

Quality improvement in vegetable production through robot-assisted slug control

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In Europe, several slug species are important pests in agricultural and horticultural crops. Damage is caused by slugs due to feeding activity and contamination with faeces or slime, leading to deterioration in the quality of the products and financial loss. In horticultural crops, this damage may occur from seedling or transplanting until harvesting, and therefore, control measures need to be applied during the whole growing season.

Traditionally, the most common method for slug control is the spreading of slug pellets containing either metaldehyde or iron-III-phosphate as a molluscicide. However, the application of such baits may be harmful for beneficial organisms and its success is highly dependent on the timing of application and weather conditions. Other preventive methods available to farmers to contrast slugs are represented by soil management practices such as tillage and fine seedbed preparation. The only alternative to chemical and preventive methods remains the manual collection of slugs in the field, which implies a huge workload, and it is therefore feasible only in limited areas.

The aim of this research project is to develop a robot-assisted solution to control slugs in horticultural crops, in order to provide this sector with a valid alternative to the manual slug collection, meanwhile reducing the use of chemical substances.

The planned robot will be able to monitor the vegetable field, detect the slugs and eliminate them using physical methods. For its construction, various technical solutions, some of which already exist from a previous project (MSR-Bot), will be adapted, further developed and combined together. The robot, which is battery powered, will be navigating autonomously in the field, and it will be equipped with an arm, with a camera to detect slugs and a tool to control them at its end.

Salad crops have been chosen to test the whole system. The control of slugs on these plants is particularly challenging, because the threshold for slug damage is very low during the whole growing season and slugs can be found on the ground as well as on the adult plants. Therefore, the control tool should be able to eliminate them without damaging the plant and the final product. Other important criteria for the selection of the control method are energy efficiency and technical feasibility.

Based on these considerations, physical control methods are being investigated. In particular, picking up slugs from plants with suction and eliminating them using electricity. Collecting the slugs would have the advantage, compared to the electric solution, that the pests could be also removed from the plants. A contamination by slug's bodies would not occur in this case. Efficacy and feasibility of both methods are currently being tested in the context of laboratory experiments.