Policy Paper: Early Pest Detection

Mateusz Krzyżanek / Adam Fojud

RILab 2c – Crop Management: Early Pest Detection (PSNC / WODR)

08/2026

1. Highlights

The Issue: Agricultural advisors need timely, reliable information on where pest and disease threats are likely to occur. Routine field inspections, heterogeneous data sources and reliance on individual weather stations can make monitoring less targeted.

The Findings: RILab 2c integrated 23053 field observations from 378 monitoring points, meteorological data, phenological information, Earth Observation indicators and treatment records into structured data pipelines and an operational monitoring environment. Three agrophage risk products were developed and integrated into the monitoring workflow, including regional-level risk assessment made available to agricultural advisors.

The Recommendations: Support interoperable, field-validated pest-risk services in advisory workflows; use regional risk information to trigger targeted scouting; and continue validation before risk outputs are used for wider operational or regulatory purposes.

The Impact: The integrated system gives agricultural advisors access to localized and regional agrophage risk information, supporting more targeted field inspections, improved phytosanitary situational awareness and more evidence-based advisory decisions. The downstream effects on pesticide use and field-visit efficiency remain to be quantified.

2. Context of the Issue

Policy Landscape: The RILab's work is relevant to the Common Agricultural Policy (CAP), the European Green Deal and Farm to Fork objectives, and to the ScaleAgData policy agenda around the Agriculture of Data. The project also connects to the Soil Deal for Europe through its focus on data-supported, monitoring-based agricultural management.

The Challenge: Existing advisory practice can require regular field visits even when environmental conditions do not indicate a strong pest or disease threat. Field observations, weather measurements, phenological information, Earth Observation data and treatment records also differ in structure and spatial scale. Station-based weather information can fail to represent local conditions relevant to pest development.

Project Gap: RILab 2c addresses the operational gap between locally collected observations and actionable spatial information. Its approach combines repeated field observations with interpolated meteorological conditions, Sentinel-2-derived NDVI, high-resolution precipitation products and other system data, and makes both location-specific and regional risk information accessible through an integrated monitoring environment.

The operational monitoring dataset included **23053 field observations from 378 monitoring points,** covering **1 voivodeship and 32 counties**, with contributions from **65 agricultural advisors**.

FIELD OBSERVATIONS → DATA FUSION → LOCAL RISK → TARGETED SCOUTING → REGIONAL AWARENESS

3. Policy Recommendations

Embed interoperable risk information in advisory workflows. Support common data structures and interfaces so field observations, meteorological information, Earth Observation indicators and treatment records can be combined and reused across advisory systems.

Integrate operational risk maps and regional reports into advisory workflows. Use the available local and regional agrophage risk information to help advisors prioritise field inspections and focus monitoring resources where the assessed risk is higher. These outputs should support, rather than replace, physical field verification and professional advisory judgement.

Require field validation and transparent uncertainty. Continue comparing predicted risk with physical field observations and communicate the limits of interpolation, modelling and seasonal variability as part of operational use and further scaling.

Support and further standardise scalable regional data services. Build on the existing APIs, regional reporting functions and reusable services to facilitate interoperability and replication across additional administrative areas.

Considerations: Implementation requires cooperation among agricultural advisory services, data

providers and relevant authorities. Governance should distinguish evidence used for monitoring from decisions that may trigger crop-protection action. The project also indicates a need to manage false positives and preserve the role of physical field verification.

4. Evidence and Analysis

Key Results: RILab 2c sustained multi-source data acquisition and developed structured integration pipelines. Field observations were collected by agricultural advisors through the eDWIN Agrophages Mobile Field Application, with monitoring points inspected at least weekly. Reference data came from test fields in Wielkopolska, including wheat, corn and sugar beet.

Scale of evidence:

- Field observations:
    - Winter wheat: 16662 observations used in the analysis
    - Sugar beet: 2765 observations used in the analysis
    - Corn: 3626 observations used in the analysis
- Monitoring points:
    - Winter wheat: 176 monitoring points,
    - Sugar beet: 80 monitoring points,
    - Corn: 122 monitoring points.
- Reference fields / seasons: 378 fields across 5 growing seasons
- Geographic coverage: 1 voivodeship / 32 counties
- Agricultural advisors: 65 advisors contributing observations or using the monitoring environment
- Risk outputs: 277 treatment recommendation / 60 regional reports / 2040 notifications generated
- Monitoring Dashboards created: 34

Product 1: Statistical assessment of observation accuracy combined field observations with meteorological information and disease-model outputs. The analysis identified monitoring points with consistency between observed occurrences and modelled risk and confirmed the value of systematic, repeated inspections.

Product 2: Geolocation-based predicted agrophage occurrence combined interpolated temperature and humidity with phenological observations, user reports, treatment records and EO indicators such as NDVI and RainGRS. Validation against physical field observations showed improved spatial representativeness compared with station-based approaches.

Product 3: The regional agrophage occurrence risk product has been completed and integrated into the monitoring workflow. Field observations collected through the mobile application are aggregated to provide regional-level assessments of agrophage occurrence risk at voivodeship and, where applicable, county level. The resulting information is available to agricultural advisors through the integrated application and monitoring environment, providing a consolidated view of the phytosanitary situation and supporting more targeted monitoring and advisory activities.

Operational tool: The Monitoring Dashboard provides a unified view of disease-model forecasts, nearby threat reports, treatment information, NDVI and prepared phenological data. It also supports weekly notifications, regional reports and API access.

Methodology: The work uses repeated in-situ observations from agricultural advisors, meteorological sensor data, interpolated environmental conditions, phenological observations, Earth Observation products and treatment records. Data are harmonised into structured pipelines and analysed through statistical, geospatial and modelling approaches, with validation against physical field observations.

Limitations: The available evidence demonstrates improved monitoring capability, spatial representation and operational availability of the risk products. Measuring long term reductions in pesticide use are future evaluation targets, and currently can be only estimated.

5. Strategic Alignment

Green Deal / Farm to Fork: The RILab supports a shift toward monitoring-based crop protection by providing spatial risk information that can help advisors verify threats locally and target field inspections. The evidence supports the monitoring and decision-support capability; any reduction in pesticide use remains a future impact to be measured.

CAP: The work contributes to digitalisation, knowledge exchange and more evidence-based agricultural advisory processes by transforming locally collected observations and environmental data into accessible decision-support information.

SDGs: The supplied policy material links the work to SDG 2 (Zero Hunger) through earlier awareness of threats to crop production, SDG 12 (Responsible Consumption and Production) through the potential to avoid unnecessary preventative interventions, and SDG 13 (Climate Action) through monitoring approaches that can adapt to changing environmental conditions.

Partnerships: The approach is consistent with the Agriculture of Data concept by translating diverse data sources into usable agricultural intelligence. It also supports the Soil Deal for Europe by encouraging monitoring-verified management and reducing the need for broad, preventative interventions where risks can be assessed more precisely.

6. References

- D3.4 ScaleAgData generic architecture and data governance, sharing meta architecture and integration of the RI Labs, v2.
- D4.5 Sensor-integrated data products, v2.
- D5.2 Deployment and Evaluation Report.
- D6.6 Policy brief (forthcoming).
- ScaleAgData, Periodic Report – Technical Part B, Period 2 (M19–36).
- ScaleAgData, RILab policy brief dataset – Crop Management / Early Pest Detection.
- Common Agricultural Policy (CAP); European Green Deal / Farm to Fork; Agriculture of Data; Soil Deal for Europe; Sustainable Development Goals (SDGs).

7. Contact Details

Mateusz Krzyżanek
PSNC
mkrzyzanek@man.poznan.pl

Adam Fojud
WODR
adam.fojud@wodr.poznan.pl