

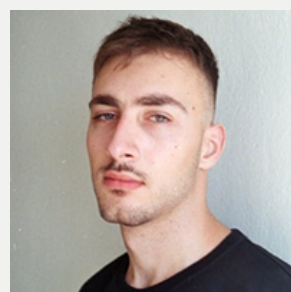
THE PURPEST PROJECT



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ASSESSING THE POTENTIAL ECONOMIC AND ECOLOGICAL IMPACT OF THE PLANT PESTS



with Stelios Kartakis



Stelios Kartakis is a PhD candidate in the Agricultural Economics and Rural Policy Group of Wageningen University and Research.

The Agricultural Economics and Rural Policy (AEP) is leading Work Package 5 – “Analyze the impact and implementation of PurPest”. Under the leadership of Prof. Justus Wesseler they conduct and facilitate research unveiling the socioeconomic impact of PurPest. More specifically, they focus on the identification of the preferred management options, the assessment of the cost-benefit balance of the VOC-sensor and its effect on different stakeholders, the socioeconomic and ecological damage of the PurPest species and the relevant regulatory framework will aid in the development of policy recommendations regarding the most appropriate management options/interventions, to tackle the challenge of biological invasions.



Co-funded by
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PurPest summer activities

During the summer of 2024 the PurPest project was presented at:

- the **28th International Consortium of Applied Bioeconomic Research (ICABR)** in Ravello, Italy;
- the **IMAPS Nordic's conference NordPac 2024** in Tampere, Finland;
- the **19th International Symposium of Olfaction and Taste (ISOT)** in Reykjavik, Iceland;
- the **XXVI IUFRO World Congress** in Stockholm, Sweden
- 1st workshop of the 2nd working group in the **Cost Action 'European Network In Chemical Ecology: translating the language of life into sustainability'** (E-NICHE, CA 22102) in Prague; and
- the **39th Annual Meeting of the International Society of Chemical Ecology** in Prague, Czechia.

The PurPest project General Meeting was held in Brno, in a hybrid format, under the organization of the Mendel University in Brno (MENDELU).

Assessing the potential economic and ecological impact of the plant pests –Conversation with Stelios Kartakis –

Can you tell us about your background and how you became interested in pursuing a PhD in Agricultural Economics and Rural Policy?

I have always been fascinated by the intersection of economics and agriculture, as both play a crucial role in shaping societies and economies. My academic journey began at the Department of Agriculture, Crop Production and Rural Environment at the University of Thessaly, where I obtained an integrated Master's degree. During that time, I caught myself being curious about the socioeconomic aspects of agriculture. Consequently, I conducted my Thesis in the Agricultural Economics and Consumer Behaviour Lab, entitled: "Assessment of Acceptance and Adoption of Cretan Diet by British & Russian Tourists".

Following this, I enrolled in the Master 2 program "Mediterranean Farming System Design for a Sustainable Food System" of CIHEAM-IAMM. There, I had the opportunity to explore bio-economic modeling and utility optimization under constraints. For my Master 2 Thesis, I examined farmers' intentions toward adopting precision agriculture technologies under two policy scenarios. This work provided insights into the effects of subsidies and penalties on the adoption rates of such technologies.



PhD in progress at the Wageningen University

My interest in agro-economy led me to pursue a PhD, where I now focus on assessing the economic impacts of invasive alien species in the EU and exploring management strategies, as part of PurPest. Joining the Agricultural Economics and Rural Policy Group at Wageningen University allowed me to delve deeper into the field and learn from leading experts. Wageningen University's extensive array of scientific disciplines and its emphasis on interdisciplinary collaboration enable me to address the multifaceted aspects of my research and enhance its impact.

What methodologies are you using to assess the economic impact of targeted plant pests at the farm level?

To assess the economic impact of the target plant pests within PurPest, my current focus is on evaluating the direct impacts they may cause under a no-control scenario. I primarily use the partial budgeting method for this purpose. However, understanding each pest's biology and



behavior is crucial for meaningful economic analyses. This involves gathering information such as the current extent of infestation, spread rates, climatic suitability, and potential distribution. Each pest presents unique challenges, so the methodologies I employ are data-driven and tailored to the specific characteristics of the pest and the available information. A general framework I always keep in mind for the quantitative assessment of potential economic impacts is the one proposed by Soliman et al. (2012), which includes four key components: (1) a climate component describing the climate suitability for the target species,

(2) a host component describing the spatial distribution and economic value of its hosts, (3) a spread component indicating the potential spread over time, and (4) an economic component to quantify the resulting impacts. For example, in the case of *Spodoptera frugiperda*, I utilized the CLIMEX model to project the potential distribution of the pest in the EU. Given that this pest exhibits extreme migratory capacity by flying and establishing transient populations northwards from its area of permanent establishment in its native range; a conventional spread model – where spread progresses over time – was not suitable. Instead, I had to account for its unique dispersal pattern. Another example is the pinewood nematode, for which I sought spatial data on its host trees (*Pinus* species) and applied a climatic threshold to determine where pine wilt disease is likely to be expressed or alternatively, where the impact may vary in intensity. For the spread simulation, I used expert-elicited parameter values provided by EFSA.

Could you explain the process and importance of conducting a cost-benefit assessment for eradication scenarios?

Conducting a cost-benefit analysis for eradication scenarios allows us to compare the potential impacts of a pest under a no-control scenario with the costs associated with eradication efforts. Prevention, early detection, and rapid eradication (EDRE) are preferred strategies compared to full-scale eradication, which is typically the most expensive control option but often inevitable. Therefore, a quantitative assessment—or cost-benefit analysis—of the available eradication options is crucial to determine whether the economic benefits of eradicating a target species outweigh the costs involved.



Training at Agroscope on the CLIMEX model

The process begins with obtaining insights into the potential impact induced by a target species. The potential economic damage under a no-control scenario is considered the worst-case scenario and serves as a baseline for understanding the pest's damage capacity, plus identifying areas that bear the most risk. Similarly, the costs and benefits of the available eradication strategies are evaluated. It is also essential to consider when and where these measures take place, as the timing and location can significantly affect the efficiency and success of the effort. Ultimately, if the costs of eradication are lower than the expected economic damage the target pest may cause under an uncontrolled invasion, then the eradication strategy is justified.

How do you balance your research commitments with other aspects of your PhD program?

Balancing research commitments with other aspects of a PhD program is a learning process I'm navigating through my PhD journey. A PhD program can be challenging, and tasks can emerge and accumulate quickly, making prioritization essential. Adding both work-related and non-work-related tasks to my calendar helps a lot! Additionally, the non-research tasks that my PhD program includes, such as attending courses, are time-consuming but beneficial. These activities ultimately contribute to my research goals and long-term development. Activities such as participating in seminars, workshops, project meetings, and conferences keep me engaged in what I'm doing and provide me with new perspectives that benefit my research.



Agricultural Economics and Rural Policy Group

Wageningen University leading the WP5 of the PurPest project

What advice would you give to other PhD students or researchers interested in agricultural economics and pest management?

The main piece of advice is to embrace inter/multidisciplinarity. The economics of plant health and invasive alien species intersect with various disciplines. One needs to engage with fields such as biology, ecology, and agronomy to gain a fundamental

understanding of the target organism/pest/species. This is crucial in order to begin conducting an economic analysis that can be meaningful. Understanding the end goal of the research and the question one wants to answer is equally important. The research question determines the complexity and detail of the analysis. Establishing clear boundaries is needed to maintain focus and manageability of the assessment within a given time frame. Lastly, it is essential to stay open to learning and exploring new tools, software, and concepts and maintain a persistent mindset.



Advancements of new technologies

Under WP2 and WP3, new technologies for plant pest detection are being developed and tested. During an intercomparison campaign held in April at AIRMOTEC's facilities in Bordeaux, the controlled generation of VOC mixtures at ppm and ppb levels was demonstrated, which is vital for sensor system prototype testing. AIRMOTEC and Volatile AI each tested their miniature gas chromatographic (GC) system with very positive results, which will be used to further improve their detection performance. UWAR tested their novel 3D printed micro-GC and identified ways to improve its retention and separation performance. UWAR also tested their surface mounted resonance (SMR) sensor array, which has shown good results for CO₂ in previous trials but needs some further development for VOCs. SINTEF and SAFTRA tested their Surface Enhanced Raman Spectroscopy (SERS) and MOF coatings and identified that more focused functionalization will be required to improve detection.

Towards the Project Review Meeting

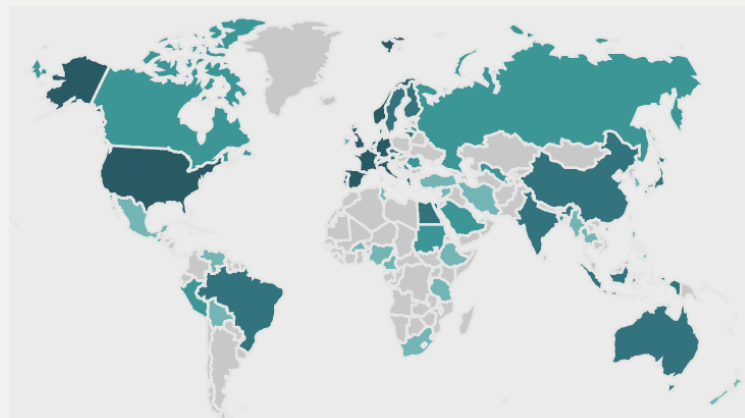
The Project Review Meeting (PRW) evaluates the fulfilment of all aspects outlined in the Description of the Action (DoA) of the Grant Agreement (GA). It serves as a constructive dialogue between network participants and the REA Project Officer, providing valuable feedback to both the consortium and the REA. The date has been set for the PurPest PRW for the **24th of September**.

Present your WP!

Ali Karimi and Jürgen Gross. 2024. "Development and validation of an innovative headspace collection technique: volatile organic compound patterns emitted by different developmental stages of *Halyomorpha halys*" *Frontiers in Horticulture* , 3:1380008.

<https://doi.org/10.3389/fhort.2024.1380008>

Worldwide reach of the PurPest project



The project maintains an official website that serves as a central hub of information (purpest.eu). The website provides comprehensive details about the project, its objectives, activities, and outcomes. It offers resources, documents, news updates, and contact information, allowing stakeholders and the public to access relevant information about PurPest.

The project website is updated and maintained regularly throughout the project to make it relevant, dynamic and engaging. In 2023 it had 834 individual visitors from 52 countries, and in the first half of **2024** it already reached 879 individual visitors from **64 countries on six continents**.

For recent news and updates follow us:



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