

CASE STUDY

Precision Agriculture with the MTSRN

Advancing UAS and GIS for Smarter Farming

Overview

Montana State University's Precision Agriculture Program and **Assistant Professor Dr. Ricardo Pinto** are leveraging the Montana State Reference Network (MTSRN) to bring next-generation accuracy and efficiency to farming operations across Montana. By integrating the MTSRN with drone mapping (UAS), GIS workflows, and precision ag equipment, the program is helping producers save time, reduce costs, and improve environmental stewardship.



Dr. Ricardo Pinto is an assistant professor at Montana State University with primary research interest in the development of precision agricultural management systems.

The Challenge

Montana farmers often manage vast acreage where every pass—whether planting, spraying, or harvesting—must be precise to avoid wasted inputs and overlapping coverage. Traditional correction services and satellite-based solutions were costly, slower to connect, and lacked the centimeter-level accuracy required for emerging technologies, such as spray drones and targeted weed management.

The Solution: MTSRN + Drone Mapping (UAS)

Ricardo's team utilizes **drones to map fields, identify weed infestations, and create GIS-based models that inform targeted treatment**. These models are loaded into spray drones and precision sprayers—which, connected to the MTSRN, deliver centimeter-accurate spot treatments. The result: precise, data-driven field management that reduces herbicide use and input costs while improving yields.

Key Benefits

1. **Operational efficiency:** Farmers use the MTSRN to provide highly accurate GPS coordinates, assisting with seeding, spraying, and harvesting to ensure perfectly straight passes, reduced operator fatigue, and minimal overlap.
2. **Financial savings:** By minimizing double passes, optimizing seed placement, and applying herbicides only where necessary, producers substantially reduce input costs.
3. **Environmental sustainability:** Spot spraying guided by precise GPS data minimizes chemical use, protecting soil and water while meeting sustainability goals across our state.
4. **Reliability and ease of use:** The MTSRN delivers fast connections across the state, even in rural regions, unlike competitors that are limited to populated metro areas. Users report near-instant connectivity and strong local technical support, saving valuable time in the field.
5. **Workforce development:** Students gain hands-on experience with RTK workflows, drone mapping, and GNSS corrections, enhancing their career readiness for precision agriculture and GIS roles.

Real-World Impact

In Ricardo's program, the MTSRN enables his team to confidently return to mapped weed locations and apply precise treatments, knowing that the models align perfectly with on-the-ground conditions.

Why the MTSRN?

At \$1,500 per year, an MTSRN subscription costs less than competing services, while providing broader coverage, faster connectivity, and centimeter-level precision.

For producers looking to integrate drones, GIS, and precision ag equipment, the MTSRN is a cost-effective backbone for their technology stack.

"The biggest impact of the MTSRN is operational efficiency. Whether it's planting, spraying, or harvesting, producers can use auto-steering with confidence, knowing they're working with accuracy and not overlapping rows or wasting input."

—Assistant Professor Dr. Ricardo Pinto



Ricardo discusses the MTSRN with Montana State Library staff at the Montana State University Agricultural Experiment Station Field Day in Conrad.