

# Work Package 6: Groundkeeper Control

This work package is being led by Jim Wilson and his team from SoilEssentials.

- Potato Cyst Nematodes or PCN are an important pest of potatoes and across Europe, PCN reduces potato yields and quality.
- In Scotland, the PCN infested land area is doubling every 7 years<sup>1</sup>.
- There are options for managing PCN such as through the control of groundkeepers which are volunteer potato plants. They have the potential to multiply the PCN population between potato crops.
- Groundkeepers can also negatively impact other crops e.g., carrots by outcompeting them for nutrients.
- Using technology to accurately identify, target and control groundkeepers within a field could benefit PCN management, the crop rotation and minimise herbicide use.

## Aim

To deliver new methods for detecting and controlling groundkeepers.

## What is a groundkeeper?

A groundkeeper is a potato plant that grows from the potato tubers left behind at lifting. These potato plants act as a food source to PCN present in the soil, allowing them to multiply which can limit the natural decline of PCN in a rotation.

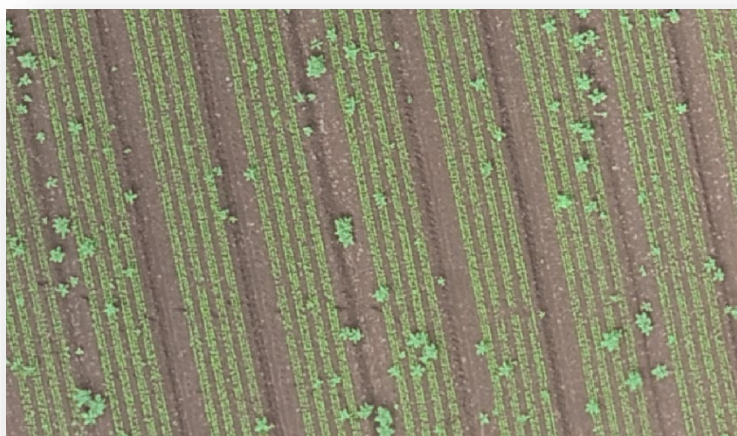


Figure 1: Drone image of a carrot field with potato groundkeepers (courtesy of SoilEssentials)

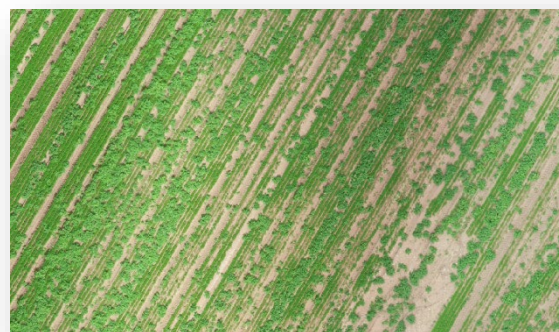


Figure 2: Drone image showing groundkeepers outcompeting the growing crop (courtesy of SoilEssentials).

## Groundkeepers are becoming more of a problem due to:

- **Tighter ware rotations** and a **decrease** in the **availability of land suitable for seed production**.
- A **change in climate** (warmer winters) as fewer are killed by frost.
- **Less grass in the rotation** which can suppress groundkeepers
- **Increase in the diversity of cash crops grown** e.g., carrots and broccoli in which control is difficult.

Questions about this work package can be sent to [enquiries@soilessentials.com](mailto:enquiries@soilessentials.com)

<sup>1</sup>[https://www.planthealthcentre.scot/sites/www.planthealthcentre.scot/files/2021-04/pcn\\_working\\_group\\_-\\_final\\_report.pdf](https://www.planthealthcentre.scot/sites/www.planthealthcentre.scot/files/2021-04/pcn_working_group_-_final_report.pdf)

The SoilEssentials KORE precision farming portal will be integrated with **drone imaging to generate whole field maps** which will **quantify and pinpoint groundkeeper locations**. This will allow **targeted and precisely controlled spray interventions** to be used to control the groundkeepers. Tailored and efficient chemical applications are an important part of Integrated Pest Management (IPM), an approach which is key to delivering this project's overall aim of a sustainable potato industry for Scotland.



Figure 3: Potato volunteers in a wheat crop.











Figure 4: Groundkeepers emerging with a spring barley crop.

The KORE system is being used to quantify the groundkeeper issue by flying drones over many different crops, developing a wide-ranging data source. This will contribute to a robust decision-making software controlled by artificial intelligence (AI). Methodology is also being developed to enable real-time detection, identification, and control of groundkeepers (and other weeds) on the crop sprayer, reducing the need for drone flights. Real Time Kinematic (RTK) technology is being used to track the effect of groundkeepers on PCN populations at precise locations.

### Work Package Success

1. Accurate measurement of the groundkeeper problem e.g., plant concentrations and the effect they have on PCN levels.
2. Development and use of precise technology to accurately spot spray ground keepers.
3. Safeguarding of vital chemicals through targeted and responsible use.
4. Ability to measure the effectiveness of control options through accurate data location.
5. Data and physical control methods integrated into a Decision support system (WP 2).

 1. Economics	 2. Decision Support	 3. Resistance Markers	 4. Accelerated Breeding	 5. Tolerance to PCN	 6. Groundkeeper Control	 7. Integrated Pest Management	 8. Knowledge Exchange
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More information and factsheets about each work package can be found on [pcnhub.ac.uk](http://pcnhub.ac.uk)

