INNOVATIVE WAYS TO ESTABLISH COVER CROPS

PRACTICAL FARMERS OF IOWA ANNUAL CONFERENCE | JANUARY 17, 2019

BLAIR FARM, LLC

Kellie Blair
Dayton, Iowa

kellieblair@akrfarm.com

BlairKellie

HomeAgainFinnegan

KellieMarieBlair








FARGO AIRE













Oats & Rye – Hagie Seeded


FARGO AIRE



November



May







Cover Crops

Erich Wickman
Wickman Chemical




N466FL
R44
RESTRICTED




MASSEY FERGUSON


30
JOHN DEERE
SIMONSEN
2584

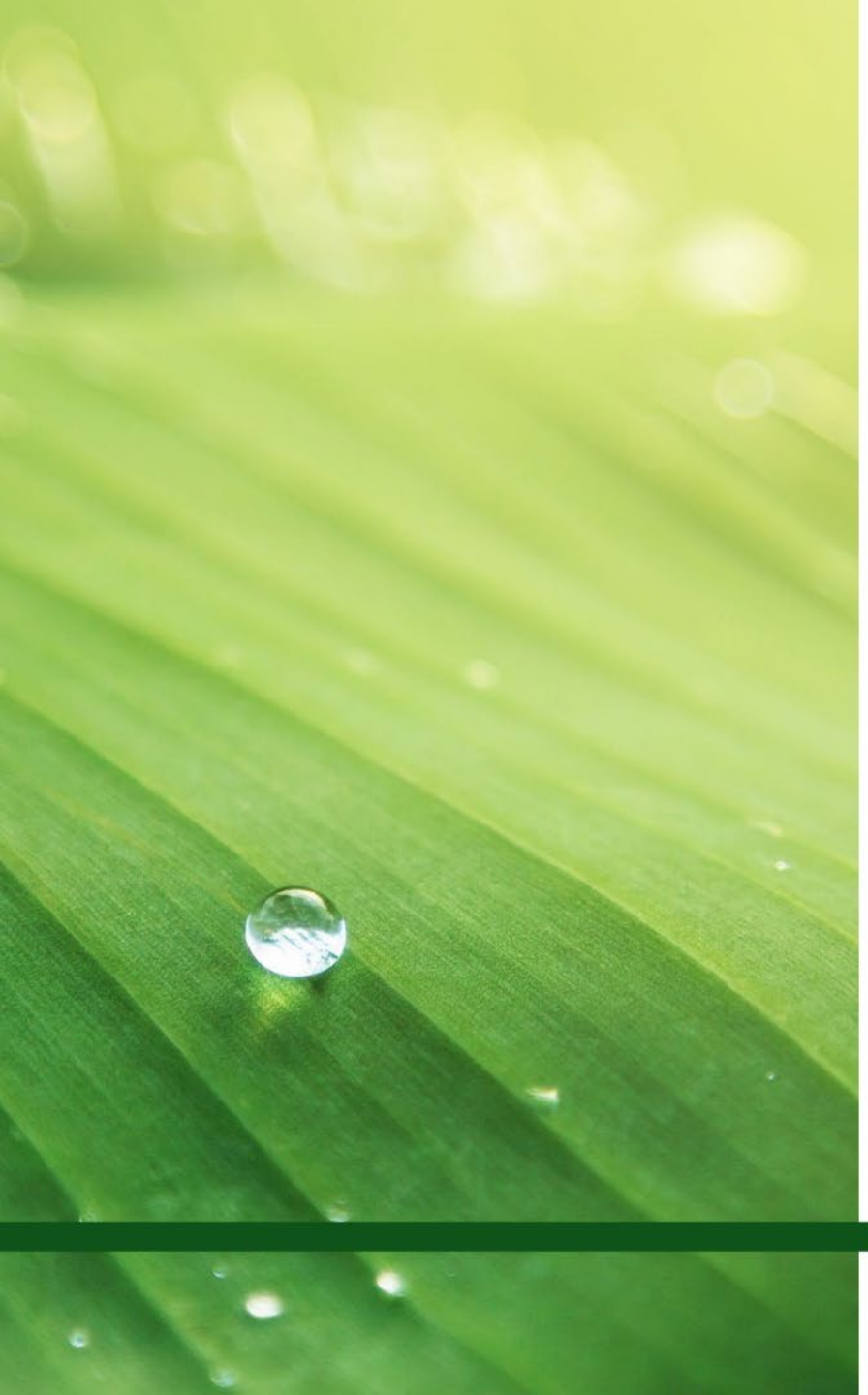

WICK
CAUTION




240 VOLTS


NEW HOLLAND
T8.350
EXCELERATOR
8000





RANTIZO

WE DELIVER SOLUTIONS

@RantizoSprays

Soon there will be *9 Billion* people in the world, yet fewer and fewer are working agriculture.

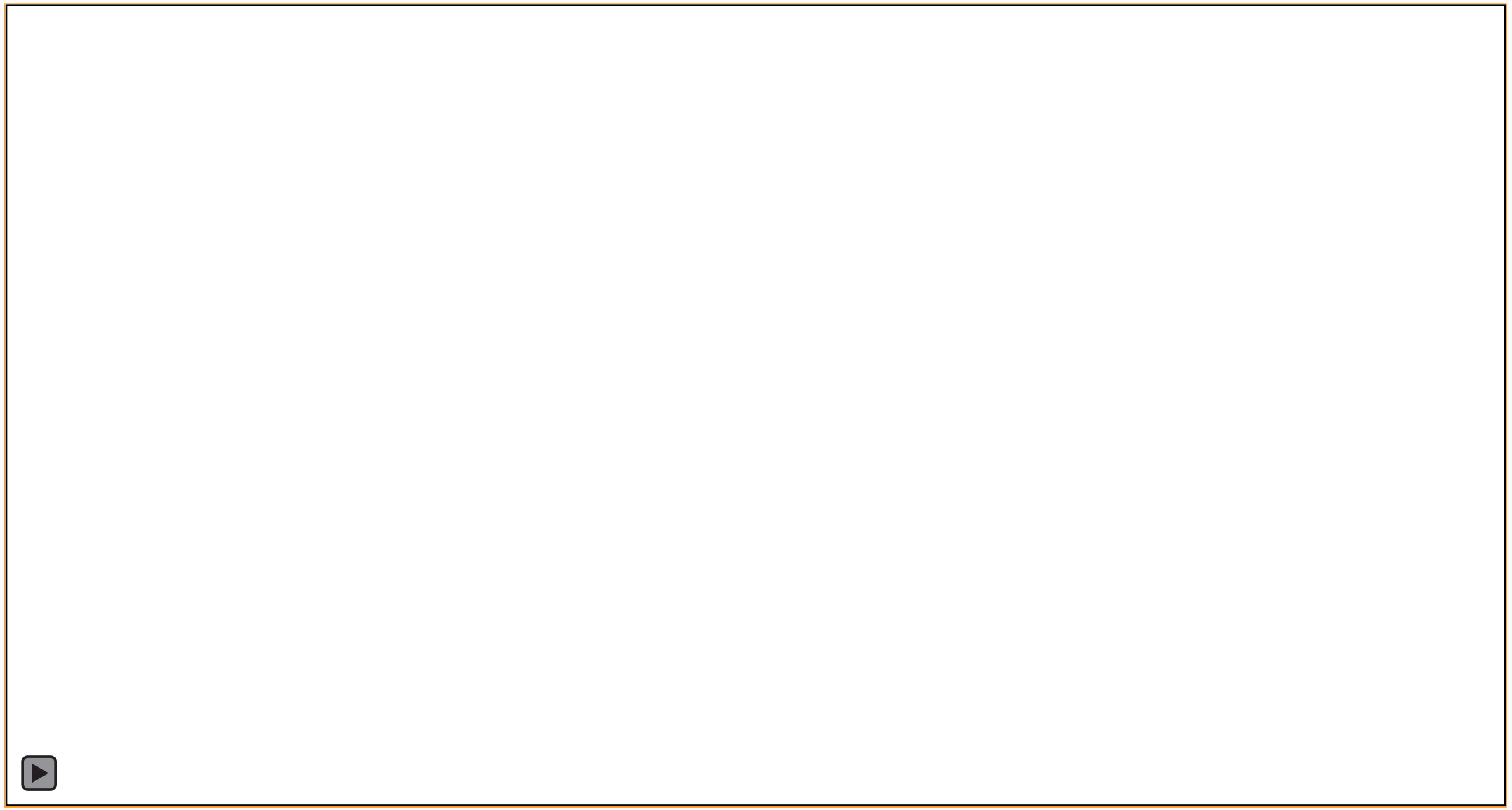
Automation and *Technology* are critical to feed a growing population with a shrinking labor force.



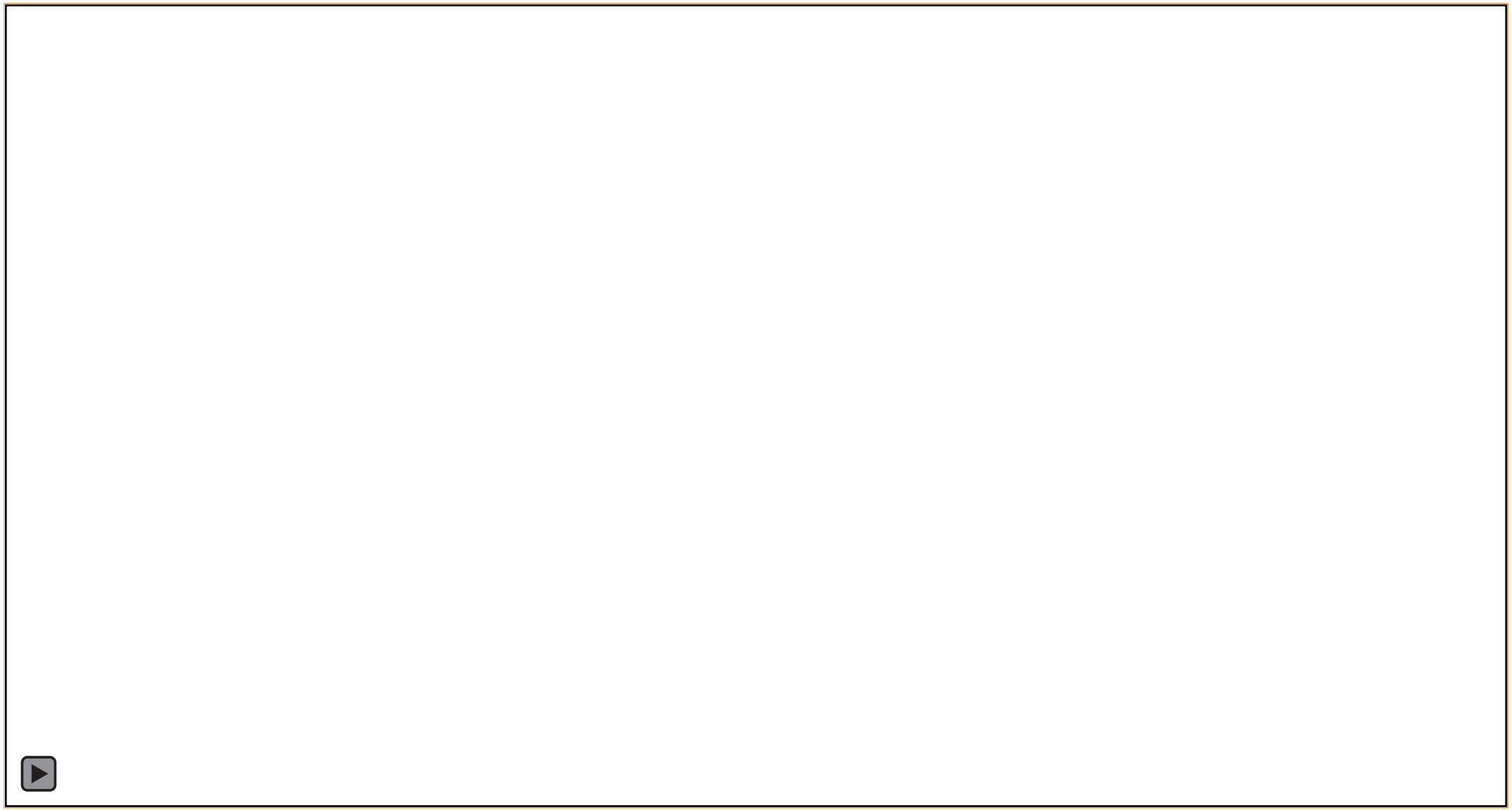


There have been tremendous advancements in agricultural technology over the past several decades, however, agrichemical spraying has not kept pace.

Stuck In The Mud

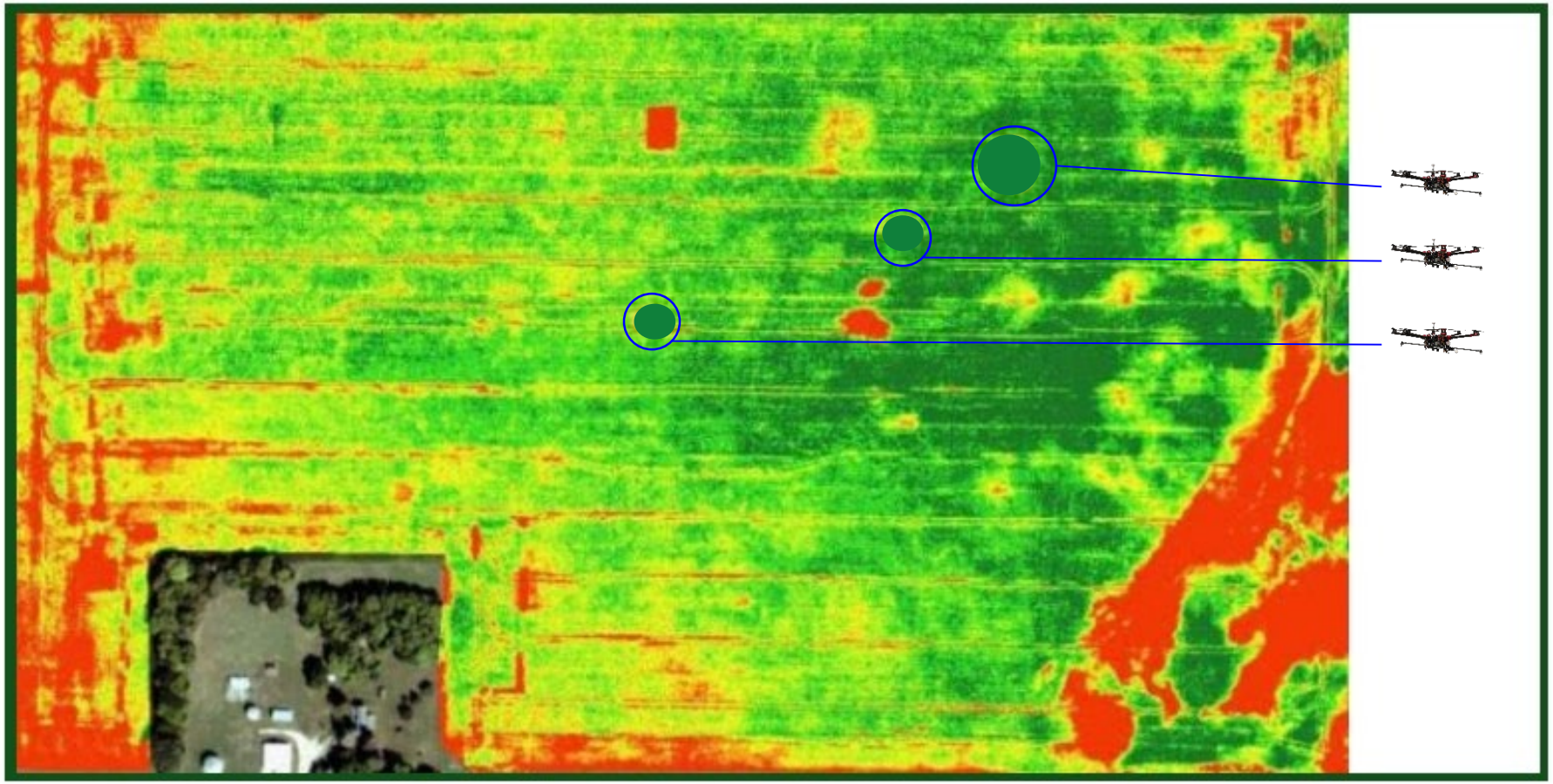


Fly & Apply



The Rantizo Concept

Identify. Diagnose. Apply. Verify.



RANTIZO®
WE DELIVER SOLUTIONS

How Rantizo Works

1. Identify



Continuum Ag, LLC

- Soybean field in southern Iowa
- Field imagery identifies problem areas

How Rantizo Works

2. Diagnose



- Yellow streaking on leaves
- Nutrient deficiency
- Micronutrient application needed



How Rantizo Works

3. Apply



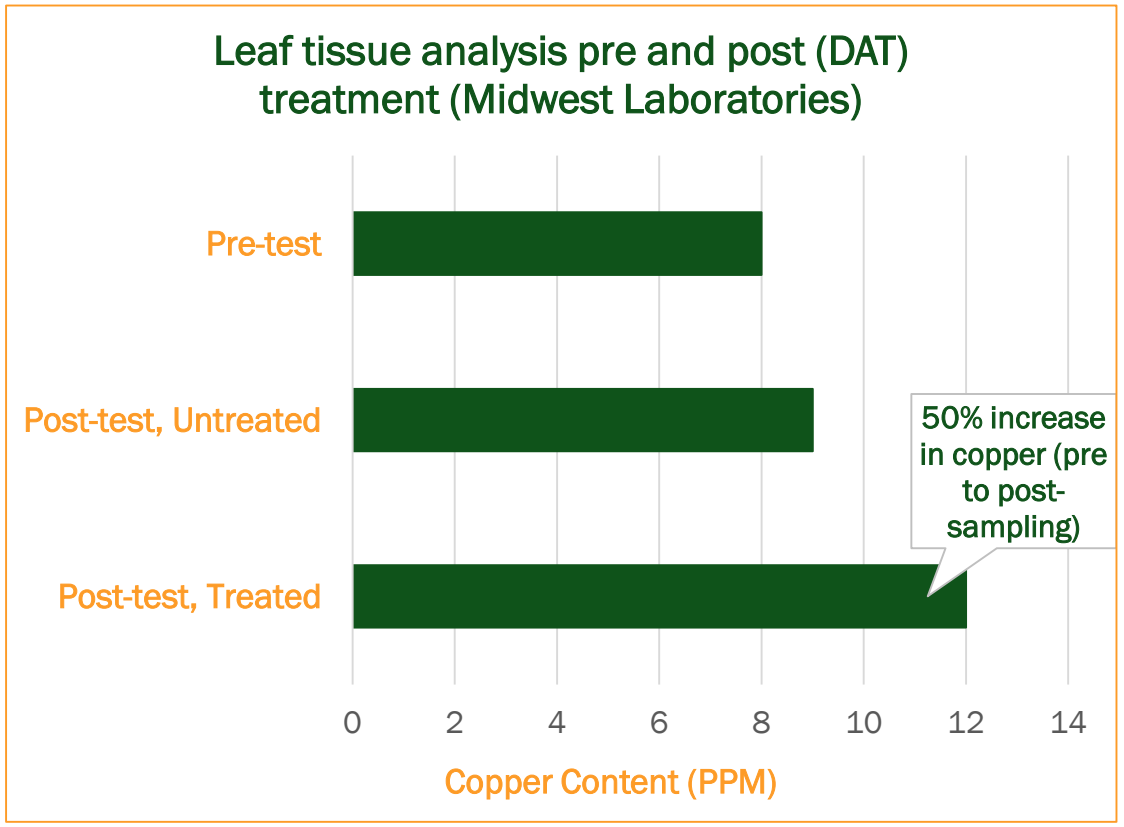
- (6) 50’ x 200’ treatment strips
- (2) reps per treatment strip
- (3) treatment variants

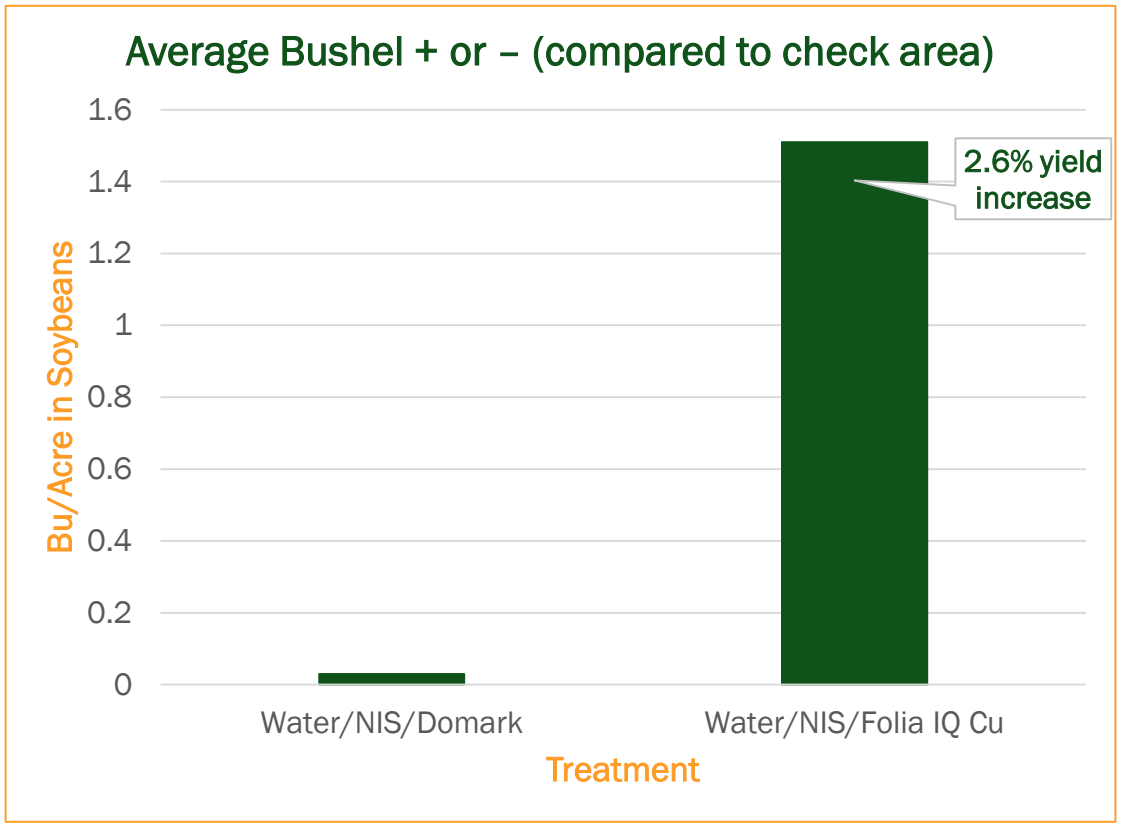
PHYTOBIOTICS

RANTIZO® WE DELIVER SOLUTIONS

How Rantizo Works

4. Verify





RANTIZO®
WE DELIVER SOLUTIONS

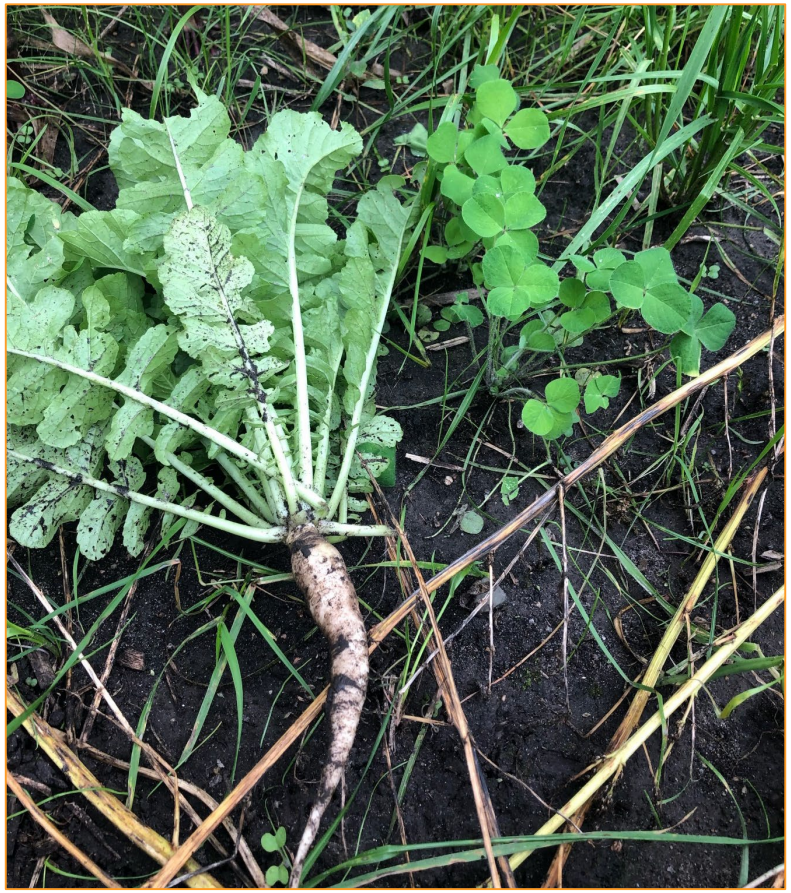
Dry Application Opportunities



Targeted treatments

- Cover crop seeds
- Pollen
- Granular fertilizers
- Beneficial insects

Drone-Based Cover Crop Seeding







RANTIZO®
WE DELIVER SOLUTIONS

Why Drones for Cover Crops?

"Accuracy"

"Timing in between rains"

"Plots...seems like a no brainer"

"I was amazed how fast it can fill in small patches. It Turns around much faster than a tractor, airplane, or helicopter with no crop damage."

"An average farmer can buy, maintain and, fix themselves, unlike an air tractor."

Benefits

- Increased field access
- Reduced crop damage
- Eliminated soil compaction

Use Cases

- Prevent plant patches
- Row crop interseed/overseed
- No till practices
- Nutrient retention
- Organic ecosystem facilitation

Cover Crop Seed Application

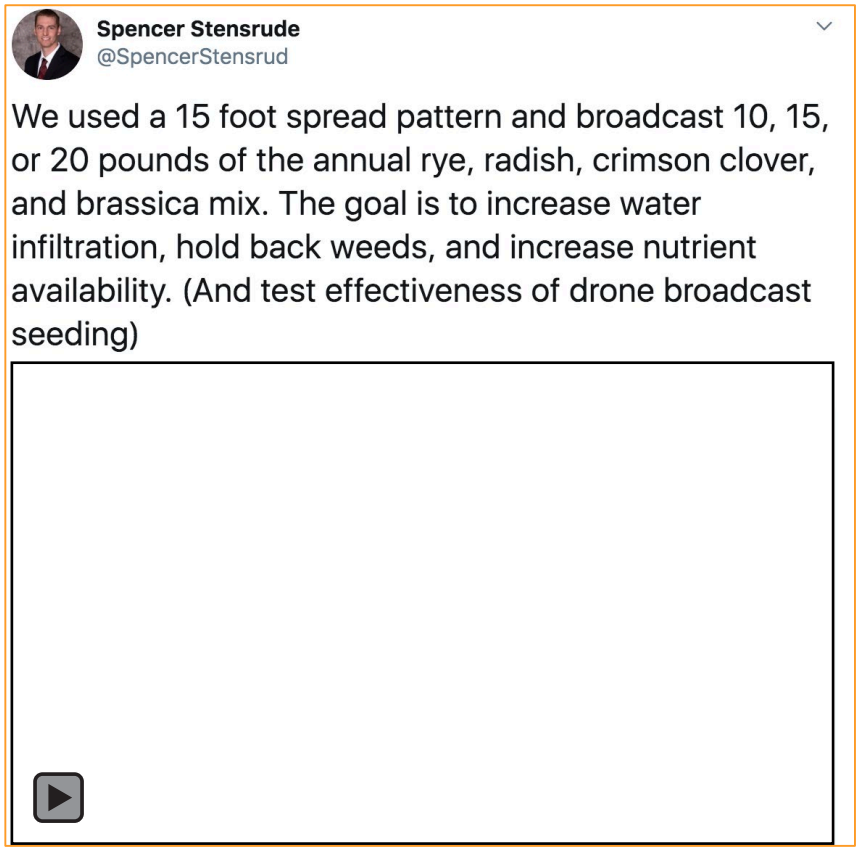


Rantizo Applications

- **Location: Northern, IA**
- **Cover crop seed:**
  - **Annual rye**
  - **Crimson clover**
  - **Radish**
  - **Brassica mix**
- **Use case: Muddy patches in fields**

RANTIZO® WE DELIVER SOLUTIONS

Cover Crop Seed Application





RANTIZO®
WE DELIVER SOLUTIONS

Cover Crop Seed Application

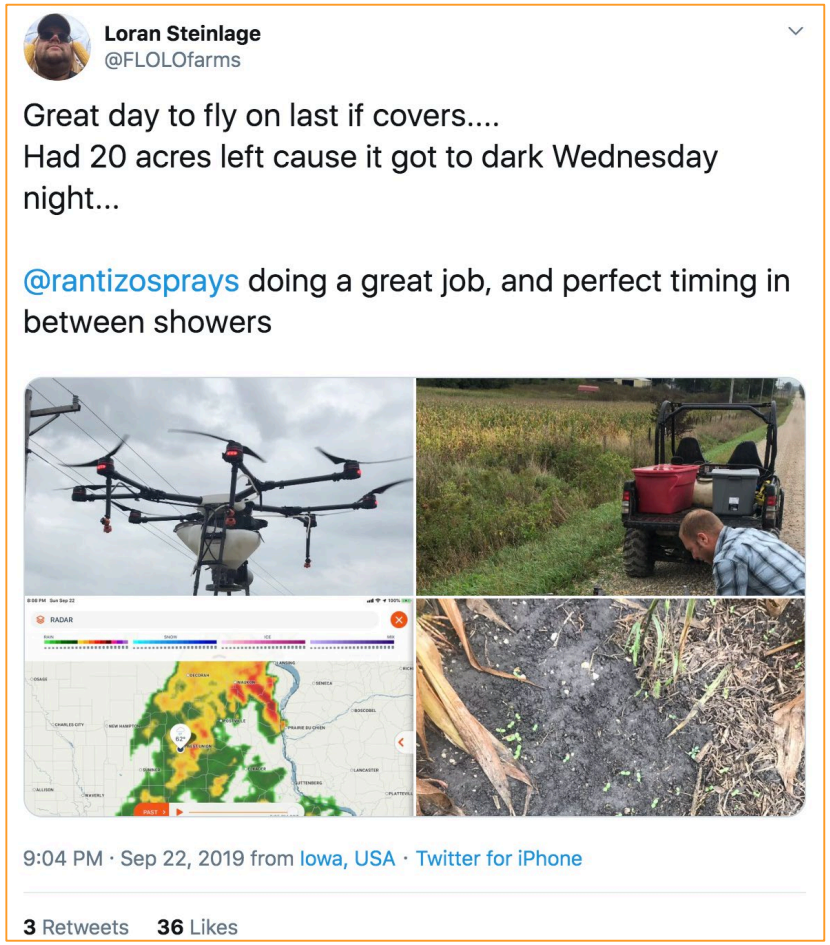


Rantizo Applications

- **Location: Ainsworth, IA**
- **Cover crop seed:**
  - **8-way mix: cowpea, harry vetch, clover, radish, etc.**
- **Use case: Interseeding**

RANTIZO® WE DELIVER SOLUTIONS

Cover Crop Seed Application



Rantizo Applications

- **Location: West Union, IA**
- **Cover crop seed:**
  - **Crimson clover 5.5 lb./ac**
  - **Harry vetch 15-10 lb./ac**
- **Productivity: 30 ac/hr**

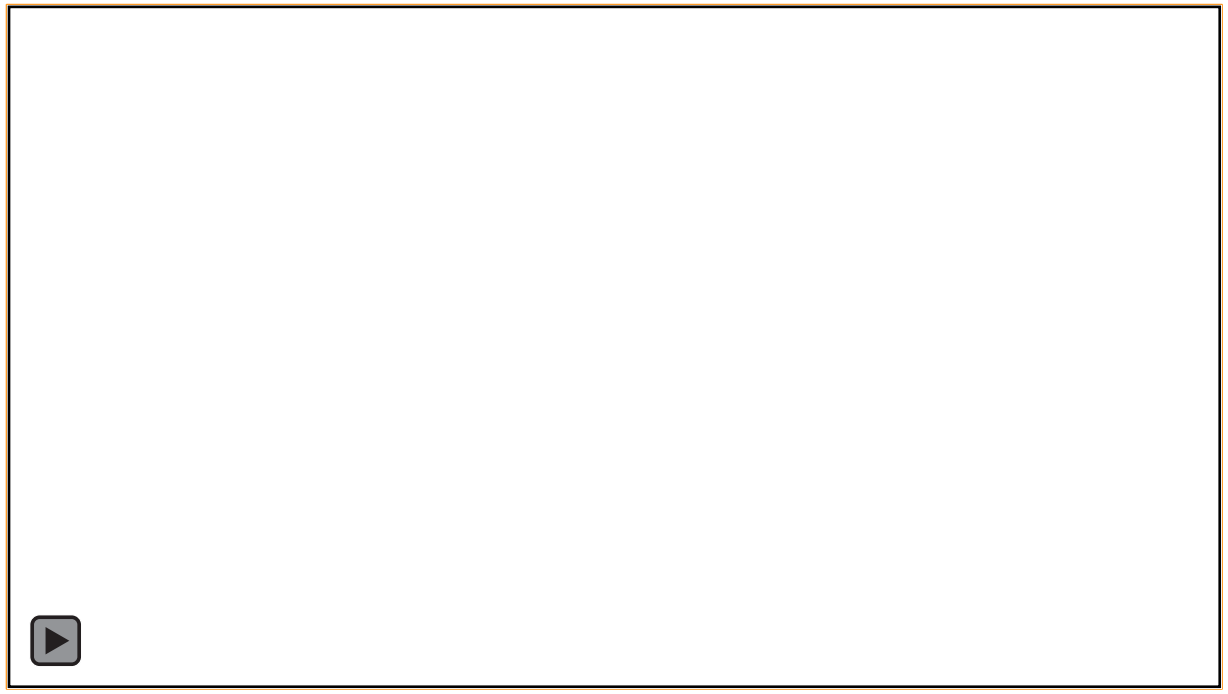
RANTIZO® WE DELIVER SOLUTIONS

Cover Crop Seed Application





Cover Crop Seed Application



Rantizo Applications

- Location: Prairie Du Chien, WI
- Cover crop seed:
  - Buckwheat

Cover Crop Seed Application

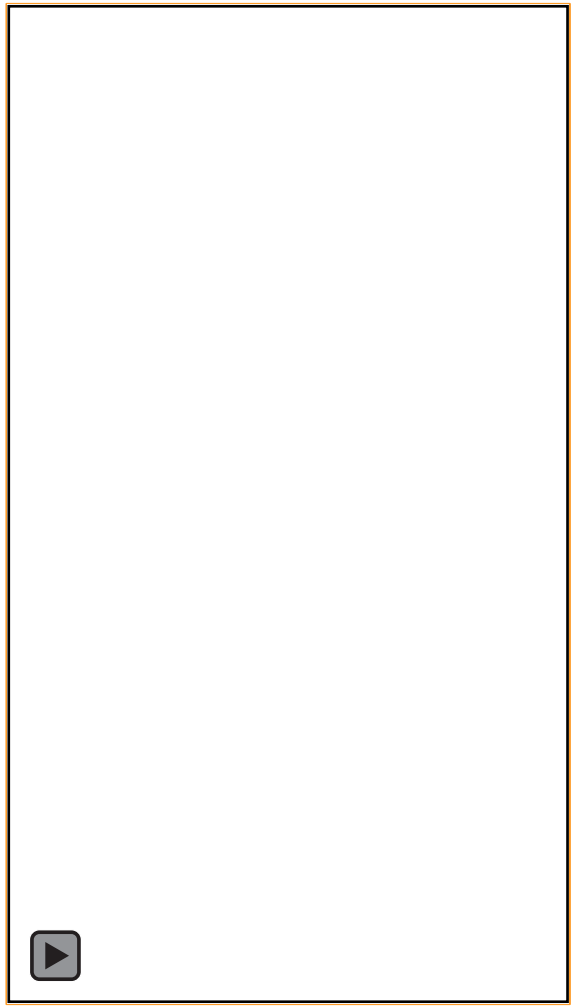


Rantizo Applications

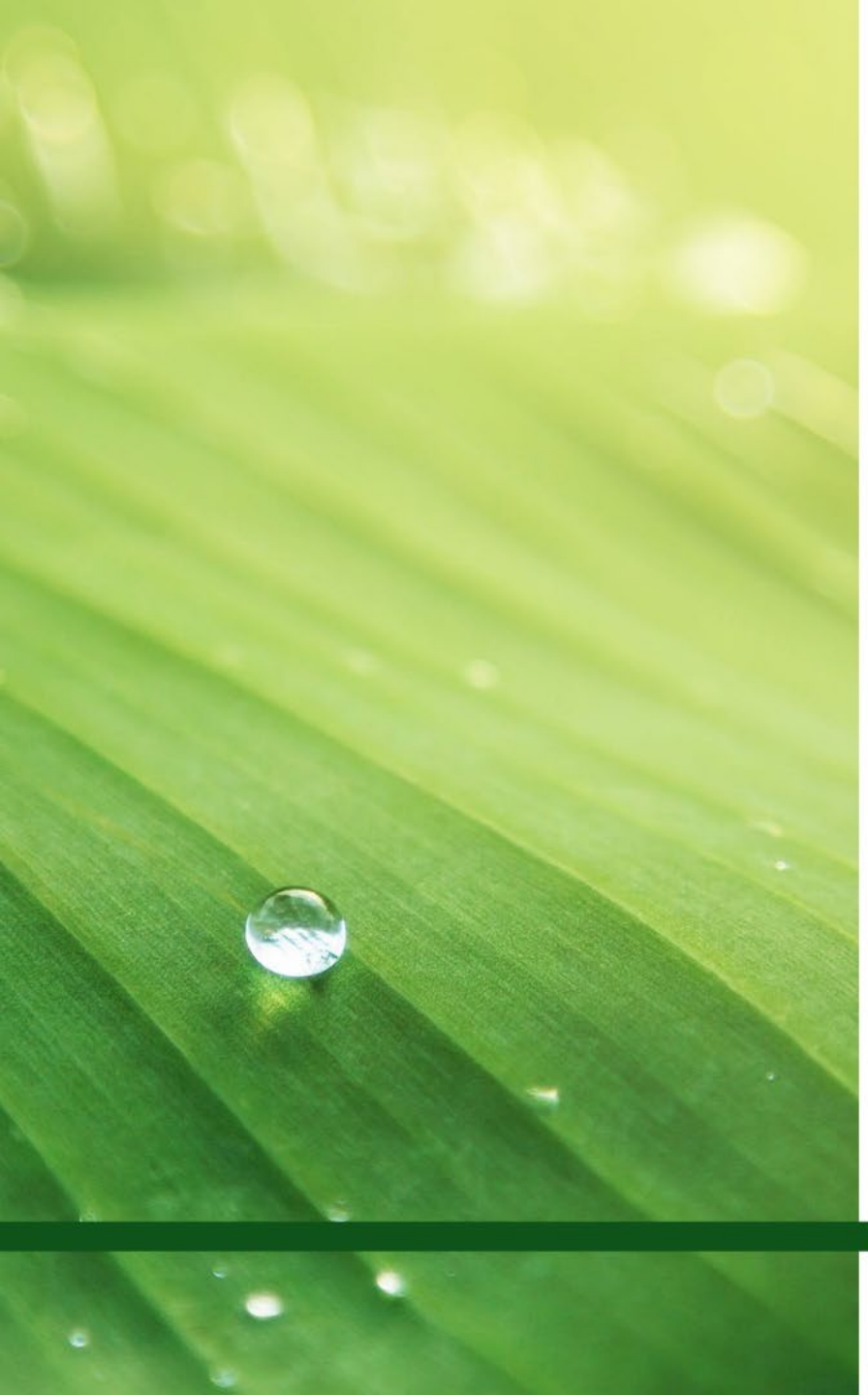
- **Location: Hayesville, IA**
- **Cover crop seed: Cereal rye**
- **Use case: Standing corn**
- **Field size: 35-40 acres**
- **Application rate: 25 lb/acre**

RANTIZO® WE DELIVER SOLUTIONS

Productivity Calculations



Lbs. per acre	Acres per hour
10	12
15	8
20	6
25	5
30	4
40	3



RANTIZO

WE DELIVER SOLUTIONS

@RantizoSprays

Additional Statistics

Agricultural Spraying Market

$36B

Global annual chemical application market

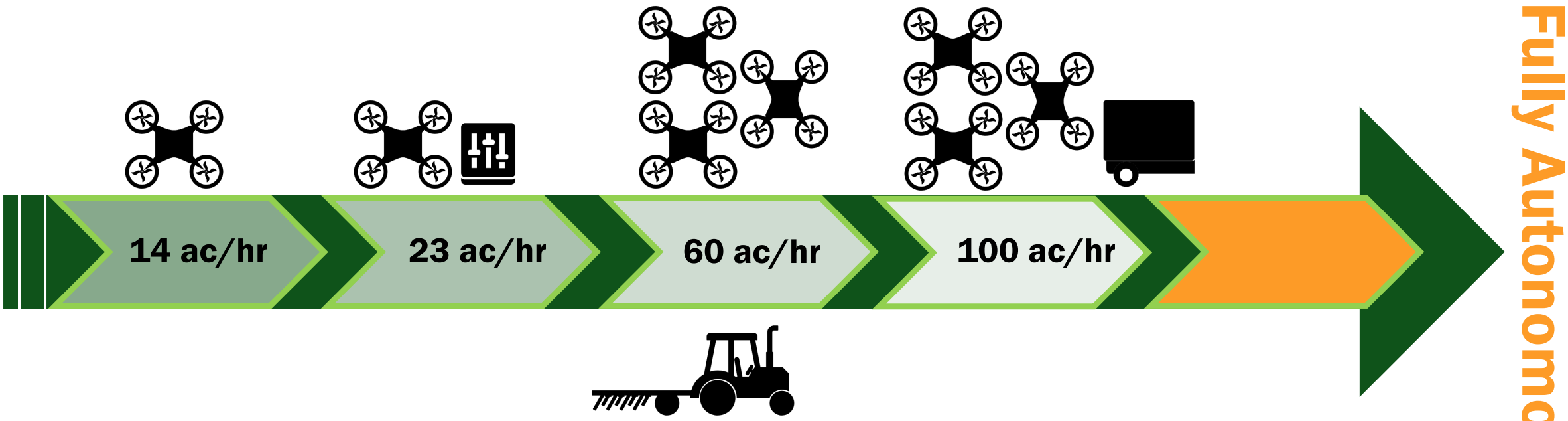
Agrichemicals

- Decreased effectiveness
- Increased spray frequency

Custom Applicators

- Treat 70% of U.S. cropland
- Heightened operational challenges
  - Labor shortages
  - Capital expenditures
  - Employee safety

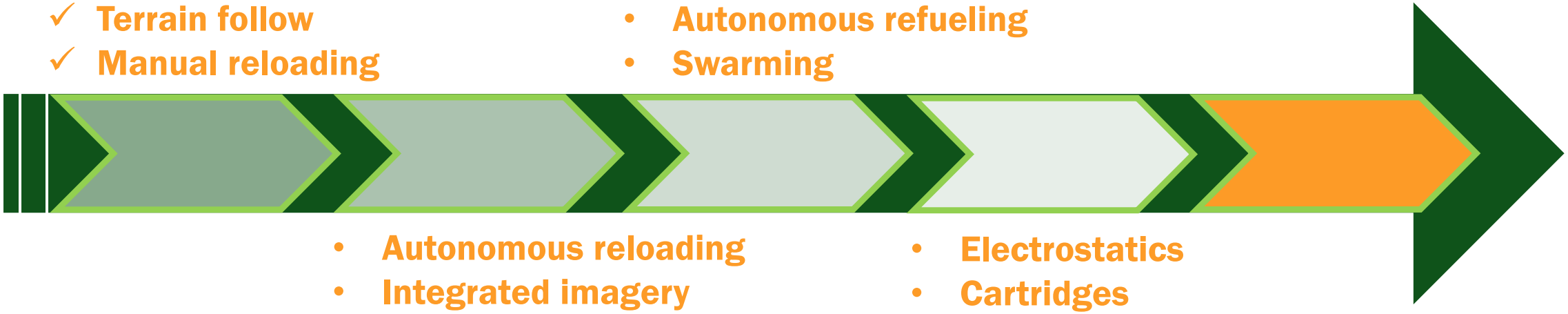
Path to Unmanned Spraying



Path to Unmanned Spraying

- ✓ Autonomous flight
- ✓ Collision avoidance
- ✓ Terrain follow
- ✓ Manual reloading

- Autonomous refueling
- Swarming



- Autonomous reloading
- Integrated imagery

- Electrostatics
- Cartridges

Fully Autonomous

RANTIZO®
WE DELIVER SOLUTIONS

Spot Spraying Benefits

Assumptions

- **Total acres = 100**
- **Chemical cost per acre = $35**
- **Yield increase per acre treated = 15 (bu/ac)**
- **Price per bushel = $4**

	Drone	Ground	Aerial
% of acres requiring treatment	100%	100%	100%
% of acres treated	100%	100%	100%
Total chemical cost	$ 3,500	$ 3,500	$ 3,500
Profit/acre	$ 14	$ 18	$ 10
Total profit	$ 1,350	$ 1,800	$ 1,000
Drone advantage (hire vs. ground)	$ (450)		



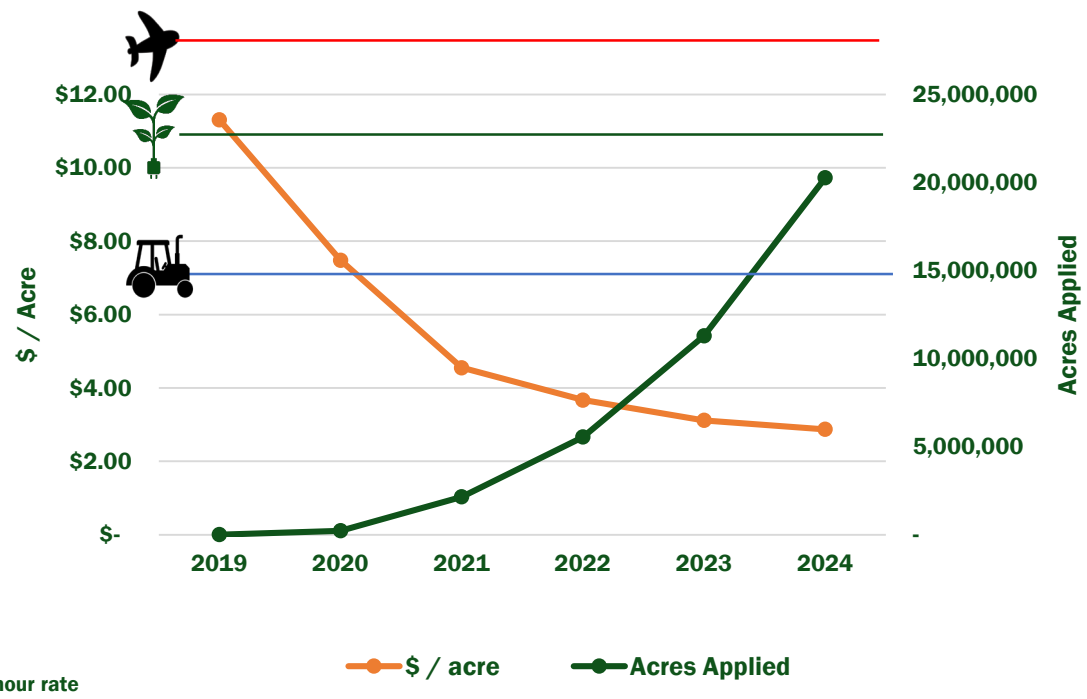
RANTIZO®
WE DELIVER SOLUTIONS

Multiple Pass Scenario

	1st Pass	2nd Pass	3rd Pass	Spot Spraying Cost	Full Coverage Cost
% ac requiring treatment	25%	10%	5%		
% ac treated	25%	10%	5%		
Total chemical cost	$875	$350	$175	$1400	$3500

RANTIZO®
WE DELIVER SOLUTIONS

Rantizo Spray Economics



*$150/hour rate

2020 Milestones

- Mix & Fill Station
- Swarming

2021 Milestones

- Trailer

2022 Milestones

- Electrostatics
- Cartridges

RANTIZO®
WE DELIVER SOLUTIONS

Revenue Opportunities



Drone, Sprayer and Software Sales

- Equipment sales
- Franchise/Distributorship

Application Service and Training

- Application service sales
- Partnership service royalties

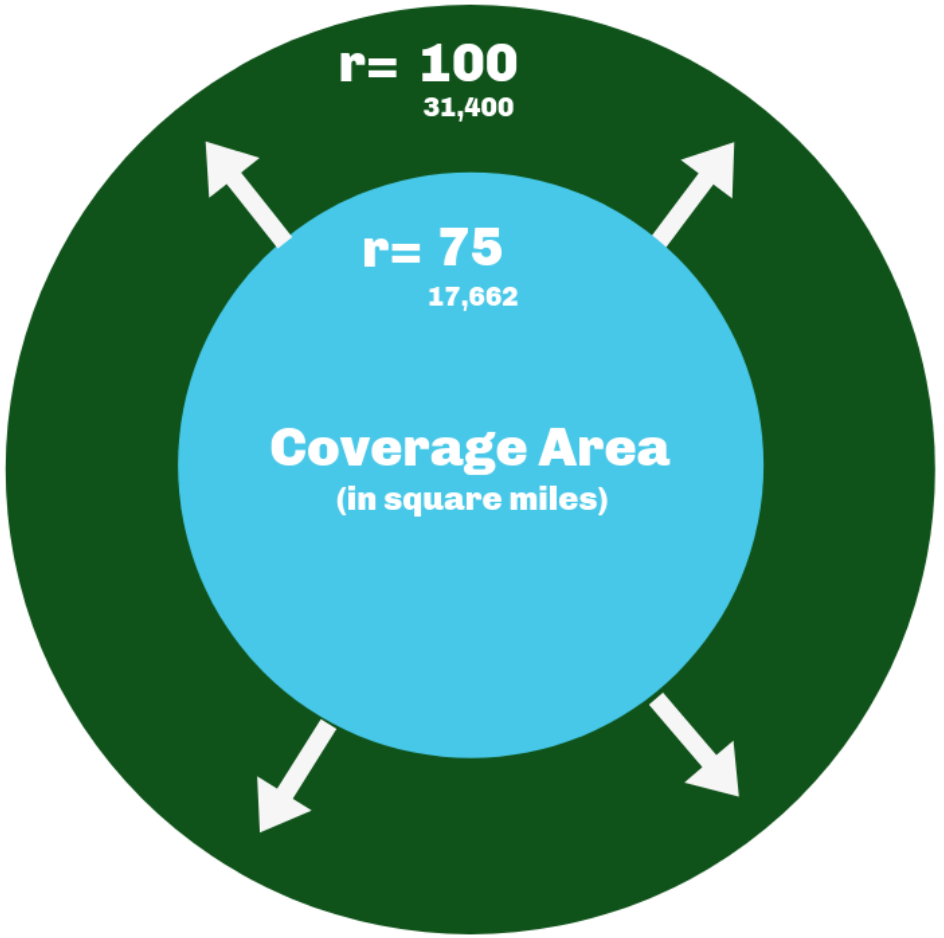
Agrichemical Cartridges

Data Aggregation

RANTIZO®
WE DELIVER SOLUTIONS

78%

Increase to serviceable area with same labor force when increasing to 100 mile radius from 75 mile radius



Lafayette, IN Weather Data – June 2018

Traditional Methods – 47 Hours to Spray

June 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4 2	5	6 8	7	8	9
10	11	12	13 3	14	15 5	16 6
17 5	18 1	19 3	20	21	22	23
24	25	26	27	28	29 3	30 11

GREEN = 8 or more legal spray hours in a day
YELLOW = Less than 8 legal spray hours in a day
RED = Could not spray due to off-label weather conditions, rainfall event, or fields too wet.

106 Legal Hours Ignoring Rainfall

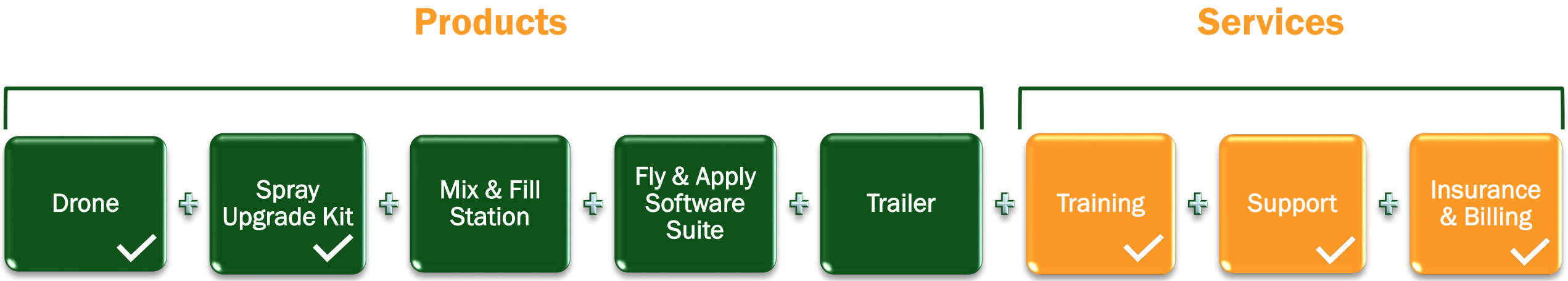
June 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 3	2 5
3	4 2	5	6 8	7 2	8 5	9 3
10 1	11 7	12 11	13 3	14	15 5	16 6
17 5	18 1	19 4	20 1	21 4	22 4	23 5
24	25 1	26 6	27	28	29 3	30 11

GREEN = 8 or more hours with no temperature inversion and favorable wind speeds during daylight hours
YELLOW = Less than 8 hours with no temperature inversion and favorable wind speeds during daylight hours
RED = Could not spray due to temperature inversion or off-label wind speeds

Purdue date retrieved 3/25/19 from Purdue University's Extension website at: https://extension.entm.purdue.edu/newsletters/pestandcrop/article/update-on-wind-speeds-and-the-new-dicamba-labels/

Rantizo Platform

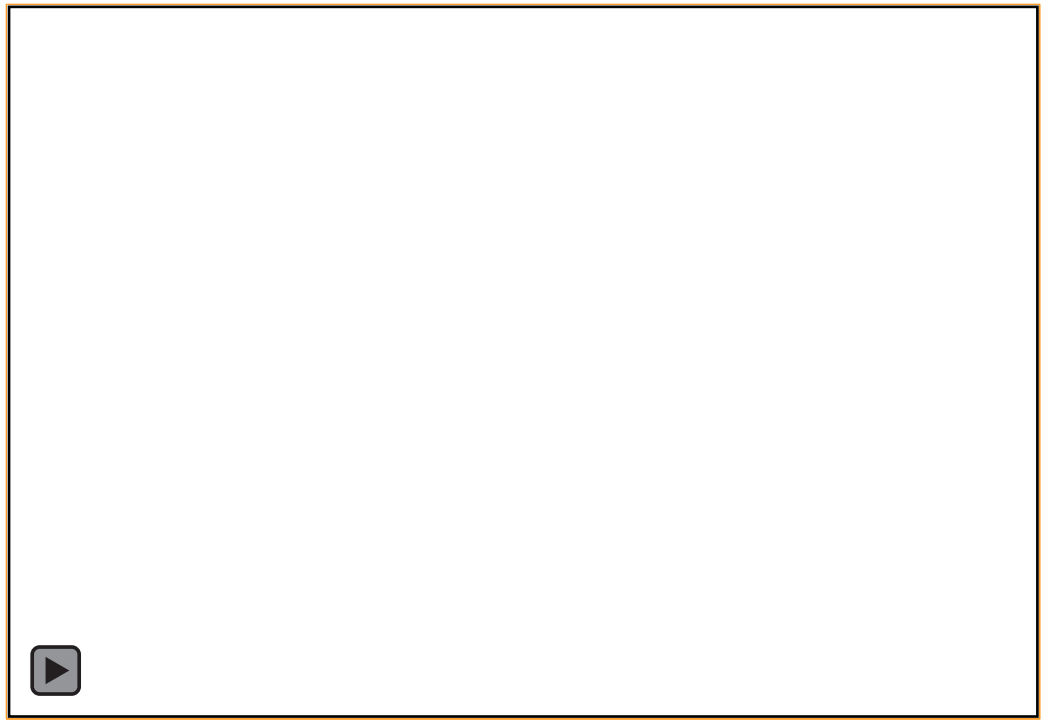


Platform Feature: Drone



- DJI Agras MG-1P
- Market leader in drone development
- Built for agricultural spraying

Platform Feature: Upgrade Kit



RANTIZO
WE DELIVER SOLUTIONS

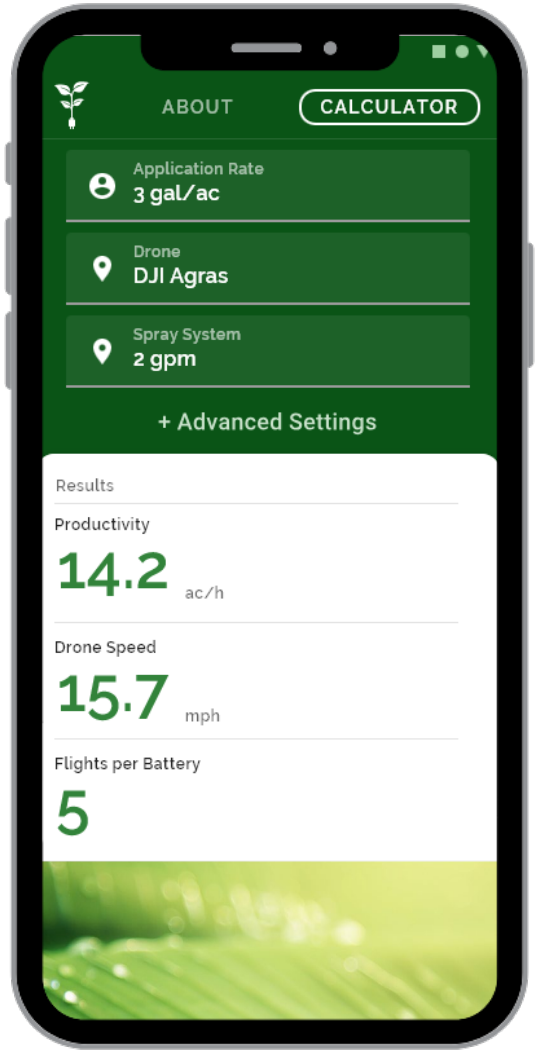
- 20' swath width
- 2.7 gallon tank
- 14 acres/hour
- 3.5 acres/charge

Platform Feature: Mix & Fill System



- Automates the refill process
- Reduces refill time and operator fatigue
- Improves productivity to 23 acres/hour
- The agility of the drone is extended to all aspects of chemical handling

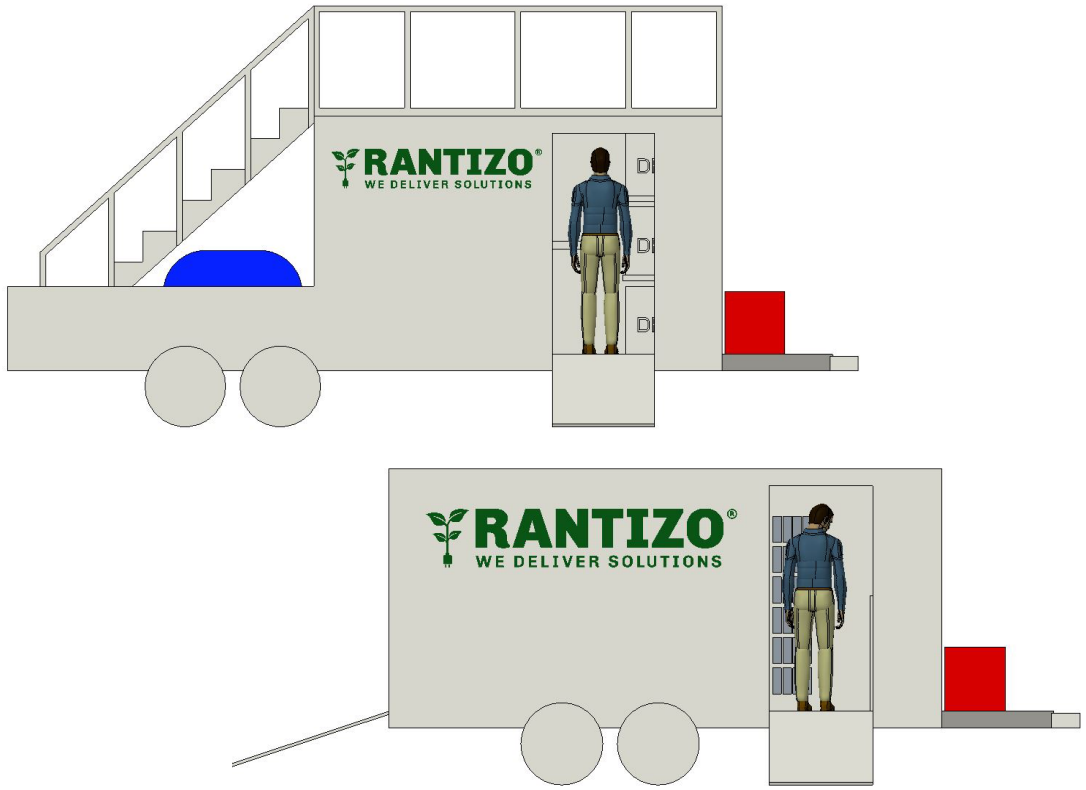
Platform Feature: Software Suite



- Desktop and mobile friendly interfaces
- Job scheduling and inventory tracking
- Back office and in-field status monitoring
- Job list and truck loading checklist
- Automated equipment configuration
- Invoicing and reporting

RANTIZO®
WE DELIVER SOLUTIONS

Platform Feature: Trailer

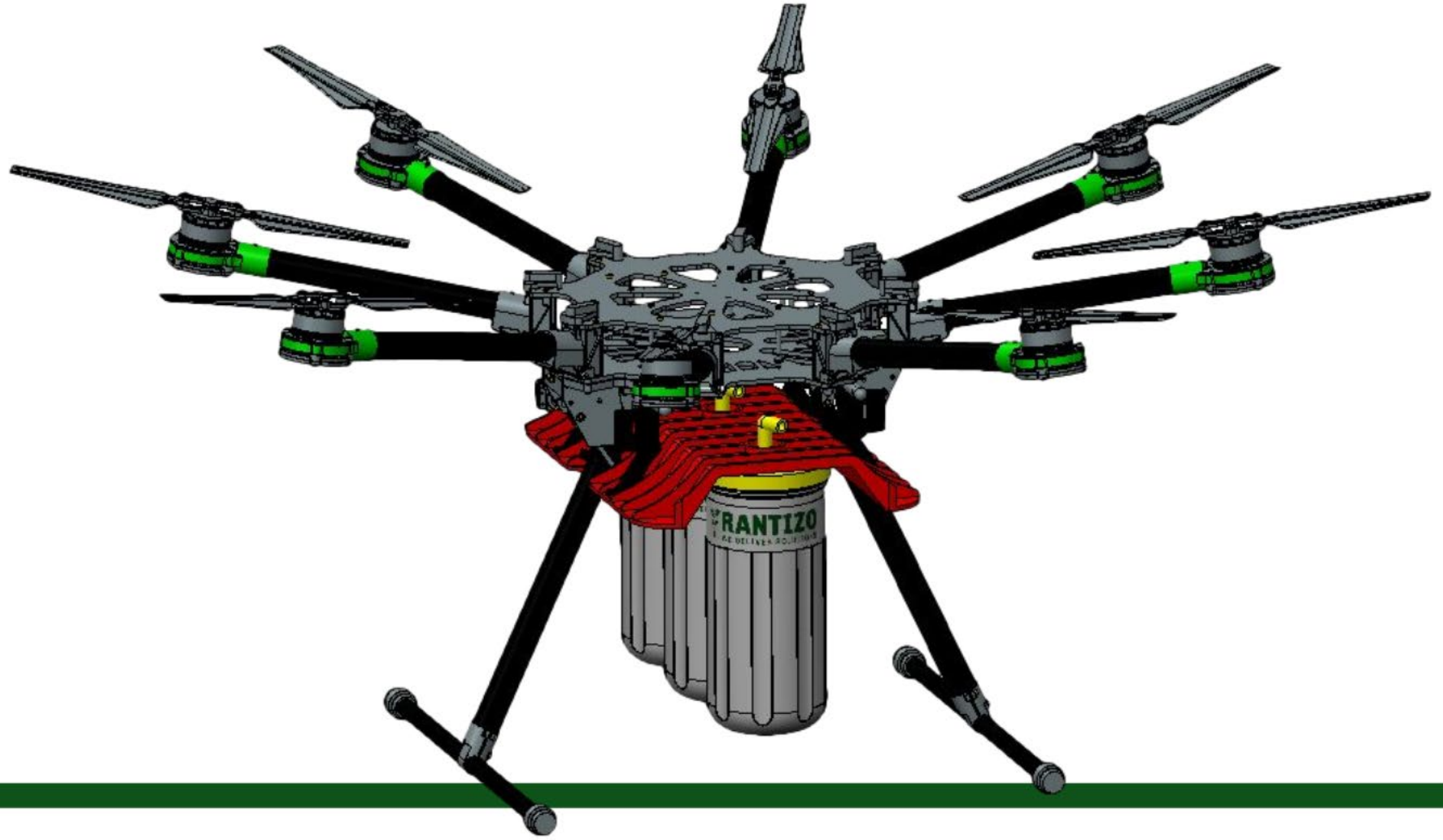


- Custom applicators desire a full package
- Contains everything needed to spray
  - Generator
  - Water Tank
  - Mix & Fill
  - Workspace
- Observation deck enables more flights

Platform Development: Electrostatics



Platform Development: Cartridges



- Safer chemical handling
- Auto-docking and reloading
- Streamlined logistics
- Enhanced security
- Recurring revenues

RANTIZO®
WE DELIVER SOLUTIONS

Platform Benefit: Data

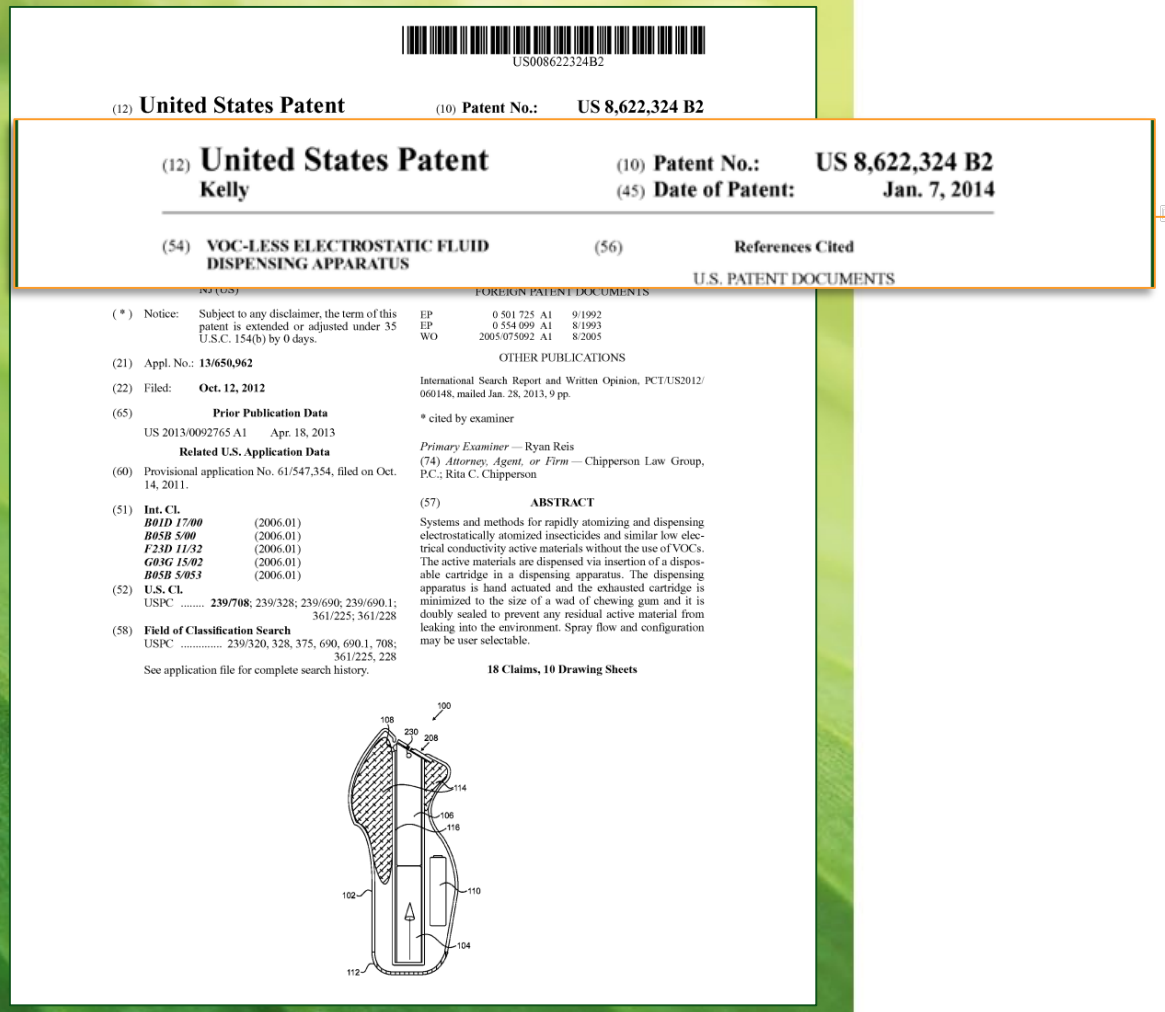


- Existing data companies simply gather and identify information
- The Rantizo platform utilizes an intelligence vault of data to identify pests, diagnose treatments, accurately apply solutions and verify success
- This intelligence vault is valuable for farmers, ag retailers, and industry partners

Rantizo Territories



Barriers to Entry



US008622324B2

(12) United States Patent (10) Patent No.: US 8,622,324 B2

(12) **United States Patent**
Kelly

(10) **Patent No.: US 8,622,324 B2**
(45) **Date of Patent: Jan. 7, 2014**

(54) **VOC-LESS ELECTROSTATIC FLUID DISPENSING APPARATUS**

(56) **References Cited**

U.S. PATENT DOCUMENTS

FOREIGN PATENT DOCUMENTS

EP 0 501 725 A1 9/1992
EP 0 554 099 A1 8/1993
WO 2005/075092 A1 8/2005

OTHER PUBLICATIONS

International Search Report and Written Opinion, PCT/US2012/060148, mailed Jan. 28, 2013, 9 pp.

* cited by examiner

Primary Examiner — Ryan Reis
(74) *Attorney, Agent, or Firm* — Chipperson Law Group, P.C.; Rita C. Chipperson

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/650,962**

(22) Filed: **Oct. 12, 2012**

(65) **Prior Publication Data**

US 2013/0092765 A1 Apr. 18, 2013

Related U.S. Application Data

(60) Provisional application No. 61/547,354, filed on Oct. 14, 2011.

(51) **Int. Cl.**

B01D 17/00	(2006.01)
B05B 5/00	(2006.01)
F23D 11/32	(2006.01)
G03G 15/02	(2006.01)
B05B 5/053	(2006.01)

(52) **U.S. Cl.**
USPC **239/708**; 239/328; 239/690; 239/690.1; 361/225; 361/228

(58) **Field of Classification Search**
USPC 239/320, 328, 375, 690, 690.1, 708; 361/225, 228
See application file for complete search history.

(57) **ABSTRACT**

Systems and methods for rapidly atomizing and dispensing electrostatically atomized insecticides and similar low electrical conductivity active materials without the use of VOCs. The active materials are dispensed via insertion of a disposable cartridge in a dispensing apparatus. The dispensing apparatus is hand actuated and the exhausted cartridge is minimized to the size of a wad of chewing gum and it is doubly sealed to prevent any residual active material from leaking into the environment. Spray flow and configuration may be user selectable.

18 Claims, 10 Drawing Sheets

Intellectual Property

Granted

- License & Distributorship rights for issued patent
- Trademark for Rantizo®
- Trademark for Fly & Apply®

Filed

- Provisional patent for cartridge reloading system

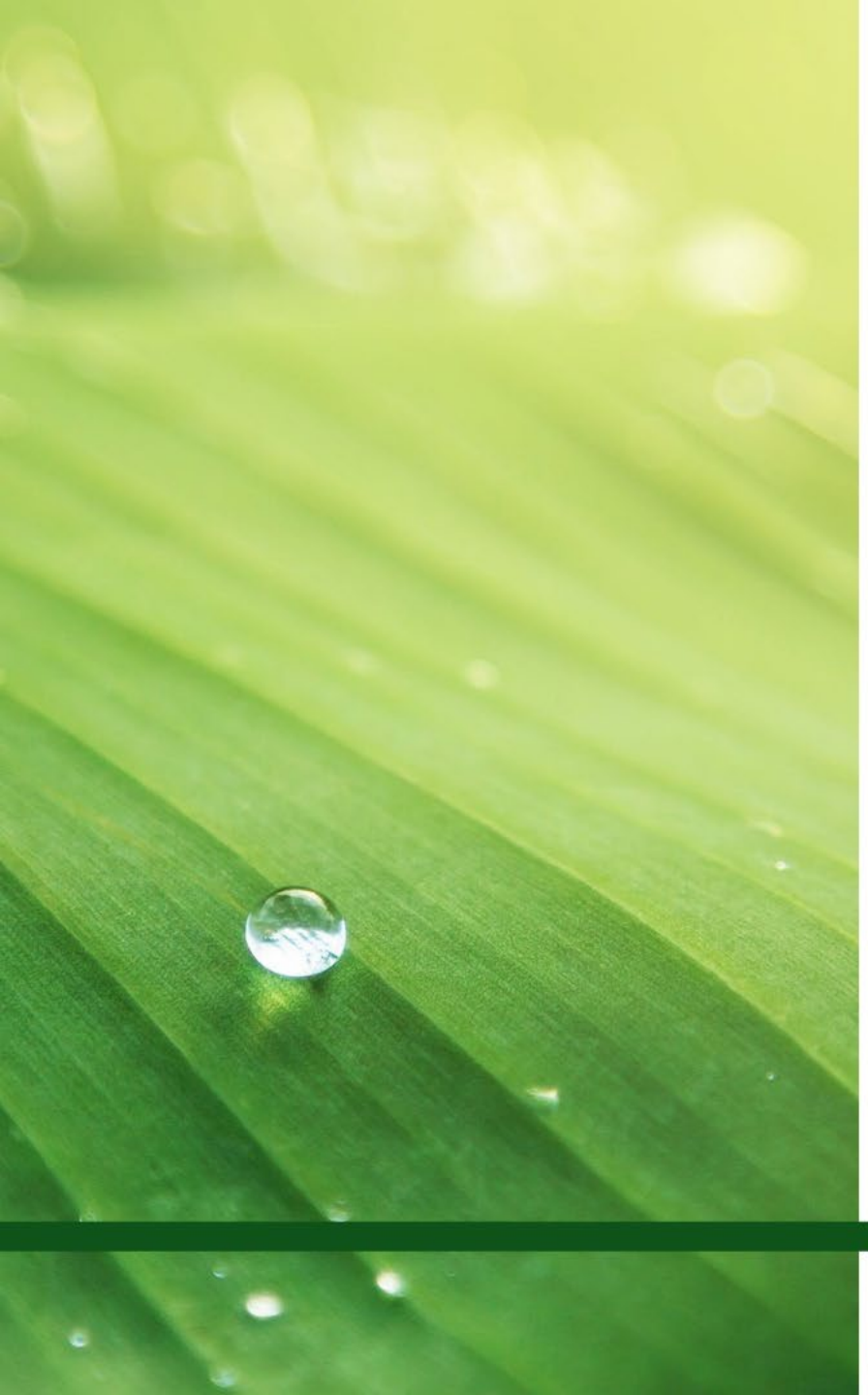
Planned

- Patent for reconfigurable boom
- Patent for software integration

Licensing

- Part 137 Certification (multiple states)
- 2 Employees with Part 107 Certification & Commercial Pesticide Licenses

RANTIZO®
WE DELIVER SOLUTIONS



Partners

DJI

TARANIS

syngenta

JPK JANSY

FARM DOG

KZVALVE

4Ry

PHYTOBIOTICS

THE UNIVERSITY OF IOWA

powerpollen
PRESERVE. ENHANCE. GROW.

Continuum Ag, LLC

IAS
Innovative Ag Services

Rantizo Team



Michael Ott

CEO

Monsanto, novozymes, Bunge



Mike Schmitz

Director of Technology

John Deere, Cerner, The University of Iowa



Gerald Beranek

CPO

Beratek Industries, The University of Iowa



Randy Cooper

Director of Operations

Goodrich, Rockwell Collins



David Pieper

Director of Sales

Raven, ag-chem, AGI Junge Control



Emily Carlson

Marketing Lead

Iowa startup accelerator, The University of Iowa



Beau Brown

Product Manager

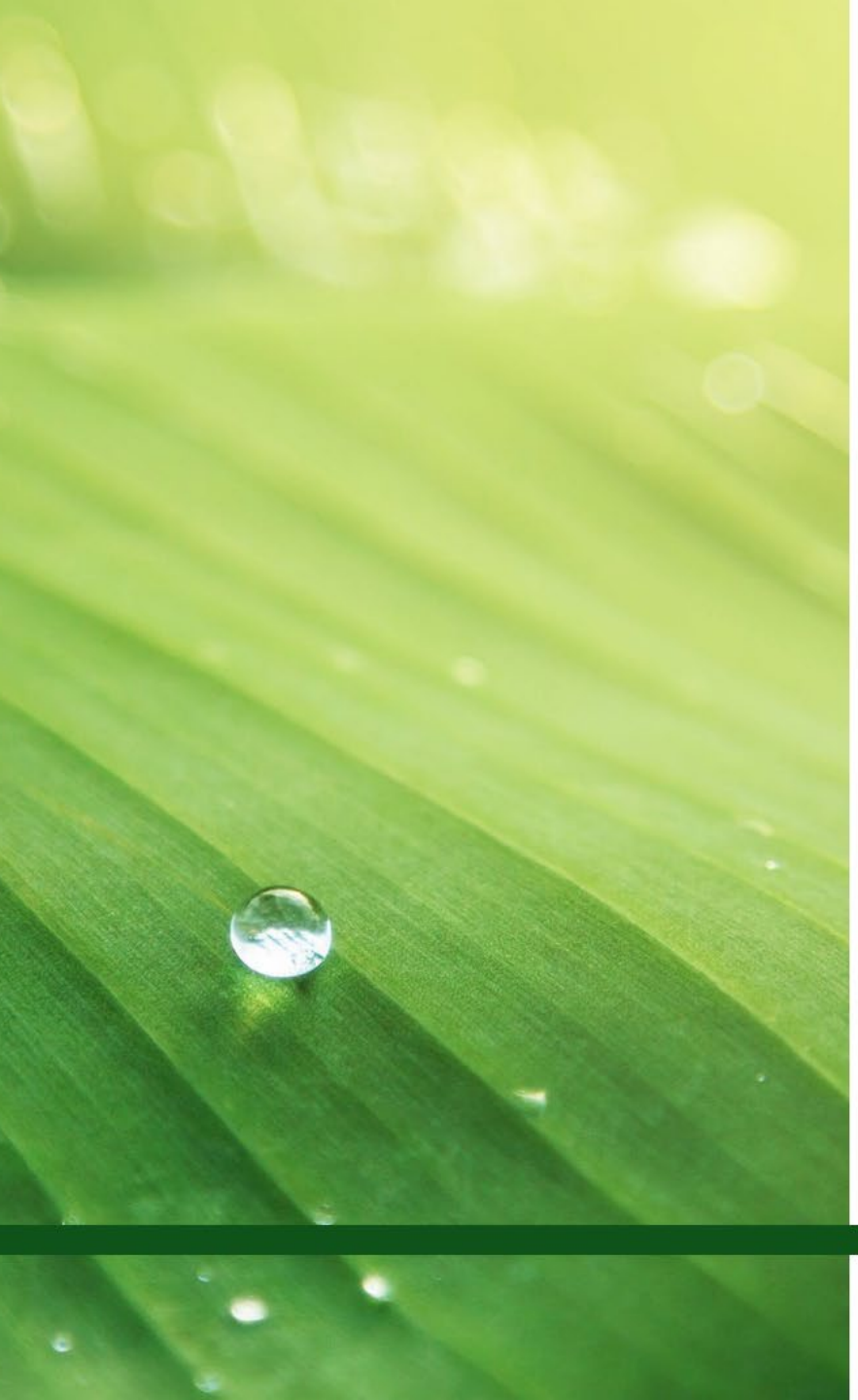
Microsoft, Honeywell, Scrum Alliance



Caleb Howard

Chief Pilot

CALCAM Aerial Productions



RANTIZO®

WE DELIVER SOLUTIONS

Michael Ott | CEO

ott@rantizo.com | (319) 621-8580

Rantizo In The News





Winner:

- 2018 AgLaunch Pitch Competition
- 2019 Ag Innovation Competition
- 2019 Pappajohn Iowa Venture Competition
- 2019 Best Tech Startup

Voted:

Top 100 Semifinalist – Startup of the Year 2019

2019 New Product of the Year Awards – AgProfessional Readers' Choice

Farm Bureau AG Innovation Challenge – In Partnership with Farm Credit

The Tech Tribune – Best Tech Startups 2019

Featured In:

Commercial UAV News

CropLife

PrecisionAg

Growing Produce

Rural Radio Network

Farm Futures

AGPRO

Future Farming

Spudman

Successful Farming

Successful



RANTIZO
WE DELIVER SOLUTIONS

Location:
41.699952, -92.012435
Crop:
Soybeans
Identified Pest:
Waterhemp
Prescribed Treatment:
Liberty
Application Rate:
38 oz/ac
Wind:
5 mph NE
Temperature:
83° F

Not Successful



RANTIZO
WE DELIVER SOLUTIONS

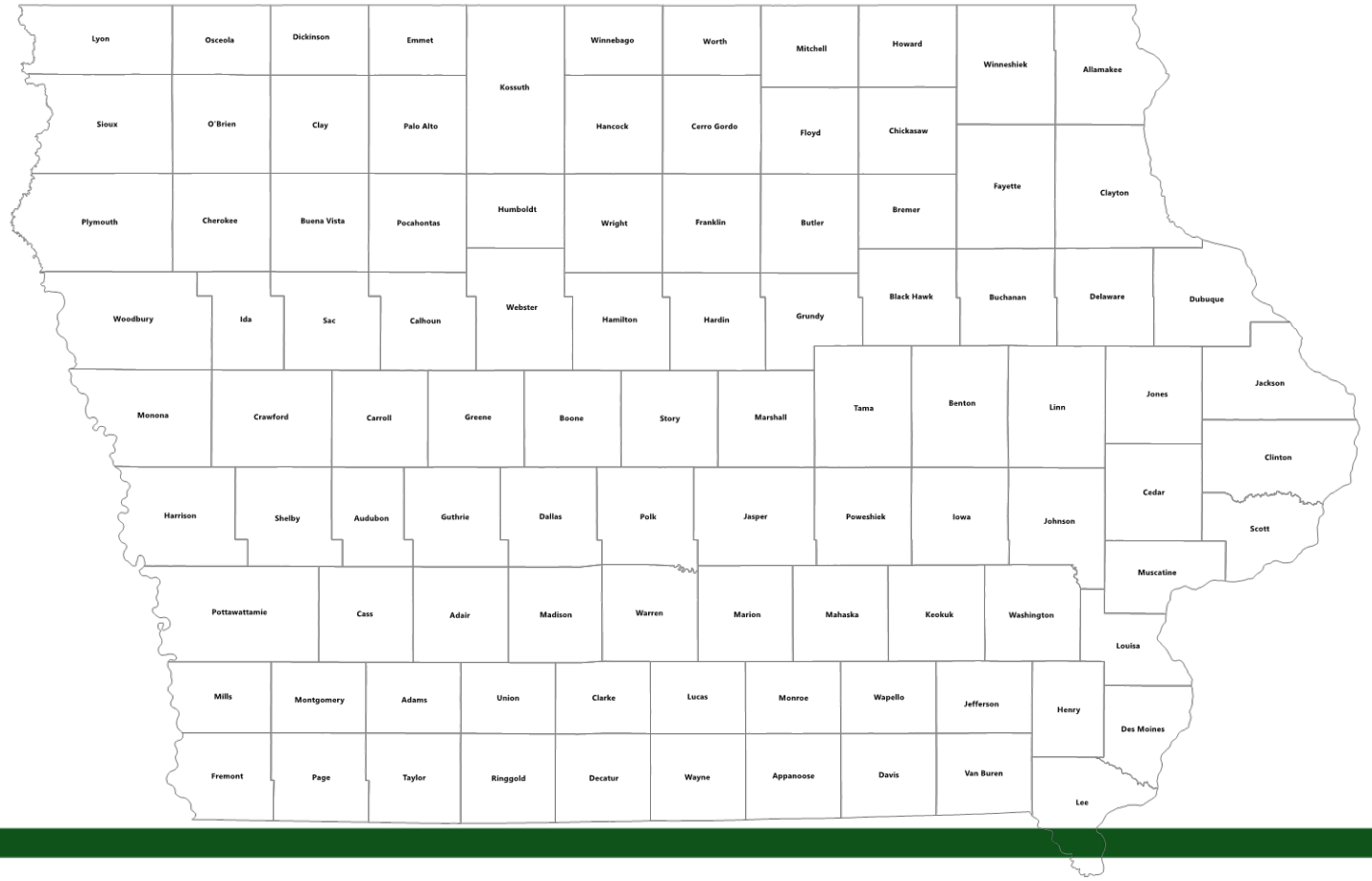
Location:
41.720188, -92.047765
Crop:
Soybeans
Identified Pest:
Waterhemp
Prescribed Treatment:
Dicamba
Application Rate:
8 oz/ac
Wind:
3 mph SW
Temperature:
88° F

Prediction & Prescription

Sample Analysis
Waterhemp Treatment by Pesticide

Pesticide Applied

- Roundup
- Dicamba
- Liberty



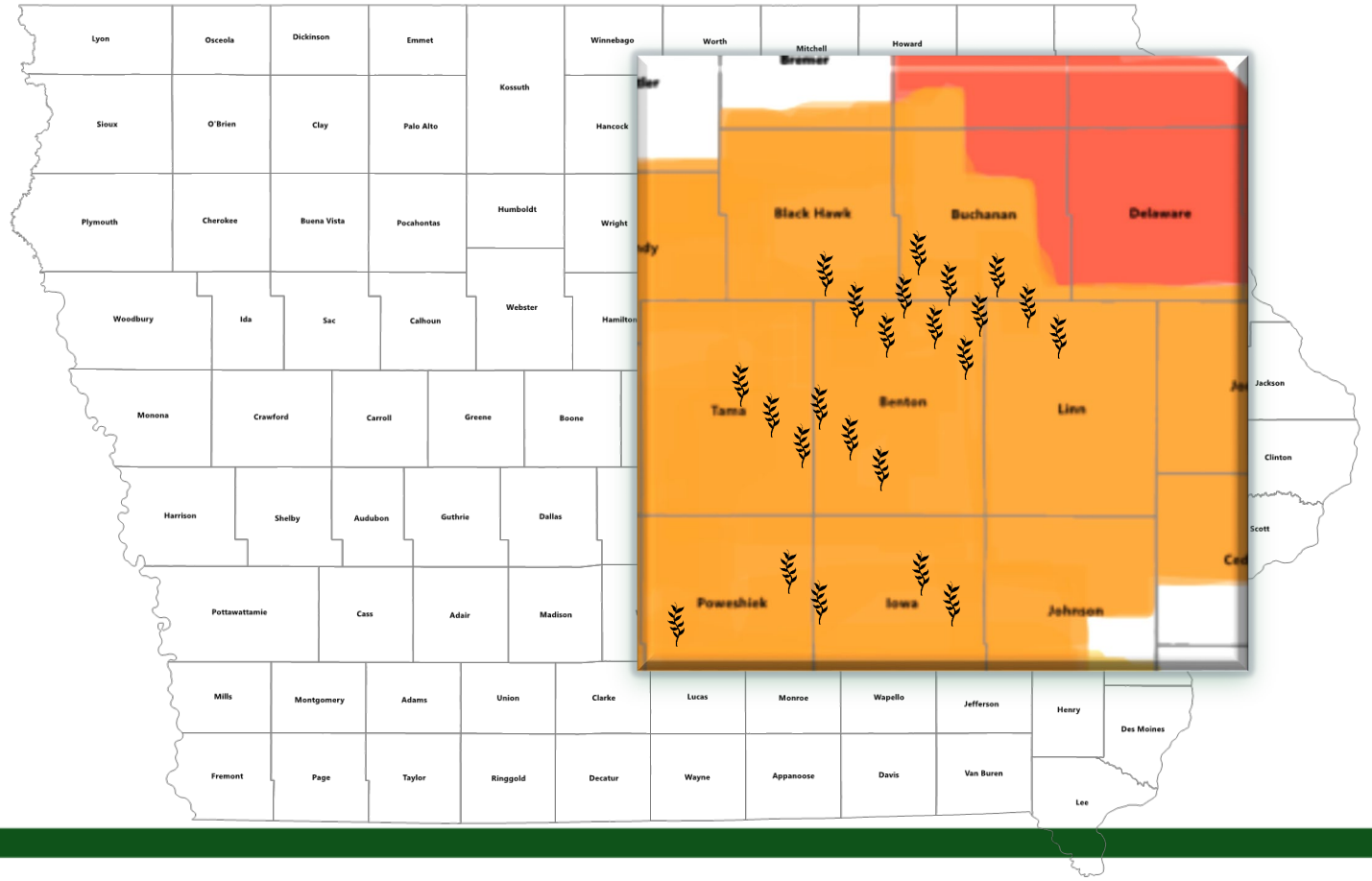
RANTIZO®
WE DELIVER SOLUTIONS

Prediction & Prescription

Sample Analysis
Waterhemp Treatment by Pesticide

Pesticide Applied

- Roundup
- Dicamba
- Liberty



RANTIZO®
WE DELIVER SOLUTIONS

Near Term Market Opportunities

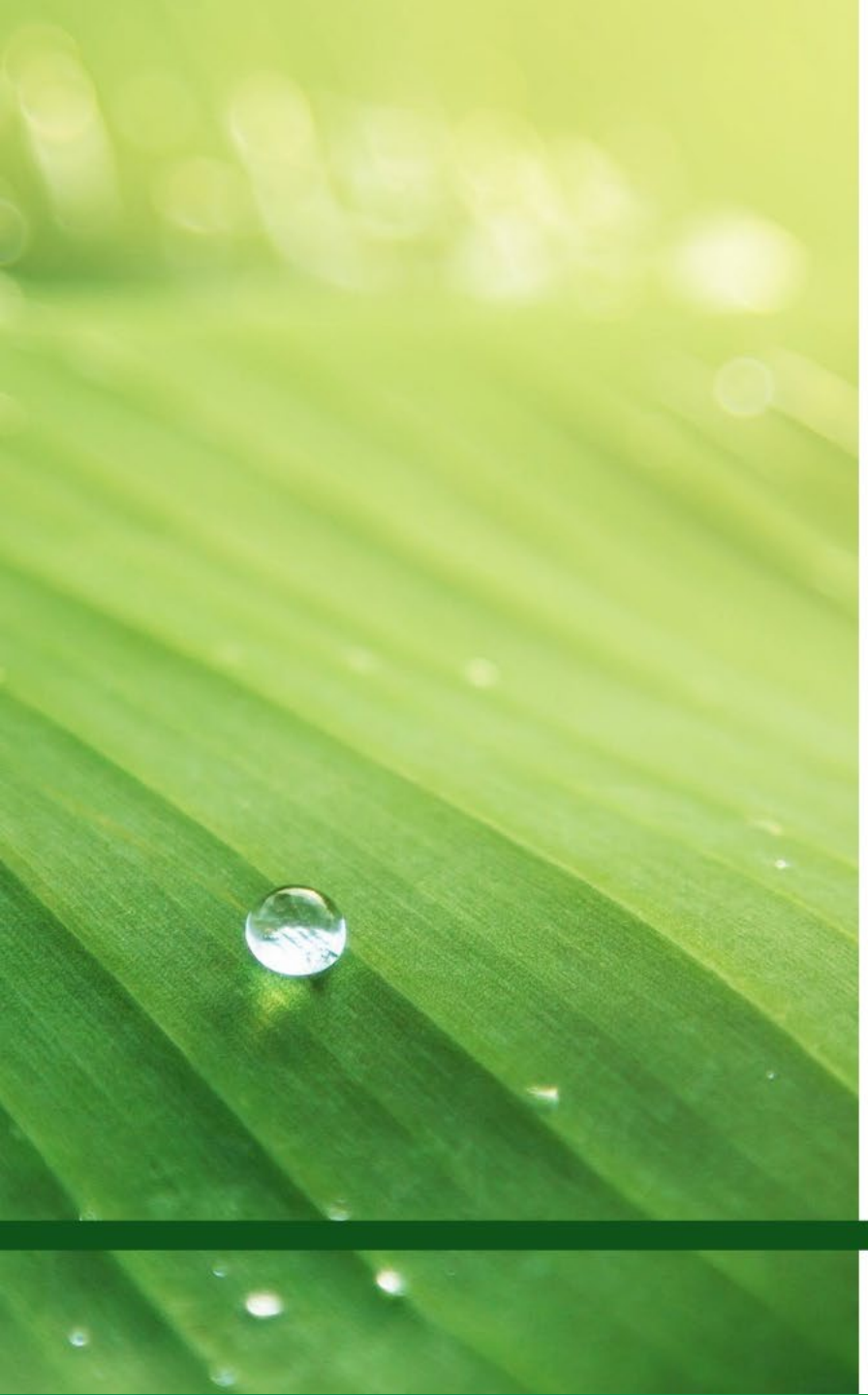
High Value Use Cases

- Specialty crops
- Greenhouses
- Organics
- Test plots
- Pollen application
- Beneficial insects

Spot Spraying

Rescue Situations





The Competition

Company	Equipment Cost	Per Acre Cost	Under 55 lbs.	FAA Approved	Multi-state licensing	Integrated imagery	Ease of use
RANTIZO WE DELIVER SOLUTIONS	$$	$	✓	✓	✓	✓	High
Leading Edge Aerial Technologies	$$$	$$	✓	✓	✓	✓	High
KIWI TECHNOLOGIES	$$$	$$	✓	✗	✓	✗	Low
hse HSE-UAV.COM	$$	$$	✓	✓	✗	✗	Medium
hylio	$$	$$	✓	✗	✗	✓	Medium
Scorpion Drones	$	N/A	✓	✗	✗	✗	High
YAMAHA	$$$	$$$	✗	✓	✗	✗	Medium

Advisory Board



Matt Beckwith

Co-Founder

McKinsey&Company

mahyco
EVERY SEED COUNTS

HARVARD UNIVERSITY



Dr. Arnold Kelly

Electrospray

PRINCETON UNIVERSITY

ExxonMobil



Donovan Taves

Hardware

52 25 TAVES BAYOU PLANTING

NRCS
Natural Resources Conservation Service



Dr. Ken Park

Spray Adherence

Northwestern University

MIT Massachusetts Institute of Technology



Steve Meyerholz

Agronomy

Stutsman

AGRIBUSINESS ASSOCIATION OF IOWA

Rantizo Spray Economics

Single Drone	A/hr	A/day	$/A	$/hr	Drones to Cover 1MM Acres
Agras	6	47	$25.37	$150	264
w/ Pump Upgrade	10	82	$14.65	$150	153
w/ Pump & Boom Upgrade	13	106	$11.31	$150	118
T16	14	115	$10.39	$150	108
w/ modifications	18	147	$8.15	$150	85
Rantizo ESS 55	22	174	$6.89	$150	72
Rantizo ESS 75	28	222	$5.39	$150	56
Ground Application	75	600	$7.00		
Aerial Application	100	1,200	$15.00		

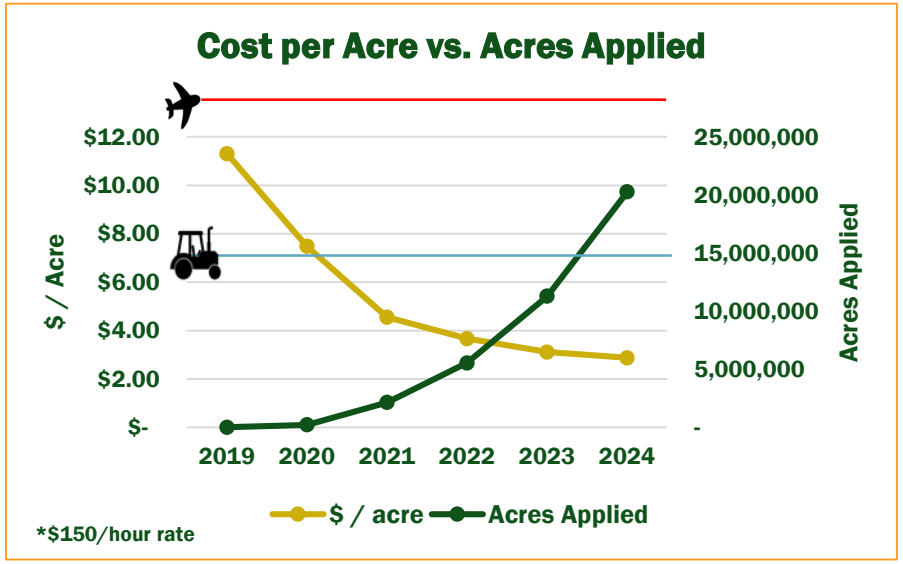
Swarm	A/hr	A/day	$/A	$/hr @ $4/A	Swarms to Cover 1MM Acres
Agras	30	236	$11.84	$350	53
w/ modifications	66	531	$6.78	$450	24
T16 w/modifications	92	736	$4.89	$450	17
Rantizo ESS 55	109	871	$4.13	$450	14
Rantizo ESS 75	139	1,112	$3.24	$555	11

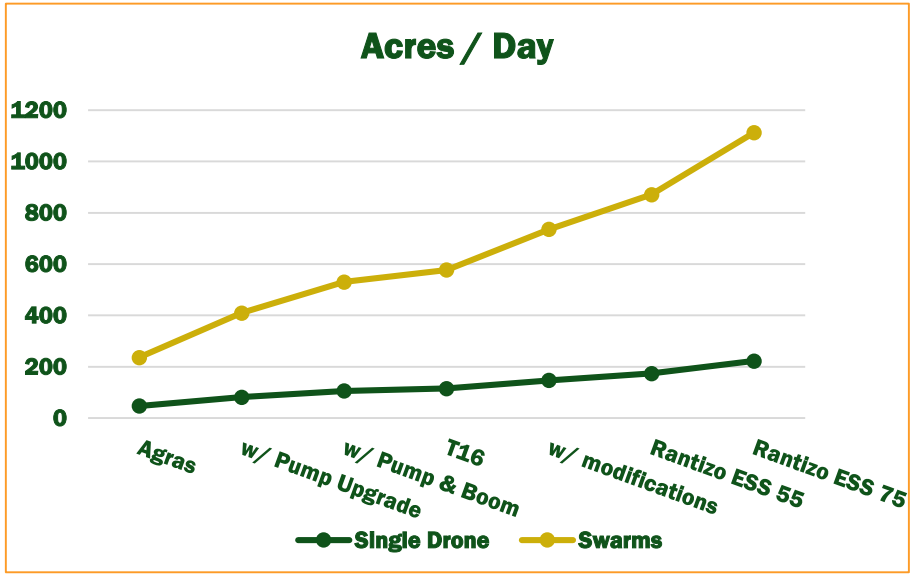
Assumptions:

- 5 drones/swarm
- $150/hour
- $4/acre minimum when using swarms
- 8 hours/day
- 80 spray days/year

Introduction of:

- >55lb unit and swarming capability - 2020
- Accelerated electrostatic adoption - 2021
- ~100lb unit - 2022
- ~150lb unit and alternative fuel source - 2023





Rantizo Differentiation

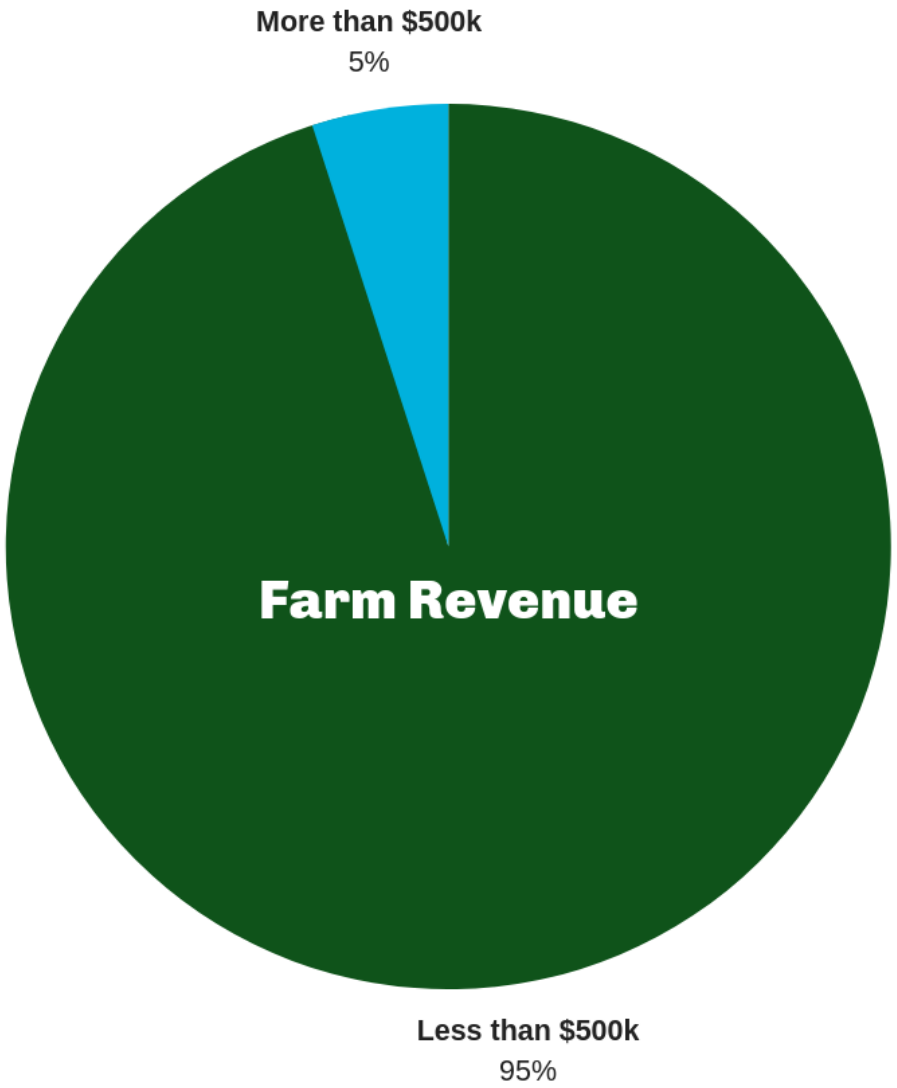
Spray Method	Application cost per acre	Equipment Cost	Field Condition Independent	Crop Agnostic	Spot Spraying Capability	Reduced Soil Compaction/ Crop Damage	Overspray/ Drift	Autonomy	Agrichemical Exposure
RANTIZO WE DELIVER SOLUTIONS	~$11	$$	✓	✓	✓	✓	Low	✓	Low
	~$7	$$$$	✗	✗	✗	✗	Medium	✓	Medium
	~$15	$$$$	✓	✗	✗	✗	High	✗	Medium
	~$50	$	✗	✗	✓	✓	Low	✗	High

25%

The percent of growers that stated input costs were their biggest challenge

Savings per acre on input costs through use of precision ag (USDA)

$12



"We don’t want to own the machinery, we don’t like owning machinery because it has to sit all year, not enough use, don’t want too much extra seasonal labor."

"I don’t want to keep equipment and cost that goes into maintenance…I’m not an agronomist so he will provide expertise, tell me what to do and save me money in the long run."

"Hard to get into fields because they're so wet here."

Segment Opportunity

- 286 million acres of commercially treated cropland
- $7-$11/per acre per spray depending on application method
- $2.6B - $10.4B opportunity in commercial custom application

