Role of Insects in Pollination and Crop production

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Abstract

Pollination is performed by mean of abiotic and biotic factors. Among the biotic factors, Insect pollinators (entomophily) play lead role in pollination. Contribution of insects in global food production ranges between 15% and 30%. Insect pollinators enhance both quality and quantity of crops and are associated with crops in ecosystem and visitations of these insects positively correlated with yield. Pollination is critical for food production and human livelihoods, and directly links wild ecosystems that many wild animals rely on for food and shelter with agricultural production systems. Without this service, many interconnected species inhabiting, and processes functioning within, an ecosystem would collapse. Therefore, this article includes the role of insects in pollination which ultimately leads to increase in quality and yield of the crops.

Introduction

Pollination brings fertilization by allowing the fusion of male gametes and female gametes. It helps in the production of foods and seeds. Pollination aids in the transmission of features and characteristics from both parents to the offspring. It is an essential part of plant reproduction. Pollen from a flower's anthers (the male part of the plant) rubs or drops onto another flower, where the pollen sticks to the stigma (the female part). The fertilized flower later yields fruit and seeds. Pollination affects crop quality and quantity. Some crops, such as field beans and mangoes, are self-pollinating but give better yields if pollinated by insects. Many, such as passion fruit, cowpea, sesame, litchi, mustard and cashew, give a substantially increased yield when pollinated by insects.

A pollinator is the biotic agent, animals or vector that moves pollen from anthers to stigma of a flower. Insects and other animal pollinators are vital for the production of healthy crops for food, fibers, edible oils, medicines, and other products. They are vitally important to agriculture, as well as our food system and ecosystems. They help thousands of flowering plants reproduce, from flowers to fruits and even some crops. Pollinator habitat can also provide benefits on the farm, such as preventing soil erosion and improving biodiversity. Both adaptions, along with their high frequency of flower visitations, make bees the most effective pollinators in the world. Although not as efficient as bees, other insect pollinators such as wasps, flies, beetles, moths and butterflies still play a critical part in plant pollination.

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Insects aid in cross pollination in fruits, vegetables, ornamentals, cotton, tobacco, sunflower and many other crops. Insect pollination helps in uniform seed set, improvement in quality and increase in crop yield. Insects and other animal pollinators are vital to the production of healthy crops for food, fibers, edible oils, medicines, and other products. It is estimated that more than 1,300 types of plants are grown around the world for food, beverages, medicines, condiments, spices and even fabric. Of these, about 75% are pollinated by animals. More than one of every three bites of food we eat or beverages we drink are directly because of pollinators. In fact, pollinators such as bees, birds and bats affect 35 percent of the world's crop production, increasing outputs of 87 of the leading food crops worldwide, as well as many plant-derived medicines (Klein *et al.* 2007). About 6 million acres were devoted to producing fruits, vegetables, and nuts- most of which are dependent upon insect pollination. These plants provide about 15 percent of our diet (Gregor, 1976). The commodities produced with the help of pollinators generate significant income for producers and those who benefit from a productive agricultural community. Pollination by bees therefore increases fruit production by 50% over that achieved by wind (Krishnnan *et al.*2012).

The use of pollinators (honey bees) and pollinizers in aonla orchards is necessary for

increasing the fruit yield (Allemullah & Ram 1990). Smyrna and second crop San Pedro figs are pollinated exclusively by the hymenopterous fig wasp (*Blastophaga psenes* (L.), which overwinters in the caprifig fruit. The use of this wasp is the oldest form of man-manipulated insect pollination, a system referred to as caprification.

Bael is only about 5 % flowers are self-pollinated and 95 % animal pollinated. It is mostly pollinated fruit crop which has entomophilous flowers by various insect pollinators like honey bees (*Apis dorsata*, *A. mellifera*), hover flies, yellow wasp, carpenter bee, weevil, black ants, butterflies etc. (Haldhar *et al*. 2010). Cucumber crop requires insect pollination as an additional input for enhancing the yield (Shah et al. 2015). Ramanujam *et al*. (1964) reported 55.86% natural cross pollination in coriander, 70.05 to 77.83 % in ajwain and 82.20 to 91.4 % in fennel. Papaya plants are cross pollinated by insects and wind. Insect pollinators for papaya are honey bees, wasps, midges, thrips, syrphid flies, and butterflies (Crane, 2013).

High yield and high-quality crops are produced by the pollinators. Pollinating insects improve the yields of around three-quarters of crops.

Conclusion

In this article, we conclude great potential of insect pollinators in production of different agricultural crops. Hence, declining bee population poses a threat to global agriculture. Improving the health of bees and other pollinators is a necessity. Without pollinators, much of the food we eat and the natural habitats we enjoy would not exist. Taking action now to protect pollinators and reduce the usage of toxic pesticides is a positive step for our environment and economy. In the long run, if we don't find some answers, we could lose a lot of bees. A realistic way to ensure pollinator conservation is to promote and enhance its value to society.

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