@OhioStatePA

# Utilizing Technology for Alternative Nutrient Management Plan John Fulton



2018 Ohio Grain Symposium, Columbus, Ohio



### Digital Agriculture (IoT in Ag)



(i) About

Plot Generato

Trials (Login)
Push History

7 FAQS



# **U.S.** Precision Ag Trends

#### Variable-rate Technology (VRT)

- Variable-rate fertilizer and lime (high adoption; >50%)
- Variable-rate seeding of corn (>25% adoption)
- Variable-rate seeding of soybeans (quickly growing in adoption)

### **Digital Tools**

• New summary analytics for agronomic and business evaluation (farmer have interests; >10%)



# Technology advancements



Offer now

Will offer by 2020

## Precision Ag Services Offered

		Don't oner now, but did				onernow			
	Field mapping (with GIS)		5%	6		7	8%		
	VRT fertilizer or lime presc	sc 15%				82	.%		
	VRT fertilizer appl	15%	3%			81	L%		
	VRT lime appl		30%	<mark>% 3</mark> %			67%		
	VRT pesticide appl			56%	56%		24%	17%	
	VRT seeding presc		34%		109	%	56%		
	Yield monitor sales/support		49%		7%	4	1%		
Yield m	Yield monitor and other data analysis		33%		11%	6	57%		
	Satellite/aerial imagery		29%		12%	59%			
	UAV	41		.%		27%	27%		
Guidanc	Guidance/autosteer sales and support		57%			3% 3		36%	
	Grid or zone soil sampling	15% 3%			82				

Don't offer now, but did

Never offered /Don't know



### FIELD EXECUTION CONSIDERATIONS 2 Fertilizer Sources with 1 Pass

MAP Rx --- 0 to 336 kg/ha



Potash Rx --- 0 to 336 kg/ha



Most companies offer solutions to <u>carry and independently meter 2 or more</u> <u>products</u> on their fertilizer application equipment today (NO need for blending fertilizer sources).

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### Mid-season (V6-V10) application of N (urea) in corn



Rate controller with VRT and automatic swath control technology









### **As-Applied Data**

# Move from one machine to another

SYNC with multiple machines in the same field

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# **P & K Application**

Costs	Straight Rate	Variable Rate			
MAP	\$4,223 (210 lb/ac)	\$2,788 (140 lb/ac)			
Potash	\$2,936 (210 lbs/ac)	\$2,765 (199 lbs/ac)			
Spread Charge	\$489 (\$5/ac)	\$537 (\$5.5/ac)			
Total	\$7,648	\$6,090			
	VR Fertilizer ROI: \$1,558 (\$15.95/ac)				
1. Data	2. Information	3. Knowledge			

#### Fertilizing Prescription (Dry) 2017 - 5 - MAP



Fertilizing Prescription (Dry) 2016 - 5 - Potash







# Farm Digital Toolbox

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#### **APPs / Data Collection Software** SMS Advanced Climate FieldView Cab • Farmobile Beck's FarmServer Raven SlingShot • Encirca • MyJohnDeere • Pix4D • Encirca • ArcGIS • CropMetrics • AirScout • BOX GeoVantage • ADC Account



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0.075/0.15



- Precision nutrient management complex to implement.
- High resolution soil maps soil OM , CEC, water holding capacity, and texture.



### **Data-based Decision Making**





### Nitrogen Status



Monitor available nitrogen to take action and prevent yield loss with Climate FieldView<sup>™</sup> Pro.

# Apps for P & K Management

Tools to increase application efficiency, assist in rate/timing decisions, documentation, calibration, etc...

### Industry Apps for P/K



AgWorld Sampling App – Assist in intensive soil sampling jobs/management.



IPNI Crop Nutrient Removal Calculator – Estimate crop nutrient removal for a variety of crops.



AgPhD Fertilizer Removal App – Calculate nutrient amounts needed for yield target.



Ohio Apps

OnMRK – Application Documentation,

Spread/no-spread management.



PLOTS – On Farm Research for P/K.



FERT – Fertilizer Calculator.



SPREADCAL – P/K Spreader Calibration.

#### Field Data Management

Арр	Details				
Ohio State PLOTS	Available from: OCV, LLC Operating system: Android / iOS Description: Create replicated on-farm trials to compare hybrids, fertilizer rates, stand counts, and more. Provides statistical comparisons and summary reports. Cost: Free Account needed? No				
	Available from: The Climate Corporation Operating system: Android / iOS Description: Connected suite of digital ag tools. Tracks rainfall, field health, nitrogen status, yield analysis, and recent activities. Includes delivery of weather information. Paid subscription required to access some functionality. Cost: Free Account needed? No				
FieldView Cab	Available from: The Climate Corporation – US Operating system: Android / iOS Description: Digital tool for visualizing planter and harvest field data while supporting field scouting, imagery, and soil data layers. Cost: Free Account needed? No				

#### Weather

Арр	Details				
The Weather Channel The Weather Channel	Available from: The Weather Channel Operating system: Android / iOS Description: View local and national forecasts, current weather conditions, and weather maps. Cost: Free Account needed? No				
ccuWeather: Weather Forecast & Real Time Reports	Available from: Accuweather Operating system: Android / iOS Description: View minute-by-minute precipitation forecast, hyper-localized to your farm and field. Cost: Free Account needed? No				
Weather Underground: Forecasts	Available from: Weather Underground Operating system: Android / iOS Description: View hyper-local weather forecasts in addition to interactive radar, satellite maps, and severe weather alerts. Cost: Free Account needed? No				
Weather by WeatherBug	Available from: WeatherBug Operating system: Android / iOS Description: Provides fast weather alerts while viewing real-time weather conditions and hourly forecasts. Cost: Free Account needed? No				

Source: <u>https://ohioline.osu.edu/factsheet/fabe-55202</u> (87 total listed APPs)

- Includes a listing of 41- Nutrient Information and Calculators, 5 - Equipment Setup, 4 - Nozzle and Orifice Selection, 5 - Record Keeping, 6 - Soil Sampling, 4 - Field Data Management, 16 - News and Information, 4 - Weather and 2 - Area APPS.



### Data layers available after planting





### "Terra" Project









"Directed" Sampling and Scouting Sites



## COLLECT IN-SEASON DATA







### **Planter Applied Fertilizer**

### Side-dress N

JOHN DEE	Operations Center				
Client Name: Ebberts Farm Nan	ne: Tom Fulton				
28					5/24/18 1:02 PM - 5/24/18 7:50 PM
PRODUCT	TARGET RATE	TARGET TOTAL	AVG RATE	TOTAL APPLIED	AREA
28			46.22 gal/ac	5,905.87 gal	
TOTAL APPLIED			46.22 gal/ac	5,905.87 gal	127.78 ac
6-18-6					5/1/18 10:17 AM - 5/1/18 4:43 PM
PRODUCT	TARGET RATE	TARGET TOTAL	AVG RATE	TOTAL APPLIED	AREA
6-18-6			5.13 gal/ac	643.64 gal	
TOTAL APPLIED			5.13 gal/ac	643.64 gal	125.56 ac
TOTALS					253.34 ac

### 2018 N Applied Summary Report

# Software Platforms & In-field Sensors





#### **Platform Functionality**

- Precision Ag Services including imagery
- Enterprise Resource Planning (ERP)
- Benchmarking
- IoT integration

## IoT – Nutrient Sensors



https://teralytic.com/

Gas Sensors 18IN / 6IN DEPTHS (45CM / 15CM) Aeration (O<sub>2</sub>) Respiration (CO<sub>2</sub>)

# SUMMARY



Precision Ag adoption continues to increase in US.

Growing opportunities to utilize imagery and digital technologies during the season.

New opportunities to maintain field records + generate new insights.

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### **Digital Agriculture**

Providing solutions to meet world demand

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#### **Ohio State Precision Ag Program**

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