

# **Utilization of GPS Based Technology in Row Crop Research and Bulk Production at the Davis Purdue Ag Center**



**6230 N State Road 1**

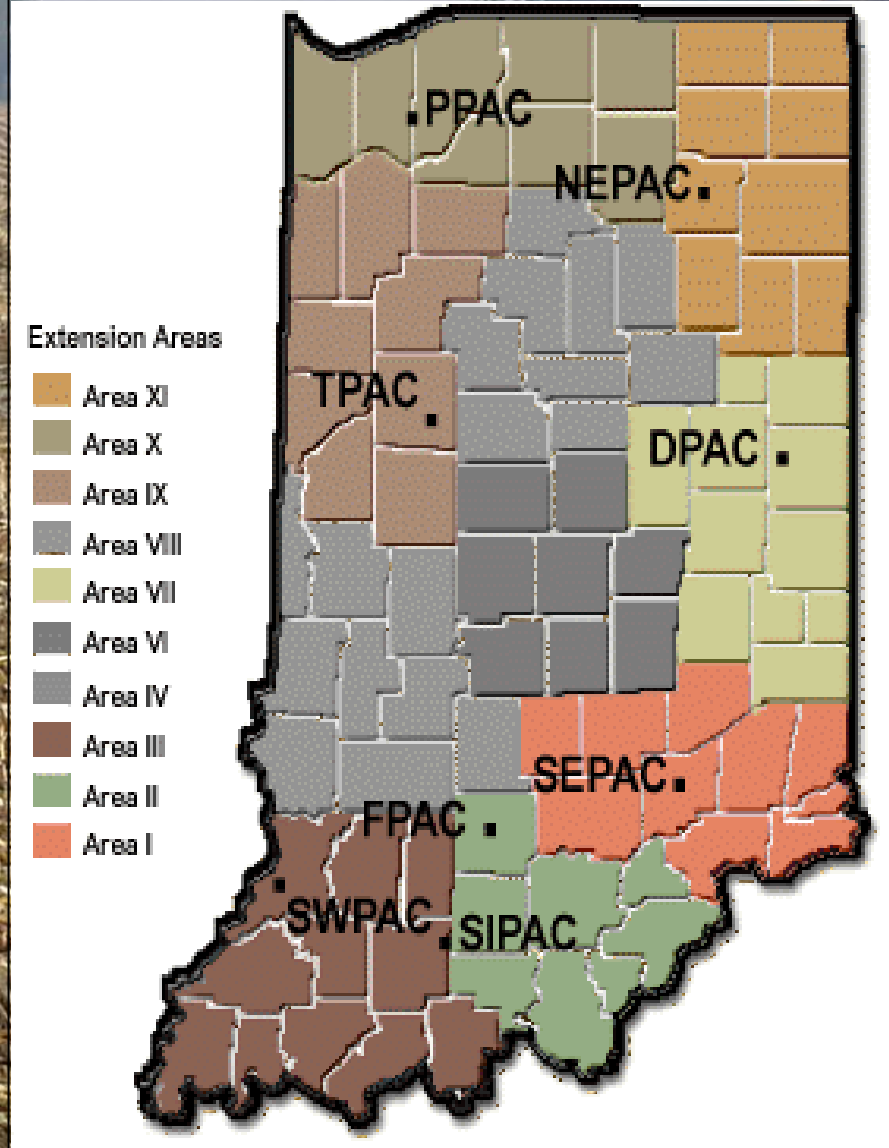
**Farmland, IN 47340**

**765-468-7022**

**[www.agriculture.purdue.edu/pac/davis/index.html](http://www.agriculture.purdue.edu/pac/davis/index.html)**



- One of 8 Ag Centers in Indiana
- 623 acres – 450 Tillable
- Corn, Soybeans, Wheat
- Emphasis on Site Specific Ag
- Long Term Timber Management and Genetic Research





# Davis Purdue Ag Center (DPAC)



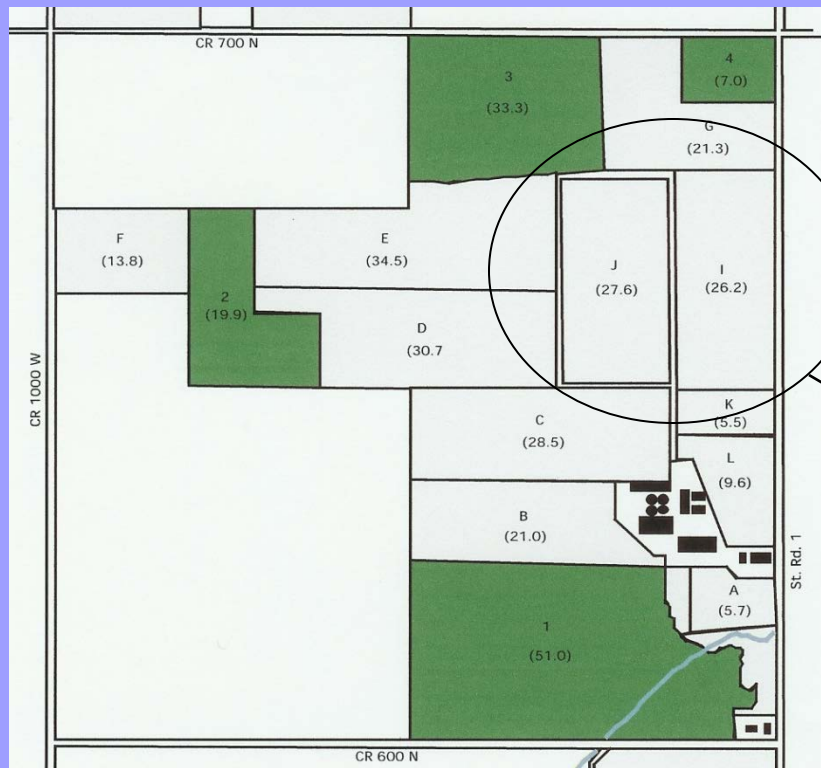
1917



2011

- Gift from Martha Davis in 1917
- Given in memory of her son Herbert Davis
- Original gift was 385 acres
- DPAC Expanded to Current Size in 1960s
- Horses, Beef Cattle, Dairy Cattle
- Hog Operation Phased Out in late-1990s
- Row Crops



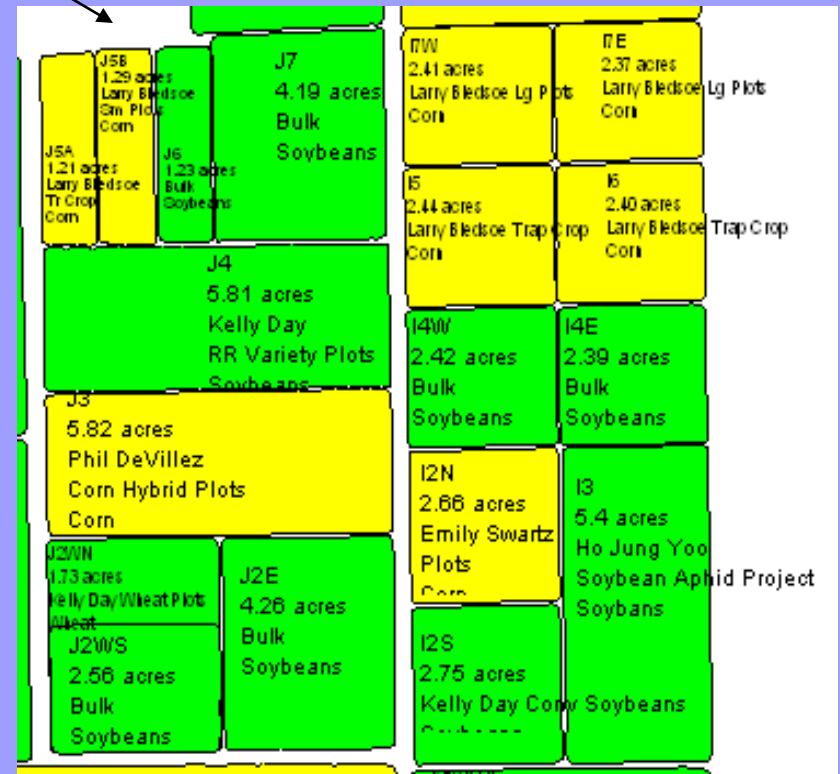


## Traditional Small Plot Research

No Plot Equipment

2 ½ hours from Purdue Campus

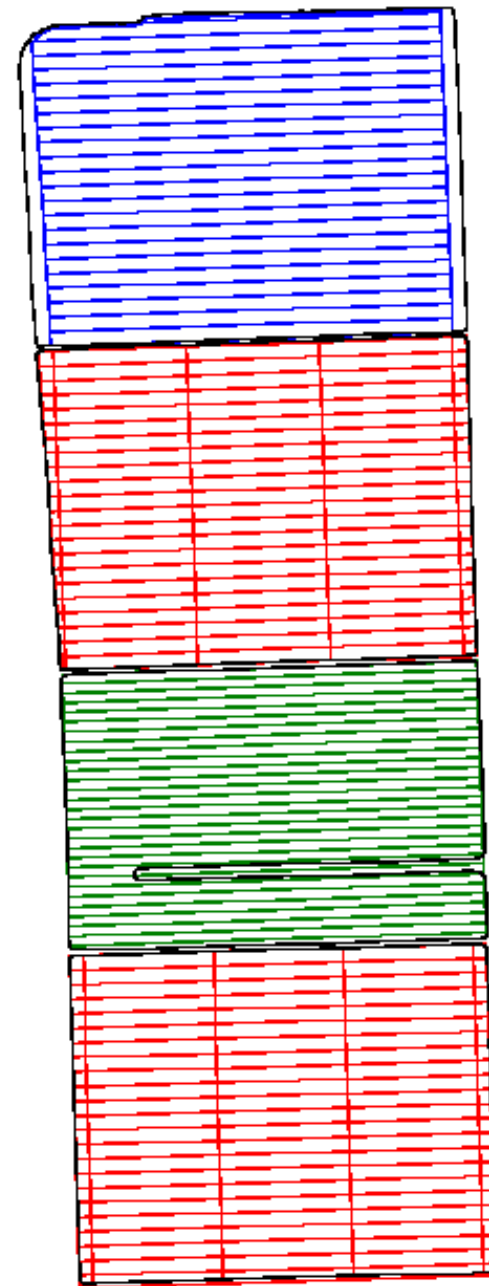
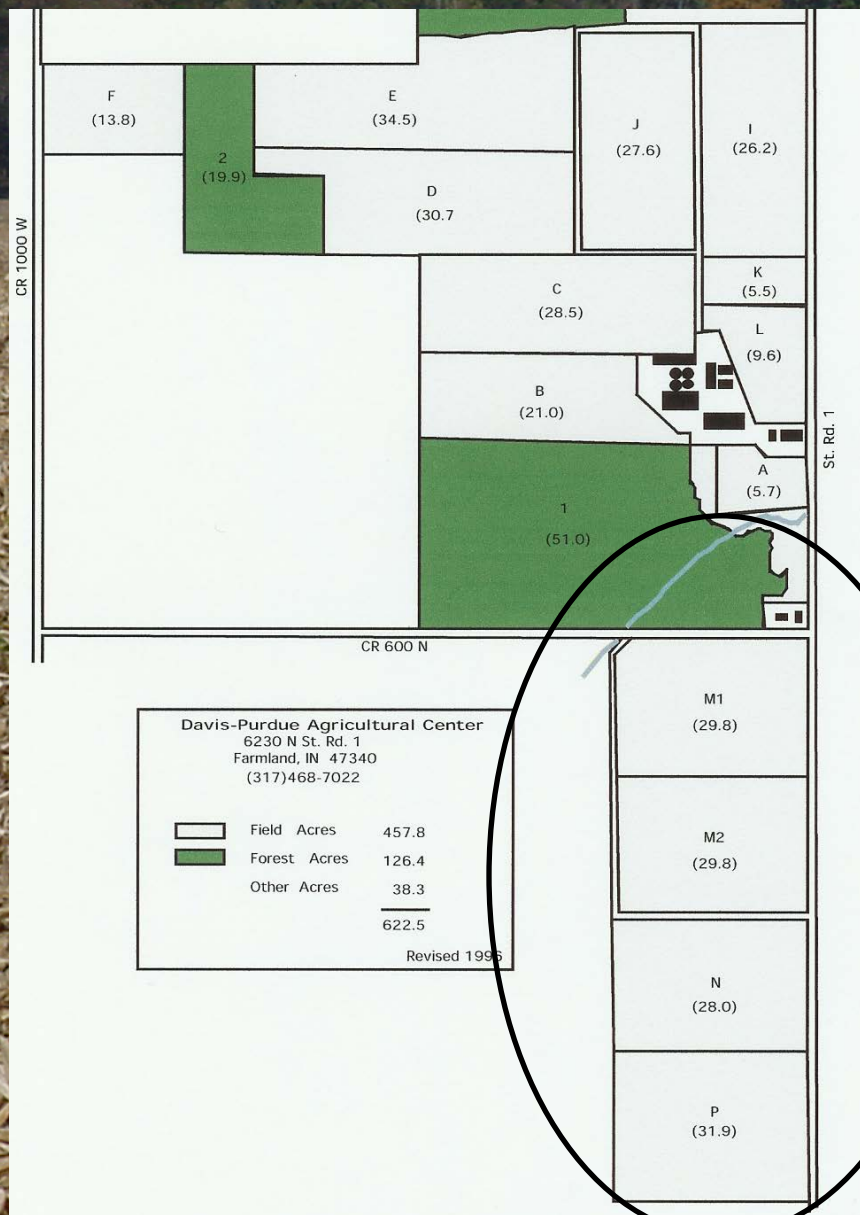
Heavy Clay, Poorly Drained, Variable Soils



Most Fields – 30 acres in size  
Not Suitable for Small Plots

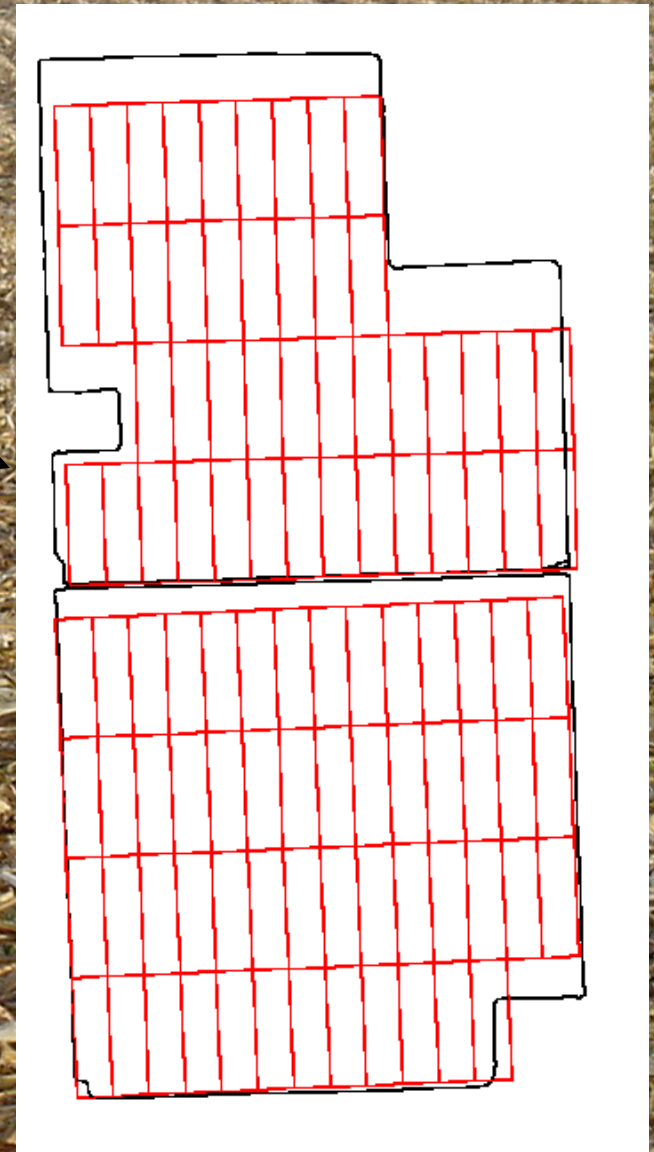
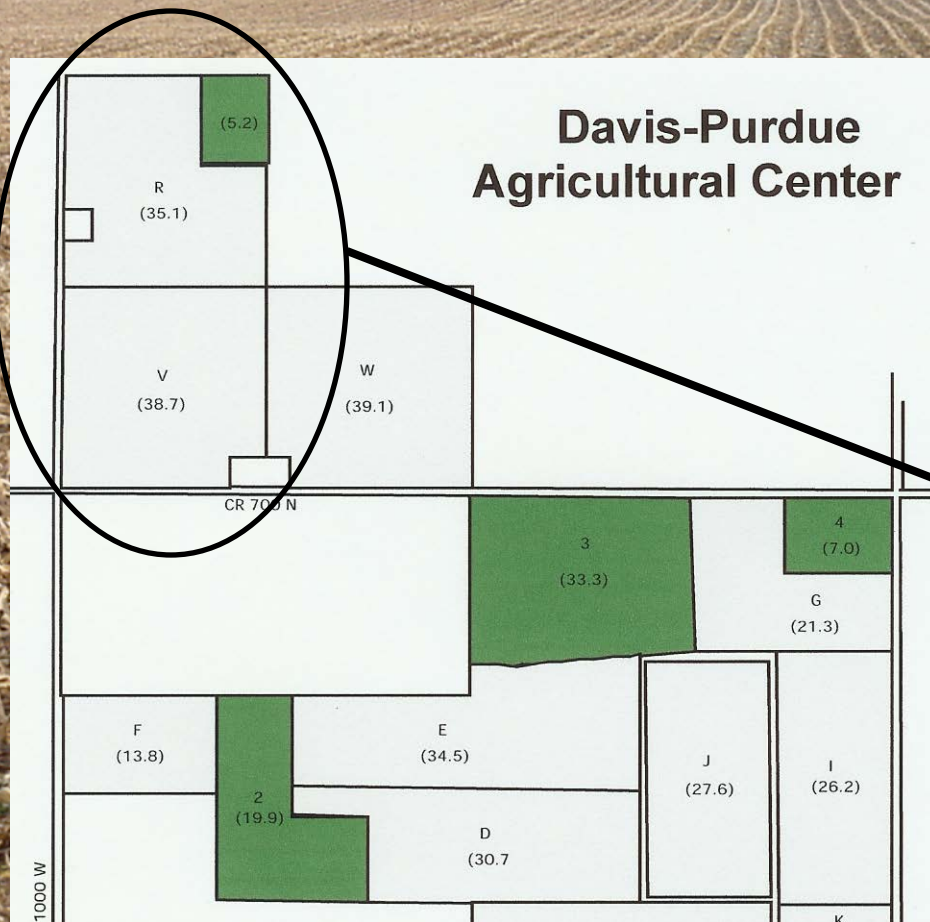


# System of Field Scale Research Plots





# Field Scale Research Plots - 90 ft wide by 300 ft long



# Utilization of GPS Technology at DPAC

## Development of Field Scale Plot System

**1995**

- Ag Leader AL2000 with FM DGPS
- No Software on farm

**1996 – 1997**

- **AL2000 & Rockwell Vision System**
- **Omni Star GPS Receiver with Satellite DGPS**
- Logged data on VCD & Exported data as CSV files
- Kawasaki Mule for mapping & soil sampling



**1998 – 2000**

- Switched to elevator side mount moisture sensor
- **Grid Soil Sampling and VRT applications of P&K**
- HP Palmtop computer and pocket excel for scouting
- **Trimble AgGPS 132 GPS receiver and Ipaq with Farmworks Software**
- **Added Parallel Swath Bar**
- VRT NH3 applications
- Veris Data Collection
- Topo Mapping
- Order 1 Soil Survey – Purdue and NRCS



## 2001

- Compaq Ipaq with Pocket Excel
- Field Scouting
- Crop Plan Files
- Farmworks Site Mate Software
- Picture Viewer
- Ag Leader PF3000 with GPS4100 receiver on combine
- Began VRT Applications of Lime



## 2002-2003

- Added 28 Applicator with Rawson drive
- PF3000 Pro and Rawson Drives on planter and drill
- Added Fertilizer Spreader with Rawson drive

## 2004-2005

- Kawasaki Diesel Mule for field mapping and soil sampling
- Raven Viper Computer installed on Spra-Coupe





**2008**

➤ **Chandler Lime Spreader with Raven Controller**

**2009**

➤ **Wintex 1000 Automatic Soil Sampler**



**2010**

➤ **Trimble RTK Autosteer System**  
**2 tractors and combine**

**Grid Soil Sampling**

**Data Sets**

**Farmworks Software**

**Ag Leader SMS Software Packages**





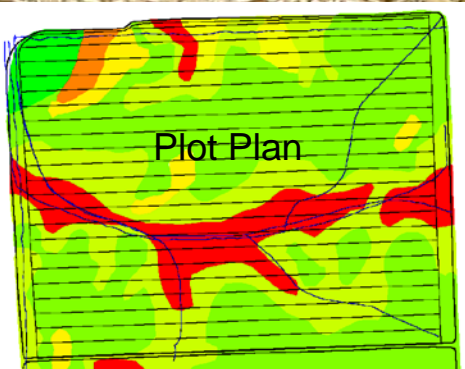
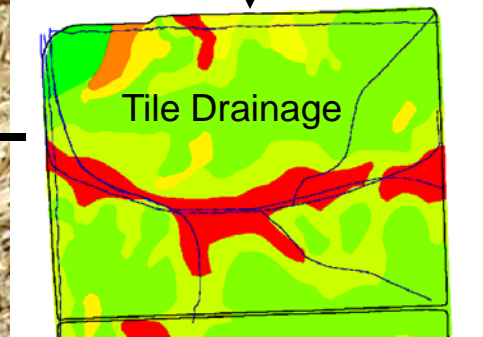
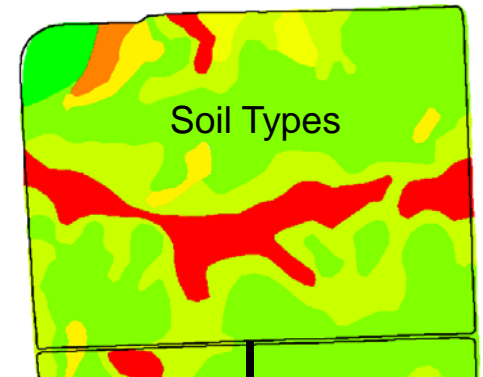
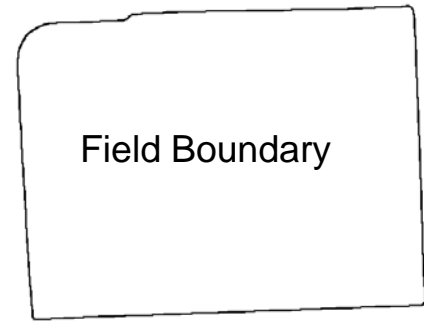
**DPAC Staff  
Verify Plot  
Plan**

## Field History & Data Sets

1. Field Boundary
2. Soil Types
3. Tile Drainage
4. Yield Data
5. Soil Fertility Data
6. Cropping History
7. Fertilizer/Lime Applications
8. Topo Data
9. Soil EC Data
10. Aerial Images
11. Others

**Project Utilizes  
Background Data  
in Developing  
Plot Plan**

## Other Data Sets

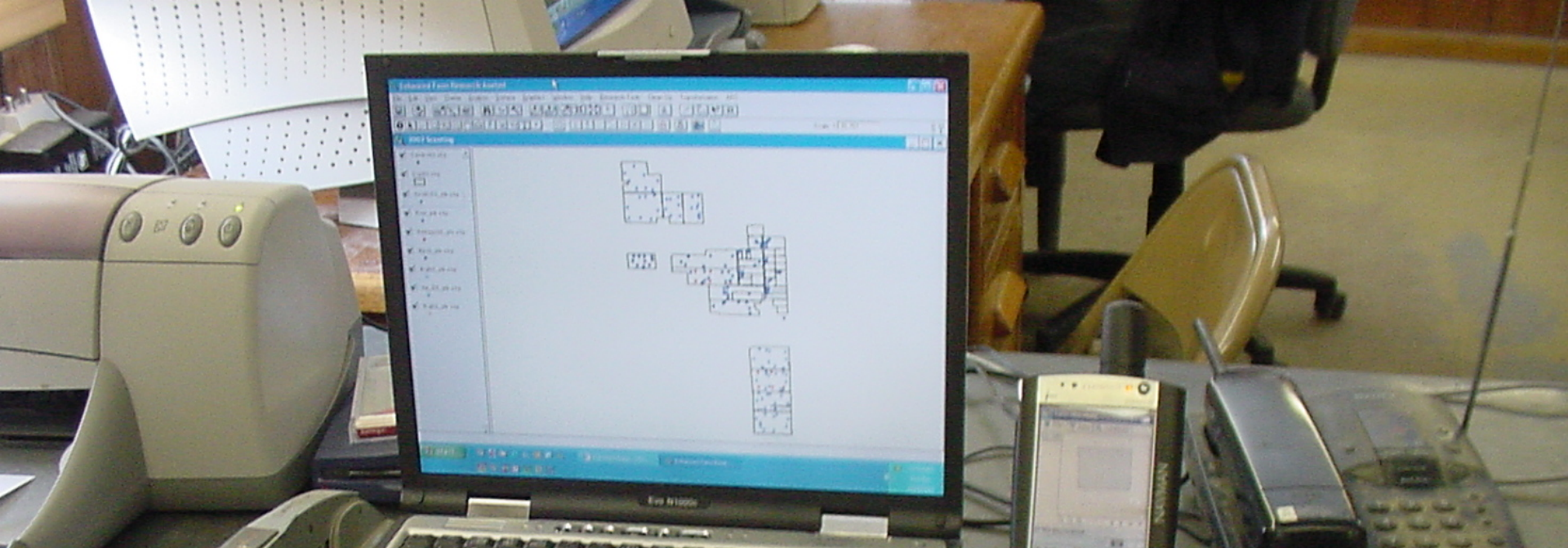




## Equipment Sized Systematically

- Field Cultivator – 22.5 ft
- Sunflower Disk – 18 ft
- Disc Chisel – 9 shank
- Planter 15 ft
- Drill 15 ft
- 28 UAN applicator 15 ft
- Fertilizer Spreader 45 ft
- Lime Spreader 30 ft
- Sprayer 75 ft boom (15 ft sections)
- Case/IH Combine – 15 ft grain table, 6 row corn head





## **Commercial Computer Software Packages**

- **Ag Leader SMS Advanced - Yield Data Processing, Prescription Files, Plot Size/Configuration, Grid Soil Sampling**
- **Farmworks Software - Crop Records, Yield Data, Prescription Files, Grid Soil Sampling, SURFACE WATER MANAGEMENT**
- **ESRI Inc - ArcView GIS**



## GPS Equipment

- Ag Leader - GPS 4100
- Trimble Navigation - AgGPS132
- Raven GPS Receiver WAAS
- Farmworks - Navman Receiver
- OmniStar USA Inc - Differential Correction Signal
- Trimble RTK System



**GPS Based  
Technology  
System**



**Rawson Drive**

**PF3000 Pro**



**Trimble FmX**



## **DPAC Staff**

- Superintendent – A/P
- Service/Clerical
- Research Faculty and Students Travel from Campus

## **Empowering Staff**

- Ability of Staff
- Expectations of Staff
- Value of New Technology

## **Implementing Technology into Routine Operations**

- Patience
- Repeated Use
- Good Communication

**EVERY QUESTION/CONCERN IS A GOOD QUESTION!!**

# **GPS Based Technology**

**Allowed Us to Bring Together Field Scale Research  
and Bulk Production Practices In An Efficient and  
Effective Manner**

## **Advantages**

- **Production Equipment – Research Purposes**
- **Ag Center Staff Can Implement Plots**
- **Research Conducted Under “Field Conditions”**
- **Variable Rate Fertilizer/Lime Applications**
- **Data Quality/Consistency – Extraction of Data**
- **Multiple Data Sets – Know the Fields**
- **New Data Sets – Verify Old Data Sets**
- **More Accurate Input Orders**
- **More Accurate Applications**

## **Disadvantages**

- **Volume of data generated**
- **Dependence on electronic equipment**
- **Variability of plots**



## Investment in DPAC Site Specific Technology

1995	\$ 12,150
1996	\$ 46,700
1997	\$ 15,133
1998	\$ 1,900
1999	\$ 12,640
2000	\$ 3,620
2001	\$ 8,000
2002	\$ 8,000
2003	\$ 45,300
2004	\$ 8,000
2008	\$ 20,000
2009	\$ 7,845
2010	\$ 21,852
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Total	\$211,140

16 Years

\$13,196/yr

\$30/tillable acre/yr

Labor/Management???

Soil Testing???

Software Cost???

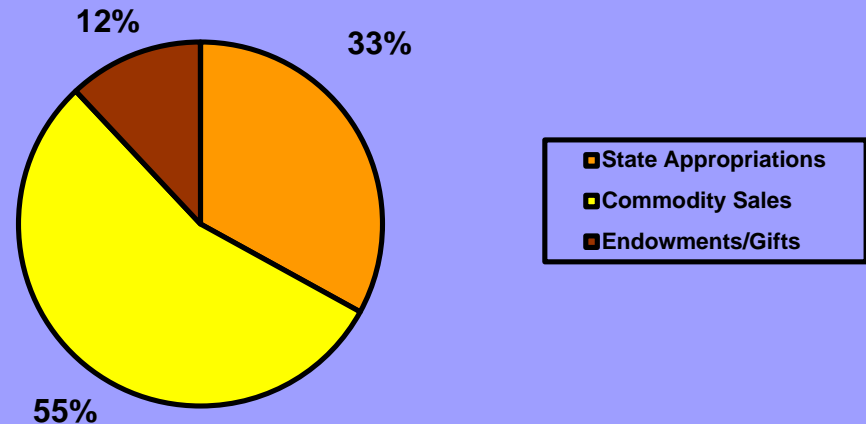
# Purdue Agricultural Centers – Financial Overview



Regional Agricultural Center funding comes largely from three sources:

- State line-item (33%)
- Sales of commodities (55%)
- Endowments & minor grants (12%)

PAC FY 2009-10 Funding Sources



## Funding GPS Based Technology

- Commodity Sales
- Endowment Funds
- Faculty
- Industry
- Other Agencies



# What Does the Future Hold???

- Use of GPS Based Technology has Expanded to other Ag Centers and ACRE
- On Farm Research
- RTK Systems have the potential to change how we look at row crop research

