PurPest CONSORTIUM

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PurPest aims to exploit the specific **Volatile Organic Compounds (VOCs)** released by pests or by the plants attacked by pests for the development of a **Sensor System Prototype (SSP)** to detect the VOCs and timely identify target pests.

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HIGHLIGHTS

- PurPest aims to develop, validate and demonstrate an innovative sensor platform that can rapidly detect five different pests during import and in the field to stop their establishment and reduce pesticide inputs by at least 50%.
- The sensor concept is based on detection of pest-specific volatile organic compounds (VOCs) emitted by host plants invaded by one or several pests. PurPest will determine the VOC signature of *Phytophthora ramorum*, the Fall armyworm (*Spodoptera frugiperda*), the Cotton bollworm (*Helicoverpa armigera*), the Brown marmorated stinkbug (*Halyomorpha halys*) and the Pinewood nematode (*Bursaphelenchus xylophilus*) under different abiotic stress conditions.

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PurPest

Plant pest prevention through technology-guided monitoring and site-specific control

ABOUT THE PROJECT

The main objective of PurPest is to control serious plant pests during import and to manage them in the field by developing a unique concept enabling pest detection in a timely and non-invasive manner.

1 Define pest specific and general VOCs emitted by target pests or infested plants

PurPest will carry out extensive experiments where 10 host plants will be exposed to five pests, including two quarantine pests, one priority pest and two established pests. These will be done in the greenhouse (for quarantine pests, priority pests and established pests) and in the field (established pests). Environmental conditions will be controllably varied. VOC emissions will be collected and thoroughly analysed to enable PurPest to generate a comprehensive database with the chemical signatures of pest specific VOC patterns for the target pest-host systems in our study. This database will be made publicly available.

2 Develop a state-of-the-art SSP that detects the VOCs

PurPest will develop SSPs that will detect thechemical signatures defined by objective 1. To obtainthe required detection limit (<ppb), sensitivity and selectivity, sensor components based on 9 different principles will be studied and developed. The best performing novel sensor components will be selected for integration into the final SSP.

3 Test and validate and demonstrate SSP under import and field conditions

Advanced data analysis, such as machine learning and artificial intelligence will enable multivariate data analysis to detect patterns and more accurately identify the VOCs obtained in objective 1 and thereby enabling identification of a pest attack. The testing strategy will start from experimental proof of concept (TRL3) to technology validation (TRL5) and demonstration (TRL6) under import conditions and fruit orchards.

4 Identify drivers of pest establishment and spread

In the long-term, the SSP developed in PurPest can be used to identify the most important drivers of pest spread and establishment. To facilitate this, we will characterize their development at high and low temperature, and generate data on host range, dispersal and multi-species interactions. This data can then be fed into pest risk models, atmospheric transport models and the global pest and disease database to better manage the target pests.

5 Maximize the Implementation and impact of PurPest

PurPest will analyse the potential socio-economic and ecological impact of reducing the risk of repeated entry of the target pests across the EU region and associated countries. We will focus on 1) plant, forest and farm productivity, 2) operator health and 3) life quality as well as the 4) beneficial effects on biodiversity and ecosystem services. This analysis will be the basis for formulating EU policies to ensure appropriate and systematic testing of plant material during import.

Dissemination, exploitation and communication are key elements in our implementation strategies and will be geared to stimulate interest, understand benefits and reduce potential adaptation barriers.

WORKPACKAGES

- **Wp1** Defining VOC signatures of target pests
- **Wp2** Sensor development and optimisation
- **Wp3** Sensor integration and testing
- **Wp4** Tests and demonstration in relevant environment
- **Wp5** Analyze the impact and implementation of PurPest
- **Wp6** Dissemination, Communication and Exploitation
- **Wp7** Project management