

Individual plant treatment in lettuce by spot spraying technology with the Steketee spray robot

Summary of a contribution for the vegetable production, presented at the autumn meeting 2018 of the Swiss Society for Phytiatry

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Without crop protection, pests cause high yield losses. Whereas the necessity of crop protection is obvious to farmers and agricultural researchers, pesticide use is highly debated and questioned by the society. Pesticides have also disadvantages. Active substances and their metabolites are detected in ground and surface water and they affect nontarget organisms and thus biodiversity.

In field crops, plant protection by broadcast spraying is still the standard technology. This is also the case for the application of insecticides and fungicides in row crops in vegetables. At early crop stages, a large proportion of the applied products therefore ends up on the soil and not on the crop plants. Precise application technologies, such as the spot spraying technology, could allow protecting the crop plants while reducing pesticide use and minimizing their negative impact on the environment. Currently, there are no such technologies available on the market, which are suited for vegetable production in Switzerland.

In the framework of the project "Ressourcenschonender, nachhaltiger Pflanzenschutz im Gemüsebau durch kameragesteuerte Pflanzenschutzroboter" a prototype was built by the manufacturer Steketee based on an existing weeding machine (Steketee IC weeder). With this prototype single crop plants are detected by cameras through image analysis and are then individually sprayed. Weeds can be hoed at the same time between and in the crop rows.

In 2018, the prototype was tested for the first time in the field. In a preliminary experiment, lettuce was sprayed. The used amount of pesticides and the biological efficacy were compared to the standard treatment (boom sprayer). The lettuce was treated twice with spirotetramat (250 g/ha, 1 l/ha Movento SC, SC, Bayer) and azoxystrobin (75 g /ha, 0.75 l/ha Amistar, SC, Syngenta).

In the standard treatment with the boom sprayer a spray volume of 800 l/ha was applied. For the application with the prototype oder by spot spraying, the same spray volume concentration was used as for the standard. However, with the prototype only 56 l/ha and 156 l/ha were applied at the first and at the second application, respectively due to the crop plant-specific application. Thus, a reduction of 93% and 80% could be achieved compared to the standard treatment. In addition, no herbicides were applied as the lettuce was also hoed with the prototype. The biological efficacy and the residue levels were similar in both treatments. The residue levels were below the tolerance limits.

This preliminary experiment confirms the high pesticide reduction potential of the spot spraying technology. In this 3-year project, the prototype will be tested in other vegetable crops. Also the prototype and its application (choice of nozzles, pressure, driving speed etc.) will be continuously improved. The main goal of this project is to facilitate the launch of this prototype into the market and making this technology available and cost effective for vegetable producers.

Impressum

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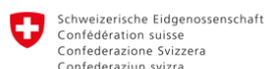
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