PROJECTS

Automatic Aphid Detection in Potato Fields

Project information

Project title: *Automatic aphid detection in potato fields*

Duration: *21 months, from April 2021 to December 2022*

Project No.: KVW-00500

Funding Agency: *Co-funded by the European Union, Kansen voor West II – European Regional Development Fund*

Co-funded by the European Union

G4P4 Kansen voor West II

Pessl Instruments GmbH, Werksweg 107, 8160 Weiz, Austria

Tel: +43 (0) 3172 5521 · Email: office@metos.at · www.metos.at

Introduction

There are several aphid species that transmit plant viruses in arable crops like potatoes and beets. Current monitoring methods for field crops rely on trapping methods that need to be analyzed by an expert and which, at best, shows how many aphids have infested the field the previous week. The aim of the project is to develop instruments which will enable the farmer to decide, if aphid population control methods are needed, based on a long-term prognosis involving the date of immigration and abundance of the aphids in the potato field. The farmer gets informed when immigration of aphids is predicted and further on confirmed by trapping with electronic devices.

The project comprises two parts. In the first part a data-analysis approach is developed with the aim to predict the time of optimal conditions for aphid migration into the potato fields. In the second part electronic monitoring devices are optimized for confirmation of the previous analysis and monitoring the occurrence of aphids in the field.

This project fits in the disease, weed and pest control part of the roadmap of the farm of the future, in which automatic detection of plague insects is explicitly mentioned. Moreover, if successful, the traps can be used to learn more on aphid dynamics during the season, and can be used as a cost effective scouting tool in the strip farming systems.

Workplan

Work package 1: Data driven and artificial intelligence for aphid dynamics

1. A selection will be made of historical trap data on aphids in the Netherlands from the NAK and for each location historical weather data will be obtained from MeteoBlue.
2. Based on a literature analysis, weather parameters that could be relevant for the predictive model will be identified. Possible artificial intelligence prediction models approaches will be summarized.
3. The most promising model-parameter combinations will be trained and tested both at WUR and at Pessl Instruments.
4. An analysis will be made of the key input parameters necessary for a predictive aphid model. (If necessary this will be postponed to 2022)
5. Validating predictive model with actual aphid countings of 2021 for different locations in the Netherlands
6. If necessary training and testing of the algorithm on other datasets.

Work package 2: Trap optimization

1. Groups of species that are likely separable based on images and are moreover of agricultural relevance will be selected. Goal is to enable the automatic calculation of the aphid-pressure index. Images taken by the iscouts in the field will be tagged based on these groups and an algorithm will be developed.
1. Designs to attract aphids to the focus area of the camera based on translucency and printing on the traps will be made and tested in the field. For this we will follow the insight given in [1], [4].
1. Designs to attract aphids to the focus area of the camera based on odors will be made and tested in the field. In the design of the i-scout there is already foreseen in a basin to add lures. For this we will follow the insights in [5], [6].
1. To validate the traps we will compare the trap catches with classically trapping methods to compare if the catches are representative.

In total we want to put 16 i-scouts in the field. Some of the trap testing will be done separate from the i-scout. It is planned to test at least 16 prototypes of iScout devices in the field during the season. Photos of those devices will be used for labelling aphids and other non- target insects in the field with the aim to train the system and finally be able automatically identify at least superfamily Aphididae.

Partners

Pessl INSTRUMENTS

WAGENINGEN UNIVERSITY & RESEARCH

meteoblue weather close to you

NAK

BOERDERIJ van de Toekomst Dichterbij dan je denkt