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Agronomy Advice
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Maximizing Corn Grain and Forage Yield

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Corn growers need to set a realistic corn yield goal in order to make sound decisions on hybrid, seeding rate, fertilizer application, and irrigation. **The goal should be the most profitable yield** that can be expected for a particular set of soil, climate, and management practices. The **yield potential** is the maximum production of a crop cultivar that can be achieved in a given environment. To achieve the yield potential, the crop must receive optimum levels of water and nutrients and be completely protected against weeds, pests, diseases, and other factors that may reduce growth. Growth-limiting factors such as water and nutrients determine the **actual yield**. Yield potential is reduced by insufficient nutrients, water supply, diseases, insects, weeds, lodging, or poor soil physical traits and quality. Maximum yields obtained in corn yield contests are reasonable estimates of yield potential because corn is grown in these plots at high density and nutrient supply, and full weed and pest control.

An experiment to maximize corn yield

Field = 18.6 A. Use management practices thought to maximize yield. Use farm scale equipment.

Objectives:

1) To maximize corn yield on a Plano silt loam.
2) To compare test plot yields at Arlington to the yield of a field managed for maximum yield.

Tillage: Fall chisel plow and spring soil finisher. In reference strip #10, use no tillage.
Rotation: Continuous corn. Strip # 5 and #7= soybean
Hybrid = Standard + 2 others to test. Hybrid planted in first reference strip is also planted in headlands. In reference strips #1 and #2, plant hybrids to test as future replacement.
Target planting date = Monday before May 1. Start in southwest corner, finish in no-tillage reference strip
Planter: JD six-row unit.
Planting speed: 4 mph (slightly slower than normal)
Plant population: Seed at 40 000 seeds/A for target of 36 000 harvested plants/A. In reference strip #8 increase by 5000 plants/A
Soil Fertility:
N rate: Use starter fertilizer plus 350 units N/A; split-applied

- 50 units in fall before chisel plow, or manure before chisel plow
- Starter: 200# of 5-14-42 (or 9-23-30 or 6-24-24). In reference strip #6, double starter fertilizer rate (400#). Placement = 2x2.
- 200 units in spring before spring soil finisher, and
- 100 units of 28% urea at lay-by. In reference strip #9, double lay-by N rate (200 units).
- In NT apply urea with air flow spreader

Manure: Fall apply 11,000 gal/A liquid manure
P rate: None
K rate: Deep placement of 600 lb K_2O/A in Strip #4
Micronutrients: None
Cultivation: No
Fungicide: Strip #4 Headline
Herbicide: Pre-emerge grass and broadleaf plus post emergence application if necessary with objective to kill all weeds
Insecticide: Force 3G @ 4.4 lb/A
Harvest: GPS Yield map everything. Double-check across scale middle 12 rows of each reference strip. Leave six-row border on each side of reference strip for re-check.
Fall operations: Chop stalks, 50 lb N or manure, chisel

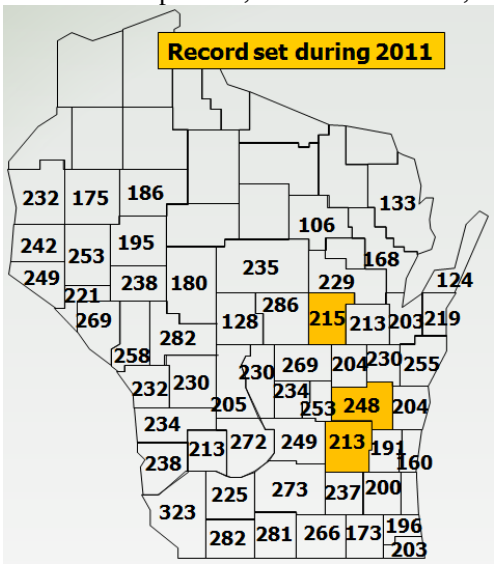


Figure 1. Highest recorded corn yields (bu/A) in Wisconsin counties (1983-2011). Data includes participants in the NCGA yield contest and Wisconsin PEPS program.

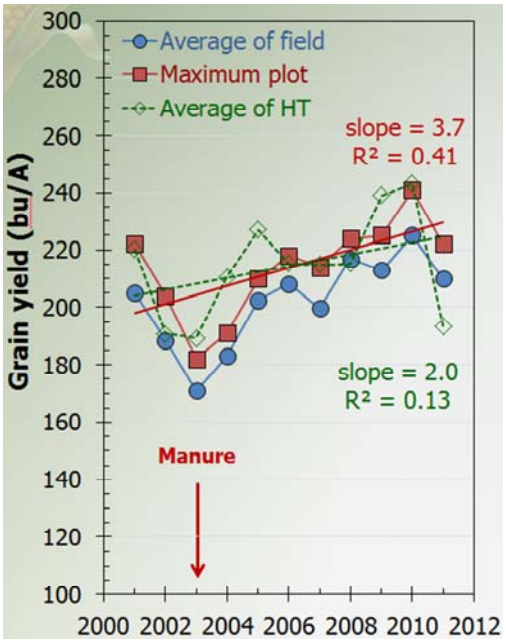


Figure 2. Corn grain yield over time when managed for maximum yield at Arlington, WI.

The Seven ~~Wonders~~ Realities of the Corn World!
How do we get there?

Due to strong market prices, the 2012 crop has the potential to be one of the most profitable corn crops ever planted. If input costs continue to increase, profit margin will be back to previous years, except with more risk. Corn growers wonder about whether touted yield enhancing management practices really work.

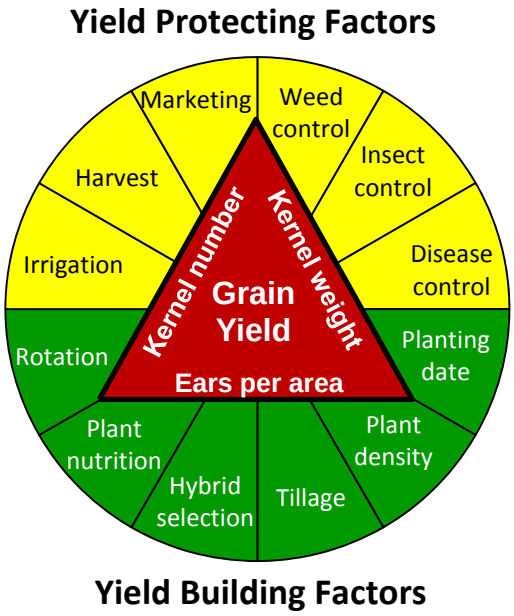
Recommended practices versus Trends

To begin this discussion we have to be careful about practices that can be recommended versus practices that intuitively may trend to greater yields, but are not statistically significant and thus cannot be recommended. These trends produce responses too small to be statistically significant.

In agronomic research it is very difficult to detect treatment differences less than 5%. So in a 200 bu/A yield environment, that means at least 10 bu/A is required before statistical differences can be detected. What about trends less than 10 bu/A? At today's prices a difference of even 5 bu/A can pay for many inputs. Is there any guarantee that a trend will make a difference on your farm?

Major management objectives for enhancing corn yield and their economic consequences

Corn grain yield consists of the components: Ear density, Kernel number per ear (row number x kernels per row), and Kernel weight. These yield components are determined at different times during the life cycle of a corn plant. The main management objective is to setup your yield potential and reduce stress at all stages of crop development. Environment, genetic and management factors interact to influence yield and are more likely to be subtractive than additive.



1) **Weather / Environment**: unpredictable
2) **Hybrid**
   a. Top to bottom ranking = 0 to 30% change (Grain= 70 bu/A, Silage= 12,100 lb Milk/A)
   b. Presence or absence of genetic traits = 0 to 100% change
3) **Date of Planting**
   a. May 1 to June 1 = 0 to 30% change
   b. Also need to add moisture penalty
4) **Pest Control**
   a. Timeliness
   b. Weeds > Insects > Diseases
   c. Good v. Bad = 0 to 100% change
5) **Plant Density**
   a. 32,000 to 15,000 plants/A = 0 to 22% change
6) **Rotation**
   a. Continuous v. Rotation = 0 to 30% change
   b. Greater consequence in 'stress' environments
7) **Soil Fertility**
   a. 160 v. 0 lb N/A = 20 to 50% change
8) **Harvest Timing**
   a. Oct. 15 to Dec. 1 = 0 to 20% change
9) **Tillage**
   a. Chisel v. No-till = -5 to 10% change
   b. No-till = energy savings
   c. Cultivation: Yes v. No = 0 to 10% change
10) **Row Spacing**
   a. 30-inches to 15-inches = 0 to 5% change