

Precision Agriculture

Lesson 1, Part A

Agriculture, Food and Natural Resources Content Standards

- PS.03.04. Apply principles and practices of sustainable agriculture to plant production.
- PST.05.03. Apply geospatial technologies to solve problems and increase the efficiency of AFNR systems.

What is Precision Agriculture?

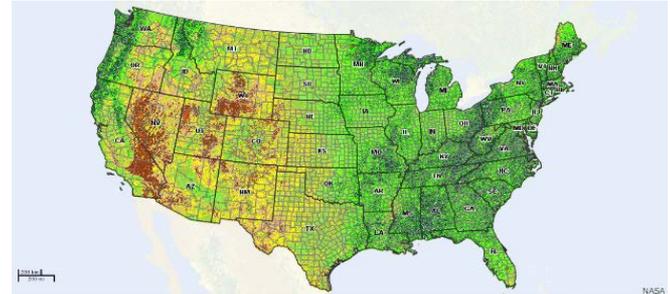
- A method of farm management.
- Includes planting:
 - The right seed
 - At the right place
 - At the right time
 - At the right depth
 - With the right nutrients and other inputs
- Technology is often used to help the operator make management decisions.

Precision Agriculture History

- Geographic Information System (GIS)
- Yield and Moisture Monitor
- Global Position System (GPS)
- Advanced Sensors, Monitors and Meters
- Remote Sensing

Geographic Information System (GIS)

- Allows user to track, recall and analyze information about individual points on a map.
 - Created by Roger Tomlinson in 1960s.
 - Only government and large industries could afford it.
 - Now in almost every aspect of commerce, construction, research and travel.



Yield and Moisture Monitor

- Introduced in the 1990s
- Mass Flow Sensor
 - Captured the amount and weight of grain being harvested.
- Moisture Sensor
 - Took readings on the moisture in the grain and speed of combine.
- Displayed the yield being harvested.
- Did not record data for future use.



Does the moisture of grain matter?

- One bushel of corn weighs 56 pounds.
- Determine the amount of corn you are actually purchasing in the following situations:
 - 100 bushels at 15% moisture = _____ pounds of actual corn.
 - Solution: $100 \times 56 = 5600 \times (1.00 - .15) = 4,760$ lbs.
 - 100 bushels at 23% moisture = _____ pounds of actual corn.
 - Solution: $100 \times 56 = 5600 \times (1.00 - .23) = 4,312$ lbs.
- Does knowing the moisture matter? Explain why or why not. *(T,P,S)*

Global Position Systems

- GPS became available to civilians.
- GPS was added to Yield Monitoring Systems.
 - Could now track location of crop being harvested.
 - Data could now be saved for future use.
 - Maps could now be created and printed.
 - Maps could be used for year-to-year analysis.



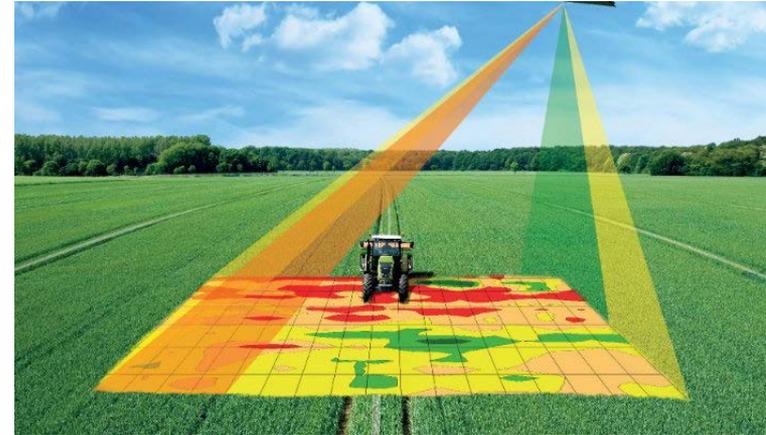
Advanced Sensors, Monitors, Meters

Increases the “precision” in Agriculture

- Sensors can:
 - Track:
 - Number of seeds planted per foot
 - If multiple seeds are planted at one spot
 - Seed skips
 - Plugged planter
 - Depth of seed
 - Moisture, pH and temperature of soil
 - Type of weeds
 - Chemical level
 - Drive our tractors straight
 - Etc.
- Meters:
 - Allow users to vary the rate of delivery of “inputs” on the run.
 - Uses a “prescription”
 - Spreaders, sprayers, planters and irrigation units have meters that can vary application rates based upon prescriptions.

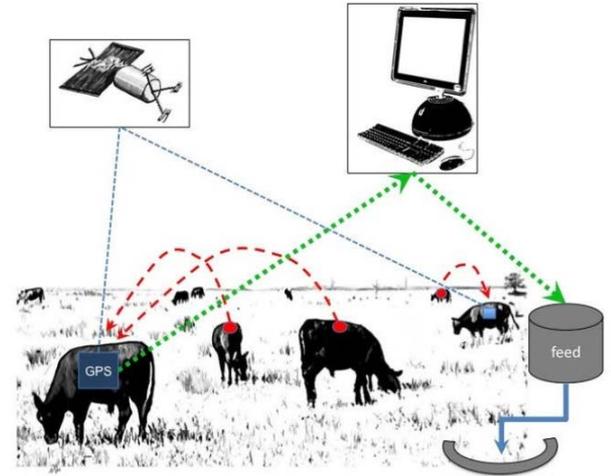
Remote Sensing

- Images are collected
 - Identifies variation in plant health and soil conditions
- Introduced in the late 1990s
- Slow start
 - Unreliable and timely delivery
 - Few satellites for public use
 - Sky needed to be clear
 - Very costly
- More reliable and affordable now
- UAVs “Drones” now being used
 - Higher resolution
 - Less affected by clouds



What about the Future?

- Detection “on the fly”:
 - Crop health
 - Water utilization
 - Soil types
 - Nutrient utilization
 - Weed, insect, disease detection
 - Range condition
 - Rotate pastures using GPS
 - Virtual fences
 - Etc.



Precision Ag Vocabulary Fun!

<https://quizlet.com/join/mPXWZnyG3>