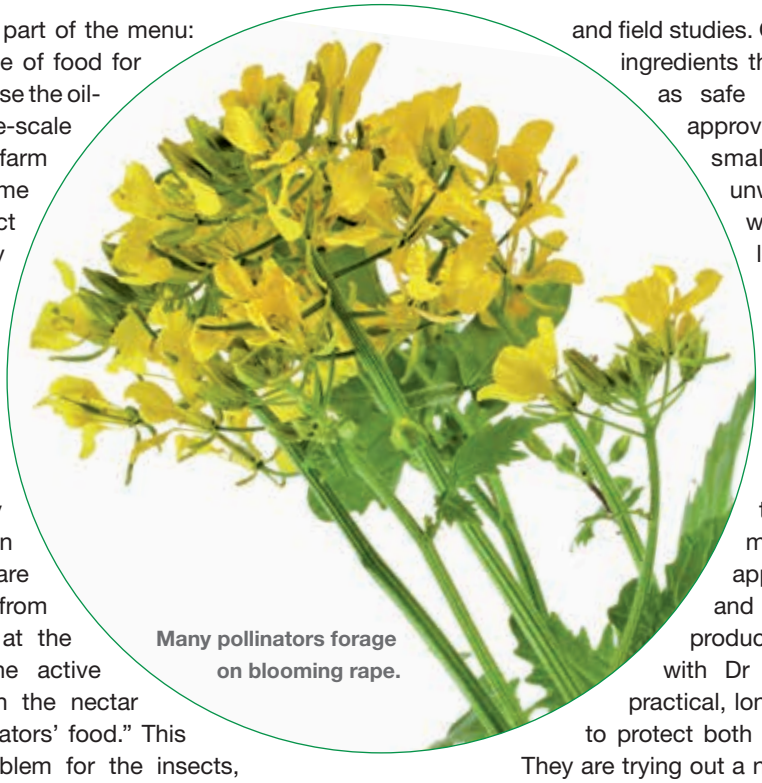
LOWER APPLICATION FOR HIGHER PROTECTION

There is some potential for tension between farmers and beekeepers. The one must keep pests in check, while the others fear for the health of their bees. But bee and crop protection can work in harmony – as a collaborative project in Germany shows.

The yellow blooms are a major part of the menu: rapeseed is an important source of food for honey bees. This is largely because the oil-rich plant is a very important large-scale crop, flowering in spring in the farm fields of Europe. However, in some cases, honey bees may collect not only pollen and nectar. They might also inadvertently pick up crop protection products – used by farmers to protect their flowering rapeseed crops from fungal diseases and harmful pests.



Many pollinators forage on blooming rape.

"Open blooms are inevitably treated with pesticides when conventional spray methods are used," says Dr Klaus Wallner from the Apicultural State Institute at the University of Hohenheim. "The active ingredient then accumulates in the nectar and pollen, that is, in the pollinators' food." This normally should not be a problem for the insects, because before crop protection products are approved for agricultural use, their impact on pollinating insects is rigorously and extensively tested in laboratory and field studies. Only those active ingredients that are classified as safe for use receive approval. However, very small amounts of unwanted residues, which are still below the acceptable threshold levels, can find their way into honey.

Bee researchers and representatives of the manufacturers of application devices and crop protection products are working with Dr Wallner to find practical, long-term solutions to protect both bees and crops. They are trying out a new approach for pesticide application that works in favor of both beekeepers and farmers: They have developed a spray technology that applies the active ingredient to crops, such as rapeseed, in

AT A GLANCE

// Rapeseed is a large-scale crop in Europe.
// The yellow blossoms are also an important food source for pollinators, such as honey bees.
// A new application technology for crop protection products can benefit the pollinators, as it reduces residues in pollen and nectar.

Droplegs
The researchers developed hook extensions that hang from the spray machine. They apply crop protection products below the flowering level.

„fit bee"

The "Dropleg project" is part of the Germany-wide collaborative project, FITBEE, supported by the Federal Ministry for Food, Agriculture and Consumer Protection in Germany. Its aim is to gain a better understanding of the interactions between bees and their environment, in order to protect bee colonies from diseases and other threats.

a way that prevents bees from coming into contact with it. Individual measures are limited in the help they can offer – a more comprehensive approach is required. That is why fourteen research institutions and companies, including Bayer CropScience, are participating in FITBEE to examine the various influences that can affect honey bees. The Dropleg project focuses on answering the question, "How can we reduce the chance of bees coming into contact with crop protection products?" The researchers' idea was to lower the spray nozzles on the machines applying the products. "Instead of spraying above the crops and onto the rapeseed blooms, the active ingredient is applied from below onto the green parts of the plant," explains Dr Wallner, who heads up the research project.

The Metzingen-based partner company Lechler, a spray equipment manufacturer, modified a conventional crop sprayer: Hook extensions – so-called droplegs – were mounted onto the several-meter-long spray boom. The nozzles hang from the spray machine like the teeth of a large comb and are pulled through the rapeseed field. Researchers at the University of Hohenheim compared crops that were sprayed from

Dr Klaus Wallner
Apicultural State Institute,
University of Hohenheim, Germany

"Instead of spraying above the crops and onto the rapeseed blooms, the active ingredient is applied from below onto the green parts of the plant."

above, as is normally done, with those treated from below with the new dropleg spray technology. They collected and analyzed honey samples from beehives that were placed next to the rapeseed fields. The researchers also caught bees as they were flying back to the hive and took samples from the pollen pellets on their legs and from their honey stomachs. The result:

The pesticide residues in the pollen fell to just under a quarter of the normal amount with the new technique – compared with the conventional method they had used.

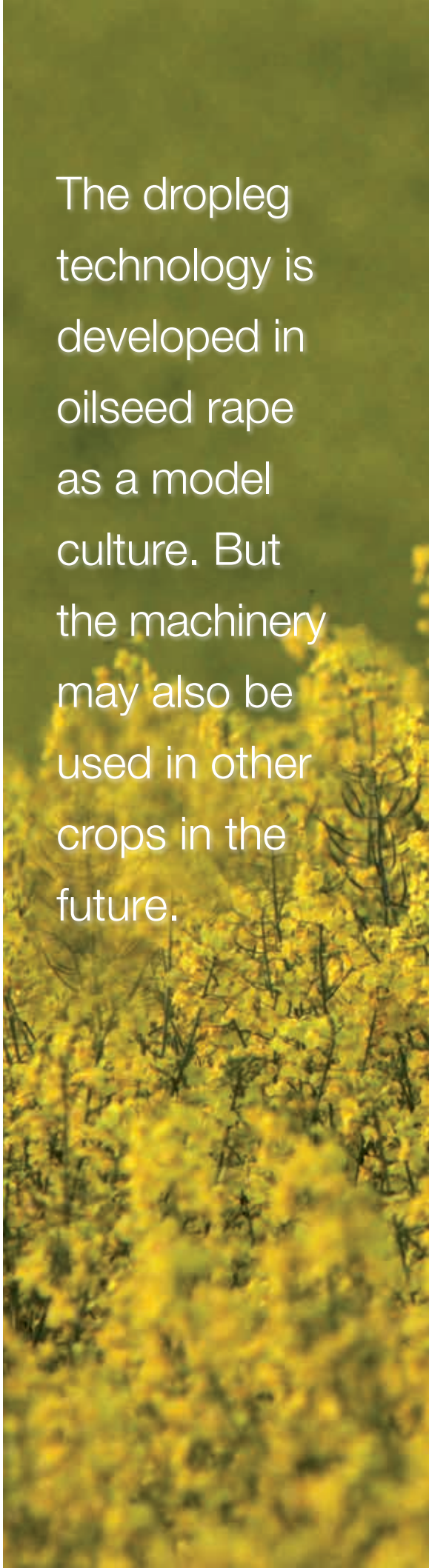
The projects partners Bayer CropScience and Syngenta Agro conducted so-called tent experiments, constructing large flight tents over the rapeseed plants. "This simulated the worst-case scenario, which is that the insects collect pollen just from the treated rapeseed field and not from any other plants," says Dr Christian Maus, Global Pollinator Safety Manager at the Bayer Bee Care Center. Yet the suspended spray nozzles also performed very well in these tests: Residues found in bee colonies, which have been foraging on oilseed rape treated with dropleg spray equipment were substantially lower than in colonies from conventionally treated rapeseed crops.

The new technique benefits not only pollinators but also farmers because the crop protection products are applied between the plants, reducing the impact of wind and thus lowering drift losses significantly.

There is also no compromise in efficacy of the product. And even pests on the blooms are caught out: When the droplegs comb through the rapeseed, they shake the blooms, causing pests like the cabbage seed weevil to fall off onto lower leaves. There they then get sprayed with the crop protection products. This process does not damage the crop plants because of their considerable ability to bend and straighten again afterwards.

Dr Wallner: "The project is a win-win situation for all parties involved."

Oilseed rape is used now as a model culture for the development of the technology, which may also be used in other crops in the future. After the first promising results in rapeseed fields, the partners are already planning the next steps. "We are investigating how effective the application technique works against fungal diseases and weevils, independent of its impact on bees," explains Dr Wallner. If it proves to be as effective as conventional methods, everyone stands to benefit. Beekeepers could let their bee colonies visit rapeseed fields without any worries of unwanted residues in the honey, farmers would have more effective crop protection with less drift and machine manufacturers could also further develop their products.



CONCLUSION

With the dropleg technology, crop protection products are applied below the blossoms. This benefits farmers and the environment as it reduces drift losses dramatically with no compromise to the product efficacy. The concept has proven useful in rapeseed but may also be used in other crops in the future.