Precision Agriculture

Spring 2014

American Crystal Sugar Company

Topics

- Cell phone apps
- Unmanned aerial systems (UAVs)
- New seed hoppers & tubes
- ‘Real time’ harvester tracking

Cell Phone Apps

- Many growers now have smart phones that give access to many useful tools including apps
- Many different categories
  - Weed identification
  - Fuel usage
  - Perimeter measurement
  - Plat book

Precision Laboratories Mix Tank App

Cell Phone Apps

- Ag staff has identified a list of useful apps
  - Listed under the agronomy section of the Crystal website in agronomy tools
  - Please let the staff know of other apps that you might use so we can add them to our list
  - List availability for both Android and iPhone platforms

Cell Phone Apps

UAVs

- Very big topic in the agricultural community
- Can take pictures and video with GPS reference for use in GIS programs i.e. Ag Data Viewer, ArcMap
- Possible uses
  - Field scouting
  - Spraying
  - Yield predictions
  - Field drainage
  - Many others as well

Types of UAVs

- Two main types that come in all sizes and designs
  - Multicopter
    - Many rotors
  - Fixed wing
    - Looks more like traditional aircraft
    - Predator and Globalhawk systems

Types of UAVs

- Multicopter
  - Hover
  - Simple to operate
  - No runway needed
  - Low endurance
  - Usually just video not pictures
  - Cannot map a whole quarter section

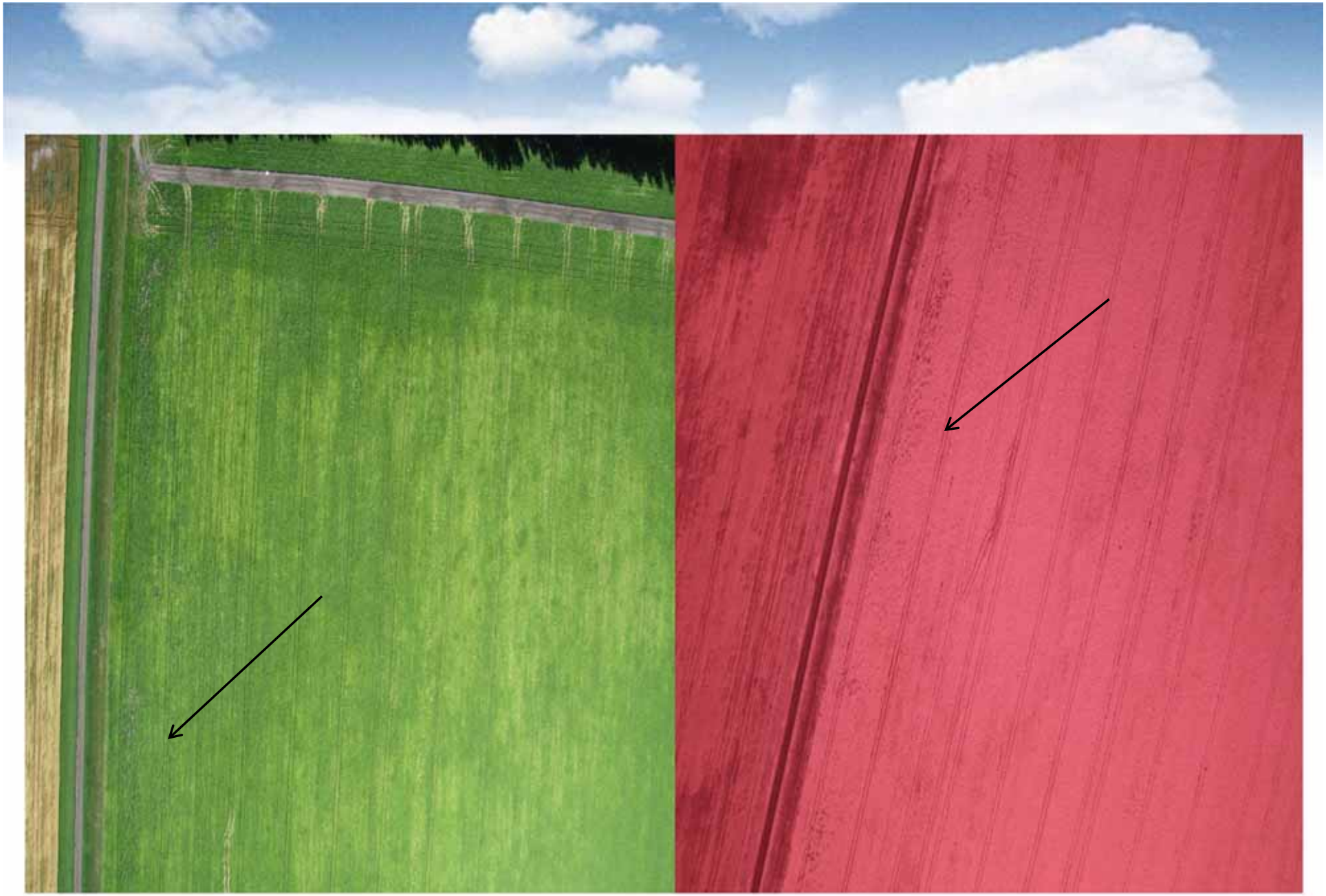
Types of UAVs

- Fixed Wing
  - Used for mapping
  - Longer endurance
  - Faster forward velocity
  - Hand launched
  - Landing challenges
  - More affected by wind

Fixed wing UAV flown in St. Thomas, ND over a rhizoctonia research plot in 2012.

Visible vs. Infrared

St. Thomas ND Field



Future for UAV

- Regulations
  - FAA Modernization and Reform Act of 2012
    - Requires a plan to be develop for UAV integration by Sept. 2015
    - Until rules are passed through Congress model airplane and research are the only legal means of operation
- In Japan UAV's already spray fertilizer and herbicides over farms
- "Unmanned aircraft holds tremendous potential for North Dakota and will provide new opportunities for agriculture, education and border security,"
  – Rick Berg, former US Congressman

Precision Planting Readies Metering System and New Seed Tube

- Precision Planting announced (Jan 2014) that it is developing a "retrofittable" multi-hybrid metering system that uses vSet meter technology and the new vDrive electric meter control system to allow for instantaneous switching between hybrids as a planter moves from zone to zone.

Copied from farmfutures.com

'SpeedTube' means faster planting

- According to Jason Stoller, Precision Planting Engineering Product Manager for the new SpeedTube, time for planting is limited, and larger planters aren't the answer for larger farms.
- "Planting speed is limited by the constraints of the seed tube, because high speeds lead to poor spacing," he explains.
- The SpeedTube will control the seed all the way from the meter to the furrow.
- **More testing** is needed to evaluate the performance of the tube on the planter test stands and trials

Copied from farmfutures.com

Real Time Beet Harvester Tracking

- Concept: Actively track ‘real time’ harvested acres to provide valuable information to decision makers in ACSC and on the farm

Harvester

GPS Tracking Device & Sensors

Data Processing

Data Visualization (Web GIS)

Source: E. Harnisch and K. Knapp 2/2014

Why Real Time Beet Harvester Tracking?

- Help manage the “lag time” in managing at risk acre decisions
- ACSC and growers have significant costs associated with a harvest disruption
  - Employee retention
- Potentially better quality beets if decisions can be made more timely
  - Less mud
  - Less frost
- Help to better manage space at piling sites
  - Pile heights based on real time harvest information

Real Time Beet Harvester Tracking

- Many precision Ag companies are interested in real-time harvested acre tracking
- Many different concepts of how to implement a system (wireless unit, plug and play)
- We have met with two companies that have a functioning prototype tested in the RRV
  - Pulsar Operational Boundaries, Inc., Eric Harnisch – VP
  - Tierra Plan, LLC, Kevin Knapp, CEO

Proof of Concept Approach

- Worked with a Crookston grower to track harvested acres
- Used different types of equipment with different types of data transmitting abilities
- Integrated the GPS and GIS web platform for data analysis and visualization
- Wanted to keep equipment and mounting simple

Harvester Monitoring Home Page

- **Key Information**
- -12 row harvester progress shown
- -6 row harvester area high-lighted in orange-open area
- Note: 12 row did 2/3 of the harvesting & 6 row 1/3

Source: E. Harnisch and K. Knapp 2/2014

Lessons Learned

- Actively tracking harvest progress seems very reasonable with a few modifications in equipment and programming
- Some equipment transmitted data better than others
- GPS data points will need to be collected more frequently for better accuracy on odd shaped fields

Future Plans

- Determine outcome to achieve how it can be incorporated with what we currently do or where we want to go
- Look into a possible pilot project
- Use upgraded equipment that address problems encountered from 2013 concept project
- Continue to investigate different options for real time harvest progress reports

Questions?