



AN AGRONOMIST'S VIEWPOINT:

In-season Verification Using Aerial Drone Imagery Data Analytics

As an agronomist working with a diverse group of growers, we understand the importance of ensuring that every input a farmer implements corresponds to the 4R's - Right source, Right rate, Right time, and Right place. This is especially true in fertilizer applications, where the agriculture industry finds itself under constant scrutiny and escalating regulations. As an example, here in Minnesota, the Minnesota Department of Agriculture (MDA) has begun implementation of the Groundwater Protection Rule (GPR), a revision to the Nitrogen Fertilizer Rule. The GPR seeks to minimize potential fertilizer sources of nitrate pollution into the state's groundwater. To comply, each fertilizer application must be justified by the four R's. To the growers, correct fertilizer placement is not just important in satisfying MDA's regulations, but providing a return on investment (ROI). But let me ask you - how many times have you ran into a situation that you were unsure of an input's ROI, or if it would be environmentally sound?

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During the 2018 growing season, I encountered this exact situation - where a potent mix of an application error, combined with weather, became a huge factor in farming. This particular year was extremely wet. It was not uncommon to have 4 inches of rain every two weeks, sometimes in one event. This kind of weather has a tremendous negative effect on nitrogen.

In early June 2018, I was scouting a cornfield on foot around V4 - V5 stage growth, and came across what appeared to be a slight pattern. As part of that growers' scouting regimen, I use Quantix to survey his fields during critical growing periods to monitor developments and verify in-season

applications. To me, drone-based aerial imagery provides the level of accuracy and detail I need to assess areas of impact, and make prescriptive farm management recommendations. With Quantix, the benefits to the grower are tremendous. Previously this level of impact predictability was based on experience, intuition and opinion. With Quantix and the AeroVironment Decision Support System (AV DSS) data analytics platform, we are now able to quantify field behavior quickly and easily. This enables both the agronomist, and the grower, to make data informed decisions throughout the growing season. After flying Quantix to assess the area in question, along with



Ashley Runholt

An Agronomist with Cottonwood Co-op Oil Company (MN), Ashley brings over 16 years of agronomy experience across fruit trees, vegetables, row crops and Precision Ag.



Quantix™ & AV DSS™

*Complete End-to-End Ecosystem
On-Demand Field Intelligence For
Every Growing Season*

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- Ashley Runholt



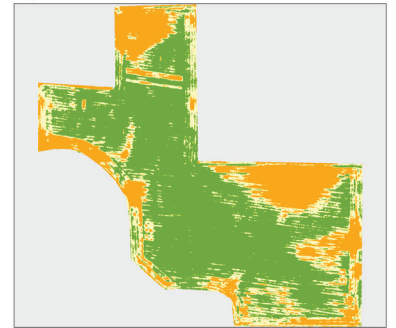
some more ground truthing, I received my Quick-Look Normalised Difference Vegetation Index (NDVI) image on the system's control tablet. NDVI is the classic indicator of plant health. It confirmed a noticeable pattern anomaly in part of the field. To zero in on the issue, I uploaded the imagery data into AV DSS to perform a deeper dive analysis. In our business time is money, and the faster I can get to the right prescriptive solution, the more value I provide to the grower. In this case, Quantix mapped the entire 140 acres in only 18 minutes, and after the data was uploaded into AV DSS, I had a complete view of my field in less than 24 hours.

Utilizing the advanced image processing and data analytics capabilities of AV DSS, we are able to analyze crop health using NDVI, GNDVI, and anomaly layer maps. What we saw blew our minds. The imagery collected by Quantix picked up a pump error on an anhydrous application conducted last fall that was previously undetected. The neatest experience, to me as an agronomist, is that not only does Quantix & AV DSS enable you

to gather and analyze drone aerial imagery, but you can also incorporate ground truthing pictures, and collaborate with the grower through one integrated platform.

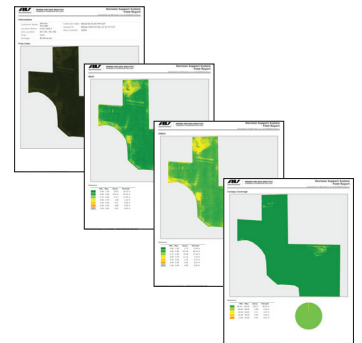
Now that I had identified the root cause of the problem, the discussion to pull the trigger on an in-season nitrogen application became our critical decision point. Thinking back to the 4Rs we asked ourselves - when would we know if it will be a true return on investment, the right timing, and at the right rate? We identified through the anomaly layer on the AV DSS software the pump error from a fall anhydrous application. Our next step was to pull the growers anhydrous maps, and calculate the amount of nitrogen needed to make up the mistake. Based on our analysis, the grower and I decided to go out within a week to apply 20 pounds of nitrogen. At harvest, the application was validated by showing a 3 bushel increase over the field average. Although three bushels is not a huge ROI, it is unknown how significantly less the yield would have been without the application.

In today's world, every move agronomists, and growers alike make are being analyzed under a microscope, and we are awash in informational data that leads to confusion rather than actionable intelligence. Quantix & AV DSS gives me the ability to use data and science together in an organized way to develop a true, custom plan for growers. To me, this is what being an agronomist is all about - helping the grower be environmentally sound, and improving operational performance, without sacrificing yield.



Anomaly Layer

Based on NDVI - provides indication of the overall uniformity of the field. Quickly identify areas that are performing better or worse than average



AV DSS Field Reports

Easily export geo-location data, imagery data sets and statistics

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