

MULTISTATE RESEARCH FUND IMPACTS

Gathering and Using Data on Farms

Crops have complex responses to inputs like fertilizer and water. Farmers have to consider many variables when deciding how much to apply. On many fields, inputs are applied inefficiently. Conducting scientific experiments directly on farms could revolutionize how farmers make decisions. Instead of data from small-plot research trials, farmers could use precision technology to collect data from their fields and test tools, products, and practices in "real-world" conditions.

Researchers at land-grant universities are working together to advance the "cyber-infrastructure" — the hardware, software, networks, and people — that enable farmers and their advisors to design and implement experiments, manage and analyze data, and turn analyses into efficient, profitable crop production strategies.

WHY DOES THIS WORK MATTER?

- Farmers can make decisions *for* their farms based on **data** *from* their farms.
- *Site-specific* data help farmers **optimize inputs**, which can lead to **lower costs**, **better crop growth**, and **improved profitability**.
- *Efficient* agrochemical use can **reduce pollution** from runoff and leaching.
- On-farm data **improve models** and **inform policymaking**.
- Greater use of digital agriculture could **attract skilled workers** to rural areas.

RECENT PROJECT HIGHLIGHTS

Consistent methods. Working together, project members developed standard protocols for collecting, processing, and storing data.

Algorithms for data analysis. Project members developed analytical algorithms to turn data into recommendations.

Infrastructure for on-farm experiments. Project members created a cloud-based software system and a user-friendly public portal, difm.farm, which allows crop consultants and farmers to design and implement on-farm trials and store and analyze data. In the future, a mostly automated system will also provide management advice based on data.

Better data for better decisions. In 2026, difm.farm was used to design and manage over 170 on-farm trials across the U.S., Canada, and South Africa. Farmers generated detailed data from their trials, and some anticipate changes they make based on data analysis will increase their profits by thousands of dollars per year.

A community of practice. Project members host a discussion forum for those involved in on-farm experiments so they can raise concerns, share lessons learned, and share best practices.

Building capacity for on-farm trials. Project members trained Extension professionals, crop consultants, and farmers how to design, set up, and analyze on-farm experiments. Training and troubleshooting have improved the quality of data uploads and analysis.

MORE INTEREST, MORE DATA

Because of this project's research and outreach, interest in on-farm precision experimentation is increasing rapidly all over the world. In the future, it's likely there will be thousands of on-farm experiments each year, producing tens of thousands of observations.

THE MULTISTATE APPROACH

This project uses federal capacity funding to bring together scientists. This approach has many benefits.

- With members in **multiple states**, the project can pilot tools and methods on different crops and production types in different areas and under different conditions.
- **Interdisciplinary expertise** tackles issues from all angles.
- **Coordination** spreads the workload, reduces redundancies, and makes research more consistent and reliable.
- Project members can **share resources** such as data, tools, and facilities.
- Established teams can **leverage external grants** by demonstrating track records of productivity.
- Led by land-grant universities, this project seamlessly integrates **Extension** and **teaching**, supporting farmers and the next generation.

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