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Insects pollinators a key players of every ecosystem

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Fertilization the most important process in plant's life cycle is dependent on biological transporters. Biological transporters or Pollinators are the organisms that transport pollen grains from the stamen's anther to the stigma of the carpel. Recent knowledge about pollinators on a global scale investigated that more than 1000000 different animals acts as pollinators for more than 20000 kinds of wild plants (flowering). Beside the different members of class insecta and other invertebrates, more than 1000 vertebrates (birds and mammals) have been reported to have role in pollination. More than 90% species of plants in the tropical areas are dependent on animals or insects for pollination. Mostly self-pollination is done without wind or insects but in certain self-pollinating plants need pollinating agents. On the other hand for cross pollinating plants biological agents/ pollinators are mandatory. Abiotic and biotic methods are used to pollinate plants. Wind (anemophily) and water are the primary means of abiotic pollination (hydrophily). Vertebrate pollination (zoophily) and insect pollination (Entomophily) are the most common forms of biotic pollination.

Keywords: Insect pollinators, entomophily, biotic pollination

INTRODUCTION

Insects have a significant advantage over other animal pollinators when it comes to pollination. Different groups of insects have evolved to get appropriate traits to pollinate different types of flowers. As an added attraction for these pollination insects, many flowers provide delicious liquid nectar. Plants pollinated by insects generate huge pollen grains, but in smaller quantities. The requirement to attract insect pollinators led to the evolution of spectacular insect pollinated flowers. However, bees obtain pollen from different wind pollinating flowers, such as maple, oak, and maize. Bees are the most efficient insect pollinators because they can work in complex flowers, are attracted to delicious odor's, and employ nectar cues. Honeybees, more than any other form of bee, have a number of advantages as pollinators. Moths are nocturnal or crepuscular hoverers that use their long proboscis to feast on flowers. Butterflies are attracted to vividly colored flowers, which they pollinate to allow them to land on the blossoms that are facing upward. The most varied of all the insects are flies. Flowers that look and smell like carrion attract carrion or dung flies (Willemstein, 1987).

Ecology of Pollinating agents

Insect pollination is not only important for cultivated crops but it is also essential for grasslands, herbs and shrubs (Baker and Hurd., 1968). Fruit and vegetable growers in different countries are facing a decline in wild bee population due to human activities that damage their habitat and foraging places. The loss of pollinating insects would have the biggest impact on uncultivated areas, where most plants (that maintain soil stability and nourishment) would die out. (Bohart., 1972). A disaster alert was also issued at the same time due to our disregard for the importance of pollination. According to (Abelson, 1971), monoculture and the usage of only a few plant strains render the food supply vulnerable to plant enemies. According to (Harlan., 1972), the post-modern era saw tremendous increases in yield as well as a near-complete genetic wipe-out, with entire continents planted with one or a few closely related populations. These four narrow genetic bases, together with the loss of gene pools, spell calamity. One method to avert a disaster like this is by cross-pollination. Insect-pollinated agricultural seed yields are frequently lower than they should be, due to a shortage of specific insects rather than climatic, soil, or cultural factors. In northwest Mexico, (Bruner., 1966) looked on the exclusively commercial side of vegetable cultivation. He believes that low agricultural production in some areas is due to lack of effective pollination by bees. Pollinators and plants are so linked that their extinction

would have drastic effects.

Impact of pollination on Agricultural sector

More than 2500 different plant are used as food. Of these only 250 are widely grown, and only 10-12 (including rice, maize, potatoes etc) provide food to more than 80% of the world (Thurston., 1969). Insect pollination appears to have a small impact on global food production, perhaps less than 1%. Crops worth millions of dollars, on the other hand, rely on insect pollination, primarily by honeybees. More than half of the world's fats and oils come from plants (coconuts, oil palm, olives, soybeans, and sunflower seeds) (Guidry., 1964). Many of these plants rely on insect pollination or benefit from it. When these sources, animal and plant products, are considered, insect-pollinated plants account for one-third of our overall diet, either directly or indirectly. Furthermore, insect-pollinated legumes have the ability to take nitrogen from the air, store it in their roots, and then release it into the soil to benefit other plants. Soils that are not fertilized with processed minerals can quickly become depleted and economically unproductive if this beneficial effect is not achieved. Pollination also has an impact on the quality and efficiency of crop production. The importance of pollination for the next crop generation is usually ignored. Hybrid seed is valuable because of its early growth, plant health, and increased fruit or seed production. Inadequate pollination can lead to lower yields, as well as delayed harvesting and a high percentage of poor fruits.

Costs and Benefits of Crop Pollination

(Levin. 1967) estimated that insect pollinated crops in addition with bee pollination worth $7 million. Along with that honey and wax of honey bee nest worth more than $40 million. We can't quantify the ecological value of the seeds, fruits, and nuts produced, which are consumed by a variety of wildlife species, but it's undeniably considerable. Aside from honeybees, other pollinators are extremely valuable, however their value is difficult to quantify. (Bohart., 1972) estimated that the wild bee industry was worth well over $1 million per year in terms of expenses and benefits. Bohart's estimate is likely to be outnumbered by a large number of other unmanaged and underestimated wild bees. Although bumble bees are excellent pollinators, they can be challenging to manage (Holm., 1966). Unfortunately, they have been nearly eradicated in many highly cultivated areas. If the demand for insect pollination increases, the number of honey bee colonies should increase as well. This is far from the case. The number of colonies in farms has been continuously reducing (Tyler and Haseman., 1915). The number of bees needed to produce the most fruit or seeds may be far greater than the location's capacity for honey production or colony maintenance. Many more properly kept and managed honey bee colonies appear to be in demand than can be deployed for pollination of current and future crops. We need to be aware of the declining number of pollinators and think about how to track and reverse the trend. If we don't start taking care of our crops' important pollinators, a calamity could occur. A global lack of bees and other pollinating insects is harming crops all around the world, perhaps leading to much higher fruit and vegetable prices. In recent years, increased pesticide use has wreaked havoc on pollinator numbers, and much of their natural habitat, such as dead trees and old fence posts, has been eliminated to make way for more agriculture. Pollinator conservation is thus a critical issue in the worldwide context of agricultural and natural productivity sustainability. Pollination conservation has begun to gain a higher profile than it has in the past (Torchio.1994).

Economic value of insect pollinators in Pakistan

Pakistan's agriculture sector accounts for the majority of the country's export profits. For the fiscal year 2010-11, it accounted for 17.5 percent of Pakistan's total exports. Agriculture is just as vital for industrial development as it is for economic development. Agro-based industries account for around 60% of Pakistan's 5,000 industrial entities. Agriculture provides raw materials for industries in the United States. To meet population needs, the government's policy is to ensure maximum food security through sustainable agricultural development and balanced food sector growth, as well as to generate agricultural surplus to boost the agricultural sector's exports, which would ultimately improve the country's growth performance (GOP., 2011). Insect pollinators are worth 954.59 million US dollars in Pakistan's Himalayan area (Partap *et al*., 2012). Pakistan's pollination-dependent crop production is valued at $1.59 billion US dollars, according to recent estimates. Fruits are worth 0.98 billion dollars, vegetables are worth 0.32 billion dollars, nuts are worth 0.15 billion dollars, oilseeds are worth 0.13 billion dollars, and spices are worth 0.004 billion dollars (Irshad and Stephen). Pollinators are not completely necessary for the production of pollinated crops. There's a certain amount of reliance. Data on Pakistani crops was used to calculate some statistics. Melon, Pumpkin, and Watermelon, Almond, Apple, Apricot, Cucumber, Loquat, Mango, Chille, Papaya, Persimmon, Tomatoes necessitate pollinators. In Pakistan, 26 fruit crops, 7 oilseeds, 4 legumes, 19 vegetables, 2 spices, and 3 nut trees are among the 61 significant pollination crops utilised as food. Almond, apple, apricot, beans, cherry, coriander, citrus, coconut, cotton, cucumber, eggplant, fig, gourd/pumpkin, guava, litchi, mango are some of the crops that benefit from insect pollination in Pakistan During 2010-2011, Pakistan produced 3.126 million tons of vegetables and 6.926 million tons of fruits. These are the most commonly pollinated crops by insects. As a result, pollination control will be extremely useful to these crops Irshad & Stephen., 2014).

Decline In Pollinators population

Currently, there is a well-documented decline in insect pollinators, such as a large fall in the diversity and number of wild pollinators in agricultural settings. A significant reduction in natural habitat or an increase in the distance between natural habitat and humans (Ricketts et al., 2004). On the other hand, the biodiversity study of insect pollinators in fragmented forests is still in its infancy and needs meaningful direction (Didham et al., 1996), as well as a significant number of data (Sodhi et al. 2010). Insect pollinators are important for ecosystem health and global food security since they pollinate 75 % of crop species, 35 % of global agricultural productivity, and up to 88 % of flowering plant species (Ollerton *et al*., 2011). Agricultural intensification (especially habitat loss and pesticide use), climate change, and the expansion of alien species are all major risks to pollinators (Potts et al., 2010). Despite their importance, credible large-scale, species-specific estimates of pollinator range change are lacking, particularly for bees and hoverflies, which are among the most important pollinators (Garratt et al., 2014).

CONCLUSION

Pollination specifically by insects play a key role in ecosystem, in other words it runs the ecosystem. Hence it is an important factor of crop and fruit production in the agriculture sector. Water, wind, and animal pollinators such as bats, moths, hoverflies, birds, bees, butterflies, wasps, thrips, and beetles all are assist plant in pollination. Insect pollinators accounts for 30% of global food production.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

AK present the idea, AB and IU has supervised and wrote the manuscript, SAN, IK, FM and SAU did the collected published data. AKam and HH reviewed and reform the manuscript. All authors read and approved the final version.

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