

Development of a robotic solution to detect and fight slugs

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Almost every type of crop can be attacked by slugs, which can lead to significant losses in yield and quality. Ploughless cultivation and the cultivation of intercrops intensify the slug problem, as these factors offer the slugs opportunities to find food and retreat all year round. As a consequence of the mass propagation of slugs, the application of snail baits is carried out as a "routine measure" in the rape growing areas of Europe, but this intervention option achieves only inadequate results. The aim of the project is to develop an alternative robotic solution that detects slugs by sensors and combats them. The use of a robot is expected to increase control success. In addition to the possibility of protecting the environment, operating resources and working time can be saved.

In the first year of the project, a carrier vehicle was built, which navigates autonomously via GPS over an area. In addition, a sensor for slugs detection has been developed that uses digital image processing to detect slugs in the field. In the second project year, the sensor will be used in field trials. It is intended to collect data on the quantitative slug behaviour. In this context, an intensive literature research on slug behavior was conducted, which serves as a basis for the anticipatory control of the robotic solution. In the third year, the individual modules

are combined and the functionality of the system is proven. Furthermore, it is checked whether the system can be extended to control other pests (e.g. mice).

KommTek GmbH has developed a robotic platform on which a manipulator arm is mounted.

The Department of Agricultural Engineering at the University of Kassel is working on the development of a detection module for the detection of slugs. Optical properties of slugs and different soils were determined in experiments. It becomes clear that slugs reflect less strongly at a light wavelength of 950 nm than the soils examined. This offers the possibility of segmenting slugs with the help of a filter and making them visible to the robot for targeted control.

As a basis for the navigation of the robot, the Julius Kühn Institute has collected data on slug behaviour within the framework of intensive literature research. It turns out that the life cycle of slugs is strongly influenced by environmental factors. In laboratory tests a suitable tool is developed, which fights slugs safely and energy-efficiently. For reasons of future acquisition costs of the end product and energy efficiency, mechanical tools were first tested for their suitability. The tools to be tested are designed in such a way that various mechanical control principles can be mapped and tested.