

The 'top ten' for corn management: Truths, notions, and fallacies

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This presentation covers corn management ideas - whether valid or invalid - based on scientific findings and some notions. Topics include responses to narrow rows and plant populations as well as 'mystery' yield losses after physiological maturity.

Please indicate your opinion on the following statements by checking the appropriate column following the statements. Marking the column with the '?' indicates you are either uncertain about your answer or the statement is not necessarily true.

Corn management		True	?	False
1	Corn development and growth mean the same.			
2	Transgenic traits are offensive traits.			
3	Fixed and Flex hybrids respond differently to environments.			
4	Prolific hybrid adoption allows for reduced stands & increases yields.			
5	Corn yields following corn are not penalized.			
6	Increased N increases grain yields.			
7	Narrow rows always increase yields.			
8	Corn planted before an early-May snow storm will do poorly.			
9	Increasing seeding rates over time helps only seed companies.			
10	Picket fence stands improve yields.			
11	Corn hailed or frosted before V6 will survive.			
12	Tillers affect yield.			
13	Test weight and yield are correlated.			
14	Corn loses dry matter mysteriously after physiological maturity.			
15	Nitrogen applied to corn stalks in the fall will enhance stalk breakdown.			
Looking back and ahead		True	?	False
16	Hybrid adoption spurred the large corn yield increases in the 1940's.			
17	Corn yield will continue to increase in the 21st century.			
18	Our climate is not changing.			
19	Agronomy - Agriculture - is all about science....and not art.			
Extension and applied research support issues		True	?	False
20	Iowa corn check off dollars support applied corn research.			
21	The need for Extension education and outreach is a thing of the past.			

Truth, notions, and fallacies are three words we use to describe our perceptions of the world. ‘True’ things conform to facts or reality. In the same context, notions are impressions of something, opinions or concepts. The word fallacy, on the other hand, implies some error or flaw in reasoning.

With these definitions in mind, I suggest that we base most corn management decisions on either notions or fallacies. I say this because although truth is what we all want to set our sights, as a scientist, I know that in reality almost everything we think as ‘true’ carries a probability of uncertainty - that we may or may not acknowledge. Let’s talk here about a few issues relative to corn management. Since there is a probability that what I think is a fallacy, is actually true, I’ll indicate my opinion on the item and provide some logic following each of the items below. I’ve divided them into a few categories.

Corn management

1. **Corn development and growth mean the same.** False. Growth is an increase in plant size or weight. Development is the progression of plants through different stages of maturity (see Abendroth, et al., 2011).
2. **Transgenic traits are offensive traits.** False. Transgenic traits are defensive in nature and practice. To illustrate this, if lines of the same hybrid are identical except one has a transgene for insect tolerance the other line does not, if the insect is not present, the lines will yield the same. On the other hand, if the insect is present at harmful levels, the one with the transgene will yield more. Transgenes protect yield, they don’t increase it.
3. **Fixed and Flex hybrids respond differently to environments.** Uncertain. Researchers have not substantiated claims that hybrids with different ear types will respond differently to stresses of various kinds and timings. Select hybrids based on previous performance over time and or locations and not because it has a specific ear type (Thomison, P. R. 1990).
4. **Prolific hybrid adoption allows reduced stands & increases yields.** Uncertain. Prolific hybrids produce more than one ear per plant at normal to slightly below normal seeding rates. This should provide increased stress tolerance and allow lower seeding rates. Although currently there are some prolific hybrids available, there is no evidence that they increase yields over typical, single-eared hybrids. Breeding efforts for the last 5 or more decades largely focused on single-eared hybrids not prolific hybrids. Current U.S. research is limited (Gardner et al. 1987).
5. **Corn yields following corn are not penalized.** False. Yields of corn following corn average up to 15 % less than those of corn following soybeans (Kent and Elmore, 2010).
6. **Increased N increases grain yields.** Not necessarily. For more information ask John Sawyer or attend his session, 29, “Options for in-season adjustment of nitrogen rate for corn.”
7. **Narrow rows always increase yields.** Not necessarily, but true to a point... and that point is 30-inch rows. Corn in thirty-inch rows normally yields more than those in wider rows. However, yields from systems with narrower rows yield the same as those in 30-inch rows. But, stay tuned. If seeding rates continue to increase, eventually more equidistant planting systems will be necessary. (Abendroth and Elmore, 2006)
8. **Corn planted before an early-May snow storm will do poorly.** False. In ‘normal’ years, planting right before snow and a guaranteed drop in soil temperatures would result in serious stand losses and variability in emergence. This year, those factors were out-weighted by a very wet and cool May!
9. **Increasing seeding rates over time helps only seed companies.** False. Iowa’s increasing seeding rate over time has indeed sold more seed helping seed companies, but it has been in part also responsible for the yield trends mentioned above. Modern hybrids are more stress tolerant than earlier hybrids, they are built to withstand higher densities. The ability of modern hybrids to withstand higher populations is in part the reason for the excellent yields we normally experience and current yield trends.
10. **Picket fence stands improve yields.** False. Achieving optimum stands and uniformity of emergence timing are far more important to yield than having perfectly spaced plants.
11. **Corn hailed or frosted before V6 will survive.** Uncertain. We know that corn growing points are protected from most frost or hail events until the 6th leaf stage. At that time it emerges from the soil and is vulnerable. However, events that defoliate corn before growing point emergence from the soil can damage or kill corn

seedlings. This occurs primarily when growing conditions are cool and wet following a stress event. (Elmore and Doupnik, 1995)

12. **Tillers affect yield.** True. Modern research shows that tillers have little influence on grain yield and what influence they have is normally positive. However, excessive tiller numbers may mean that seeding rates are lower than optimum (Thomison, 1995).
13. **Test weight and yield are correlated.** False. Test weight is a marketing term based on weight per bushel. It is associated with seed size, seed coat slipperiness, among other factors and is not correlated with yield. (Nielsen, 2012)
14. **Corn loses dry matter mysteriously after physiological maturity.** False. After physiological maturity – when maximum kernel weight is reached – the only major loss is grain moisture loss. (Elmore and Roeth, 1999, 2000; Byamukama, et al., 2013).
15. **Nitrogen applied to corn stalks in the fall will enhance stalk breakdown.** False. See Mahdi Al-Kaisi's presentation, session 31. "Best management practices for sustaining yield and soil quality."

Looking back and ahead

16. **Hybrid adoption spurred the large corn yield increases in the 1940's.** False. Hybrid adoption was associated with other major breakthroughs in management at nearly the same time. Other management improvements such as narrower row spacings, higher seeding rates, development of commercial N sources, herbicides, insecticides, seed treatments, and planting and tillage equipment were essential for yields to increase. Nevertheless, hybrids formed a key basis for a management package that spurred corn yield increases that continue to date. (Elmore, 2013)
17. **Corn yield will continue to increase in the 21st century.** Uncertain. Iowa corn yields continue to increase about 2 ½ bushels per acre per year – 30-year trendline. Promises of 300 bushel national average yields in 17 years - by 2030 – will not likely be fulfilled. In fact, some think national average corn yield increases will level off sometime before we even get close to 300 bushels per acre (Elmore & Abendroth, 2007).
18. **Our climate is not changing.** False. Climate change means that we can expect more variability like we've experienced in 2012 and 2013. Gene Takle, director of ISU's climate science program stated, "... there are very, very few scientists who are active in studying climate science who deny the existence of the role of heat-trapping gases in raising our global average temperatures, and the fact that these heat-trapping gases are produced by humans," (Leys, 2013).
19. **Agronomy - Agriculture - is all about science... and not art.** False. 'Science' attempts to acquire trustworthy knowledge about the world. 'Art' is the application of human skill, and imagination. It takes science to do art well, and it takes art to do science well. Agriculture resides at the intersection of art and science. Consider the quote from Daniel Webster, 1840, "When tillage begins, other arts follow. The farmers therefore are the founders of human civilization."

Extension and applied research support issues

20. **Iowa corn check off dollars support applied corn research.** False. With few exceptions, applied corn production research is not funded by the state corn check-off. A perception among Iowa agriculturalists is that Iowa Corn Promotion Board – the board that administers the check-off funds - supports applied corn research. However, applied corn research at Iowa State University is supported by seed and chemical companies as well as USDA-NIFA grants.
21. **The need for Extension education and outreach is a thing of the past.** False. Extension has and hopefully will continue to play a critical role in advancing and developing Iowa cropping systems alongside farmers and Ag-industry colleagues. A viable, sustainable agriculture depends on it. Remember, industry's goal is to provide products and services often associated with educational materials and information; many of these were developed by Land-Grant University and Extension scientists. Extension's unique role is to provide non-biased, objective, research-based information to serve the common good.

Part of our jobs – whether farmer, crop consultant, agronomist, reporter, Extension worker, or scientist – is sort fact from fiction, the truth from false perceptions and claims. True things don't change over the long haul. But, relative to corn production and management, what is true and works today may not be true tomorrow; circumstances change. My grandfathers and dad planted corn in 40 inch rows with seeding rates in the teens. It was the best for those varieties and early hybrids and for those times. Be willing and open to change! Keep asking questions and adapting to new circumstances and new truths/notions!

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