

# Comparing Reid's Yellow Dent to Modern Corn Genetics - Across Production Systems

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## Abstract:

What is the yield potential of an older open pollinated corn variety? How does the best of the past compare to modern genetics? Six years of work comparing Reid's yellow dent open pollinated corn to modern genetics shows a 100 bushel per acre deficit. Trials were conducted to compare populations, nitrogen rates and other genetics.

## Overview of trials

- Conducted at the Ohio State University's Western Agricultural Research Station, South Charleston, Ohio
- For the years 2011 to 2016
- Soils are Strawn-Crosby (0-2% slopes) and Kokomo silty clay loam (0-2% slopes)
- The 30-year annual normal is 40.22 for 1981-2010

## Objective of trials:

- Challenged in 2009 with finding an eye-catching and educational demonstration for the Farm Science Review, the university fall harvest show
  - Led to a planting of historically important corn varieties, those demonstrations continue to this date.
- This led to many conversations with growers and exhibitors (seed company agronomists) on the yield potential of older open pollinated corn varieties as compared to modern hybrids.
- Later challenges from industry agronomists, suggested we look at older, popular hybrids and even more modern open pollinated varieties.
- One grower suggested that buying open pollinated seed would save enough on seed costs to make up for the difference in yield.
- This demonstration at the Farm Science Review and continuing yield comparisons has led to presentations and discussions on the value of bio-engineering or GMOs (genetically modified crops) with farmers, industry and the public.

## Methodology:

- Over the six years of the continuing trials, all varieties or hybrids were planted with a modern, conventional corn planter: John Deere 1750 to 1755 in 30-inch rows.
- Fertilizer as urea was applied at planting, through the planter. Usually 50 pounds or more pounds/A.
- Conventional corn herbicides were used, no glyphosate.
- Tillage used was typically fall chisel or chisel-disk, then early spring field cultivator or vertical tillage tool to level and prepare for planting. Planting was into a stale seed bed approximately two to four weeks after spring tillage.
- In all years, except 2016, a soil insecticide was used and applied through the planter.
- Reid's yellow dent is widely available from multiple suppliers, and apparently still popular. There does appear to be some differences in maturity and appearance. Some sources (Schlessman Seed Company) provide seed treatments, many do not.
- The seed for the 2014 and 2015 hybrid B73xMo17, was produced in 2013 by crossing the parents then collecting ears, shelling the seed and cleaning. Planted with no seed treatment. Parent seed was provided by the North Central Regional Plant Introduction Station ARS at Iowa State University.
- The 2016 Truckers Favorite Yellow O.P. was provided by Schlessman Seed Company of Milan, Ohio.

Figure 1. One of the poorer showings for Reid's, maximized yield at 67 bu/A but bested the modern open pollinated. Lodging due to disease led to their downfall. Plant height for Reid's was approximately 10-12 feet, for Truckers 12-14 feet, the modern hybrid seven feet.

Year 2016		Modern hybrid	Recent OP	Old OP
Treatment	Seed	Trucker's	Reid's yellow	
Seeding rate/	Consultant's	Favorite	dent	
N rate	SC11AQ15	Yellow		
----- yield bu/A -----				
18,000 100N	151.1	48.7	67.2	
18,000 200N	160.9	41.7	56.0	
36,000 100N	196.0	33.5	57.7	
36,000 200N	227.1	32.4	53.5	
	LSD 0.10	27.6		Prob > F 0.0000
-- lodging 1-10 scale (1 standing, 10 flat) --				
18,000 100N	1.7	7.3	6.0	
18,000 200N	1.7	7.7	7.3	
36,000 100N	1.0	6.3	7.7	
36,000 200N	1.0	6.7	7.3	
	LSD 0.10	1.3		Prob > F 0.0000

Figure 2. Tested for a second year B73xMo17 tolerated higher seeding rates well. Reid's lodged somewhat but posted a best of 87 bu/A. An excessively wet season showed the value of higher N rates.

Year 2015		Modern hybrid	1960s hybrid	Old OP
Treatment	Seed	Stewart's	B73xMo17	Reid's yellow
Seeding rate/	7A259RIB			dent
N rate				
----- yield bu/A -----				
18,000 100N	176.2	98.8	77.4	
18,000 200N	192.0	107.3	87.1	
36,000 100N	211.8	159.4	55.5	
36,000 200N	233.5	169.3	72.7	
	LSD 0.10	18.2		Prob > F 0.0000
-- lodging 1-5 scale (1 standing, 5 flat) --				
18,000 100N	1	1.8	3.8	
18,000 200N	1	2.0	3.5	
36,000 100N	1	1.3	3.8	
36,000 200N	1	1.5	4.0	
	LSD 0.10	0.4		Prob > F 0.0000

Figure 3. Tested a late 1960's hybrid, low seeding rates and higher N rates, showed yield of 153 bu/A. Reid's responded well to higher nitrogen levels, even at the 36,000 seeding rate stood well enough to reach almost 100 bu/A. The Stine hybrid, promoted as a high seeding rate and narrow row width tolerant hybrid, had very low seedling vigor and as a result did not maximize yield.

Year 2014		Modern hybrid	1960s hybrid	Old OP
Treatment	Seed	Stine	B73xMo17	Reid's yellow
Seeding rate/	R9740VT3Pro			dent
N rate				
----- yield bu/A -----				
18,000 50N	133.4	127.4	61.0	
18,000 150N	158.6	152.7	90.9	
36,000 50N	132.6	124.3	54.4	
36,000 150N	178.5	139.2	96.9	
	LSD 0.10	20.9		Prob > F 0.0000

Figure 4. Across a range of seeding rates and nitrogen levels, Reid's showed it could tolerate 30 thousand seeds/A seeding rate and preferred the higher N rate – but is still 120 bu/A below the modern hybrid.

Year 2013		Modern hybrid	Old OP	
Treatment	Seed	Consultant's	Reid's yellow	
Seeding rate/	SCS11HQ38		dent	
N rate				
----- yield bu/A -----				
15,000 50N	137.4		56.7	
30,000 50N	168.6		56.4	
45,000 50N	156.1		28.5	
15,000 150N	145.1		73.5	
30,000 150N	204.0		82.4	
45,000 150N	222.3		75.7	
	LSD 0.10	27.0		Prob > F 0.0000

Figure 5. Across a range of seeding rates, Reid's showed it could tolerate higher seeding but settled in around 18,000 seeds/A to produce top yield.

Year 2012		Modern hybrid	Old OP	
Seeding rate	Pioneer	Reid's yellow		
	P1395XR	dent		
----- yield bu/A -----				
5,000	129.7	60.1		
18,000	176.4	93.3		
31,000	233.7	84.4		
44,000	227.1	75.8		
	LSD 0.10	15.5		Prob > F 0.0000

Figure 6. In 2011, our first year of growing Reid's yellow dent in a competitive trial, we learned its limitations as the photograph below shows, with just a little encouragement it could go down. We also learned that a modern hybrid under modern production practices could generate 100 bu/A more yield. We also found ways to limit the yield of the modern hybrid.

Year 2011		Modern hybrid	Old OP	
Seeding rate	Pioneer P3384	Reid's yellow		
		dent		
----- yield bu/A -----				
5,000	101.2	63.8		
18,000	161.0	93.1		
31,000	193.8	72.4		
44,000	191.2	62.8		
	LSD 0.10	13.5		Prob > F 0.0000



## Seed choice and comparisons:

Reid's yellow dent:

- Developed in 1847. Won the Chicago World's Fair corn show in 1893.
- By 1936 this was the most popular variety in the U.S. Was the dominant corn (75% of production) for 50 years.
- With derivatives makes up 50% of background of modern US hybrids.
- Reid family origins are from Northern Ireland, settled in Springfield, OH after War of 1812
  - A late season frost and a neighbor's assistance with their seed stock led to the discovery that culminated in modern corn hybrids.

## Production practices and observations:

- Row width
  - While Ohio settled on a 30-inch row by the 1980s, the older genetics were selected in wider rows
- Seeding rates
  - Modern hybrids tolerate and require high seeding rates, likely due to changes in root architecture as well as improved stalk quality
- Harvest
  - In our trials accomplished by machine was done by hand into shocks when Reid's was in widespread use
- Nitrogen rates
  - Older genetics respond similarly to N rates as modern hybrids
- Insect protection
  - The older genetics seemed to attract insects, particularly European corn borer and Western corn root worm
- Disease resistance or tolerance
  - Stalk quality is a major issue for the older genetics, partly due to plant height, but also due to susceptibility to many plant diseases including Grey leaf spot and Northern corn leaf blight.

## Conclusions:

- This was fun, and has given me an appreciation of the work that plant breeders, both amateurs and professionals, have made in developing modern corn.
- Today's hybrid seed corn is worth the price in comparison to older genetics and open pollinated varieties.
- If you want to look at the best yield for the modern hybrid vs Reid's yellow dent, the advantage is 128 bu/A .

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