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Biodiversity Of Insects In Relation To Wheat Cultivation In Hanumangarh District Rajasthan

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Abstract: The present paper highlights the diversity of insect fauna recorded in the different region of Hanumangarh district. The investigation provides baseline information on the occurrence of various insect species in this locality. Field surveys were carried out in Tibbi and its adjoining areas, resulting in the documentation of insects belonging to 12 different orders. Among these, the most prominent groups include Lepidoptera, Coleoptera, Isoptera, Orthoptera, Diptera, Hymenoptera, and Hemiptera. The insect assemblage of the region was found to be dominated by butterflies, beetles, flies, crickets, ants, termites, bees, and wasps.

Key words;- insect, wheat,agroecosystem, order.

Introduction:-

Biodiversity within agroecosystem, or “agrobiodiversity; includes the variety of living organism and their intrections within agricultural systems, includings crops, livestock and the surrounding environment. Diverse ecosystems can support more crop production, pest and diseases resistance and more adaptable farming systems and contribute nutrient cycling, pollination and water regulation. Agroecosystems have rich biodiversity of organisms including wide range of plants and animal species. In agroecosystems arthropods are one of most diverse and ecologically significant group of invertebrates. Serving as pollinators, nutrient recyclers, scavengers and food sources for other animals. insect, archanida, crustacea and myriapoda are the major classes of phylum Arthropoda. Insecta is the largest class of phylum Arthropoda. Insects are also known as hexapods with three pair of legs, well defined head, thorax, abdomen and typically one or two pairs of wings. Insects are estimated to comprise approximately 80% of the known species of animals. These are about 1 million known species of insects throughout the world.

Insects in agroecosystems exhibit immense taxonomic and functional diversity. Key orders such as Coleoptera (beetles), Lepidoptera (moths and butterflies), Hymenoptera (bees, wasps, ants), Diptera (flies), and Hemiptera (true bugs) perform various ecological roles. Pollinators, such as bees and butterflies, are

essential for the reproduction of many crop species, directly influencing yield and quality. Predatory and parasitic insects, like lady beetles and parasitoid wasps, contribute to natural pest regulation, reducing the reliance on chemical pesticides. Decomposers, including various beetles and flies, facilitate nutrient cycling by breaking down organic matter, thereby maintaining soil health.

Study area:-

Rajasthan is the largest state of India in terms of geographical area. For the present research, Tibbi block of Hanumangarh district has been chosen as the study site. This region lies in the northern part of Rajasthan and forms a tehsil of Hanumangarh. Agro-climatically, the district falls under Zone Ib, also referred to as the Irrigated North-Western Plains of Rajasthan. Geographically, it is situated between 29°05' N to 30°06' N latitudes and 74°03' to 75°03' E longitudes. The district is surrounded by Punjab in the north, Bikaner and Churu in the south, Haryana in the east, and Sri Ganganagar in the west. Tibbi is located about 23 kilometers east of Hanumangarh, the district headquarters. Agriculture is the primary occupation here, largely supported by irrigation facilities. The climate of Hanumangarh is characterized by extremely hot summers, cold winters, scanty and uncertain rainfall, along with significant fluctuations in temperature. Rainfall is generally confined to

the monsoon season, which begins in early July and ends by late September. Although the annual precipitation is low, irrigation from the Indira Gandhi Canal Project (IGNP) fulfills the water requirements for agriculture. Additionally, the Ghaggar River flows through this region, and its downstream stretch is locally called Nali. However, excessive irrigation, combined with the presence of a hard subsurface layer, has led to problems of waterlogging in some canal command areas. Both Rabi and Kharif crops are cultivated here, and the availability of assured irrigation ensures high agricultural yields.

Material & methods : An important element of Integrated Pest Management (IPM) is the systematic monitoring of insect populations, as it generates essential information on the occurrence, abundance, spatial pattern, and ecological role of both beneficial and harmful insect groups. The present investigation was undertaken in an agricultural ecosystem during December 2022 to April 2023. Insect sampling was performed fortnightly, covering three major seasons—winter (November–February), summer (March–June), and monsoon (July–October). Collections were made at 2–3 hour intervals throughout the day to record diurnal activity patterns. To capture the wide behavioral diversity of insect species, a combination of standard and widely recommended methods was used. The survey design was based on the stratified random sampling approach described by Yates & Finney (1942) and Abrahamsen (1969). Different techniques were applied for different guilds of insects: sweep netting for aerial species, hand-picking with forceps for foliage and soil-dwelling forms, pitfall traps for ground-active arthropods, and light traps to attract nocturnal insects. For nocturnal collections, a 260-watt mercury vapor lamp was employed biweekly, operated overnight in the crop fields to ensure effective sampling. Since insect populations tend to be randomly distributed across agricultural habitats, multiple replicates were obtained every month. This strategy improved statistical robustness and ensured an ecologically representative dataset, ultimately offering valuable insights into pest population trends, seasonal fluctuations, and overall insect biodiversity in relation to crop growth stages and environmental conditions.

Result & Discussion :- In this study, different orders of insect species such as Lepidoptera, Coleoptera, Diptera, Orthoptera, Hymenoptera, Isoptera, Hemiptera, etc. were observed . Coleoptera and Lepidoptera are major orders of insects that are found in this study area. Many types of beetle are observed like; ground beetles, ladybugs, dung beetles etc. Many types of moths, butterflies and their larval stage (caterpillars) have also been reported and Various types of flies, termites, wasps and bugs are also reported here.

The insects reported in this area are listed in the following table -:

S.NO	COMMON NAME	SCIENTIFIC NAME	ORDER
1.	Locust	*Schistocerca gregaria*	Orthoptera
2.	Field cricket	*Gryllus*	Orthoptera
3.	House cricket	*Gryllodes sigillatus*	Orthoptera
4.	Grasshopper	*Chrotogonus hemipterus*	Orthoptera
5	Red cotton bug	*Dysdercus cingulatus*	Hemiptera
6	Mealy bug	*Phenacoccus solenopsis*	Hemiptera
7	Stink bug	*Halyomorpha halys*	Hemiptera

8	White fly	*Trialeurodes sps.*	Hemiptera
9	Red fire ant	*Solenopsis invicta*	Hymenoptera
10	Paper wasp	*Ropalidia marginata*	Hymenoptera
11	Potter wasp	*Eumenes*	Hymenoptera
12	Lemon emigrant	*Catopsila pomana*	Lepidoptera
14	Cotton leaf worm	*Spodoptera litura*	Lepidoptera
15	White moth	*Leucoma salicis*	Lepidoptera
16	Click beetle	*Ampedus sanguineus*	Coleoptera
17	Ladybug	*Coccinella septempunctata*	Coleoptera
18	Ground beetle	*Amara aulica*	Coleoptera
19	Dung beetle	*Scarabaeus satyrus*	Coleoptera
20	Common green bottle fly	*Lucilia sericata*	Diptera
21	Flesh fly	*Sarcophag bercaea*	Diptera
22	Garden springtail	*Bourletiella hortensis*	Collembola
23	Common dragon fly	*Pantala flavescens*	Odonata
24	Ground skimmer	*Diplacodes trivialis*	Odonata
25	Two prolonged bristletail	*Campodea fragilis*	Diplura
26	Green lacewing	*Chrysoperla carnea*	Neuroptera
27	Termite	*Odontotermes obesus*	Isoptera
28	American cockroach	*Periplaneta americana*	Blattodea

Conclusion :-this study provides basic information about insect biodiversity in agro ecosystem of the study area.insects play important role in agro ecosystem .more then hundred insects are reported in wheat crop in tibbi region of hanumangarh district rajasthan.

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