

A CHOICE **FRUIT** BOWL

Papaya, guava, mango: For us humans, these kinds of fruits bring a welcome change to ordinary mealtimes. But of what interest are these fruits for bees and other pollinators? In many cases we know relatively little about which insects pollinate which crops or how or when. But now, a collaborative study between Bayer and the University of Freiburg is working on filling the gaps in our knowledge – providing information that could be used to develop bee-friendly application methods for insecticides in the future.



Mango flowers (above) rely on pollinating insects to develop the juicy fruit (below).

With some 75 percent of the world's crops depending, to some extent, on insects to pollinate them, the smallest farmworkers of all have a very big role to play. If bees, bumble bees and flies didn't lend a helping hand, fewer fruits and seeds would grow in fields or on trees and bushes. However, the insects actually do more: Their involvement can affect the size of crop yields and the levels of nutrients they contain. In many cases researchers have yet to reach a consensus on the role that bees play in pollination of crops. Even for conventional classics like apples, almonds and rapeseed some open-ended questions remain, never mind more "exotic" crops like guava, mango and cocoa.

The insects' involvement can affect crop yields and the levels of nutrients they contain.

"For many crops there's thin data on the ground. And even if information on pollinators is available, the findings are often ambiguous, which makes it harder to assess," says Dr Christian Maus, Global Pollinator Safety Manager at the Bayer Bee Care Center. Yet crop protection researchers are very keen to get hold of any existing information, especially on the pollination of exotic crops, as it will help them in developing bee-friendly insecticide application schemes and usage guidelines. "For them to be able to do that, we need to know things like which crops honey bees and other pollinators actually visit regularly, and during which part of the year and at what time of day they do it," says Dr Maus. This is why Bayer is supporting a new study that will go through and summarize all the currently available scientific literature on crops worldwide.

The study is being run by the working group of Prof. Alexandra-Maria Klein's

AT A GLANCE

- // Many crops depend on insect pollination.
- // However, the exact role of bees and other pollinators is often unclear.
- // Closing gaps in knowledge: Bayer supports a literature study on crops worldwide.
- // More knowledge could facilitate the development of bee-friendly insecticide application methods by others in the future.

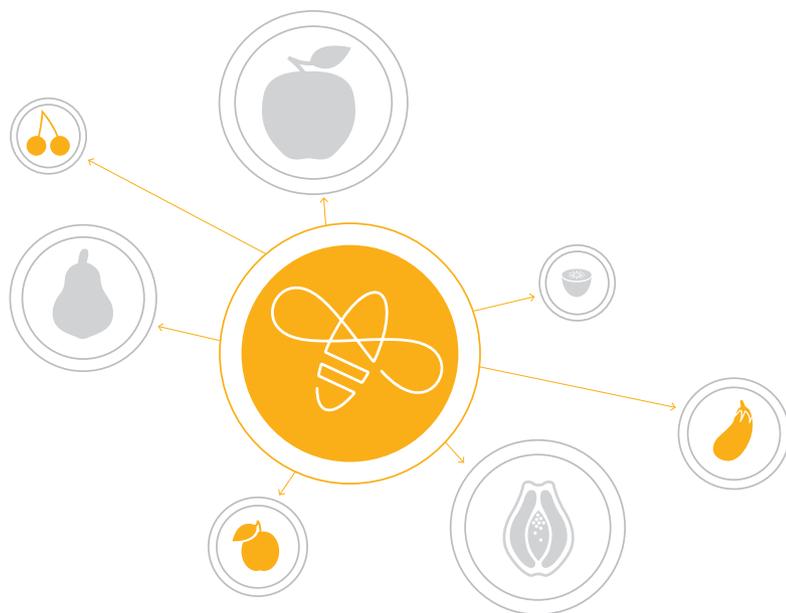


Dr Christian Maus
Global Pollinator Safety
Manager, Bayer Bee
Care Center

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Most papaya plants can self-pollinate their blossoms.

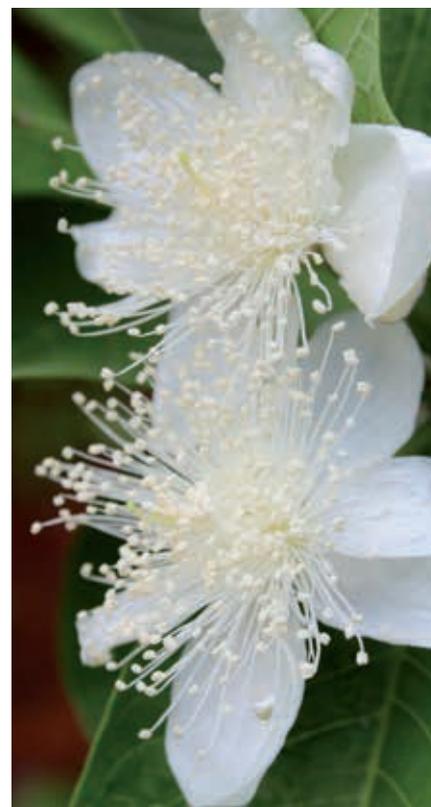


Honey bees pollinate many important fruits, nuts and vegetables that contribute to a healthy diet.

Nature Conservation and Landscape Ecology working group at the University of Freiburg. One of the team members, Dr Virginie Boreux, spent two years trawling through archives and online databases – and the work has paid off: “From about 1,500 publications, I found information on more than 130 crops,” she says. The oldest find dates back to 1881. Dr Boreux identified the most important findings in each of the studies and created a table that summarizes them by crop. Mangos, for instance, were the subject of less than a dozen studies published in English, conducted in various regions.



Guava fruit



Insect pollination of guava flowers (above), can provide higher fruit yields.



Papaya fruit



The cocoa flower (left) is pollinated by small flies to produce fruits (right).



“Although some studies indicate that mangos are pollinated by honey bees and wild bees, in others it seems that flies play an important role,” says Dr Boreux. Investigating which pollinators are important for fruit harvests was not the only focus of her work: She was also interested in finding out whether the insects preferred nectar or pollen, when exactly they visited the plants, and what conditions will promote pollination. It is a laborious task, as not every study contains information on all the key issues and not every finding is scientifically sound.

Some studies even arrive at contradictory findings.

This is why Dr Boreux is now concentrating on evaluating the masses of data. The work involves filtering out the most important and most reliable data, weighting them and then making them available in an easy-to-use system. But even once that’s done, Dr Boreux still won’t be able to rest. “I’m sure the data pool will keep on growing,” she says.

“There are still significant gaps in our knowledge, so research into the pollination of agricultural crops will continue for a long time to come.”



Papaya is one of the most popular tropical fruits worldwide. It has become an important export product for developing countries.



INTERVIEW

Filling gaps in the knowledge

Professor Alexandra-Maria Klein runs the Nature Conservation and Landscape Ecology Group at the University of Freiburg, Germany. Her research focuses on the ecology and biodiversity of plant-insect interactions in cultural landscapes.

THE RESULTS

The study shows, for example, that wild bees contribute greatly to the pollination of tomatoes, lettuce (for seed production) and melons among other crops. The situation is quite different with, for instance, field beans or citrus species, which are mostly visited by honey bees in the interpreted studies.

In addition to this, the pollinator composition can vary from country to country for some crops. For example, onions are pollinated (for seed production) mainly by wild bees in the USA, flies in Pakistan, and honey bees in Poland.

How much of an effect do pollinators have on crop yields?

“It can vary widely. Some varieties of rapeseed can deliver high yields with no help from insect pollination at all. With other crops, though, yields can go up by as much as 25 percent when the winged helpers get involved. And some apple and cherry varieties wouldn’t produce any fruit at all without help from pollinating insects.”

Do honey bees and wild bees differ in terms of how well they pollinate?

“Honey bees are highly social and form large colonies, which means they are very efficient pollinators. But they don’t fly in cooler temperatures, wind or light rain. When that happens, bumble bees take over

pollination duties. Also, a lot of wild bees fly between blossoms more than the honey bees do. That can be an advantage if pollen from a different plant individual or variety has to be transferred.”

What gaps in knowledge still need to be filled?

“For a start, our knowledge about the effects of a stop in pollination extends to just a few crops. We also don’t know much about which species of insect act as pollinators, or when and how exactly they do it. Another grey area is what and how much food and nesting sources are important, especially for wild bees. The only way we can work out how to protect specific groups or species of bee is if we know which ones rely on which plants and vice versa and to understand their nesting requirements.”

CONCLUSION

The effect of pollinators on crops can vary widely. But researchers are working on filling the gaps in knowledge. With that, it will be possible to work out how to conserve specific pollinating insects and the important services they provide for nature and humans.