

# 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?

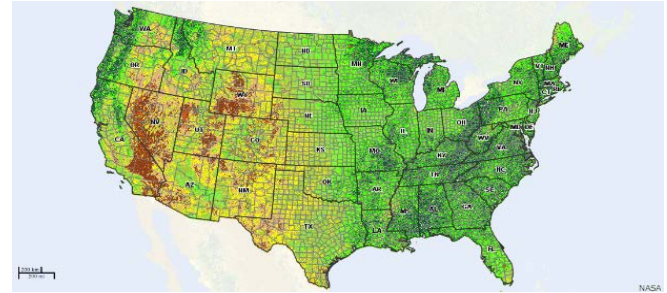
- A method of farm management.
- Includes planting:
  - The right seed
  - At the right place
  - At the right time
  - At the right depth
  - With the right nutrients and other inputs
- Technology is often used to help the operator make management decisions.

# 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.





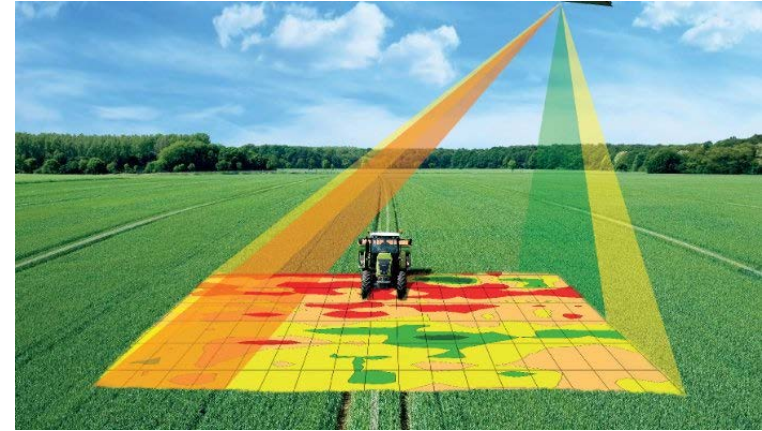
# Advanced Sensors, Monitors, Meters

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.

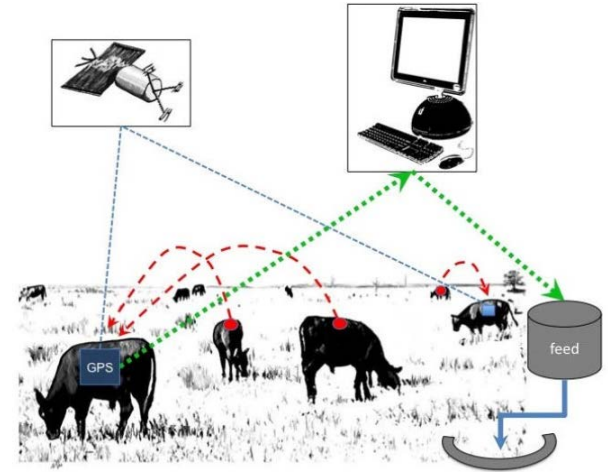
# Remote Sensing

- 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>