NEWSLETTER

June 2025

# THE PURPEST PROJECT

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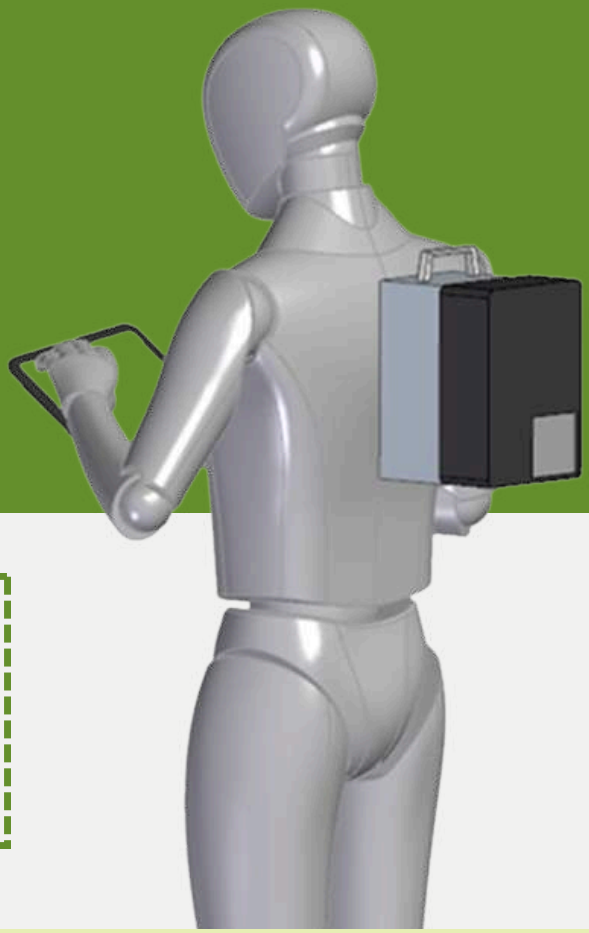

## PURPEST TECHNOLOGY REFINED, TAKING STEPS FROM LAB TO FIELD

At the end of an exciting spring season full of activities in nature, in the labs, and in the field, the **PurPest** Newsletter brings you highlights of our recent technological, scientific, and collaborative progress. In the lab, testing of the Sensor System Prototype (SSP) showed improved detection of VOCs from FAW-infested maize, an exciting step forward on the path to field deployment. As the SSP moves into real-world trials, the Stakeholder Advisory Board pushed for global engagement, and new collaborations with Horizon Europe projects are further strengthening our pest management network. Meanwhile, a newly published PurPest open-access study that you should not miss modeled FAW migration and its potential economic impact across Europe, reinforcing just how important early detection really is.

Co-funded by the European Union

# PurPest spring activities

**The PurPest project** was presented at:

- **GREEN-IT Plant Interaction Meeting**;
- **International Day of Plant Health**;
- **Oeiras Valley Science Festival**;
- and at the **Digital Solutions for Smart and Sustainable Agriculture and Rural Development**.

Also, PurPest established:

- collaboration network with **FORSAID**;
- enhanced **Sensor System Prototype**;
- and held another **Stakeholder Advisory Board meeting**.


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**scientific** reports

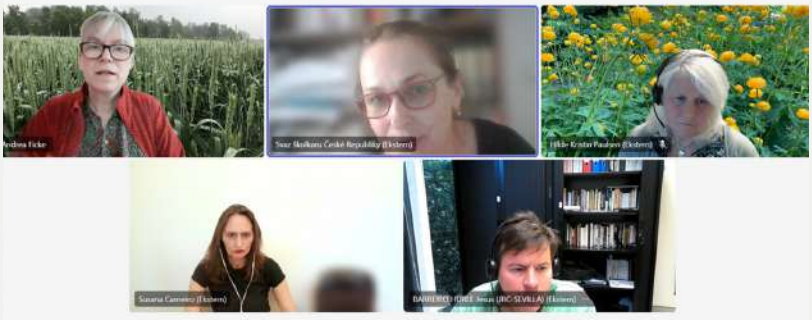
OPEN **Migration extent and potential economic impact of the fall armyworm in Europe**

Stelios Kartakis[1✉], Kiran J. Horrocks[2], Kutay Cingiz[3], Darren J. Kriticos[4,5] & Justus Wesseler[1]

The fall armyworm (FAW), *Spodoptera frugiperda* (J.E. Smith, 1979), is a major agricultural pest native to the Americas that feeds on several crops, particularly maize. Since 2016, FAW has invaded more than 50 African countries, much of Southeast Asia, and Oceania, severely impacting agriculture and posing a threat to global food security. Following its recent detections in Europe in 2023, this study investigates FAW's migratory capacity and potential direct economic impact on European grain maize production under a "no-control" scenario—areas previously unexplored in the context of Europe. We explored FAW's potential distribution across the European continent by incorporating updated climatic data, refined parameter values, and an expanded occurrence dataset into a revised CLIMEX niche model. Our results reveal sizable potential economic impacts with the southern European Member States facing up to €546 ha$^{-1}$ grain maize gross margin annual losses, exceeding €900 million under the worst-case scenario. These member states bear the highest risk since they include areas projected to be climatically suitable for both permanent FAW establishment and transient populations during warmer months. This study provides important insights into the risks posed by FAW to Europe and can inform preparedness and decision-making to mitigate the economic consequences of its invasion.

**Kartakis S, Horrocks KJ, Cingiz K, Kriticos DJ, Wesseler J.** Migration extent and potential economic impact of the fall armyworm in Europe. **Sci Rep. 2025** May 19;15(1):17405. **doi: 10.1038/s41598-025-02595-7.** PMID: 40389579; PMCID: PMC12089574.

# SAB meeting highlights new testing results and expanded outreach

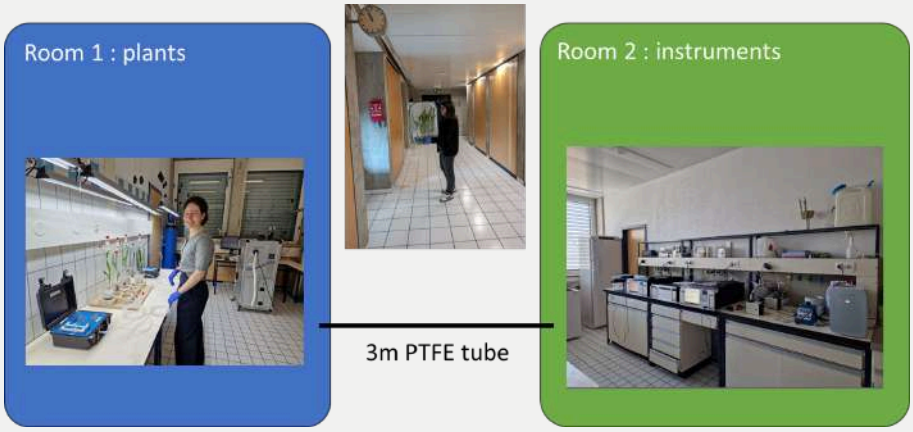


This spring, the PurPest project made progress in stakeholder engagement through **Stakeholder Advisory Board (SAB) meeting**. These meetings brought together experts, partners, and contributors to support the project's goal of combating the spread of plant pests by improving rapid pest detection and building a global stakeholder alliance.

The April 29 meeting advanced key discussions on pest detection technologies, recent testing, and plans to grow a global stakeholder network. One of the highlights was the presentation of new testing results from the Sensor System Prototype (SSP), designed to detect early signs of pest presence. Encouraging updates included improved detection methods for volatile organic compounds (VOCs).

An additional session held on May 27 focused on expanding the project's reach. A leadership change within the Czech Nursery Association was announced, with a new representative set to participate in future SAB meetings. Discussions also explored ways to strengthen engagement with nurseries and National Plant Protection Organizations (NPPOs) outside Europe, an ongoing challenge and a priority for broadening the impact of PurPest. Looking ahead, the next SAB meeting is scheduled for October 28, 2025. In the meantime, PurPest continues to encourage new stakeholders, share knowledge, and prepare upcoming events to promote safer and more sustainable approaches to plant pest management.

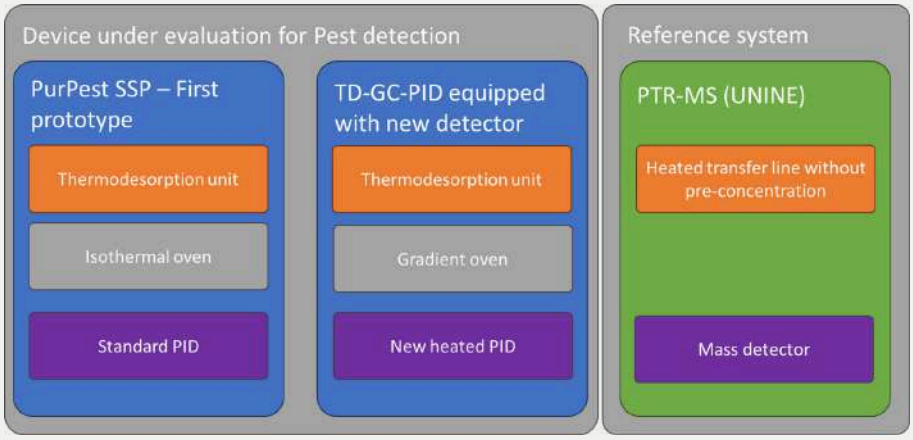
# Improvements on the PurPest SSP demonstrates superior VOCs detection in FAW-infested maize




In March 2025, **AIRMOTEC** carried out a successful series of sensor performance tests at the **University of Neuchâtel** (UNINE) as part of the PurPest project's continued development of the **Sensor System Prototype (SSP)**. The objective was to evaluate the SSP's capability to detect volatile organic compounds (VOCs), this time using **maize** plants infested with Fall Armyworm (FAW).

During the two-week testing period, two SSP configurations were compared, the current version featuring a non-heated Photonionization Detector (PID), and an improved setup equipped with a newly developed heated PID. Both systems included a thermodesorption unit and were tested under controlled laboratory conditions. Infested maize plants were enclosed in either netted bags or glass containers, while the VOC analysis instruments were placed 3 meters away in an adjacent laboratory.

The heated PID successfully detected three VOC markers, Phenol, DMNT, and Benzylacetate, emitted exclusively by infested plants during daylight hours. These findings were further validated by the PTR-MS data, but they already indicate a significant improvement in sensitivity for pest-related VOC detection. As a result, the heated PID will be integrated into the next-generation portable SSP.




The updated SSP will also include new electronics and software for managing a temperature gradient, a redesigned internal layout, and an upgraded column oven. This marks an important step forward in the development of effective, early-warning systems for plant pest infestations.

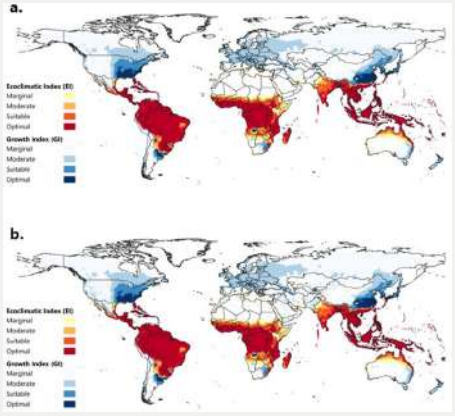



# What's next - field testing and demonstrations

Over the summer, the experimental **Sensor System Prototype (SSP)**, currently in development, will advance to the next phase of testing. These trials will take place in collaboration with **PurPest partner institutions** and will focus on training teams to operate the new system effectively in various locations, gathering hands-on feedback to improve performance and ease of use, and integrating additional sensor modules that are still under development.

Once the system is confirmed to be field-ready and final adjustments are completed, the improved portable versions of the SSP will be demonstrated at key plant import sites and nurseries. Future live demonstrations will be open to external experts and stakeholders, providing a firsthand look at how this innovative technology can transform early pest detection and strengthen crop protection.

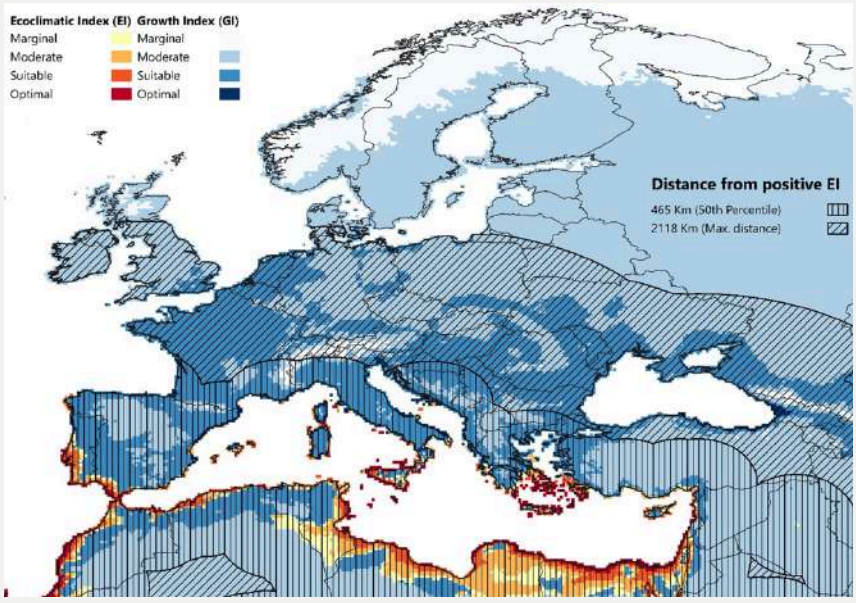
# Fall armyworm threatens European crops




The PurPest project has just published a **new study** on the **fall armyworm** (FAW, *Spodoptera frugiperda*), a fast spreading, crop pest threatening European agriculture. Originating from the Americas and known to feed on over 350 plant species, with maize as its primary target, FAW has rapidly expanded its global range. In this study, updated climate and occurrence data were used to model FAW's population establishment and its potential economic impact on European grain maize production. The results are suggesting that annual gross margin losses could reach **€901 million** if FAW is left uncontrolled.

The **CLIMEX model** results indicate that FAW thrives best in tropical and Mediterranean climates but can also survive in semi-arid areas with irrigation. This has important implications for Europe, where the Mediterranean coast is identified as the hotspot for permanent FAW establishment.

Southern European countries, particularly Greece, Portugal, Italy, and Spain, are most at risk due to favorable climatic conditions that support both the permanent establishment of FAW populations and seasonal migrations from nearby regions. Further, FAW's adults can migrate and cause damage to crops up to 2,000 kilometers northwards, establishing transient populations in countries such as Austria, Hungary, Germany, France, and Romania. Europe remains vulnerable to seasonal FAW outbreaks if the pest establishes permanent populations along the Mediterranean coast.




Map showing where the FAW could thrive in Europe. Colors indicate where the pest could survive year-round (climate suitability), while hatched areas estimate how far it could migrate from established zones (spread potential).

These findings underscore the importance of early detection and warning systems, particularly in high risk southern and central European countries. Policymakers, researchers, and farmers seeking to understand and respond to one of Europe's emerging agricultural threats can explore the full scope of this **open-access article** in **Scientific Reports**.

# PurPest Brand Guidelines available online


The PurPest project's **Brand Guidelines** are now available on the project website under the **Media Center**. This section provides easy access to project graphical resources, ensuring consistent and professional use across all communications. Designed to support partners, engage stakeholders, and inform the interested public, the guidelines help maintain a unified visual identity.


# New collaboration with FORSAID

PurPest and **FORSAID**, both funded under the **Horizon Europe program**, have announced a new partnership to enhance sustainable pest detection and control across Europe. **FORSAID** focuses on protecting forests from invasive pests intensified by globalization and climate change, using advanced tools such as remote surveillance, robotic systems, and AI-driven modeling to support early identification, monitoring, and risk assessment. By combining different innovative approaches and technological strengths, the two projects complement each other in developing a unified pest control toolkit for forests and farmlands, supported by strong stakeholder engagement.

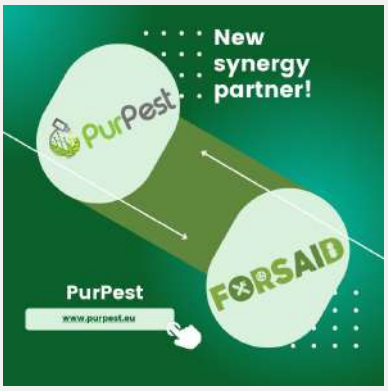



Image created by FORSAID

This collaboration further expands a growing network of EU-funded initiatives committed to sustainable, environmentally conscious solutions, building on our already active collaborative network with **REACT**, **BeXyl**, **COMPAS**, and **SafeWax**. More information is avalable at **FORSAID News**.

# Ready for the General Project Meeting

The **PurPest General Project Meeting** will take place from **June 11–13, 2025, in Évora and Oeiras**, **Portugal**. This three-day gathering will bring together all PurPest project partners to assess progress across Work Packages, discuss scientific and technical developments, address challenges, and strengthen collaboration.

**See you in sunny Portugal!**

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