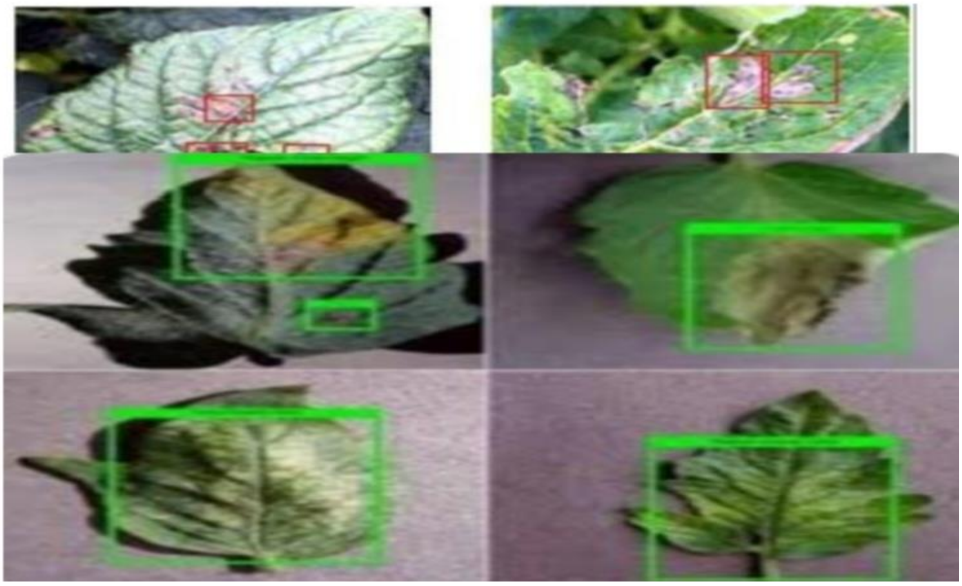

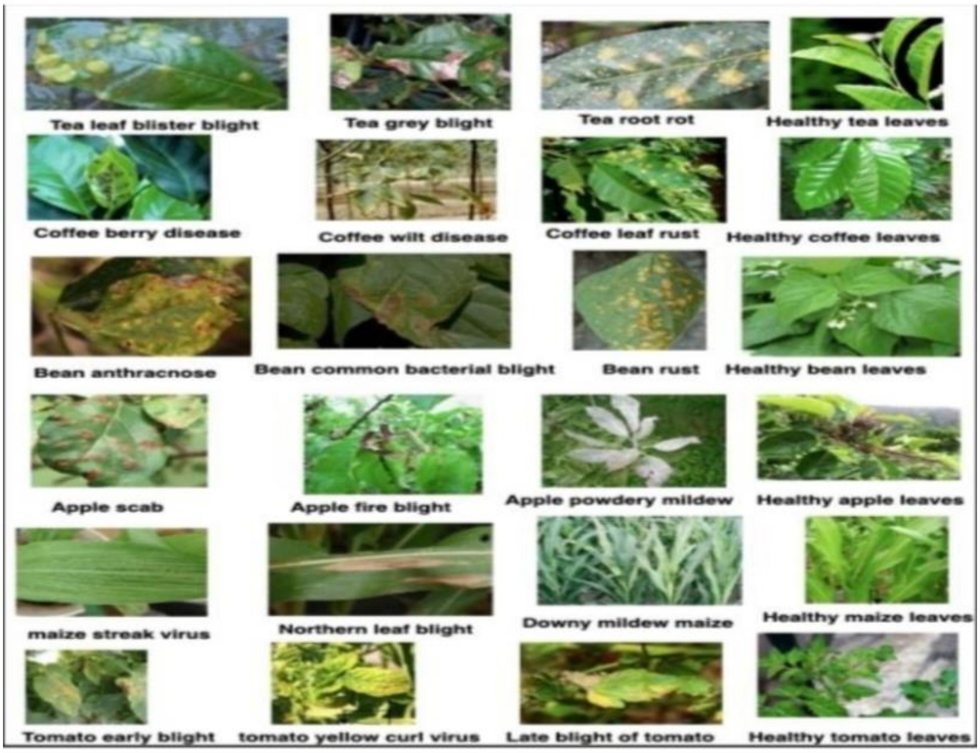

By Order Lepidoptera ,Order Hemiptera, Order Diptera and Order Orthoptera (Table 1). The Order Coleoptera (5 species) had three family namely Family Chrysomelidae (2

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species), Family Meloidae (1 species) and Family Scarabidae (2 species) and they were found to be most dominant. This is followed by Order Lepidoptera (4 species) which had three Families namely Family Noctuidae (2 species), Family Papilionidae (1 species) and Family Sphingidae (1 species). Order Hemiptera (3 species) had three family namely Family Aphididae (1 species), Family Pentatomidae (1 species) and Family Flatidae (1 species). Order Diptera and Order Orthoptera was found to be the least dominant. In Order Diptera (1 species) only one family was seen to infect the crops i.e. Family Tipulidae (1 species) and also Order Orthoptera (1 species) had one Family Acrididae (Table 2, Fig. 1). To better monitor, identify, and alert farmers to potential changes in insect pest distribution, population ecology, damage assessment, yield losses, and impact assessment, existing insect pest control systems should be upgraded. Release and establishment of natural enemies, which require further study, will therefore be highly beneficial.

LTo lessen the effects of insect infestation on crop productivity, pest control strategies such as host plant resistance and additional pest management options should be implemented. To maintain agricultural productivity and enhance our environment and health, it is essential to create new tactics or improve existing ones for controlling insect pests that do not involve the use of chemicals.

Insect Infestation Pest Crops Productivity

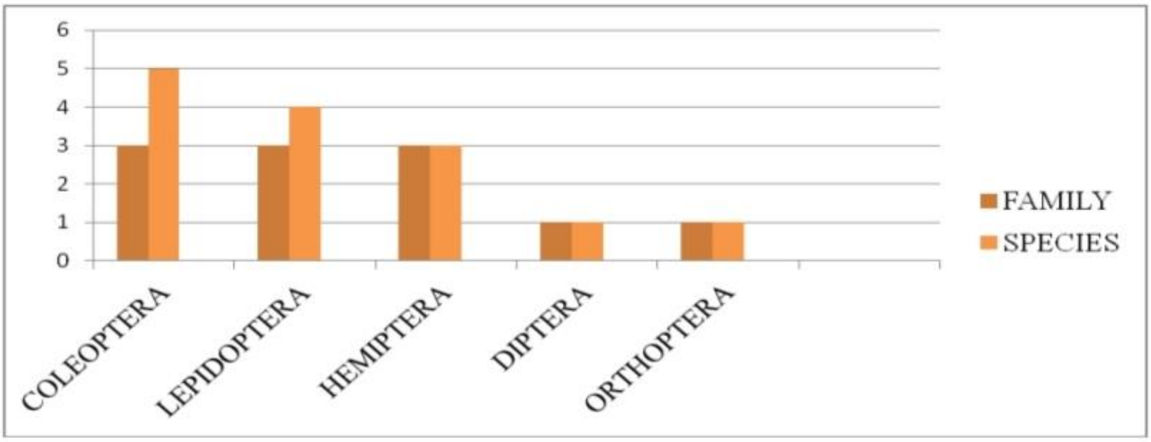

Fig. 1: Number of family in different orders of insect pests found in agricultural crops of Gangolihat Village.

Integrated pest management (IPM) is an effective, environmentally sound approach to pestmanagement (Kabir and Rainis, 2015). It guards against secondary pest outbreaks, pest resurgence, and disease transmission and also protects beneficial insects. Monitoring pest populations, identifying pest-resistant plant varieties, and adjusting cultural, mechanical, chemical, and biological control as necessary to meet production objectives are all part of IPM techniques .Wild entomofauna and birds largely contribute to the productivity of crops through the provision of ecosystem services, such as pollination and natural pest control (Classen et al., 2014).

There have been numerous reports of parasitic and predatory natural enemies being used to control agricultural insect pests (Van den Bosch et al., 1982). The wildflower strip

elevates farmland biodiversity, enhances foraging opportunities for various insect pests and pollinators, and also ensures improved productivity (Matthias et al., 2016). Farmers often over-apply pesticides or spray at inappropriate times because they lack knowledge of the negative impacts associated with these practices (Jepson et al., 2014). Moths and butterflies are beneficial as pollinators but their larvae are potentially harmful. Cabbage White butterfly larvae, an invasivespecies, are serious pests of Brassicaceae plants (Cipollini 2002; Snell-Rood and Papaj, 2009). Additional education and training is needed to better inform farmers of responsible pest-management techniques and appropriate pesticide-application techniques (Parveen, 2010). Farmers will need to be informed about the environmental effects of incorrect pesticide use and how this affect societal groups and future food production. Excessive pesticide use may be the cause of existing and upcoming ecological disasters in the quest for increased yields.

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