The Economic Payback of Precision Technology

Christopher Murphy
Clint Luellen
Cody Van Drie
Eric Mensen

Presentation Outline

- Introduction
- Problem statement
- Methods
- Results
- Application
- Summary

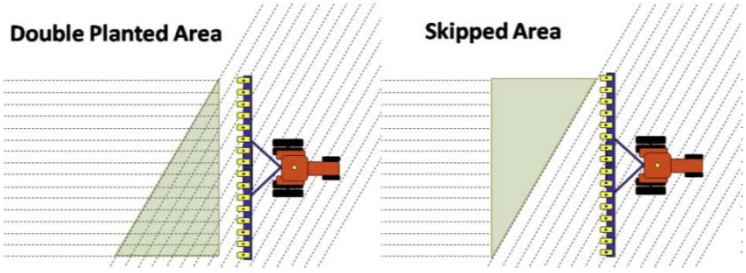
Introduction

- Precision Agriculture is:
  - "The application of technology to improve agricultural production."
- Precision Equipment:

  Yield Monitors, Variable Rate, Section Control, Guidance systems, Data Mapping, Prescriptions, Data Management

Problem Statement

- There's little research on % overlap from in-field studies.



Fulton. Et al., 2011

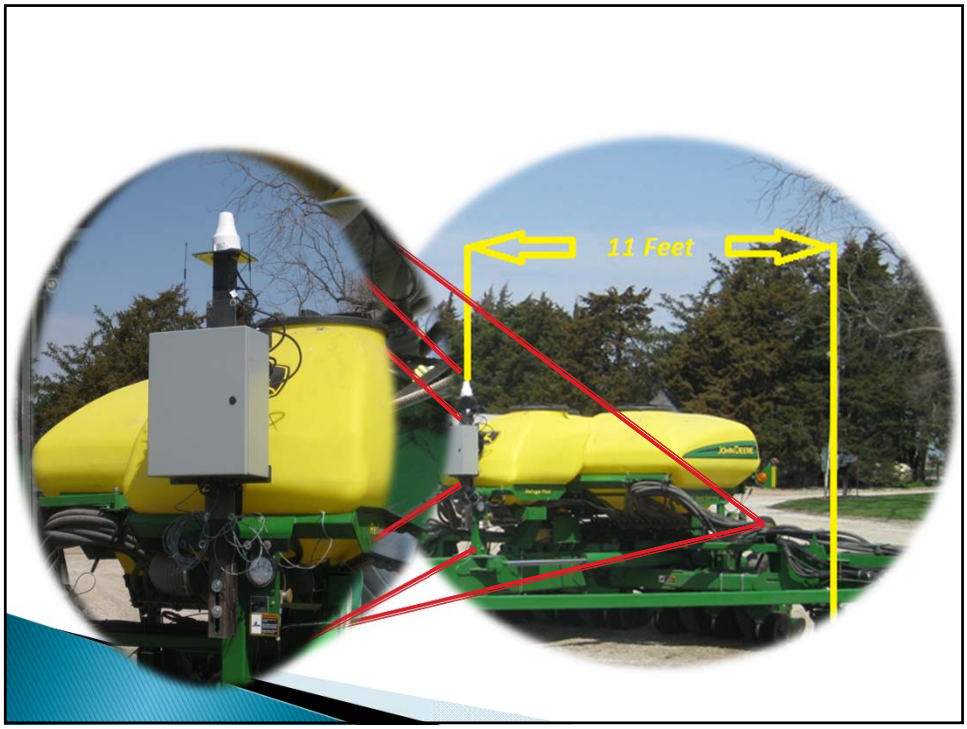
Method

- Attach GPS equipment to tillage and planting equipment of two farmer cooperators in Central and Northwest Iowa.
- Collect and analyze data to determine the percent overlap in tillage and planting operations performed by the cooperators.
- Use the data to determine ROI for the cooperators.

Planting Data Collected

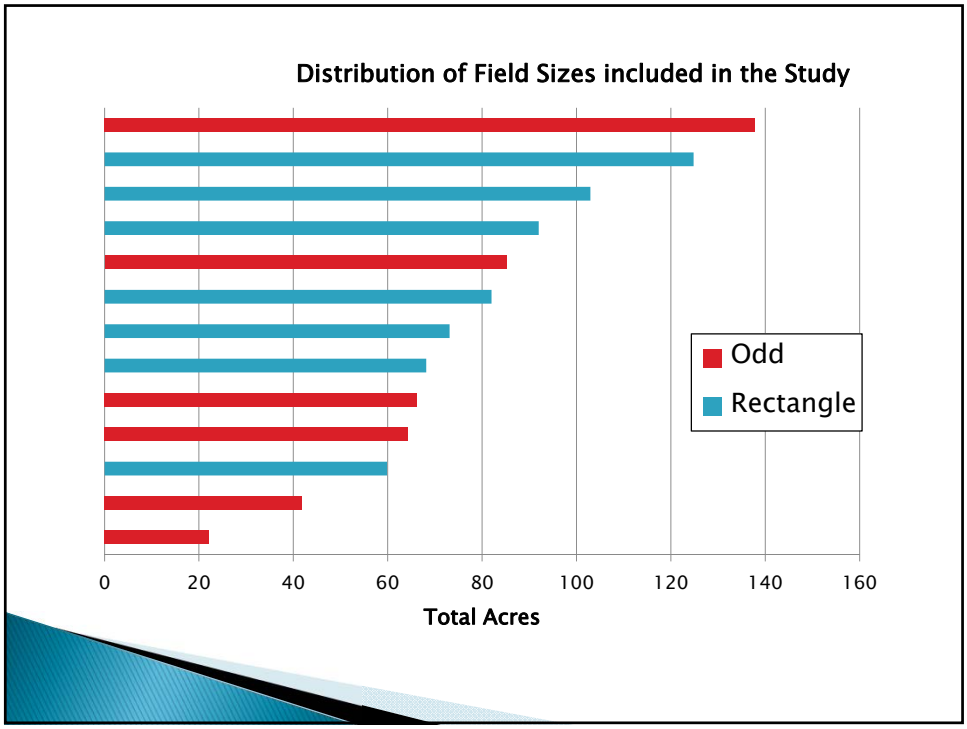
- Headland Error
  - Each pass entering and leaving headlands

Deere, 2009



Tillage Data Collected

- Pass to Pass Error
  - 8–10 passes
  - Minimum 3 Measurements per field



Overlap: Affected by Field Shape

Field Shape	Tillage Overlap (%)	Planting Overlap (%)
Rectangle	7.5	2.8
Odd	6.4	3.8

Percent Overlap by Operation

Operation	Average of all fields (%)	Standard deviation between fields
Tillage	7.2	2.4
Planting	3.3 (10% Yield loss on these acres)	1.2

- What do these numbers mean for the average producer?

Tim – 2400 Acres

- $0.96/acre Tillage
- $7.89/acre Corn
- $6.39/acre Beans

- 1200 Acres Corn * $7.89/acre corn = $9,468

- 1200 Acres Beans * $6.39/acre beans = $7,668

- Total = $17,136

- 3600 acres Tillage at $0.96/acre = $3,456
  - 2400 Field cultivate
  - 1200 Disk

TOTAL: $20,592/year

- Tim Savings per year $20,592
- Initial Planting System Cost (24 Row)
  - Section Control > $13,773
  - RTK Auto Steer Cost > $12,500
  - Total Cost > $**26,273**
- Initial Tillage System Cost
  - 2 Tractors with WAAS Autosteer > $17,000
- Grand Total
  - $43,273
- Tim > $\frac{\$43273\ Total\ Cost}{\$20592\ savings\ per\ year}$ = **2.1 Years**

Summary

- Planting
  - 3.3% Planting Overlap Error
  - Average Iowa operation
    - Total yearly gain of $7.89/acre (includes yield)
- Tillage
  - 7.2% Pass to Pass Error
  - Average Iowa Operation
    - Reduced costs of $0.96/acre
- Autosteer and section control may be a worthwhile investment.

References

- Fulton, J, D Mullenix, A Brooke, A. Winstead and B. Ortiz. "Automatic Section Control (ASC) Technology from Planters." Alabama Cooperative Extension System, Sept. 2011.
- John Deere Product Information http://salesmanual.deere.com/sales/salesmanual/en_NA/ams/2010/feature/swath_control_pro/apps_planters.html?sbu=ag&link=prodcat