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Understanding Hemipteran Insects in Rajasthan and Their Interplay with Agricultural Crops: A Comprehensive Study

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Abstract

Numerous agricultural and green plants are severely harmed by the deadly sap-sucking pests known as scale insects. The occurrence of a large variety of scale insects has been attributed to environmental factors in the study area and the absence of much more hunters. The paper provides a baseline for future research on coordinated bug the executives and its additional effects on agricultural products. During the harvest season, it was also noted that substantial sucking vermin and their typical enemies, Savage woman bird creepy crawlies, and Menochilus sex maculatus Fabricio, occasionally appeared on Indian bean crops. The most extreme and lowest temperatures, as well as the amount of precipitation, did not significantly affect the number of aphids, jassids, or white flies. With regard to aphid and jassid populations, the association coefficient of relative stickiness demonstrated a non-critical connection, although the same relationship was virtually certain with white fly populations. The connection grid of the savage population showed that there was no statistically significant correlation between the highest and lowest temperatures, relative humidity, and precipitation. Nevertheless, its population has a significant impact on irritant species.

Keywords:*Hemipteran Insects, Rajasthan, Interplay, Agricultural Crops*

1. Introduction

One of the oldest crops among cultivated plants is the Indian bean, also known as the hyacinth bean, Egyptian kidney bean, dolichos bean, Lablab bean, seim bean, or chicharo, and the Australian pea. It is a perennial herbaceous plant that holds a prominent place among the organic vegetable crops grown in fields and home gardens. While dried seeds are used in various vegetable food preparations, it is primarily developed for green instances. It is a significant source of dietary fiber, minerals, and proteins. Bug annoyances play a big role in reducing Indian bean effectiveness. By sucking the cell sap from the tender sections of plants and also from the lower portion of the leaves, both fairies and adults destroy the environment.

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When these irritations are extremely pervasive, they attack every component of the plants, including the building blocks, which impede growth and reduce yield. The current exams were held in Jobner (Jaipur), a legitimate representative of Rajasthan's semi-dry region, keeping in mind their gruesome nature and importance.

Scale insects have been identified as severe pests that attack a vast array of host plants worldwide. They are sap-sucking polyphagous irritants of many ornamental and agricultural plants. They directly hurt the host plant by sucking the sap from various parts of the body, but they can also indirectly harm the plant by sending or promoting the attack of plant microorganisms and by emitting honey dew. However, species belonging to the family Diaspididae eat directly on the contents of parenchymal cells and do not produce honeydew. They consume parenchymal tissue. Scale insects are usually thought of being honey dew consumers by subterranean insects. In a sort of mutualistic connection, scale insects provide a regular source of energy in the form of honeydew, or sweet excrement, to other insect species in exchange for protection from natural predators. Subterranean insects that tend hemipterans are primarily members of the subfamilies Myrmicinae, Dolichoderinae, and Formicinae.On the executives of this bug, both at the global and subcontinental levels, there is a wealth of information available. The sources, however, are insufficient to provide sufficient information from their taxonomical, cytological, subatomic, and environmental diversity viewpoints.

2. Literature Review

Ullrich (2001) looked into the variety of plants and insects in wildflower patches in an arable setting in Switzerland. In order to assess how devoted these strips are to biodiversity on a scene-level and to generate recommendations for their best management, it is necessary to look at the sorts of plants and insects that are present in wildflower strips and the factors that affect them. What functions do colonization and natural laws have in the formation of insect networks in wildflower strips? Do specialist species or just generalist species have the capacity to efficiently and quickly arrange themselves into insect networks in wildflower strips? If true, what natural elements make it possible to easily identify the insect networks in various wildflower strips? Do wildflower strips act as a centre for the movement of insects? What was the rate and area of insect colonization of their host plants? Each component will provide a

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solution to the topic of how to maximize biodiversity on a scene scale with wildflower strips.

Rueda (2008) noted that a major portion of mosquitoes that live in freshwater habitats are dreadful biters and vectors of diseases that affect both humans and animals. They also play an important part in the environmental food chain. Relevant details about mosquitoes, such as their shape, classification by scientists, distribution, species diversity, exploitation, endemicity, phylogeny, and clinical significance, are documented.

According to Hameed (2010), butterflies offer the best introduction to the fascinating world of insects. They are distinguished by the time of year they are active and by their coloring, and they are also the best at catching insects. We looked at the Farook school grounds and Azhinjilam with floral components and geological aspects for variation and host plant inclination in butterfly networks. There were a total of 38 different animal groups, each with five families. The Farook school grounds were abundant with a wide variety of species. Butterfly species circulation has been found to vary seasonally, with late wet and post-storm months seeing the highest incidence of the phenomenon. Nearby are the most well-known plant species, including Leucas aspera and Lantana camera. Touching and water level have a significant impact on botanical systems, which in turn affects the variety of butterflies.

Tamang (2010) reported empirical data from the Butterfly Park in Bannerghatta that showed a remarkable variety of butterfly species were present in the current review. There were also a few peculiar animal species found, like the Southern birdwing. Other species included the Baronet, Normal Castor, Blood Red Rose, Normal Wanderer, Normal Mormon, Mottled Travelers, and many more. There were lots of flowers in the recreation area, which provided a home for butterflies and other insects to thrive. The numbers of many species were not very high, despite the observation of numerous distinct species and numerous obscure species. It's possible that either climatic changes or human action are to blame for this.

In Jhansi, which is well-known for its fortress, greenery, and surrounding steep terrain, Kumar (2012) attempted the concentration. These rocky areas and nurseries have been a haven for butterflies and other insects. The butterfly is an essential part of every conventional biological system since adult butterflies fertilize. They are exceptionally adaptable life forms that can keep a network going even in a fragmented environment like the natural world. Although the larval stages are herbivorous and harmful to property, the adult forms are crucial pollinators of a few

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trees and herbaceous greens. Because they are powerless to halt changes in bloom supply brought on by deforestation and natural contamination, they serve as the organic markers of pollution. The current study concentrated on the several locales the butterflies visited, as well as their scavenging habits and overpopulation in various Jhansi areas. Throughout the visit, a few distinct butterfly species were seen as bloom visitors on various flowering plants (garden, cultivated, semi-wild, and wild) in particular regions. The types of gathered butterflies were revealed to be the most well-known and intensely dynamic species throughout the day. Although nymphalids were thought to be very prevalent in the plane areas of Jhansi as bloom visitors, only one animal species, Papiliodemoleus, could be collected from just two sites.

3. Material and Methods

3.1.Collection and Sampling

In the current study, a significant portion of the insect (species) population was collected twice, in the academic years 2020–21 and 2021–22, in the months of February–March and September–October, over the course of three or four visits that lasted around two–three hours, most usually between 11:00 and 1400 hours. A number of species' abundance was also reported.

Most of the insects included in the investigation were gathered from a range of plants, including grass, flowers, weeds, bushes, spices, and trees. A small number of insects were also taken from cow dung found on the surface of the soil and concealed between rocks. Some were supposedly located close to building walls and water sources.

Hand picking, thrashing, clearing, and lashing were the methods used.

- **By Hand Picking:**Rarely, the small, delicate-bodied insects were collected by hand plucking. To prevent harm to their bodies, termites, bugs, and other underground creatures that were hiding under dried leaves and stones were carefully collected by hand.
- **By Beating:**This technique was used to identify certain creeping insects among others resting on trees. The strategy was accidentally applied.
- **By Sweeping:**In the clearing strategy, insects were collected using clearing nets. The net that was employed was just a thin cloth pack hung from a circular handle. This

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technique was used to collect a variety of large winged insects, including butterflies, moths, grasshoppers, dragonflies, and others. The majority of the assortment was finished using this strategy.

- **By Trapping:**The light snare, sticky snare, water traps, pit fall trap, and lures trap are among the four or five distinct ways to capture insects. The pit fall technique, however, was only applied to crawling and running insects.

Examples obtained by any of the techniques were quickly transferred to the killing containers. While moving the insects (such as butterflies, moths, grasshoppers, and dragonflies) and for their protection, proper care was taken to prevent any harm. Wide mouthed glass containers with cotton fleece inside that has been soaked with ethyl acetic acid derivative have been used. To avoid harming all sorts of insects, photographs of specific insects were obtained.

3.2. Sorting:

Within 4-5 hours of being killed, the insects were classified scientifically according to consumer and family preferences since they were brittle and stiff, which would hinder extending.

3.3.Stretching or Spreading:

Family insects were extended for both short- and long-term storage in boxes or cabinets after being sorted and arranged in various formats. Spreading was finished thoughtfully in a way that ensures a sizable amount of stockpile and gives more time to study the cases for clear evidence.

Figure 1: Pinned butterfly

The corpse had insects pierced through it upward. Sticking location changes when insects assemble. Huge Heteroptera (bugs) and Coleoptera (creepy crawlies) pass through the right elytron, the mesoscutellum, the chest between the premises of the front wings, and the back of the pronotum, respectively. Bees, wasps, butterflies, and moths pass through the chest.

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However, the wings of butterflies, moths, and other insects were appropriately dispersed before sticking or bug was placed into the assortment box. The bug's pin remained inside of it while its dorsal side wings spread out on a tightly packed thermocol sheet. In butterflies, moths, and flies, the back margins of the forewings were straight across and angled appropriately to the body. Fragments of paper attached to the packed thermocol held the wings firmly in place. After sticking, the samples were given names. To denote the name, territory, date, and season of assortment, slick white paper stripes were used as markers.

3.4.Data Management

was completed by separating bug proof from distinct ID facilities. With the aid of a PC, several tables, pie graphs, and charts were created using the information acquired.

4. Result and Discussion

4.1.Result of Bagher Forest

The untouched by human activity Bagher Backwoods. The restricted area under review did not have a particularly diverse range of species.Because we didn't have the appropriate backcountry group with us, we finished our research at the furthest regions of the dense Bagher forests. Because of the dense, untamed flora and wild animals, it was risky for us to go inside very far.Lepidoptera, Hemiptera, Coleoptera, Hymenoptera, and Odonata are among the five distinct orders we observed to be present within our group of 12 persons. Only nine of them stood out. (Tables 4 and 5).

- **Lepidoptera**

Families Pieridae and Nymphalidae were responsible for handling the requested butterflies. Only one extremely common animal species, such as Teriashecabe (Linnaeus), makes up the Pieridae population, and Junoniaalmona is the only member of the Nymphalid.Sharma also oversaw the extensive butterfly research in Rajasthan, India, in the Aravali region, between 2008 and 2011. He identified 38 different Lepidoptera insect species.

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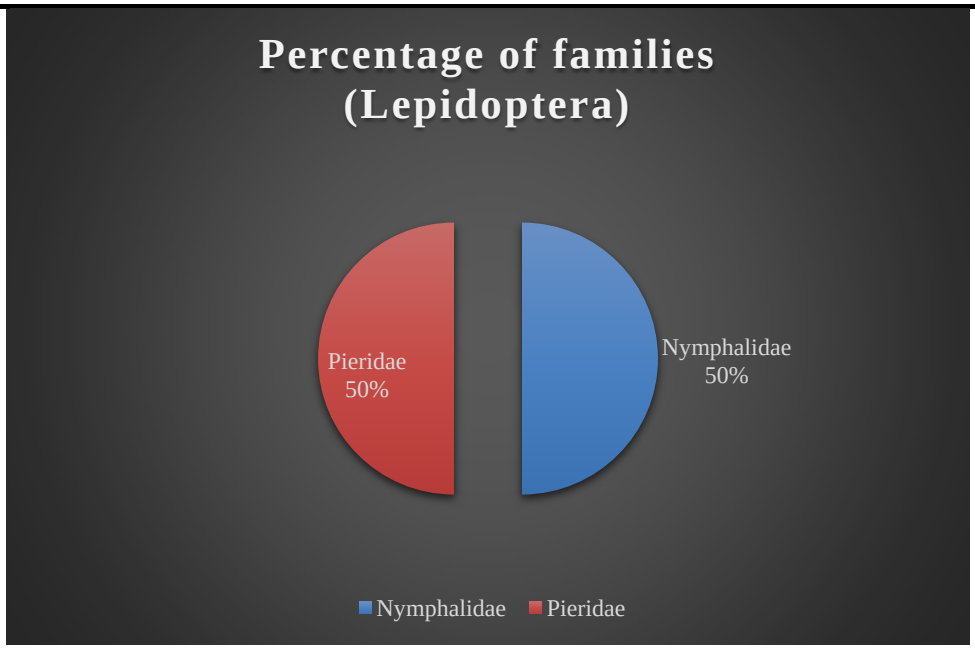

Figure 2: Lepidoptetra (butterflies) current situation

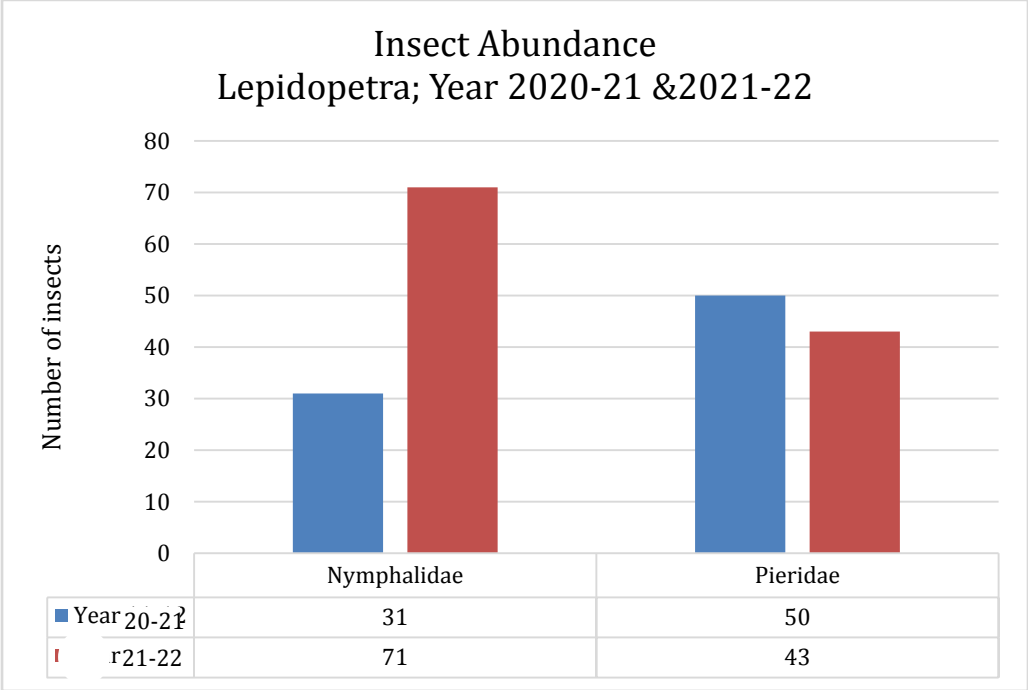

Figure 3: Study comparing the number of Lepidoptera families in the years 2020–2021 and 2021–2022

- **Hemiptera**

Hemipteran records for three families—Reduviidae, Lygacidae, and Coreidae—come from this

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area. Family Reduviidae includes Acanthaspis sp. and Rhinocoris sp., although family Coreidae is handled by Petalocnemis obscura (dallas) and family Lygacidae by Spilostethuspandurus separately.

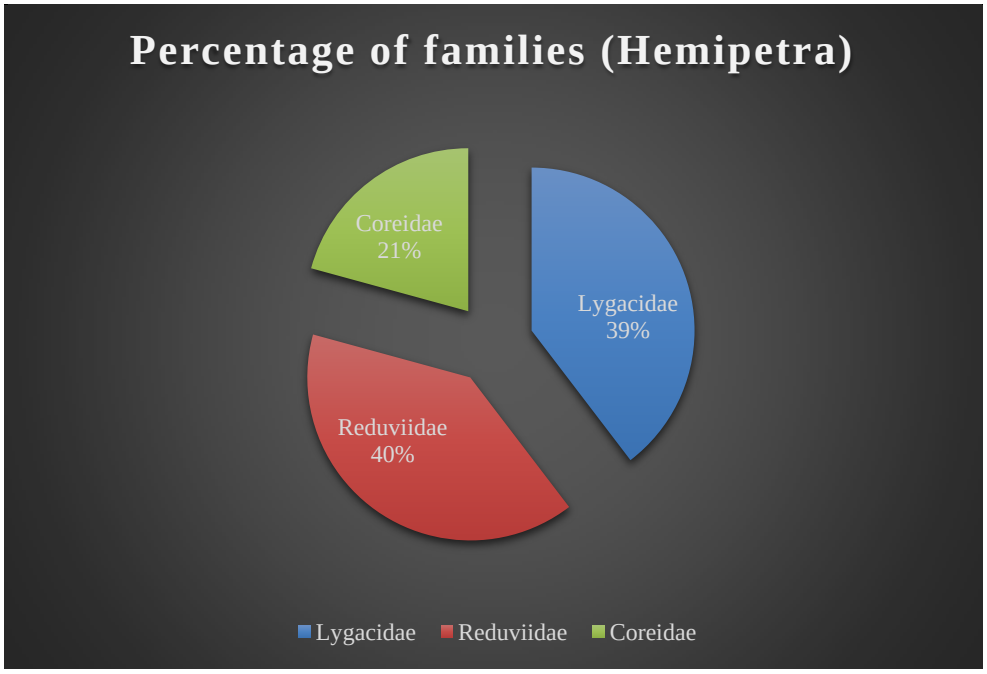

Figure 4: Bug situation for Hemiptera

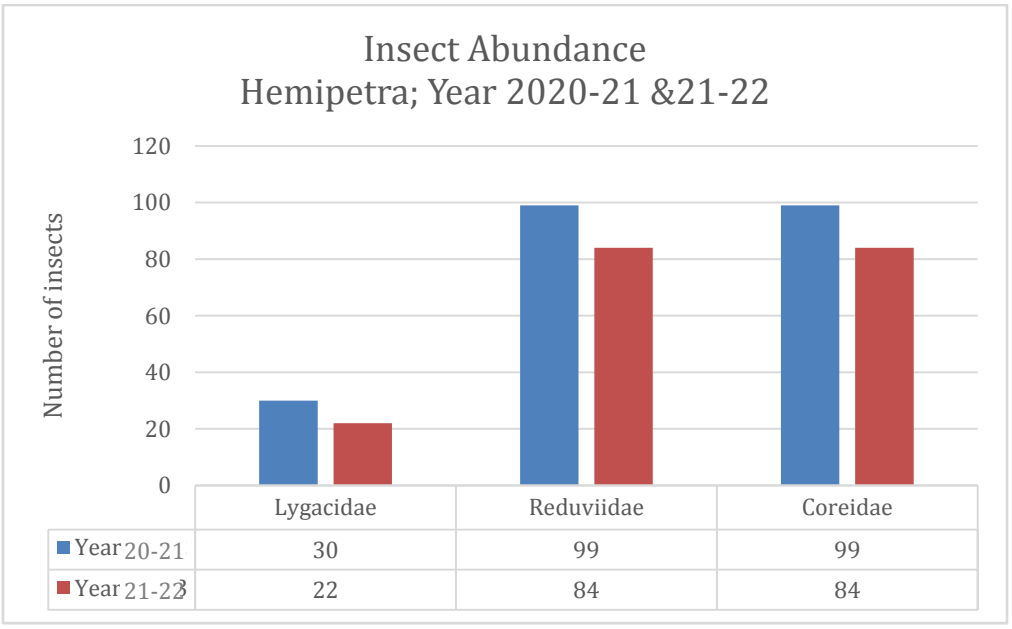

Figure 5: The number of families in the order Hemiptera in the years 2020-21 and 2021–22 was compared in the study.

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- **Odonata**

The species Neurothemis intermedia (Rambur) belongs to the phylum Odonata. The Odonata (damselflies and dragonflies) fauna of the Manchabandha hold forest in Baripada, Odisha, was studied by Kalita et al. (2014). They discovered 48 distinct odonate species, which are divided into 3 genera and 8 families. The Libellulidae family was the most complex. In these woodlands, odonates were discovered in a diversity that had never before been seen.

Table 1:A comparison of the number of members of the Hemiptera family in the years 2020–21 and 2021–22

S. No.	Family	No. of Species	No. of Individuals	
			Year 2020-21	Year 2021-22
1.	Libellulidae	1	52	44

- **Coleoptera**

Orphnus species were the primary Coleoptera species. Just in the year 2012, this species was discovered in the cow compost.Nine people were counted as having noticed.

Table 2: Study comparing the number of members of the Coleoptera family in the years 2020–2021 and 2021–22

S. No.	Family	No. of Species	No. of Individuals	
			Year 2020-21	Year 2021-22
1.	Scarabacidae	1	1	09

- **Hymenoptera**

In 2012, a Dolichhovespula species was spotted along the Bagher Timberland's boundaries.

Table 3: Study comparing the number of members of the Hymenoptera family in the years 2020–21 and 2021–22

S. No.	Family	No. of Species	No. of Individuals	
			Year 2020-21	Year 2021-22
1.	Vespidae	1	57	47

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Table4: Insects found at Bagher Forest in Jhalawar in 2020–21

S.No.	Insect Identified			Abundance (Approx. no. of insects)	
	Order	Family	Genus Species	Feb-March 2020- 21	Sept-Oct 2020- 21
1.	Lepidoptera	Pieridae	Teriashecabe (Linnaeus)	28	24
2.	Lepidoptera	Nymphalidae	Junoniaalmona	18	15
3.	Hemiptera	Reduviidae	Acanthaspis sp.	24	22
4.	Hemiptera	Reduviidae	Rhinocoris sp.	32	27
5.	Hemiptera	Coreidae	Petalocnemis obscura (dallas)	19	16
6.	Hemiptera	Lygacidae	Spilostethuspandurus	17	15
7.	Odonata	Libellulidae	Neurothemis intermedia (Rambur)	24	21
8.	Coleoptera	Scarabacidae	Orphnuspicinus	2	2
9.	Hymenoptera	Vespidae	Dolichovespula sp.	27	23

Table 5: Insects discovered in Jhalawar's Bagher Forest between 2021 and 2022.

S.No.	Insect Identified			Abundance (Approx. no. of insects)	
	Order	Family	Genus Species	Feb-March 2021- 22	Sept-Oct 2021- 22
1.	Lepidoptera	Pieridae	Teriashecabe (Linnaeus)	24	21
2.	Lepidoptera	Nymphalidae	Junoniaalmona	14	13
3.	Hemiptera	Reduviidae	Acanthaspis sp.	22	19
4.	Hemiptera	Reduviidae	Rhinocoris sp.	27	22
5.	Hemiptera	Coreidae	Petalocnemis obscura (dallas)	17	13
6.	Hemiptera	Lygacidae	Spilostethuspandurus	13	11
7.	Odonata	Libellulidae	Neurothemis intermedia (Rambur)	20	17
8.	Coleoptera	Scarabacidae	Orphnuspicinus	10	2
9.	Hymenoptera	Vespidae	Dolichovespula sp.	22	20

5. Discussion

5.1.Impact of Anthropogenic Activities on Bagher Forest's (Undisturbed) Biodiversity

It was a sparse, dry deciduous forest. Although Table 6.18 revealed that occasionally, people would brush some steers and cut some trees for wood (fuel) on the outside edge of the woods, the area was deserted.The remaining parts of the forests were untouched by human activity.

We conducted our research at the outer reaches of the dense Bagher woodland, where there was the least variability, and deeper exploration of the forest proved unreliable.

The destruction of living space by woodland clearance generally results in a decline in the variety and abundance of backwoods animals, particularly for species with a small geographic distribution.

The school grounds, which were particularly disturbed by human activity, held the most species and their overflow, according to the results of the current focus on biodiversity and anthropogenic activities of four, whereas the number of species identified and people recorded from the Bagher backwoods was least in an area that was undisturbed. It demonstrates how a metropolitan green foundation may be used to create a better climate, provide biological system management, and more.

6. Conclusion

By evaluating relative overflow and components of existing related species, the current analysis has identified the agriculturally significant insects. The species of bugs were separated from the collected insects, and their morphological and atomic identification was obtained. Furthermore, the invasion rate revealed that there was both a site- and plant-specific invasion. There is no question that the advancement of humanity harms biodiversity, especially in light of current unrest. the environmental damage caused by agricultural and endless suburbs. However, not all of the data is inaccurate. Numerous animal and plant species can now flourish in urban and sub-urban areas because they have adapted to the shifting needs, food supplies, hunters, and threats there. Some techniques may be quite successful in increasing the biodiversity of the nursery climate. Chile's remarkable extravagance is a result of human-caused aggravations. The current emphasis on bug biodiversity and the effects of human movement in various ecosystems demonstrates that human activity may not necessarily be bad; it may even be good by creating the ideal environment for insects to thrive in.

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