Proceedings for Panel: *Precision Agriculture*

Panel Chair: Dr. Alice Robinson (Pivot Bio)

Panelists: Dr. David Brown (Pivot Bio), Eric Johnson (AIRBUS), Dr. Stan Martin (DOE | ORNL)

The panel on precision agriculture (ag) explored ideas about the concept of precision ag and how data is currently being used in the industry to frame out the challenges faced in delivering actionable Big Data solutions for farm management decisions.

What is precision Ag?

Data has always played an important role in farming practices and the management concept of precision ag has been in development for 30+ years. The concept is fairly simple: observe, measure and execute farming practices at intra-field spatial scales.

This is done for example either by sub-field level grid sampling, by soil zones or even in some cases on a plant by plant basis with the goal of whole farm optimization.

The main benefits being you can grow and do more with less resources by only using exactly what you need where and when you need it with the added benefit of reduced environmental impact.

How do we know what when and where?

One thing is for sure there is no shortage of data in Ag. As with all other industries, advances in compute power, sensor information, cellphones, and network coverage are but just a few of the factors that have driven data volume and availability.

What to do with all the data is often overwhelming and big data solutions have been challenging. As data amasses in the industry and AI solutions continue their development, how close can we actually get to replicating complex farming decisions? Can we achieve a 'Smart Farm' where daily farm management decisions are data driven and automated? And what are the most important questions farmers want answers to?

The Panelists

Dr. Stan Martin | DOE | Oak Ridge National Laboratory

Dr Martin opened up the talks with a journey from Norman Borlaug's efforts to specifically breed disease resistant traits in wheat to the green revolution 2.0. Driven by data and tech advancements, Dr Martin painted a picture of where precision ag will move into the future and how we will have to adapt to continue to grow. A key message is that the solutions for us to be and do better on this planet and beyond will be challenging but that the future is really up to us.

Eric Johnson | AIRBUS | Fort Collins

Eric Johnson presented an overview of the AIRBUS satellite capabilities in terms of spatial and temporal resolution. We had an introduction into the data layer offerings of the AgNeo platform, an agricultural monitoring service for decision support under the AIRBUS intelligence arm. We learned about Verde crop analytics and modelling data layers for derived biophysical parameters from spectral imaging. A key point well-made was that you only have to be as precise as you can accurately execute.

Dr. David Brown | Pivot Bio | Berkeley CA

Dr. Brown presented on the things that move a grower to make a decision: yield, yield, and yield! He pointed out that due to a very strong relationship between nitrogen and yield, applying more nitrogen was always a quick and easy decision for growers to make, much to the detriment of the environment (a problem Pivot Bio is hoping to alleviate with their nitrogen producing microbe: ProveN). Dr. Brown cited variability, scale and cost as limiting factors in the adoption and expansion of tech and precision ag with a $1000/ac revenue resistance line. He pointed out that rapid advancements in machine learning and robotics were making dense on-the-ground data sets possible to collect. An important question from Dr. Brown is that now we have all this data, what are we going to do with it?

Discussion Session

The panel addressed major advances in driving precision ag forward over the last 10 years from the first applications of using GPS for equipment guidance to cell phone and network coverage giving immediate connectivity to deliver actionable information in the field.

Audience questions focused a lot on exploring the ideas behind what precision agriculture is, what types of data are generated, and measurement resolution. It is clear data uniformity, collation, ownership, and industry collaboration are potential barriers agriculture has to address to move Big Data, AI solutions to impacting grower decisions.

Next Steps

It is clear there is a lot of industry specific knowledge that needs to be assimilated both from precision ag into PHM and vice versa to really explore how these two fields can best come together. A collaborative working group with experts from both sides could really help to accelerate this and it was exciting to be part of PHM's first exposure to the possible applications in agriculture.