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Beneficial Insects and Agriculture

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ABSTRACT

On agricultural land, there are numerous insects that are not a threat to crop production but are useful to farmers in various ways, such as natural enemies, productive insects, pollinators, scavengers, weed killers, and soil builders. In the current situation, farmers' motivation is one-sided: they want to make the most money possible while neglecting the impact on beneficial insects, the environment, and human health. Insecticides can be an essential agricultural production tool for increasing yield, but their widespread and indiscriminate usage puts farmers at risk of significant health problems, as well as having negative implications for insects that are helpful to farmers. Fields with numerous helpful insects have a favourable impact on crop output, therefore cautious decisions about insect pest management and farmer knowledge of beneficial insects should be made.

INTRODUCTION

Pollination and natural pest control are two examples of ecosystem services provided by beneficial insects to agriculture. From a conservation standpoint, it attempts to improve insect-derived ecosystem services (i.e., beneficial insects in farming systems that give ecosystem services to crops). Recycle organic resources. Beneficial insects have helped to preserve human cultures and civilizations in a variety of ways: they control the population of many hazardous pest species, generate natural goods, and dispose of waste etc. It is important to realise how much we rely on insects for our existence and what life would be like without them.

The use of broad-spectrum insecticides and the widespread development of agriculture reduce the variety of natural enemy populations, increasing the risk of pest outbreaks. In fact, pesticide use has been linked to a significant reduction in natural pest control services. As a result, improving the agro environment looks to be one of the most effective strategies to reduce the usage of chemical pesticides for pest and disease management. It will also improve agricultural production's long-term viability [1].

Beneficial insect role

Natural enemies

Natural enemies are insect predators and parasitoids that attack and feed on other insects, notably insect pests of plants. Natural enemies help to regulate pests through this sort of feeding, which is known as natural biological control. In farmed systems, natural enemies are responsible for around 33% of natural pest management. Predaceous natural enemies are insects that are free-living, mobile, bigger than their insect prey, and may devour many preys throughout their life cycle. However, parasitoids mostly belong to the Hymenoptera and Diptera orders, and their host ranges are thought to be more unique. By increasing to pest mortality that is most sensitive to herbivores, predators and parasitoids can help to limit or postpone pest population development. Due to differences in phenology, pest management became more successful when various populations of natural enemies were present. Natural enemies

can be manipulated as part of integrated pest management programmes in a variety of ways, including the importation and establishment of exotic natural enemy species (classical biological control), direct manipulation of populations (augmentative biological control), and, most importantly for this study, manipulation of their environment.

Pollinators

These are flower visiting insects that feed on blooming plants for nourishment given by the plants (nectar, pollen). While foraging, flower-visiting insects have the capacity to convey male gametes (found in pollen) to female gametes, resulting in pollination. The majority of the world's blooming plants, including many cultivated plant species such as sunflowers, Cucurbitaceous vegetables, Coriander, Cardamom, Apple, and others, rely on insect-mediated pollination for reproduction. To produce a high yield, many crops rely on pollination for seed development and fruit formation. Insect pollination is responsible for an estimated 35% of global crop output.

Pollination services are provided by the *Apis meliffera* L. (European honey bee) in the majority of crops. Non-Apis bees are also essential agricultural pollinators, particularly for crops where honey bees are ineffective pollinators (e.g. alfalfa, squash). Crop pollination is controlled by a few non-Apis species. Bumble bees, Bombus impatiens Cresson (Hymenoptera: *Apidae*), are examples of non-Apis species that are managed for cranberry (*Vaccinium* spp.) and greenhouse tomato (*Solanum lycopersicum* L.) pollination. Despite the fact that bees are the most effective insect pollinators of most plant species, other insects have been acknowledged for their pollination services.

Weevil *Elaeidobius kamerunicus* plays an enormous role in pollination of Oil Palm (Coleoptera: *Curculionidae*). Both in Smyra and Capri Fig Plantation, fig wasps are responsible for pollination [2].

Insect as food

Insects were utilised to provide nourishment to our forefathers. In many places, people still eat insects as a source of protein [3]. Dried grasshoppers, which are high in protein and low in fat, are offered at Mexican village markets. Tortillas are made from insects combined with flour and can be cooked or crushed into meal. The larvae of the wood-boring beetle can be cooked or grilled over an open fire. There's also a vast list of nutritious edible insects, like as ants, bees, termites, water grubs, caterpillars, flies, crickets, katydids, beetle larvae, and dragon fly nymphs. In Thailand, the pupa of the silkworm is used as human food.

Soil builders

Insects that live in soil dig tunnels, which serve as passageways for smaller creatures, water, air, and roots. Insects increase soil aeration, and earthworm activity can benefit the soil nutrient cycle, as well as the physical qualities of the soil, such as structure and tilth, as well as the activity of other beneficial soil species. Small dung beetles use dung to build tunnel walls and dung balls, which helps to keep the soil quality high. The excrement of insets enriches the soil as well. Fly Larvae, Crickets, Termites, Wasps, Beetles, Ants, Cutworms, and other insects are some of examples.

Weed killers

So many insects eat on weeds that aren't desirable. They do the same thing with grown crops. In many cases, In several situations, the presence of these insects has played a significant role in the direction of weed removal.

Scavengers

Scavengers are insects that feed on the dead and rotting materials of plants and animals. Insects (scavengers and decomposers) assist in nutrient biochemical cycle. Examples include the bark beetle, water scavenger beetle, termites, and ants, among others.

Insects as Medicinal Organisms

Insect-derived compounds have been widely utilised in medicine since ancient times. In chronic and post-surgical lesions, maggots and honey exhibited therapeutic properties. Honey is also used to heal burns, and when combined with bee wax, it has been proven to be therapeutic for dermatological diseases. Royal jelly, another honey product, is used to alleviate postmenopausal symptoms.

CONCLUSION

Organic livestock farming isn't a one-size-fits-all solution to all livestock-related issues. It is primarily a production method for a niche premium market with stringent quality standards for the manufacturing process and a high level

of managerial competence. It is critical for the growth of organic livestock farming to ensure consumer confidence in organic products by meeting self-created demands to a great degree. Organic livestock production is difficult not just for farmers, but also for agricultural research and interdisciplinary collaboration. Animal raisers should have detailed methodologies and indicators for assessing animal welfare on the farm. Farmers should also have a support structure in place to help them enhance the quality of their output. The most important component is that socioeconomic studies on the adoption of organic animal husbandry should be conducted.

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