HALY-ID

HALYomorpha halys (HH) IDentification: Innovative ICT tools for targeted monitoring and sustainable management of the brown marmorated stink bug and other pests

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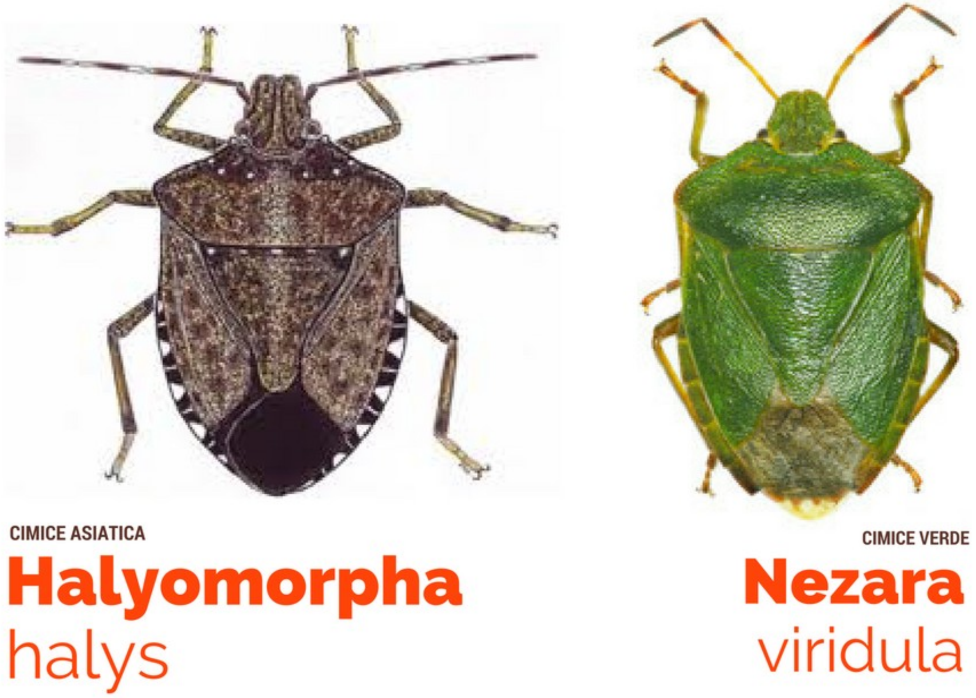
Kick-off cofunded Projects Seminar
17-18th March 2021

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement no 862665 ICT-AGRI-FOOD.

Contest

The HALYomorpha halys HH or Brown Marmorated Stink Bug BMSB:



- In China, HH feeds on *Eucommia ulmoiides,* a tree (15 mt.) threatened in the wild but cultivated for use in traditional Chinese medicine
- Since its arrival –most probably as a hitchhiker in containers, in North America in the 1990s, the invasive brown marmorated stink bug (Halyomorpha halys) has spread to 44 states in the U.S., becoming an agricultural pest in at least 25 states and causing nuisance problems in seven more.
- *HH* has rapidly spread since 2004 throughout the European continent. HH is present in 28 countries, and just few days ago (end of February 2021) the first specimens have been spotted in United Kingdom.
- The brown marmorated stink bug , *Halyomorpha halys* (Stål), is a voracious eater that damages fruit, vegetable, and nut crops. HH is resistent to chemical defense due to the its stilet, and it stopped Integrated Pest Mamnagement.

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Contest

- **In 2019, the economic impact of this pest for fruit orchards (pear, apple, peach, kiwi, nut) in Northern Italy was estimated at €588 millions**

Exhausted growers reach the final decision to eradicate their orchards

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HH also affects the market basket:

- the insidious damages not visible at the naked eye that undermine the consumer confidence

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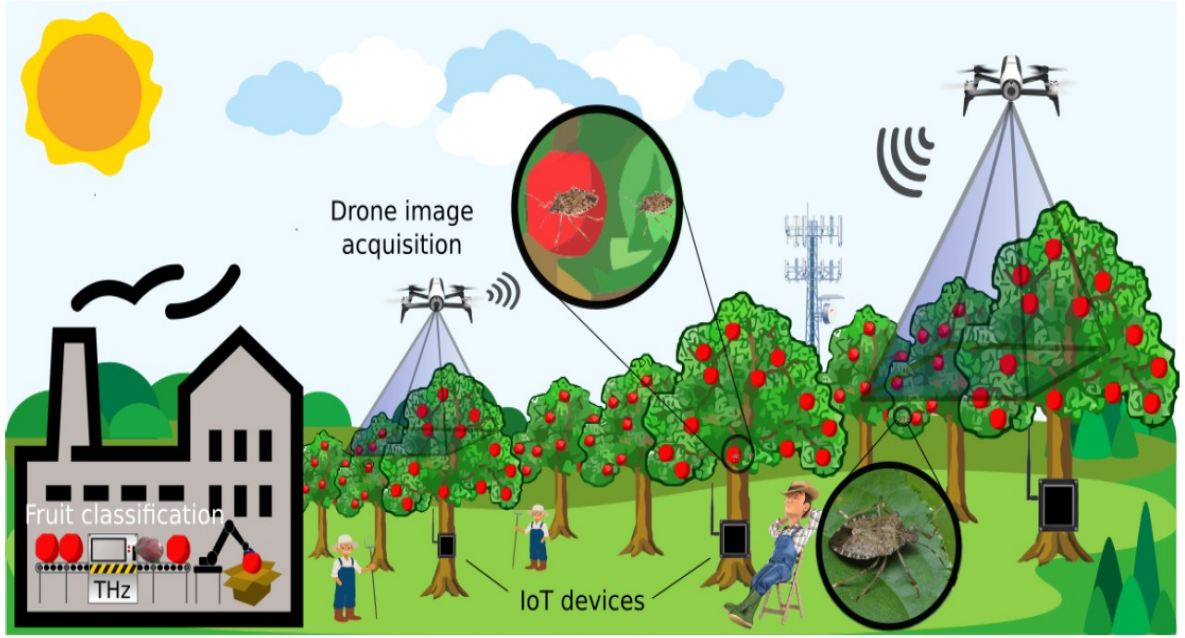
Our project will impact on:

- The monitoring of the orchards (growers, farmers, health plant operators)
- The fruit sorting process (fruit industry, farmer organizations)
- → The confidence of the final
- consumer on
- the fruit supply chain



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Main project objectives

Discover identification methods for HH (and other targeted pests)

Reduce costs and augment efficiency of monitoring activities

Increase marketable fruit quality

Propose models for describing HH (or other target pests) orchard infestation

Design a logbook system of the orchard activities

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Our methods:

- Design **Hardware Architecture and Algorithms :**
  - **for DETECTING** HH as well as other targeted pests,
  - **for DETECTING ‘invisible’ damages**
  - using
    - Drones
    - Internet of Things devices
    - Vision Chips (visible spectrum and not visible)
    - Offline Machine Learning Algorithms
    - Edge Artificial Intelligence Algorithms
- **for MONITORING** the HH (as well other pests) population
    - Scheduling activities (when and where collect images/data) for estimating the strength of the bug attack
    - Technical challanges (drone data muling, energy harvesting, and data cloud integration)

    - → **Integrated the results to work towards a Log-book** of the orchard activities

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Cooperation with Stakeholders

- GROWERS:
  - Increase quality of production, increase profit
  - Restore Integrated Pest Management

- FIELD ADVISORS:
  - Considerable reduction of work/time/energy in monitoring
  - Increase reliability in their suggestions

- Supply Chain Organizations:
  - Increase quality of the fruit along the production chain
  - Market and strength end-consumer confidence

- Advanced Tech Industry:
- invest in ad-hoc hardware for orchard tech at reasonable cost

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Stakeholders that we'd like to engage

- Technology Producers:
  - Invest in Cheaf Off the Shelf (COTS) or Low cost hardware for AgTech
    - drone-camera systems for inspections under a small angle view
    - integrate communication ability in drone system
    - integrate Intelligence at the Edge
    - develop specific sensors (vibrations) useful e.g. for traps without pheromone disadvantages

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Dissemination and outreach

UNDER CONSTRUCTION

Web-site: https://www.haly-id.eu/

Repositories:

NextCloud: for bulk storage, e.g. for image and video data, and literature

GitLab: for our software

Workshops: WiDroit -- The 17th International Conference on Distributed Computing in Sensor Systems DCOSS – **Yearly**

Devoted to scientific results on drone and IoT applications

Within the Consortium	To the Scientific Community	Towards the Stakeholders
Project Meetings Technical Meetings	Publications on Int'l IEEE and ACM Journals Educational aspects (advanced course on the learned lesson)	Meeting and Demos to • Farmer Associations • Producer Cooperatives
Symposium (in presence) at the end of the second year		Demos to Tester Groups from the end of the second year

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CONSORTIUM

Università degli Studi di Perugia, Italy

Università degli Studi di Modena e Reggio Emilia, Italy

Technische Universität Braunschweig, Germany

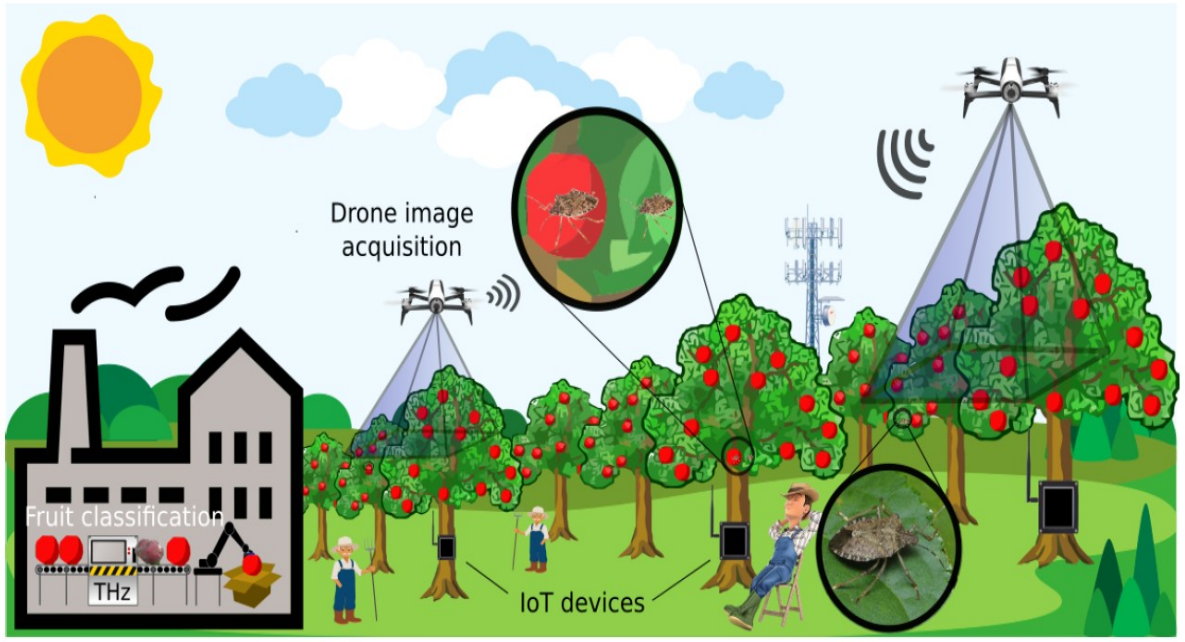
Tyndall National Institute, University College Cork, Ireland

University of Western Macedonia, Greece

University Polytecnica of Bucharest, Romania

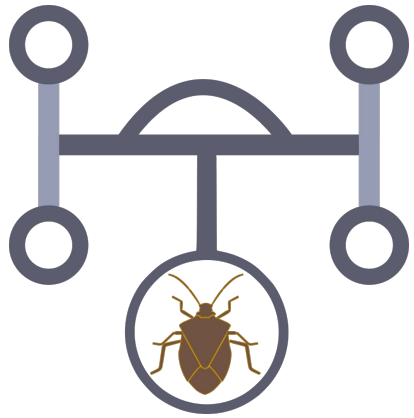
One Planet Research Center, Imec, The Netherlands

This project has received funding



LET'S KEEP IN TOUCH!

Please feel always free to reach out to us.



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Thank you for your attention!