Science Societies

# Practical agronomic research from an equipment dealer perspective

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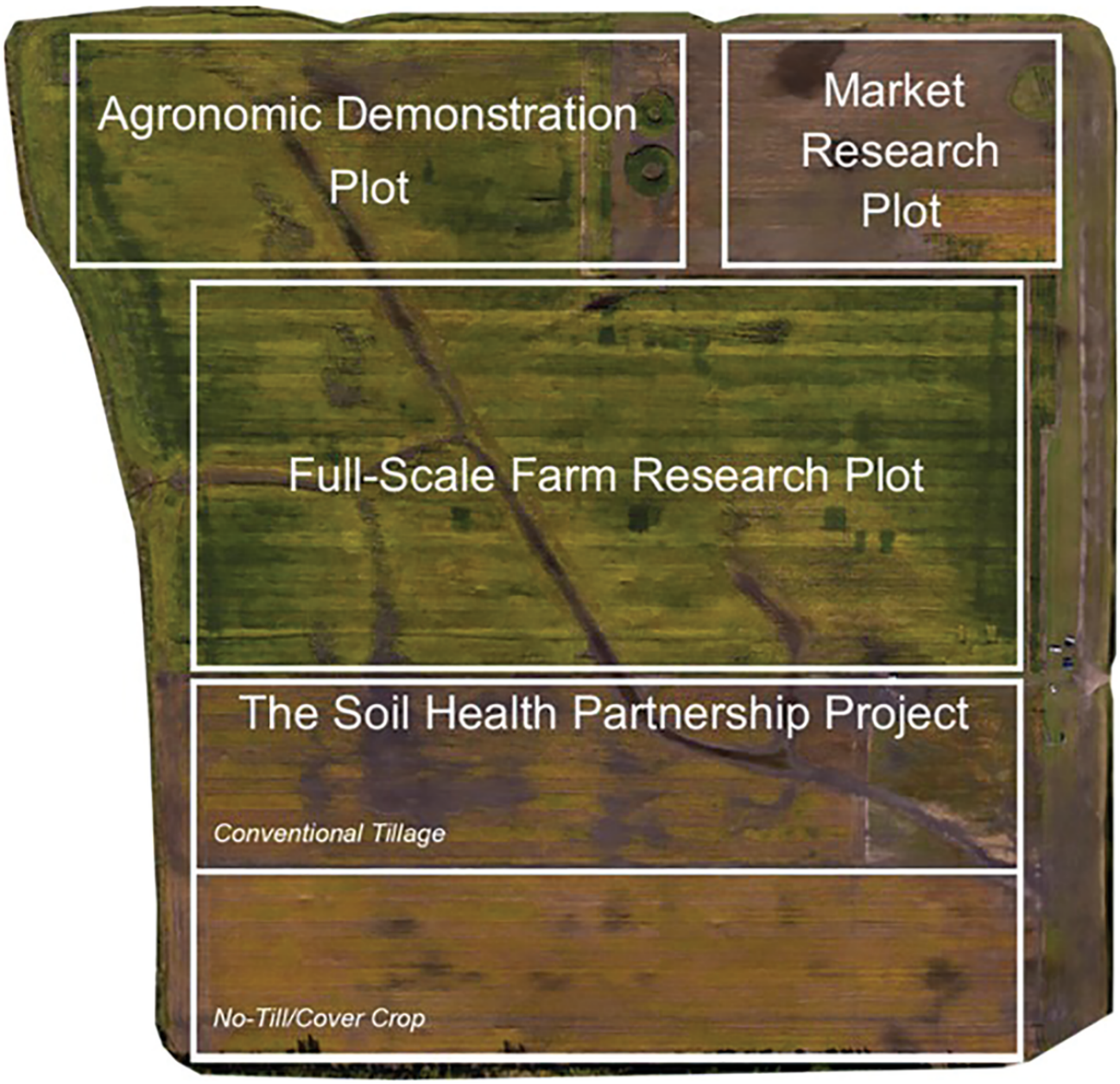


*Figure 3, The NDSCS Kosel Family Agriculture Land Lab.*

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Founded by sixth-generation farmer, Ronald D. Offutt, RDO Equipment Co. has deep agricultural roots and is one of the world's largest John Deere agriculture equipment dealers.

In early 2018, RDO was presented with a unique opportunity with the North Dakota State College of Science (NDSCS) in Wahpeton, ND. A 91-ac parcel of land was donated to the school and named the Kosel Family Agriculture Land Lab, a place for students to get out of the classroom and into the field to grow, care for, and harvest a crop. Furthermore, at the end of each season, the grain would be donated to the school for the students to learn about grain marketing and farm management. All proceeds from grain sales would be held by the NDSCS Foundation for future use at the Land Lab.

RDO was invited to participate, providing equipment, people, and time to support the Land Lab and projects designed for student learning. Joel Kaczynski (Product Specialist Manager), Anthony Kramer (Product Specialist Supervisor), and Jacob Maurer (Agronomist), all CCAs, formed the team leading the project.

RDO's motivations to participate in the NDSCS Land Lab include the following:

- Offer students a real-world learning experience using full-scale machinery and common farming practices.
- Increase knowledge of the product portfolio currently offered by John Deere.
- Expand agronomic demonstrations into farm-scale research trials.
- Grow the network of local, state, regional, and global stakeholders.
- Acquire invaluable first-hand field experience behind-the-scenes prior to conducting customer product demonstrations.
- Develop and foster an internal "culture of agronomy" using agronomic demonstrations for training the sales team to pair customers with equipment based upon their agronomic goals.

## Prior to the Land Lab

For RDO, it is important that team members are more than just knowledgeable about equipment, technology, and the realities of the job site. RDO strives to be leaders and experts in precision agriculture technology. Because of the high cost of ownership and risk associated with a site like the Land Lab, RDO did not have a dedicated training ground available to develop the skill set to best serve the agronomic challenges facing its grower-customers.

Prior to the Land Lab, RDO would cooperate with local growers to conduct agronomic demonstrations or research trials. Growers had to be willing to grant the team access to their farming records and assume the risk of exposure to negative outcomes, both economic and agronomic. Depending on the agreement, the outcome may or may not have been shared due to the trial being conducted on private land. The Land Lab alleviates the potential for a negative customer experience or loss of data as no one single entity assumes all risk, and all outcomes are shared openly among cooperators.

The Land Lab also gives RDO the freedom to explore current trends and develop long-term research projects. The typical approach to project design is to begin with a basic agronomic demonstration, meant to showcase the capabilities or efficiencies gained by a feature of a machine. These demonstrations then expand into full-scale, multi-year, replicated research trials if any outcomes warrant further work.

## A Practical Approach

Trials and agronomic demonstrations at the Land Lab are meant to be simple and straightforward with the average person able to determine the objective and the outcome. Each pass, or replication, is carried through the entire length of the field, demonstrating how the treatment impacts yield across the many variables of soil type, moisture, and fertility.

***Figure 1,*** *A "row of shame" at the NDSCS Land Lab representing a combine pass with a single row of data that was harvested with improper header overlap.*

All agronomic data is collected with commercially available, late-model equipment and shared in real time, exposing the raw, unfiltered realities of data collection (Figure 1). It also shows the true risks involved in crop production and how farm practices can positively or negatively impact yield. This is critical to keeping the Land Lab as comparable to real-life farming practices as possible.

The agronomic data set was made publicly available through a demonstration account hosted by RDO and can also be accessed by request through Team Manager in the John Deere Operations Center. Those interested may view it at **www.MyJohnDeere.com** (Figure 2).


***Figure 2,*** *Access to the NDSCS Land Lab data set is available through* ***www.MyJohnDeere.com****.*

Working with a multitude of cooperators and collaborators adds an element of transparency that many on-farm academic research projects do not have, which can lead to challenges when it comes to communication as well as redundancy or replication of workflow. However, by removing the curtain that oftentimes shields many research projects, a culture of collaboration has developed where information is

shared and synergies are cultivated among industry partners, growers, students, and faculty in real time.

## The Land Lab Takes Shape

Prior to the site being donated, the Land Lab had been planted to soybeans for five consecutive years and farmed as a single parcel. In the interest of increasing the number of data sets and crops to observe within a given season, the Land Lab was divided into three separate crop management zones and four plots (Figure 3).

Starting from the south, the first 28-ac zone is The Soil Health Partnership Project. The purpose of the project is to demonstrate the economic and environmental benefits of different soil management strategies as part of a USDA Sustainable Agriculture Research and Education (SARE) grant.

The next zone is 30 ac and used for farm-scale replicated field research trials.

Moving north, the final zone is split in half. The west plot (approximately 12 ac) is used for agronomic demonstrations, and the east plot (approximately 10 ac) is used as a market research plot by a local seed company.

## Year 1 (2018)

For the first year, the team decided to conduct simple agronomic demonstrations and focus on the fundamentals of crop and data management.

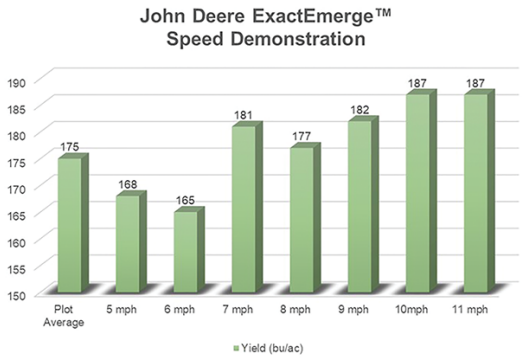


***Figure 4,*** *Results from 2018's agronomic demonstration of planting speed gathered from John Deere Field Analyzer Beta.*

### Agronomic Demonstrations

The first agronomic demonstration showcased planter efficiency at various

speeds in corn (Figure 4). This was completed using a John Deere 8370R tractor paired to a DB44 Planter (24 row, 22-inch row spacing) with ExactEmerge row units. The plot demonstrated the planter's ability to plant consistently across a range of speeds from 5 to 12 mph.

**Soil Health Partnership Project**

For the first season, the entire Land Lab was tilled using a John Deere 9520RX tractor paired to a 2230FH Field Cultivator with TruSet. The Soil Health Partnership plot was planted to spring wheat on May 16 and harvested on August 30. Following harvest, the 28-ac plot was divided in half, laterally, with the south half receiving a cereal rye cover crop seeded in September and the north half receiving no treatment.

## Year 2 (2019)

The second year of the Land Lab experienced an increase in structured research trials and agronomic demonstrations conducted on the site.

**Agronomic Demonstrations**


***Figure 5,*** *Agronomic demonstrations are an invaluable training tool for the RDO team to understand the agronomic impact their equipment has on growing a*

The team's agronomic demonstrations for Year 2 included a planter setup demonstration plot in corn, a spot-spray application trial, and a salinity management plot. For the planter setup demonstration (Figure 5), the planter was adjusted very drastically to showcase the negative agronomic impact improper setup can potentially have.

*crop.*

For RDO, this plot was the perfect way to demonstrate that, no matter what technology a customer has, if the planter is not properly optimized, the ability to capture a positive outcome is significantly reduced.

**Corn Field Research Trial**

***Figure 6,*** *Anthony Kramer plants a 15-inch corn treatment pass at the NDSCS Land Lab.*

With a John Deere 8345R tractor and 1795 planter (12 row, 30-inch spacing with 13 split-row units on 15-inch spacing), the team planted a replicated field trial (Figure 6) on May 31. The trial is meant to study the impact row spacing (15 and 30 inch) and population (35,000 and 50,000) have on yield in corn. This trial is replicated using the same layout and planter on a grower's field in Redfield, SD. The second plot was planted on June 5.

**Soybean Field Research Trial**

Using the same John Deere tractor and planter, a similar replicated trial spans across the Soil Health Partnership plot where alternating treatments of 15- and 30-inch row spacing are combined with alternating populations (80,000, 140,000, and 220,000). The objective is to demonstrate the yield impact row spacing and population have

across both no-till and conventional tillage practices. The plot was planted on June 3.

### Soil Health Partnership Project

For the second year of the project, the north half of the plot was tilled using conventional practices with a John Deere 9620RX paired to a Lemken Rubin-12 followed by a pass with a John Deere 9570RX paired to a 2230FH Field Cultivator with TruSet (Figure 7). Due to the considerably wet field conditions, the cereal rye from last fall was not able to be terminated prior to planting, resulting in the soybean plot being planted "green." The rye was baled within five days after planting, prior to emergence.

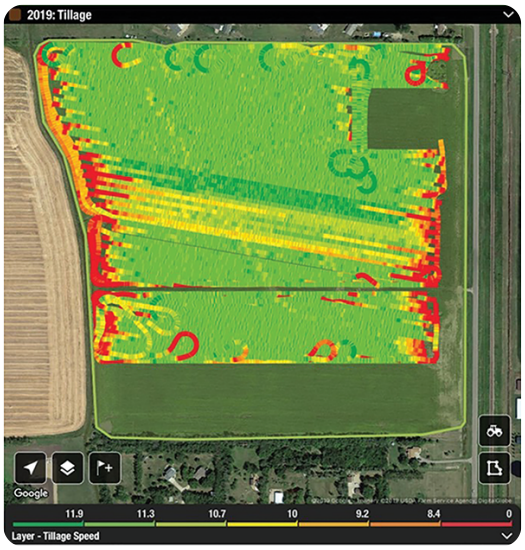


***Figure 7,*** *A 2019 tillage map in John Deere Operations Center shows the tillage pass by RDO's field cultivator compared with the "Soil Health Partnership" no-till plot.*

## Future Work

The plan for future years is to begin a corn–soybean rotation between The Soil Health Partnership Project plot and the Farm-Scale Research plot. The row spacing and population trial will be replicated once again at the Land Lab and will expand to several new sites in North Dakota and South Dakota. The goal is to continue to garner invaluable insight into the challenges of residue management, crop protection, fertility, and machine proficiencies that come with an increase of population and tighter plant spacing.

Until now, there has been limited "in-field" engagement by RDO's team members and customers, requiring the team to recreate scenarios digitally or graphically to share

the lessons learned at the Land Lab. Having made several modifications to plot layout and planting crops that aid in moisture management, the goal in future years will be to host field days and events, bringing the audience to the field.

Keep up with what's happening at the Land Lab by visiting **www.RDOequipment.com/landlab**. For more on the Land Lab and all things precision agriculture, follow Anthony Kramer (@RDOTonyK) or Jacob Maurer (@RDOJacobM) on Twitter and listen to RDO's Agriculture Technology Podcast (available on the RDO website and SoundCloud), a bi-weekly podcast hosted by Anthony Kramer.

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