Press release

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Research collaboration between Bosch and Bayer turns farms digital

Smart farming: sustainably clearing fields of weeds

- Herbicides are only used where they are really needed
- Farmers can use new technology to spray pesticides more efficiently
- Dr. Markus Heyn, member of the board of management of Bosch: “Smart spraying sustainably clears fields of weeds. This safeguards yields while protecting the environment.”
- Tobias Menne, head of digital farming at Bayer: “Together, we want to break new ground by combining different technologies and expertise.”

Stuttgart and Monheim, Germany – As the world’s population grows, the amount of agricultural land available per capita is decreasing. According to predictions made by the Food and Agriculture Organization of the United Nations (FAO), farmers will have to sustainably generate around 50 percent more yield by 2050 in order to feed the global population. For this equation to work in the future, agriculture will require crop protection and technical innovation. Both have to be as environmentally friendly as possible. To make this a reality, Bosch and Bayer have now joined forces. As part of a three-year research partnership, the companies will develop smart spraying technology that makes the use of pesticides more efficient. “Smart spraying sustainably clears fields of weeds. This safeguards yields while protecting the environment,” says Dr. Markus Heyn, member of the board of management of Bosch. The research concept will be presented at this year’s Agritechnica trade fair in Hannover.

Spraying and saving

In the fields, crops like corn and wheat compete with weeds for water, nutrients, and a place in the sun. The result: poorer harvests. In order to combat these undesirable plants efficiently, the large-scale use of herbicides is usually the only remedy at present, even though weeds do not always grow evenly throughout the field. The result is that crops and arable soils are also sprayed with pesticides – and that can be bad for the environment. “Together with Bosch, we want to break new ground by combining different technologies. Our aim is that herbicides

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are only used where they are really needed," says Tobias Menne, head of digital farming at Bayer. Especially in the early phase of their growth, weeds are hard to identify. Using camera sensors, the new smart spraying technology is able to differentiate between crops and weeds, and uses special application technology to target weeds with pesticides, thus reducing environmental impact. "With smart spraying, we are bringing more intelligence to the fields," says Dr. Johannes-Jörg Rüger, head of Bosch's Commercial Vehicles and Off-Road unit. What sets it apart from previous systems in the market is that they only provide "green detection," but cannot distinguish between crops and weeds.

X marks the spot

Here is how it works: before farmers drive out to their fields, a digital "field manager" helps them to assess the situation in the field and recommends the best time to treat weeds. In one step, weeds are precisely identified and pesticide is sprayed in a single process as the crop sprayer crosses the field. Multiple cameras spread across the entire width of the crop sprayer take a continuous series of pictures, identifying the different weeds and allowing the optimum treatment to be defined. While the crop sprayer is still crossing the field, the herbicide is sprayed in the required quantity and mixture using the appropriate application parameters. While the relevant weeds are targeted, weedless areas remain untouched. All this occurs at lightning speed, within milliseconds.

"Smart spraying is a quantum leap in the fight against weeds," says Björn Kiepe, head of agronomy at Bayer's digital farming unit. "We are combining modern weed identification technology with the ability to apply different active substances as the situation demands. This process is very precise, with a spatial resolution of well under one meter. This will make it even easier for farmers to practice sustainable crop protection." Most importantly, the system takes account of pretreatments, the interaction of different active substances, and the best possible degree of efficiency of the herbicides being used in order to prevent weeds from developing resistance.

Key focus areas in Bosch's research are highly effective sensor technology, intelligent analysis procedures, and the selective spraying system. In its partnership with Bosch, Bayer is applying the experience it has gained in the fields of geographic information systems (GIS) – including the development of algorithms as a basis for making agronomic decisions – integrated crop protection, formula technology, and application technology.

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