life from cosmos finapp

Maximizing Efficiency in Pivot Irrigation



How Bauer and Finapp Optimize Water Use Thanks to Cosmic-Ray Technology

BAUER's Challenge

How can large irrigated fields be managed with a single, reliable soil moisture measurement?

Bauer is a global leader in irrigation technology, known for its advanced center pivot systems used worldwide to improve agricultural productivity and water efficiency.
In pivot-irrigated fields, **soil moisture can vary significantly at small spatial scales** due to:

- Soil heterogeneity
- Micro-topography
- Irrigation distribution dynamics

Traditional **soil moisture sensors provide point-based measurements, capturing only very localized conditions.** As a result, multiple sensors are often required to represent large fields—leading to:

- Increased costs
- Complex deployment
- Limited scalability

Bauer needed a **solution** capable of delivering **representative soil moisture data across large areas,** without increasing system complexity.

Name	Location	Study validation	Colture	Irrigation	When
Bauer GmbH	Brasil	Universidade Federal de Viçosa	Corn	Central Pivot	2025

The Finapp Approach

Finapp leverages Cosmic Ray Neutron Sensing - **CRNS technology** to measure **soil moisture over a much larger footprint** compared to traditional sensors, providing a more representative view of field conditions.

Step 1 - Scientific Validation
An independent study conducted by the Universidade Federal de Viçosa (Brazil) evaluated the accuracy of Finapp's technology under real agricultural conditions.
The results showed:

- High correlation with reference measurements
- Strong accuracy across varying soil moisture conditions

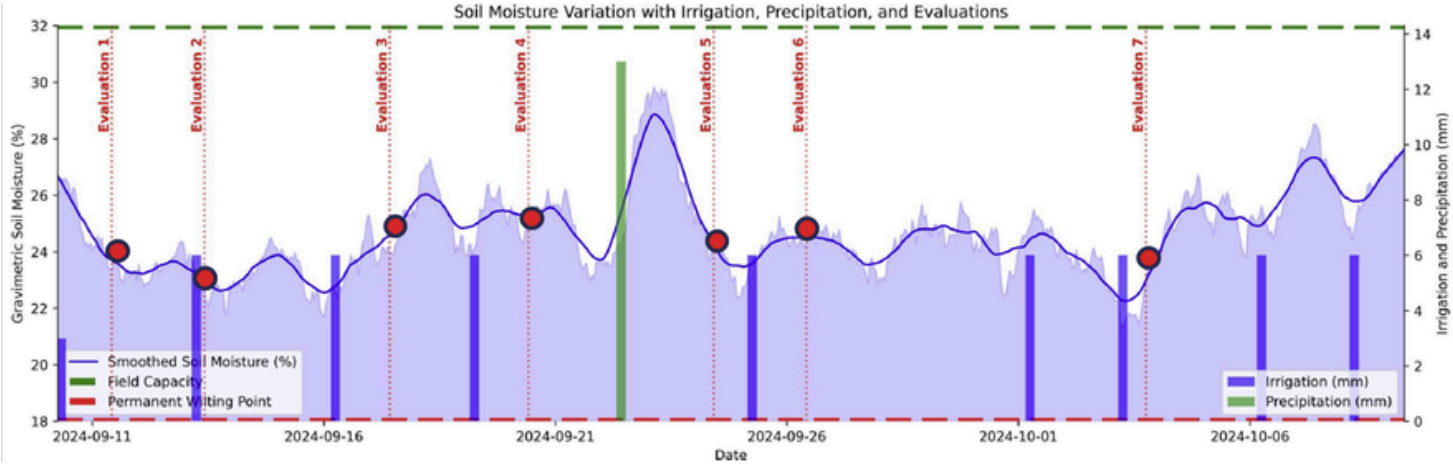


Figure 1: Finapp Soil Moisture MAPE: 6.47% compared with gravimetric sampling

This study confirmed that **Finapp provides reliable and scientifically validated soil moisture data.**

Step 2 - Field Validation with Bauer
To test real-world performance, Bauer installed two Finapp probes within the same pivot-irrigated field, approximately 100 meters apart.
Both probes monitored soil moisture independently over time.

Key Result
Despite the distance, **the two probes produced highly consistent soil moisture time series**, demonstrating that:

- Soil moisture trends were stable across the field.
- **A single probe can effectively represent a large irrigated area**

This is made possible by the **wide measurement range of the Finapp probe**, which covers an area with a radius of approximately 125–175 meters, effectively capturing the full variability of the soil.

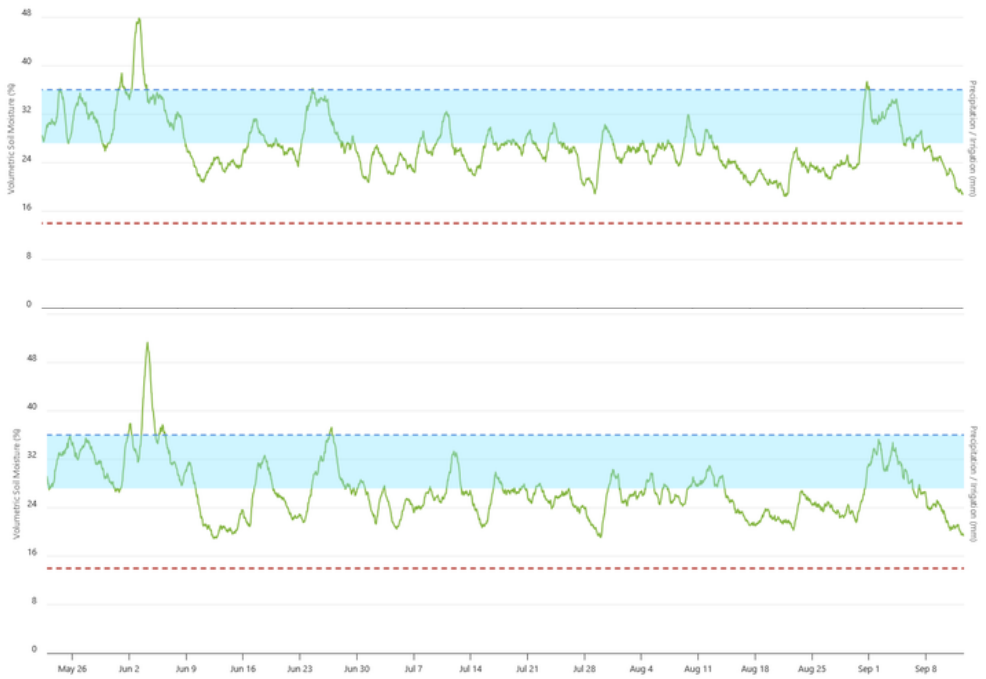


Figure 2: Strong correlation between the two soil moisture trend - Soil Moisture Smoothed $r^2 = 0.88$

Benefits

This validation demonstrated a key advantage for irrigation management:

- High measurement reliability
- Spatial representativeness over large areas
- Reduced number of sensors required
- Simplified installation and maintenance

For Bauer, this means being able to monitor entire pivot systems with minimal instrumentation, reducing both operational complexity and costs.

Conclusion

The collaboration between Bauer and Finapp demonstrates how advanced sensing technologies can transform irrigation management.
By combining scientific validation with real-world field testing, Finapp proves its ability to deliver:

- Accurate
- Scalable
- Cost-effective soil moisture monitoring

With over **600 Finapp probes deployed**, Bauer is turning a shared vision into reality: preserving water resources to build a more sustainable and greener future.

"With Finapp, we can monitor soil moisture across an entire pivot using a single tool. This was not achievable with traditional sensors."
Luiz Alberto Roque - CEO - Bauer do Brasil



About Finapp

Finapp develops advanced soil moisture monitoring solutions based on Cosmic Ray Neutron Sensing - **CRNS technology**.
Our mission is to enable data-driven irrigation by providing reliable, **large-scale, in depth, in real time soil moisture** insights—helping farmers and irrigation leaders optimize water use while reducing complexity.

Building on this unique expertise, Finapp has developed **Fin4Crop**, a web-based platform designed to answer one of the most critical questions in agriculture: **when and how much to irrigate**.
By combining our distinctive soil moisture insights with top-tier weather forecasts and artificial intelligence, Fin4Crop delivers **clear, actionable irrigation recommendations**.

Finapp manages the underlying complexity—so farmers don't have to—freeing them from one of the most delicate and high-impact decisions in crop management, and enabling them to focus on what matters most.

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Via del Commercio, 27
35036 Montegrotto Terme PD - Itay

+39 0490991301
info@finapptech.com
www.finapptech.com