

BEE RESEARCH IN BRAZIL

SPOTLIGHT ON POLLINATORS

Three thousand bee species are found in Brazil owing to the country's hugely diverse climatic zones and landscapes – and the variety of potential pollinators is therefore large. Bees can help many agricultural crops to bear more and better-quality fruit, for example in melon plants and cashew trees. However, research is still needed to understand which pollinators are important for which crops. That is why Bayer is working with South American bee researchers to fill in the gaps in our knowledge.



The climate in Brazil varies considerably from the tropical north, near to the equator, to more temperate climates in the south and from the semi-arid northeastern region to the humid Amazonian rainforest. The variety of habitats is reflected also in the diversity and abundance of its flora and fauna: Brazil is one of the most species-rich countries in the world. The number of insect species, alone, is estimated at more than 70,000 and among them are many important pollinators. However, there is still much to learn about plant and pollinator interaction and what this means for agriculture. Bayer researchers are working with Brazilian bee experts like Professor Dr Breno Magalhães Freitas to fill in these knowledge gaps.

Professor Freitas, an agronomist at the Federal University of Ceará in the coastal city of Fortaleza, is investigating pollinators for agriculture: "I want to know which bee species seek out which plants and what cultivation methods enable them to do so." Professor Freitas is investigating which insects act as

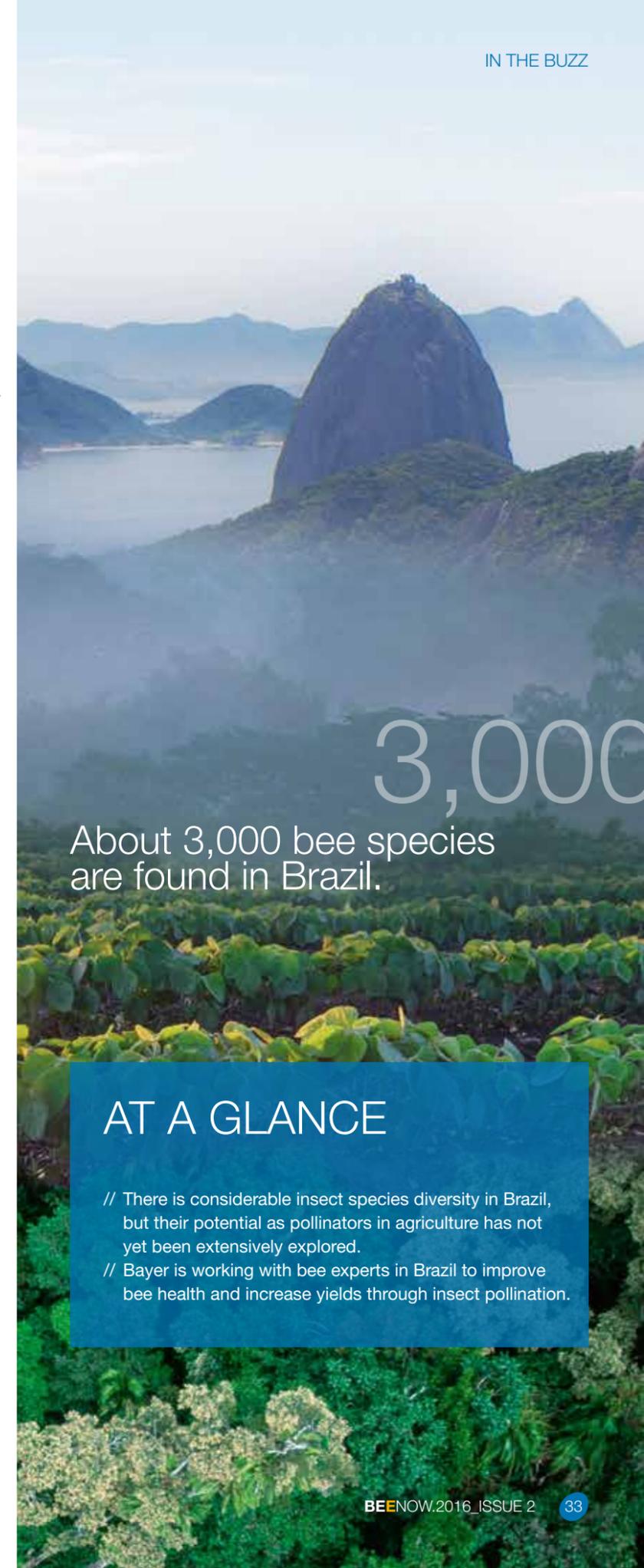
pollinators with the potential to improve harvest yields – and which are just visitors on the field or could even cause damage. "Once we know which pollinators are important for agriculture, we need to investigate the conditions under which they thrive best and which agricultural methods can help attract them safely," he explains. "In the tropics, particularly, there is still a great need for research in this area."

Around 3,000 different bee species are found in Brazil – making it a research paradise for bee experts like Professor Freitas. Many of his investigations have provided impressive evidence showing how pollinators, such as bees, can make an important contribution to food security. He has, for example, investigated the influence of insect pollination on one of Brazil's top crops, soybean. Even though soy plants can also self-pollinate, the harvest in the test fields visited by wild pollinators and honey bees was almost 20 percent higher than in control fields.

"Insects can help us increase yields on existing fields without having to farm new areas," explains Professor Freitas.

Many of Brazil's other crops also benefit from pollinating insects. Flies, moths and bees help cashew trees bear higher yields, for example. Similarly, many types of watermelon depend entirely on insects.

In addition, Professor Freitas is developing artificial nesting options for solitary bees that will help ensure especially bountiful harvests in, for example, Acerola (also known as Barbados Cherry) plantations. He is also trying to find out which native pollinators in Brazil thrive in greenhouses and can thus be used to increase yields there, too. "A stingless bee, for example, could be particularly suitable for pollinating peppers in greenhouses," he explains. Professor Freitas already has the next research step in mind and is optimizing bee breeding methods to release the greatest possible number of suitable pollinators into fields, plantations and greenhouses.



3,000

About 3,000 bee species are found in Brazil.

AT A GLANCE

- // There is considerable insect species diversity in Brazil, but their potential as pollinators in agriculture has not yet been extensively explored.
- // Bayer is working with bee experts in Brazil to improve bee health and increase yields through insect pollination.



Professor David de Jong is analyzing samples of honeycombs to find out more about the correlation between honey bee health and their nutrition.



Among the other workshop participants was Professor Dr David de Jong from the University of São Paulo in Brazil. Professor de Jong has already cooperated with Bayer in various studies. One of his research areas is honey bee nutrition. In predominantly agricultural areas, there are often not enough natural food sources available throughout the season. Beekeepers then have to supplement their colonies' diet. "But not all supplemental nutrition is equally suitable for bees," explains the entomologist. Professor de Jong's team has, therefore, developed a rapid laboratory test that shows how well bees are utilizing pollen substitution products. "That allows us to test many different compositions in a very short time and to understand why certain mixtures work well in some regions of Brazil but can even be harmful for bees elsewhere," he says.

He is also interested in the conditions under which bees will accept the artificial food sources. Bayer researchers have already supported several of his field studies, such as in a joint project with melon farmers. "With Bayer's support, we carried out tests in one of Brazil's harshest regions for bees: Mossoró, in northeastern Brazil," reports Professor de Jong. "It is so dry there that bees sometimes lack natural food all year round." Bayer is currently funding a visit to Brazil by US bee expert Dr Gordon Wardell, who developed a marketable pollen substitution product. "We will definitely benefit from Dr Wardell's experience," says Professor de Jong.

Further joint projects with Bayer are also planned: "We still want to test newly developed bee food that is supposed to be particularly nutritious. And we are thinking about how to implement a simple, mechanical solution for transporting beehives," he says. It is hoped that the results of such joint efforts will benefit both beekeepers and farmers – not only in Brazil. "Our insights and developments can contribute to bee protection in other countries, too, especially in other regions of Latin America," concludes Professor de Jong.

These options can only be put into practice, however, if farmers are also involved in pollinator research. In South America, in particular, collaboration among beekeepers, scientists and farmers can help move research forward. Consequently, Bayer supports exchange and direct interaction among all interest groups. In spring 2015, over a dozen bee experts such as university researchers and representatives from beekeeping and agricultural organizations met for a workshop, but not in South America – instead, they were the guests of the Bee Care Center in Monheim, Germany.

Bayer bee experts and their guests, including Professor Freitas, shared information about the current situation and discussed possible future strategies, measures and cooperative projects. "I can well imagine working with Bayer in the future to gain new insights and give farmers effective management recommendations," said Professor Freitas. Conversations about possible cooperation opportunities are currently underway.

Farmers harvest a better quality of melons if the melon plants were pollinated by insects.



STATEMENT BY ROBERTA NOCELLI

Roberta Nocelli is a professor at the Center of Agricultural Sciences at the Federal University in São Carlos. She investigates bee biology as well as the bees' role as pollinators and how they are influenced by agriculture.

"Brazil has the greatest bee species diversity in the world – as well as a strong agricultural sector. To preserve both, existing ecosystems must be protected and pesticide manufacturers, researchers, farmers and beekeepers need to communicate. This has already led to some initial positive results. For example, at the Bee Care Center workshop, it became clear what still needs to be investigated in order to effectively protect bees in predominantly agricultural surroundings."



STATEMENT BY DECIO GAZZONI

Scientist Decio Gazzoni leads the Agriculture and Pollination Service research program at the Brazilian research foundation EMBRAPA.

"There is still a great need for research into many pollinator topics. At EMBRAPA, for example, we are investigating the regional frequency of various pollinator species, feeding and reproductive sites, economic and ecological aspects, and the influence of management methods in agriculture. We work with many partners, and now have also teamed up with Bayer. At the workshop in Monheim, we agreed on a five-year collaboration. Soybean farming in Brazil is one focus of our joint research activities."



STATEMENT BY STEPHAN CARVALHO

Stephan Carvalho is a beekeeper, entomologist and professor at Brazil's Federal University of Uberlândia. He researches the effects of plant protection products and beekeeping methods on bee health.

"Brazil is a very agricultural country. Protecting species diversity and the different environments in which they live is an important challenge for everyone. We will make progress only if we have environmentally friendly management methods and training programs for beekeepers and farmers that raise awareness of the problems."

CONCLUSION

Research thrives on the exchange of ideas. That's why Bayer continues to work closely with universities and partners on bee research and protection projects.

Bayer is conducting joint studies with Brazilian researchers to optimize honey bee nutrition.