

“Assessing Pollinator Necessity in Horticultural Crops”

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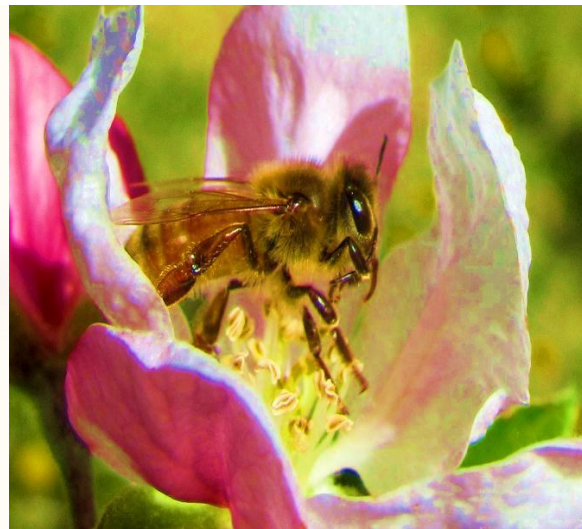
Introduction:

One of the most important techniques for preserving and expanding biodiversity and in general, life on Earth is pollination. Pollination improves livelihoods and food security for society. One of the most important pollination agents is insects. With over 16,000 pollinating bee species (Hymenoptera: Apidae) recognized worldwide, insects are incredibly diverse pollinators. Since they are the most important pollinators because of their appropriate body size, hairiness, thoroughness, steadfastness, floral constancy, and acceptable numbers, bees and insects account for approximately 80% of all insect pollination.

Identifying Pollination

Nature of Dance: For most flowering plants to reproduce sexually, pollination-the transfer of pollen grains from a flower's male organs, the anthers, to its female organs, the stigmas-is necessary. This seemingly insignificant move starts a series of events that eventually result in the development of fruit and seeds, which is advantageous to both people and wildlife.

Before the Blossom: Pollination is not always the same. Some crops experience self-pollination, which happens when pollen moves within the same flower. Examples of these crops are rice and wheat.



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For many horticultural crops, such as fruits, vegetables, and nuts, cross-pollination—the transfer of pollen from one individual of the same species to another—is essential. Progeny vigor, robustness and yield are increased by this genetic exchange, and these traits are essential for economic success.

Wind Whispers, Water Winks: The wind may bring pollen across great distances, much like a capricious postman for certain plants. Others depend on water currents, or even hummingbirds, which inadvertently aid in the movement of pollen by sipping nectar. However, for most flowering plants, a colorful group of people known as pollinators participate in the pollination dance.

The Palette for Pollinators letter

The Brigade of Buzzing: Unquestionably the stars of the show, bees come in a staggering assortment of over 20,000 different species. Honeybees are vital to large-scale agriculture because of their social organization and tenacious work ethic. Nonetheless, stingless bees, solitary bees, and bumblebees all play crucial roles in the pollination of crops including tomatoes, blueberries, and apples.

Beyond the Beehive: There's a vibrant mosaic of pollinators waiting for you beyond the bustling world of bees. Butterflies fertilize crops like melons and beans with their colorful, waving wings. Moths, the nocturnal

equivalents of butterflies, aid in the pollination of plants that bloom at night, like passion fruit and jasmine. Fruit trees like mangos and figs depend on flies, who are sometimes disregarded and misinterpreted, to pollinate their carrion blooms.

Beyond fruit and seed set, pollinators also help to higher yields and higher-quality produce:- Many times, bigger fruit sizes, better flavors, and more nutritional value are attributed to cross-pollination. For example, apples pollinated by bees are bigger and sweeter than apples pollinated by other insects.

Biodiversity Bonanza: In the intricate web of life, pollinators are crucial. Their foraging practices create the foundation for many ecosystems by assisting the survival of multiple plant species. Because of this, a wide variety of animals, including top predators and herbivores, flourish and help to maintain the delicate balance of nature.

Economic Engine: The services provided by pollination have considerable economic worth. Every year, it is valued at hundreds of billions of dollars globally. In the United States, honeybees alone serve crops like almonds, cherries, and blueberries with pollination services worth close to \$15 billion annually.

A Buzzing Warning

The Problem of Pollinators:- Pollinators face many risks in spite of their

immense value. Across the globe, pollinator populations are drastically decreasing as a result of disease, pesticide use, habitat loss, and climate change. This poses a severe risk to the foundation of our ecosystem as well as the security of our food supply.

The Pesticide Paradox: It is ironic that pesticides that kill pollinators are often used on crops that depend on them. In particular, Neonicotinoid insecticides have been linked to declines in bee populations and are gradually being outlawed or restricted globally.

Climate Change: The precise timing of plant blossoming and pollinator activity is impacted by a warming planet. For instance, reduced fruit set may arise from flowers that bloom earlier no longer matching peak pollinator counts.

Saving our pollinators

Pollinator-Friendly Farming:

Fortunately, there is yet hope. The paradigm in agriculture is changing and developing cooperative relationships with pollinators is becoming more and more important. The following are a few methods for pollinator-friendly farming:

- Plant flower strips and hedgerows with a variety of long-blooming native species to establish habitats for pollinators.
- Organic methods: Use as little pesticide as possible and instead turn to organic

alternatives or Integrated Pest Management (IPM) to protect pollinators from dangerous chemicals.

- Provide nesting boxes and suitable habitat in your backyard to attract honeybees or solitary bees.
- Keep abreast on research and conservation initiatives to support neighborhood pollinators. For year-round pollinator attraction, Beyond Farms suggests designing pollinator-friendly gardens for balconies, terraces, and backyards.
- Use organic gardening techniques to grow less pesticides, and encourage your neighbors to follow suit. Give your support to companies that use pollinator-friendly practices.
- Participate in citizen science projects or pollinator monitoring programs to gain valuable knowledge about the populations and movements of pollinators.

- **Increase consciousness:-** Talk to your friends, family, and neighbors about pollinators and share your excitement and knowledge about them. Encourage actions and policies that benefit pollinators.

Pollination Future

Technological Changes: New methods are developing to augment or even replace lost pollination services as agricultural technology progresses. Pollination robots, drones fitted with pollen-distribution devices,

and even the use of synthetic biology to create "designer pollen" are examples of ongoing research and development.

Nature as an Inspiration: The practice of "biomimicry," which is taking cues from nature and applying them to human issues, holds great promise for pollinator conservation. Comprehending the mutualistic relationships that exist between distinct crops and their indigenous pollinators can have an impact on the advancement of sustainable farming practices.

In Action: Pollinator Partnerships

1. In Washington State, Bumblebees and Apple Orchards:

Difficulty: Because honeybees were crucial to the traditional apple crop in Washington State, there were worries regarding reliance on a single species and its vulnerabilities.

Solution: To establish commercially managed bumblebee hives alongside honeybees, apple farmers collaborated with researchers. When exposed to the typical wind conditions in the area, bumblebees are more adept at foraging and have a higher tolerance to cold.

Impact: Research found that the presence of both bumblebee and honeybee populations increased fruit set and enhanced fruit quality. This multifaceted strategy

improves overall pollination success by lowering dependence on a single pollinator.

2. Costa Rican Coffee Farms and Bats:

Challenge faced by Costa Rican shade-grown coffee farms, which are renowned for their ecological sustainability, was a decrease in fruit set as a result of a decline in bat numbers. Some coffee species are pollinated at night by bats, and during the day by bees.

Solution: To draw and maintain bat populations, farmers adopted habitat restoration techniques like planting native blooming trees and bat roost boxes.

Impact: The benefits of shade-grown agriculture for biodiversity were preserved while significantly higher coffee yields were achieved due to increased bat activity. The significance of taking into account nocturnal pollinators in farm management is illustrated by this case study.

3. California's Native Bees and Pumpkin Patches:

Difficulty: Honeybees are essential to the commercial production of pumpkins, but their population decreases have put California's crop harvests at risk. Furthermore, honeybees have lower pollination efficiency when it comes to squash crops like pumpkins.

Solution: In order to determine the efficacy of planting pollinator strips around pumpkin fields using a variety of native

wildflowers that attract bees, researchers worked with farmers.

Impact: Research comparing fields with solely honeybees to those with native bees revealed noticeably greater fruit set and pumpkin weight. This shows how diversified pollinator groups can enhance agricultural productivity and promote regional biodiversity.

Conclusion

The importance of pollinators is becoming more and more apparent as we approach a future where food production that is sustainable will play a major role.

Remember the delicate dance of life that unfolds in each blossoming flower, the unspoken agreement between pollinator and plant that sustains generations of existence. As agricultural stewards, it is our responsibility to tend to this delicate dance and make sure that our fields and orchards continue to be a hub for the buzzing symphony of pollination, which feeds not only our bodies but also our minds.



POLLINATORS IN APPLE



POLLINATORS IN CUCURBITS