



BBioNets



FOREST4EU



NUTRI-KNOW



Soil-X-Change



AQUAGRI-KNOW

Integrating Traditional and Digital Soil Monitoring: Experiences from an EIP-AGRI Operational Group in Hungary

“The future of EIP-AGRI Operational Groups: challenges, opportunities and existing support services”

Tünde Gyarmati, PhD; Vince Láng, PhD – Discovery Center Nonporfit Ltd

Development of a cost-optimized novel soil sampling methodology for precision agriculture
OG coordinator

Online, 14/05/2025



The organising projects are funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.



Drawing from broad experience with Operational Groups

- Discovery Center is coordinator or member of 15+ Operational Groups across Hungary
- Diverse roles: research partner, advisory service (soil health, sustainable farming practices, precision technologies)
- Today's case study: precision soil monitoring OG in Somogy County
- Insights on collaboration, implementation and knowledge transfer drawn from our complete OG portfolio



Context & Problem

- In Hungary, many farmers want to adopt precision agriculture but struggle with selecting appropriate technologies.
- Our OG was formed in response to a clear need: farmers were overwhelmed by competing technology providers, each promising fast soil mapping results but offering little clarity on which solutions truly delivered value.
- As one farmer partner explained: *"When I became CEO of a farming company with 700 hectares in Somogy county, I tried to implement precision technologies but couldn't tell which soil mapping approaches were actually reliable and worth the investment."*
- Confusion was preventing widespread adaptation of beneficial practices



Our solution: precision soil sampling & targeted application

- As coordinators, Discovery Center established a multi-stakeholder framework to develop an integrated approach combining traditional soil knowledge with digital tools:
 - Precision soil sampling based on management zones rather than grid sampling (proved more cost effective)
 - Geospatial analysis using Digital Elevation Models (field topography, water movement)
 - GPS-enabled application equipment for targeted nutrient delivery
- This approach directly addressed the "bridging science and practice" challenge by creating practical implementation paths for farmers.



Key benefits observed

- Economic benefits that answered the critical farmer question "*Is there money in it?*":
 - 15-20% reduction in fertilizer use without yield loss (immediate cost savings)
 - Long-term cost savings from more efficient resource use
 - Improved crop resilience during drought conditions, reducing irrigation needs
- Environmental benefits:
 - More precise nutrient application reducing runoff
 - Better soil health with 25-30% improved root systems
- Increased biodiversity observed on trial sites

These tangible benefits are crucial for adoption, farmers need to see both economic and environmental value to justify the transition.



Implementation journey

- Our implementation revealed important insights about the OG process (beyond the specific technology):
 - Adoption was significantly boosted by local demonstrations where farmers could see results firsthand (vs technical explanation or published materials)
 - Knowledge-sharing among farmers proved more effective than top-down technical instruction (peer learning → trust, adoption rate ↑)
 - Technical support during initial implementation was absolutely critical for success (hands-on guidance)
- As we have heard in other discussions, "*It is a slow transition*" - most farms needed about three years to see full benefits (important implication for structuring and supporting OG projects)



Overcoming barriers

- We directly addressed common challenges identified by farmers:
 - High initial costs were mitigated by helping secure subsidies and developing cost-sharing approaches
 - Knowledge gaps were addressed through simple, visual step-by-step implementation guides focusing on practical actions rather than technical theory
 - Technical complexity were tackled by providing advisory support to ensure that farmers could get theoretical and hands-on support
 - Variability in results were addressed by developing tailored solutions based on site-specific conditions (vs 'one-size-fits-all')



Future vision for OGs

- Based on our experience across multiple OGs, successful OGs of the future will need to:
 - Focus on creating practical tools farmers can immediately implement (moving beyond knowledge sharing to action enablement)
 - Balance innovation with proven practices (integrate new technologies with traditional knowledge farmers already trust)
 - Provide economic pathways that make adoption feasible ('what' and 'how' of implementation financing)
 - Create ongoing support systems, not just one-time knowledge transfers (implementation is a 'journey', not an event)
- As one farmer noted: *"The plant-soil ecosystem is very complex - expertise is crucial when collecting and interpreting data."* (ongoing support is essential to successful innovation adaptation)



Conclusion

- Our OG demonstrated that technology adoption isn't just about the innovation itself, but about creating the right support ecosystem around the innovation.
- The future of OGs depends on our ability to make scientific advancements accessible, economically viable and practically implementable.
- Achieving this balance ensures that OGs can truly fulfill their potential as catalyst for sustainable agricultural transformation.

For further details:

tgyarmati@drdc.eu; vince.lang@drdc.eu

<https://discoverycenter.eu/portfolio-items/cost-optimized-soil-sampling>

<https://soilxchange.eu/>

Thank you!

