

Nov 30th, 12:00 AM

Can We Sustain Corn Yield Trends?

Roger Elmore

Iowa State University, relmore@iastate.edu

Follow this and additional works at: <https://lib.dr.iastate.edu/icm>



Part of the [Agriculture Commons](#), and the [Agronomy and Crop Sciences Commons](#)

Elmore, Roger, "Can We Sustain Corn Yield Trends?" (2006). *Proceedings of the Integrated Crop Management Conference*. 4.
<https://lib.dr.iastate.edu/icm/2006/proceedings/4>

This Event is brought to you for free and open access by the Conferences and Symposia at Iowa State University Digital Repository. It has been accepted for inclusion in Proceedings of the Integrated Crop Management Conference by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.

Can we sustain corn yield trends?

Roger Elmore, Professor, Agronomy, Iowa State University

Lori Abendroth, Agronomy Specialist, Agronomy, Iowa State University

Corn yields in Iowa continue at a rate of 2 bushels per acre per year. This is a trend that started back in the 1940's. Driven by hybrid genetic improvement and management the question we need to address is: Are these yield trends sustainable into the future? Will these yield trends continue to increase? If so, for how long?

We can think of yield in four different ways. Yield trends for two of these four are increasing while two are not:

Attainable Yield

- Yield with many controllable limiting factors (Nutrients, Weeds, Diseases, Insects, Wind, Soil condition): Let's consider county average yields in this category. Of course yield trends from any increment of previous year's data are valid. Which is the best increment to use for yield trend predication?
- Yield with Water Limitation: Yield with BMPs (Best Management Practices) and water limitations. These are yield from well managed, non-irrigated fields e.g. corn hybrid trials.
- Yield Potential: This requires maximum yield management and results in yield in the absence of stress. Contest winners/ Crop Models/ Yield Contest Winners produce at this level.

Biological Yield Limit

This is the physiological yield potential of corn based on physiological models and predictions. No one has achieved these yield levels.

Many interesting things could influence the slope or trend of corn yield increase. Let's call these 'Novel' limiting/increasing factors:

- Optimum return to N, Seed, etc.
- Biotech products...yield protection, yield stability, stress tolerance etc
- Yield drag with transgenic hybrids?
- Breeding for wide-spread adaptability.
- Environmental concerns and limitations
- Yield per plant effort?
- CO₂?

Findings

Corn yield potential is not increasing. There is a yield ceiling. Our high-yield producers have been hitting up against it for 20 years or more. This is based on the following points:

- Although '*Yield with many controllable limiting factors*' (county average yields) and those from '*Yield with Water Limitations*' (well managed, non-irrigated fields) continue to increase, the average yield increases are less than in the 1970's and are not increasing.
- *Yield Potential*: Iowa Yield Contest irrigated winner yields are increasing at a slower rate than non-irrigated. Nebraska Irrigated Yield Contest Winner Yields have not changed since 1985. Crop model shows no increase in irrigated yield potential since 1985. National Yield Contest Winner Yields shown no increase in irrigated yields.

For five decades we were very effective at breeding for increased stress tolerance and yield protection while managing field environments to reduce stress. We must now begin to focus on increasing yield potential as a way to raise the yield ceiling.

Suggestions

- Breed for increased yield potential
- Producers: Continue to improve in areas where controllable factors are limiting.
- Agricultural industry, commodity groups, government agencies, politicians, farm managers, rural appraisers, lenders, real estate brokers and appraisers, etc. : Encourage producers to continue to work on increasing yield while optimizing inputs and environmental protection.