



If Bees Disappear, What Happens to Your Plate?

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Bees and other pollinators play a hidden but essential role in shaping what ends up on our plates. While staple grains like rice and wheat can grow without them, many of the foods that make diets nutritious fruits, vegetables, nuts, legumes and even livestock products depend heavily on animal pollination. This article explores how pollinators support food quantity, quality and diversity and what happens when they decline. Drawing on global studies and real-world examples, it shows that pollinator loss would not cause food shortages in terms of calories, but would lead to poorer diets, widespread micronutrient deficiencies, increased risks of chronic disease and significant losses in farmer income. Declining pollination also threatens global protein security through impacts on legumes and fodder crops. Beyond nutrition, pollinator loss could drive agricultural expansion, biodiversity loss and economic instability. Protecting pollinators is therefore not just an environmental concern, it is central to human health, livelihoods and global food security.

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Introduction

Imagine what's on your dinner plate: rice or bread, a serving of beans, a little oil and if it's a good day, a splash of colourful fruits and vegetables. Now imagine taking away everything that depends on bees and other pollinators. What's left is mostly plain, starchy food, with far fewer fruits, vegetables, nuts and healthy sources of protein and fats. Around the world, about 87 major food crops rely at least partly on animal pollination, contributing roughly 35% of global food production and an even larger share of the vitamins and micronutrients in our diets (Uwingabire and Gallai, 2024). Insects especially bees do most of this invisible work by moving pollen from flower to flower. Without pollinators, many crops would still grow, but yields would be lower and food quality poorer (Gazzea *et al.*, 2023). Unfortunately, pollinators are declining worldwide. Long-term studies from Europe, North America, and other regions show major losses in wild bee populations and overall pollinator diversity. Even managed honey bees are under pressure from pesticides, parasites, habitat loss and climate change, leading to serious population declines in many areas (Samanta *et al.*, 2024). If these trends continue, it does not mean humanity will run out of food entirely staple crops like rice and wheat are largely wind-pollinated. However, it does mean less food variety and poorer nutrition, with fewer fruits, vegetables, nuts, legumes and animal products that depend on pollinated plants (Uwingabire and Gallai, 2024).

What Bees Bring to Your Plate

When we think about bees, honey usually comes to mind. But their real contribution is far bigger and far more important. Animal pollination supports at least one-third of the food humans eat and when higher yields from pollination are counted, it contributes to around 30% of global food production (Uwingabire and Gallai, 2024). Many of the foods that make meals nutritious, colourful and enjoyable depend on pollinators. This includes everyday fruits

like apples, berries, citrus, mangoes and melons; vegetables such as pumpkins, cucumbers, tomatoes and many leafy greens; nuts and oilseeds like almonds, sunflower, canola and other tree nuts; and protein-rich crops such as soybeans, beans and peas. Even livestock products are linked to pollinators, because key fodder plants like clover and alfalfa need insects to reproduce. The nutritional impact is striking. In Brazil, pollinator-dependent crops were found to supply nearly half (47%) of all dietary nutrients from the country's main food crops, especially healthy fats, folate (vitamin B9) and potassium (Porto *et al.*, 2021). At the global scale, foods that rely on pollinators provide a disproportionately large share of vitamins A, folate and other micronutrients that help prevent disease and support overall health (Uwingabire and Gallai, 2024).

Quality, not just quantity

Pollinators don't just help crops produce more food they also make food better. Large global studies show that insect pollination improves the size, shape, appearance and shelf life of fruits and vegetables, all of which determine whether food actually reaches our plates (Gazzea *et al.*, 2023). When pollination is poor, fruits are often smaller, misshapen and rejected by markets, leading to food waste and financial losses for farmers. This effect is clear in real fields. In apple orchards in Argentina, researchers found that when a native bumblebee species was missing, fruit set and the number of apples per tree dropped by more than 50%, even though honey bees were present. As a result, farmers earned 2.4 times less income. The reason lies in pollination quality, not just quantity different bee species pollinate flowers in different ways and together they ensure better, more reliable harvests (Méndez *et al.*, 2020).

If Bees Vanish: What Changes on the Plate?

What would happen if animal pollination disappeared completely? Scientific models suggest the effects would be serious. Global supplies of fruits could fall by about 23%, vegetables by 16%, and nuts and seeds by 22%. Even today, pollination is already falling short of its full potential, causing 3–5% lower production of fruits, vegetables and nuts worldwide. These losses matter for health. Reduced availability of pollinator-dependent foods is linked to an estimated 427,000 additional deaths each year, largely due to lower consumption of fruits, vegetables and nuts that protect against disease (Smith *et al.*, 2022). The biggest risks are for key nutrients such as vitamin A and folate, where tens to hundreds of millions of people could fall into deficiency without pollinators (Smith *et al.*, 2015).

Protein Depends on Pollinators Too

When we think of protein, we rarely think of bees. But without pollinators, soybeans would yield less and even meat and milk could become scarcer. That's because cattle and sheep rely on pollinated fodder crops like clover and alfalfa. Fewer bees ultimately mean less protein on the table both plant-based and animal-based.

Staple Calories vs. Real Nutrition

Even if bees disappeared tomorrow, people would not starve overnight. Crops like rice, wheat and maize mostly pollinated by wind would still provide calories. But surviving is not the same as being healthy. Without pollinators, fruits, vegetables, nuts and legumes would become scarcer, pushing diets toward starchy staples. That shift would raise the risk of heart disease, stroke, diabetes and some cancers, especially in poorer regions already reliant on limited foods. Researchers estimate that losing pollination entirely could contribute to about 1.4 million extra deaths each year worldwide, with even a 50% decline still linked to hundreds of thousands of additional deaths (Smith *et al.*, 2015).

Beyond the Plate: Farmers, Economies and Land

Farmers' livelihoods at risk: Pollinator decline is not an abstract global issue; it is already affecting rural livelihoods. In western Nepal, beekeeper surveys recorded a 50% drop in honey yield per hive and a 44% decline in active hives over a decade, largely linked to

climate change and declining floral resources (Tania, 2025). Honey sales made up about 16% of household income, while the same bees provided more than half of flower visits to crops like apple, cucumber and pumpkin. As bees decline, both income and local food security are threatened. Similar effects are seen in crop farming. In Argentina, apple orchards lacking native bumblebees experienced more than 50% yield loss and dramatic drops in farmer profits (Méndez *et al.*, 2020). Similar patterns are emerging across many countries. In places as different as Honduras, Nepal and Nigeria, poor pollination is already cutting the value of fruit and vegetable harvests by up to a third (Smith *et al.*, 2022).

More land, less nature: As pollination weakens, farmers may try to compensate by expanding cropland. Yet agriculture has become increasingly pollinator-dependent over the past 50 years, especially in developing countries. To make up for weaker pollination, farmers may clear more land. But that solution comes at a cost: forests are cut, wildlife disappears and the very insect's crops depend on lose their habitat creating a vicious cycle (Aizen *et al.*, 2009).

Are Bees Really Disappearing?

Unfortunately, the evidence is clear. Large studies show widespread declines in both wild and managed pollinators:

- Evidence from many parts of the world tells the same story. In Britain, wild bees and hoverflies have disappeared from millions of places over the past few decades. Globally, bee diversity is shrinking, especially in intensively farmed and climate-stressed regions. Even managed honey bees are struggling under the combined pressure of pesticides, parasites, poor nutrition and extreme weather. (Powney *et al.*, 2019).
- Global assessments report shrinking bee diversity and fewer flowering plants, especially in intensively farmed and climate-stressed regions (Samanta *et al.*, 2024).
- Managed honey bees face multiple stressors pesticides, parasites like *Varroa* diseases, poor nutrition, habitat loss and climate extremes leading to repeated episodes of high colony losses (Samanta *et al.*, 2024).

Can Other Pollinators Replace Bees?

Bees are not the only pollinators. Hoverflies, butterflies, beetles, birds and bats also provide valuable pollination services (Doyle *et al.*, 2020). Hoverflies alone visit over 70% of global food crops and contribute to ecosystem services worth hundreds of billions of dollars each year. However, no single group can fully replace bees. Different crops rely on different pollinators and losing highly efficient or specialized species can sharply reduce yields even if other insects remain (Méndez *et al.*, 2020). Honey bees are also uniquely mobile and abundant, making them essential for large-scale farming systems.

What Needs to Change?

Researchers around the world point to the same conclusion that protecting pollinators requires whole-system solutions:

- Reducing harmful pesticide use
- Restoring habitats such as hedgerows and wildflower strips
- Supporting diversified, low-input farming systems
- Tackling climate change
- Improving farmer and public awareness of pollinators' true value

Conclusion

If bees and other pollinators disappear, our plates won't be empty but they will be less nutritious, less diverse and more dangerous to our health. Fruits, vegetables, nuts, legumes and fodder crops would suffer most, undermining both human nutrition and global protein systems. For millions of small farmers and low-income communities, pollinator loss would mean real threats to food security and livelihoods. Protecting pollinators is not just about saving bees, it is about safeguarding the future of the food we eat every day.

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