European Network for Rural Development

Integrated Pest Control System using Aerodynamic-Spectrometric Methods

EAFRD-funded projects

Developing an integrated identification and control system that enables the detection of pests in fields and gardens and determines the optimal time to apply protective measures.

LITHUANIA

Farm's performance, restructuring & modernisation

Location
Kaunas

Programming period
2014 – 2020

Priority
P2 – Competitiveness

Measure
M16 - Cooperation

Funding (EUR)
Total budget 216 995.0
EAFRD 154 276.7
National/Regional 27 225.3
Private 35 493.0

Project duration
2018 – 2019

Project promoter*
House of Agriculture of the Republic of Lithuania

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Summary

Conventional farming practices are largely based on the preventive application of protective measures for plants. This includes spraying plants with pesticides within a pre-set frequency. However, this method means pesticides are often applied even when the plants are not affected by pests.

During the implementation of this EIP-AGRI project, the Operational Group (OG) scanned the fields with the help of drones and spectral cameras – a process that provides more information than a standard camera. The consultants and researchers used the spectral data to identify the degree of damage to the plants (diseases, pests) and provided recommendations to the farmers, on how the damaged plants should be treated. The OG created an online platform with maps showing the damage caused by diseases and/or pests, in a visual format, using the results of previous scanning and offering recommendations for each case.

Results

The Integrated Pest Identification and Control System created by the project allows the detection of pests in fields, gardens and kitchen gardens and determines the optimal time for protective measures.

The data makes it possible to develop an agrochemical model of the farm including the preparation of a tillage, sowing, fertilisation and spraying plan, as well as a map of the farm's fields.

After testing, the economic benefits of timely fertilisation and appropriate fertiliser amounts were estimated. The profit of the pilot farms increased from 9 to 34 EUR/ha.

* The Project promoter/beneficiary is an EIP-AGRI Operational Group (https://ec.europa.eu/eip/agriculture/en)

Funded by the European Commission

Context

Based on traditional agricultural practices to prevent the spread of diseases and pests, wheat is sprayed on average five times per year. Apple trees are sprayed between eight and ten times, blackcurrant is sprayed two to three times and potatoes six to seven times per year. The plant protection products are usually sprayed evenly on the entire field. This practice, however, leads to an increased use of fungicides and pesticides which is not always necessary.

Objectives

The objective of this EIP-AGRI project is to encourage farms to introduce technological innovations that ensure an effective control of pests in an environmentally friendly way.

Activities

The project was carried out in three stages. The first stage involved organising the OG and assigning the staff responsible for the project's implementation. An information stand was set up and a briefing article was published. The OG also selected the trial fields.

The second phase of the project consisted of scientific trials and tests. Tests were carried out using crop hyperspectral imaging, unmanned aerial vehicles with hyperspectral cameras and software for image processing. Hyperspectral imaging (HSI) is a technique that analyses a wide spectrum of light instead of just assigning primary colours (red, green, blue) to each pixel. The light striking each pixel is broken down into many different spectral bands in order to provide more information on what is imaged. Furthermore, plant chemical composition analyses (laboratory studies) were carried out. Other surveys that took place included a survey of the characteristics of the light reflected by healthy plant surfaces and plant surfaces damaged by pests and diseases. Based on these findings, the OG created a model of an Integrated Pest Identification and Control System.

The functionality of the system was trialled in farms growing cereals, vegetables and berries and in market gardens/ kitchen gardens. The system was then finalised and made ready for demonstration.

During the third stage, the project report was submitted, the OG issued four leaflets with recommendations and four articles were published in the national press. s. The project also organised 13 seminars, 12 days of field trips and one closing conference.

Project's partners

1. Nature Research Centre;
2. Agricultural company "Panevėžio agrocentras;
3. Suvalkija agricultural company;
4. Ažytėnai agricultural company in Kėdainiai region;
5. Art21 – Agri-food tech innovation house
6. Farmer Renatas Reikertas;
7. Farmer Egidijus Šermukšnis;
8. Farmer Edas Sasnauskas;
9. Farmer Birutė Rinkevičienė;
10. Farmer Simona Garunkštienė
11. Farmer Adolfas Jasinevičius;

Main results

The system allows the detection of pests in fields, gardens and kitchen-gardens and determines the optimal time to implement protective measures. The farmer does not need to apply preventive spraying. Only areas of potential risk are sprayed and only when it is necessary. In this way, expenses like labour and fuel costs are reduced.

The software developed uses the data collected by the hyperspectral cameras to generate vector digital maps. The data are used as the basis for developing an agrochemical model of the farm providing information on the best methods of tillage, sowing, fertilisation and spraying, accompanied with a map of the farm's fields. It also uses geographic information system (GIS) spatial data filtering functions, computer aided design (CAD) and other types of map layers.

The system's website/data visualisation platform includes the methodology describing the fundamentals of the system's operation, guidelines on the data preparation and procedure for downloading the system, as well as images of the project partners' farms showing the spread of pests on them. After testing, the economic benefits of timely fertilisation and appropriate fertiliser rates were estimated. The profit of the pilot farms increased from 9 to 34 EUR/ha.

Additional sources of information

n/a

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