

2019 Kansas Corn Yield Contest Summary



Objectives

- Recognize high-yielding Kansas corn farmers.
- Improve crop management practices and increase efficiency for greater sustainability and profitability.
- Share data collected among Kansas farmers and provide tips for improving management practices.

Fields locations

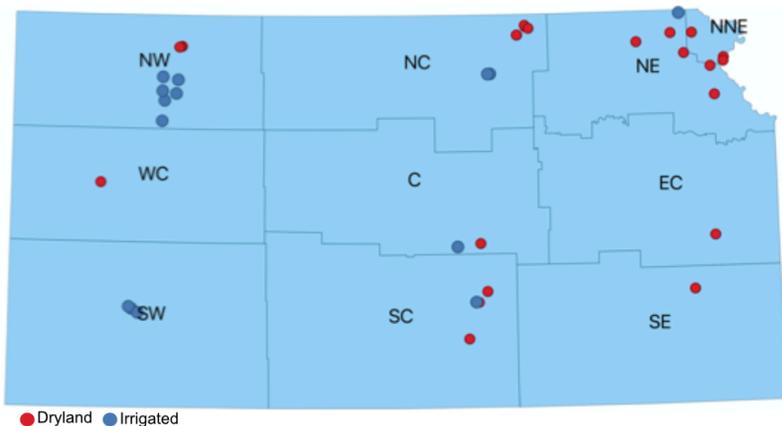


Figure 1. Fields location for high-yield corn contest entries for Kansas. Dryland (23 entries), Irrigated (19 entries).

Results

Generalities

- Yield**
 - Average yield of the harvested plots (yield entry) was 218.4 bu/a ranging from 132.1 to 303.8 bu/a (Fig. 2A).
 - Average yield of the entire fields was 197.3 bu/a varying from 95.0 to 295.0 bu/a.
 - For dryland entries, grain yield increased with the decrease in longitude (from 102 to 94°W) (Fig. 2B). This could be partially explained by the delay in planting date when moving from the eastern to the western KS. For yields <200 bu/a, yield for the plot portrayed a larger yield than the reported for entire fields.

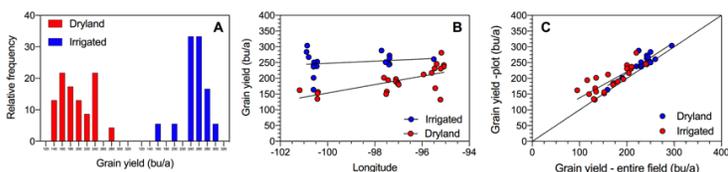


Figure 2. (A) Grain yield relative frequency distribution; relationship between (B) yield and longitude for irrigation ($R^2=0.04$) and dryland ($R^2=0.434$) fields, and (C) between yields for plot (entry) and entire fields.

Crop management

- Corn hybrids by seed companies: 73% Pioneer, 18% Agrigold, and the rest 9% for other companies, Mycogen and Dekalb.
- Average seeding rate was 28,955 seeds/a varying between 16,000 and 40,000 seeds/a. There was a positive and linear relationship between grain yield and seeding rate (Fig. 3B), showing a 5.8 bu/a increase per 1,000 seeds/a.
- 70% of the fields utilized 30 inch-row spacing.
- Soybean was the most frequent previous crop (+50%), followed by corn and wheat.
- 62% of the farms conserved the residue of the previous crop, 35% grazed it, and 3% harvested those residues.
- 62% of the farms planted corn under no-till, 22% strip-tillage and 16% other tillage practices (e.g., disk, vertical, chisel).
- From the irrigated farms, irrigation amounts were from 3 to 24 inches, with the most frequent amount placed on 6 inches (50% of all entries with irrigation).
- A majority of the corn (88%) received both pre and post-emergence herbicide, while only 8% received pre-emergence herbicide and 4% received post-emergence herbicide.
- 55% of the corn received both fungicide and insecticide applications, 41% received only fungicide application, and 4% only insecticide application.

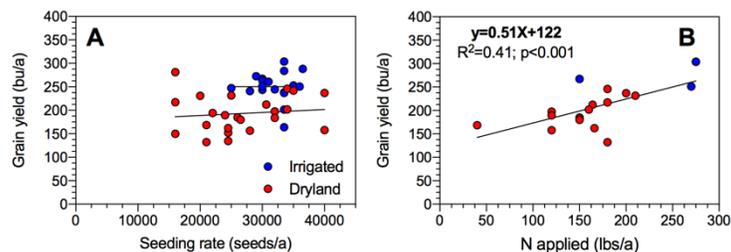


Figure 3. Relationship between grain yield and (A) seeding rate, and (B) amount of fertilizer N applied.

Fertilization

- 80% of the corn received starter fertilizer, N fertilization averaged 166 lb N/a, P fertilization 39 lb P_2O_5 /a, and K fertilization averaged 30 lb K_2O /a.
- Grain yield and N fertilization were positively related (Fig. 3B), with yields increasing 0.5 bu/a per unit of N applied (lb/a).
- None of the farmers reported to present iron deficiency.
- 4% of the corn farmers applied lime, 4% manure, and 4% applied both lime and manure in combination.

Results (continued)

Dryland vs. Irrigated corn fields

- 45% of the fields were under irrigation and 55% under dryland.
- Average irrigation amount applied was 9.2 inches.
- Average yield under irrigation (across all entries) was 251 bu/a, while the average yield for dryland was 193 bu/a (23% below the average yield for irrigated fields).

Yield environments

Yield

- Average grain yield increased 30% from low (<163 bu/a) to medium (163-278 bu/a) and 17% from medium to high (>278 bu/a) yielding environments.

Crop management

- Average seeding rate increased from 22625 to 33875 seeds/a from the low to the high yielding environment, close to more than 50% relative to the low yielding environment. Dryland environments portrayed a trend to increase on seeding rate as the attainable yield increases (Fig. 3A).
- Irrigation adoption was clearly a factor for the medium and high yielding environments (ranging from 52 to 88%) versus a low level of irrigation adopted (8%) for the low yielding environment.
- Most of the low and medium yielding fields (~85%) used both pre- and post-emergence herbicides, while a full proportion of using both pre- and post-emergence herbicides (100%) for the high yielding environments.
- A greater proportion of the fungicide was reported to be applied as the yield environment increases (from 39%, 52%, and 63% for low, medium, and high yield environments, respectively).

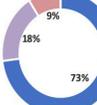
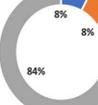
Fertilization

- A lower amount of P and K fertilizers were applied in low yielding fields (17 and 12 lb/a of P₂O₅ and K₂O, respectively) compared to medium yielding fields (58 and 48 lb/a of P₂O₅ and K₂O, respectively).
- Average rate for fertilizer N application increased by 28% from low to medium yielding and by 13% from medium to high yielding corn contest-winner entries. As was shown in Fig. 3B, a positive relationship was observed between attainable yields and fertilizer N application.

Table 1. Mean, minimum and maximum grain yield of plot (area harvested for yield contest) and entire fields for irrigated and dryland corn fields (bu/a).

		Plot Yield	Field		
			Mean	Min	Max
Dryland	Mean	193	166	206	219
	Min	132	95	155	30
	Max	281	240	303	303
Irrigated	Mean	234	251	279	279
	Min	159	164	250	250
	Max	295	304	325	325

Table 2. Summary of grain yield, crop management practices, and fertilizer strategies for different yield categories (low, medium, and high yield).

Yield Category		Low	Medium	High
		(<214 bu/a)	(214 - 257 bu/a)	(> 257 bu/a)
Grain Yield (bu/a)	Plot	163	231	278
	Field avg	146	210	247
	Field min	95	116	220
	Field max	180	250	295
Crop management	Seeding rate (seed/a)	22,625	31	33,875
	Row spacing (in)			
	Irrigation	8%	52%	88%
	Tillage			
	Herbicide			
	Fungicide	39%	52%	63%
	Insecticide	0	33%	75%
Fertilizers	Starter	46%	48%	75%
	P2O5	17	58	none reported
	K2O	12	48	none reported
	N	134	186	213
	Manure	11%	0%	17%
	Lime	0%	8.3%	17%

Summary

Different management practices affect corn grain yield. Results from the 2019 Kansas Corn Yield Contest indicated that the use of irrigation, a balanced fertilization program (N, P, and K), seeding rate above 30,000 seeds/a, use of fungicides, and both pre- and post-emergence herbicides were all management practices implemented by farmers as to maximize corn grain yields in Kansas.

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