Influence of Weather and Technology on Corn Yields

Scott Irwin
sirwin@uiuc.edu
University of Illinois

Conventional Wisdom

2007 Illinois Farm Economic Summit
The Profitability of Illinois Agriculture: Where to from Here?
Illinois Corn Yields, 1960-2006

1960-1995: +1.5 bu./yr.

1996-2006: +3.1 bu./yr.


1992-2006: +2.0 bu./yr.
Regression Models of Corn Yield

- **Yield:** State Average for Illinois, Indiana, Iowa
- **Technology:** Linear Time Trend
- **Precipitation:** Sep-Apr, May, June, July, August
- **Temperature:** May, June, July, August
- **Weather Data:** Monthly Average
- **Time Period:** 1960-2006

Model Fit over 1960-2006:

- Illinois – 95%
- Indiana – 94%
- Iowa – 94%
Effects of Technology, 1960-2006
(assuming average weather)

Illinois: +1.9 bu./yr.
Indiana: +1.8 bu./yr.
Iowa: +2.0 bu./yr.
Effects of Precipitation, 1960-2006

June Precipitation

July Precipitation

Effects of Temperature, 1960-2006

July Temperature

August Temperature
Are Trend Yields Increasing Faster at the State Level?

---

**Graph:**
- **Y-axis:** Yield (bu./acre)
- **Lines:**
  - **Blue Line:** Illinois
  - **Red Line:** Indiana
  - **Orange Line:** Iowa

**Legend:**
- Indiana: +1.8 bu./yr. (1960-1995), +1.8 bu./yr. (1996-2006)

---

New Seed Technology

**Diagram:**
- **Monsanto's Yield Boom**
- **2007 Crop Genetics Pipeline**
- **2007 Illinois Farm Economic Summit**
Key Illinois Weather Variables, 1960-2006

- Total June-July Precipitation
  - Average = 8.0"

- Average July-August Temperature
  - Average = 74.2°

Key Indiana Weather Variables, 1960-2006

- Total June-July Precipitation
  - Average = 8.4"

- Average July-August Temperature
  - Average = 73.2°
Key Iowa Weather Variables, 1960-2006

Total June-July Precipitation

Average = 8.8"

Average July-August Temperature

Average = 72.9°

The United States had so little variability in weather and grain production in the past two decades (until 1974) that an attitude of complacency had developed. There was frequent reference in the early 1970’s to the fact that technology had advanced to such a level that weather was no longer a significant factor in grain production.

—L. Thompson, Iowa State, 1975
Alternative Trend Yield Projections to 2030 for Illinois Corn Yields

1940-1959: +1 bu./yr.
1960-2006: +1.7 bu./yr.
2007-2030: +6 bu./yr.
+3 bu./yr.
+1.7 bu./yr.

1940-1959: +1 bu./yr.
1960-2006: +1.7 bu./yr.
2007-2030: +6 bu./yr.
+3 bu./yr.
+1.7 bu./yr.

Yield (bu./acre)
0 50 100 150 200 250 300 350