



# Grain Sorghum Economic Seeding Guide for Southern Illinois and Surrounding Areas

## Trial Objectives:

- Grain sorghum acres are down dramatically from recent years in Southern Illinois; however, under certain environmental and economic climates, sorghum can be a profitable cash crop for fields with a history of continuous soybean production, fields with “less productive” or drought-prone soil types, and when a low input crop is desired.
- Grain sorghum research is predominantly conducted in regions far from Southern Illinois; however, because of the potential economic and agronomic benefits, sorghum research was initiated in Jefferson County, Illinois in 2018.
- Seeding rate data is needed to help position grain sorghum products in Southern Illinois.
- The objectives of this study were to:
  - Create seeding rate recommendations for sorghum produced in Southern Illinois, understand production challenges for the region, generate economics-based recommendations, and develop a technical understanding of the crop.
  - Enable farmers to generate positive farm cash flow during negative economic times by producing evidence that grain sorghum is competitive to soybean production.
  - Provide growers with a rotational crop alternative to continuous soybeans, offering agronomic solutions including: decreasing soybean cyst nematode populations, alleviating overwintering pathogens, and providing residue for erosion control.

## Research Site Details:

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Seeding Rate (seeds/acre)
Woodlawn, IL	Silt loam	Corn	Conventional	5/25/2018	10/2/2018	40K, 80K, 120K

- A large-scale research trial was conducted south of Woodlawn, Illinois in 2018 to help determine the best seeding rate for 12 commercially-available grain sorghum products.
- Each planter pass was 1000 feet long, 22.5 feet wide, and on 15-inch rows.
- Three seeding rates (40,000, 80,000, and 120,000 seeds/acre) were used and changed at 300-ft increments within the planter pass via a Precision Planting® 20/20 SeedSense™ and a seeding prescription (Figures 1 and 2).
- 138 lb of actual nitrogen was split-applied as urea in two applications.
- The herbicide program was a pre-emergence application on May 22nd of Roundup PowerMAX® Herbicide at 32 fl oz per acre and Warrant® Herbicide at 0.5 pt per acre followed by a post-planting application on May 29th of Degree Xtra® Herbicide at 3 qt per acre.
- Rainfall was normal with a dry spell in late June.
- Data was captured spatially via a calibrated Precision Planting® 20/20 YieldSense™ Monitor in a commercial combine (Figure 5).



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## Understanding the Results

- Much like corn products, each sorghum product responds differently based on its genetic potential and regional fit. Based on this work, the data show that grain sorghum reaches its maximum potential when planted at 80,000 seeds/acre (Figure 3 and 4).
- When economics is factored and net dollars per acre are calculated, the 40,000 and 80,000 seeds/acre seeding rates were both economically attractive, which suggests that a range of seeding rates between these two rates would be acceptable no matter what product is planted. This recommendation is in line with other publications given the yearly rainfall for the region (Table 1).
- Exceeding 80,000 seeds/acre didn't add additional value from a yield or economic perspective for the Southern Illinois region in this trial (Table 1).
- Grain sorghum seed varies in size and weight (Table 2). It is not recommended to seed based on pounds per acre. Using seeds per acre is a more precise measurement and helps to ensure that seeding rates are consistent bag-to-bag and field-to-field.
- As a check, soybeans were planted in the same field and the net dollars per acre was calculated (Table 1). The average soybean yield was 51.2 bu/acre. Using a soybean price of \$8.50/bu and a sorghum price of \$3.66/bu, on average, sorghum planted at 80,000 seeds/acre netted \$133.40/acre more than soybean. At these prices, our data indicate that the minimum potential sorghum yield would be between 110.9 to 117 bu/acre to net the same dollars per acre as soybean (Table 1). This indicates that grain sorghum could be a very attractive option on fields that have been continuous soybean or where a farmer wants to diversify.

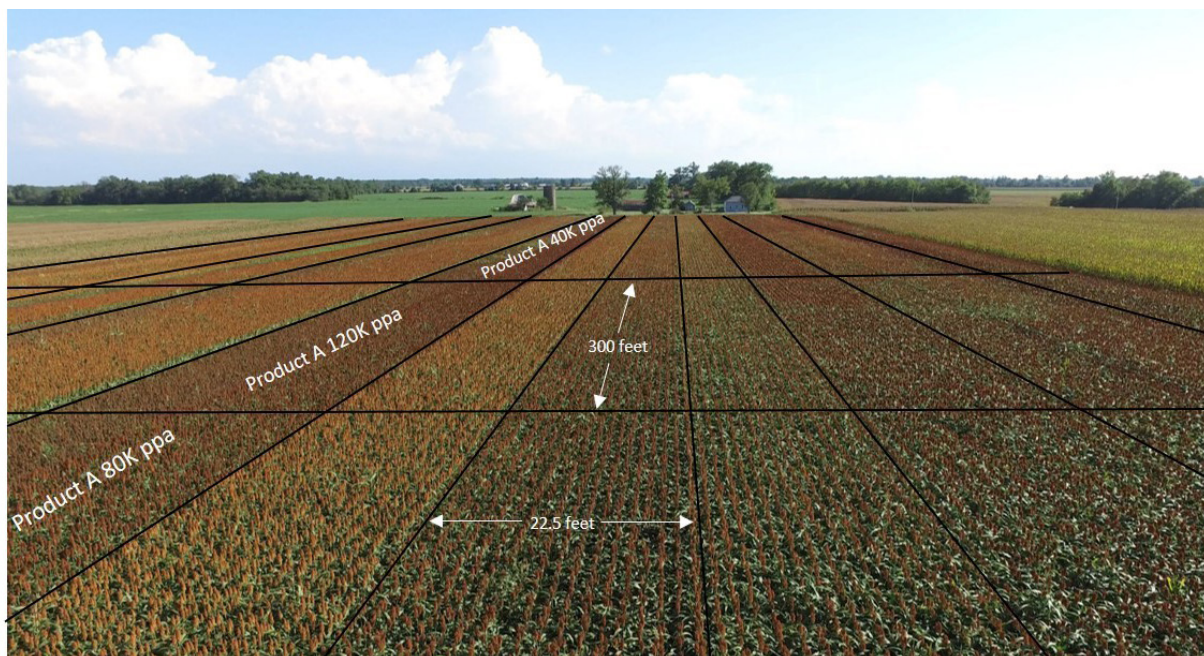
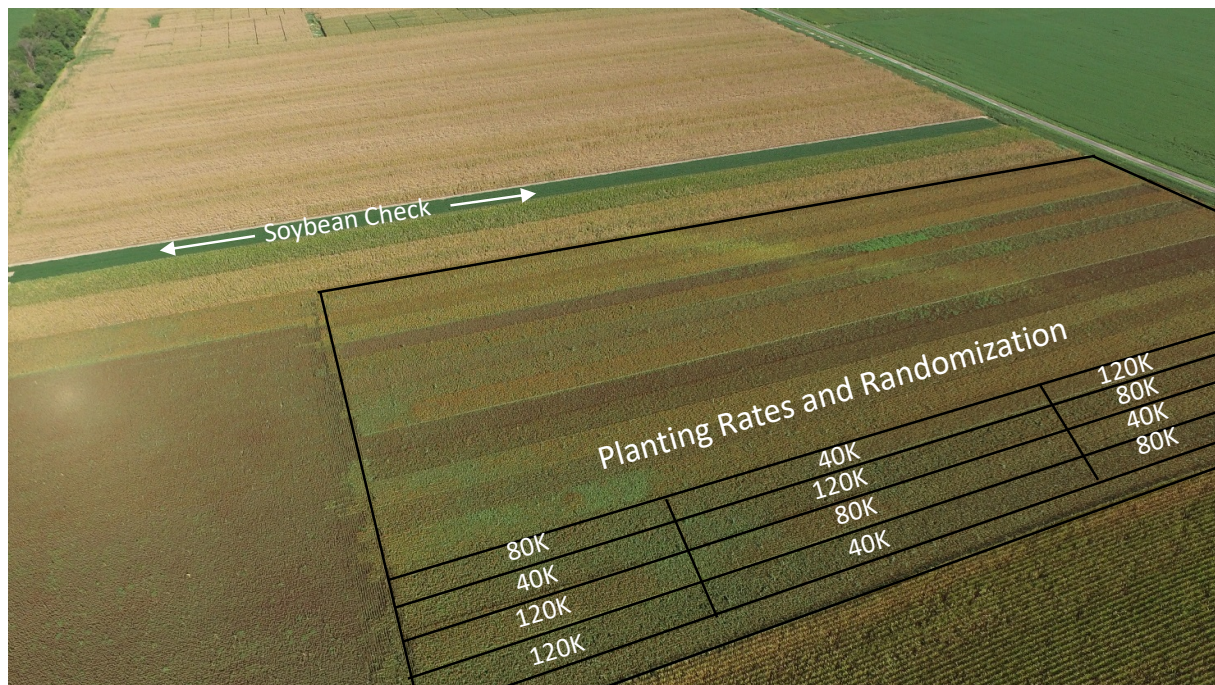


Figure 1. Plot diagram

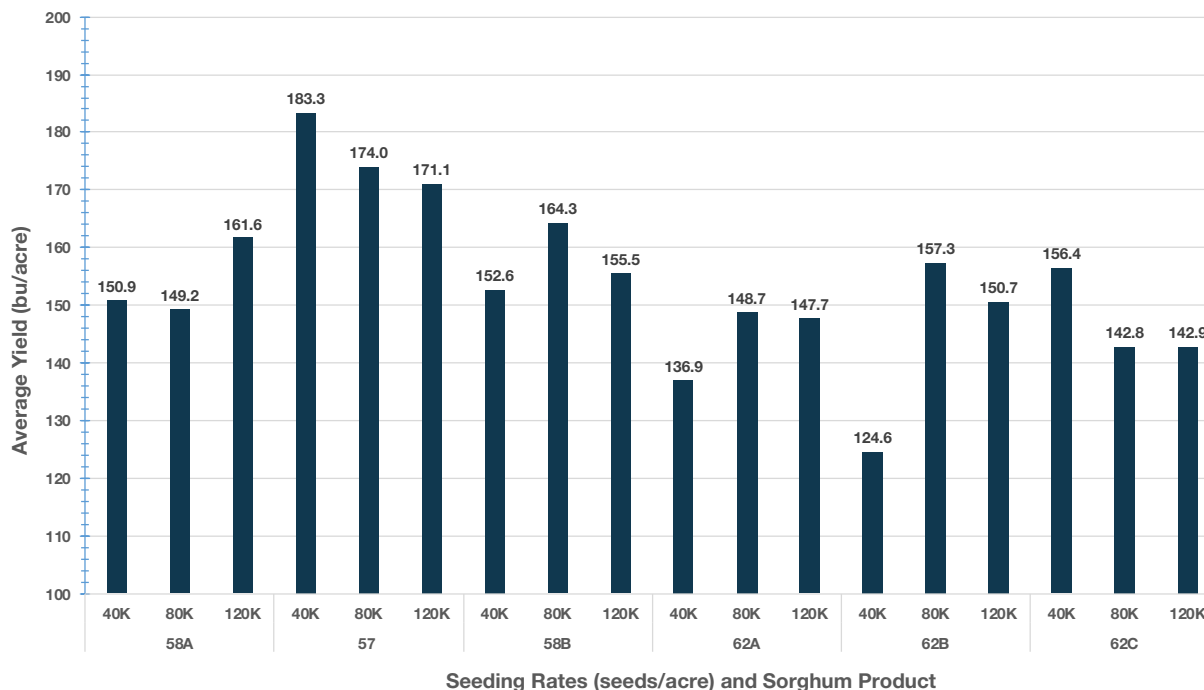




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**Figure 2. Plot diagram with randomized seeding rates and soybean check**



**Figure 3. Average yield of grain sorghum products with half bloom dates 57, 58, and 62 days at seeding rates of 40,000, 80,000, and 120,000 seeds/acre.**



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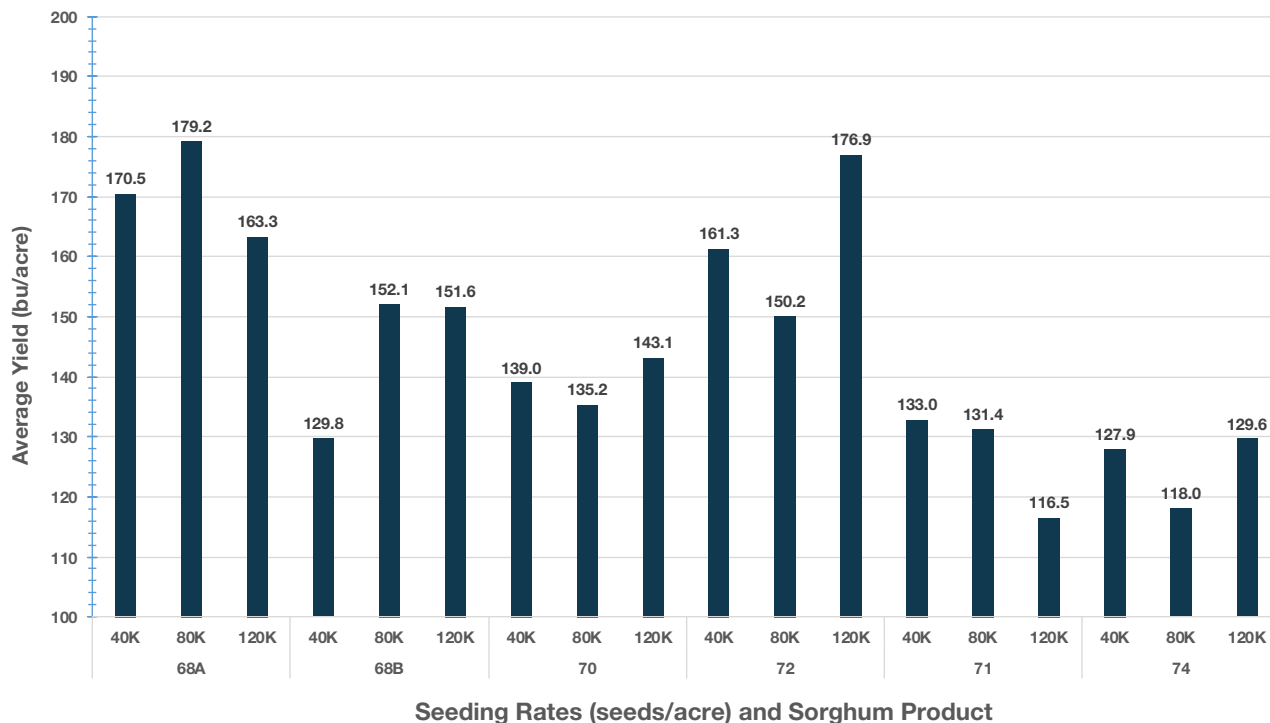


Figure 4. Average yield of grain sorghum products with half bloom dates of 68, 70, 71, 72, and 74 days at seeding rates of 40,000, 80,000, and 120,000.

Table 1. Economics of Grain Sorghum Production vs. Soybean Production

Sorghum						
Sorghum Market Price (\$/bu)	Seeding Rate (000)	Gross Income (\$/acre)	Net Income (\$/acre)	Seed Cost (\$/acre)	Average Yield (bu/acre)	Minimum Yield (bu/acre) to Achieve Soybean Net Income
\$3.66	40	\$538.70	\$434.56	\$104.14	147.2	110.9
	80	\$549.74	\$434.78	\$114.96	150.2	114.0
	120	\$552.19	\$426.41	\$125.78	150.9	117.0
Soybean						
Soybean Market Price (\$/bu)	Seeding Rate (000)	Gross Income (\$/acre)	Net Income (\$/acre)	Seed Cost (\$/acre)	Average Yield (bu/acre)	
\$8.50	167	\$435.20	\$301.38	\$133.82	51.2	



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**Table 2. Product seed size**

<b>Product</b> (Days to Half Bloom*)	<b>Seeds/lb</b>
58A	18,000
57	14,000
58B	15,000
62A	13,500
62B	14,000
62C	16,000
68A	15,000
68B	13,500
70	13,500
72	13,000
71	13,000
74	13,000
*letter differentiates products with same Days to Half Bloom date	



**Figure 5. Harvesting plot**





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## What Does This Mean for Your Farm?

- Grain sorghum was a rotational crop in many Southern Illinois farming operations prior to the wide-spread adoption of herbicide-tolerant crops and genetic advancement in the drought tolerance of corn and soybean.
- Grain sorghum has a fit on Southern Illinois farms and should be considered as part of a farm management plan when:
  - commodity prices are low
  - fields have a history of continuous soybean production
  - fields have low water holding capacity
  - when growing a low-input crop is desired
- Grain sorghum seeding rates should be between 40,000 and 80,000 seeds/acre; however, environment and equipment should be considered when deciding on a seeding rate within that range. There is no economic benefit in exceeding 80,000 seeds/acre on most products in this study.
- Grain sorghum, when produced under environmental and economic conditions like 2018, has the potential to be more profitable than soybean production.
- Grain sorghum can be a positive agronomic solution for fields that have been continuously cropped to soybean over several years.

## Additional Information

Grain sorghum production. agKnowledge Spotlight. <http://www.aganytime.com/Documents/ArticlePDFs/Grain%20Sorghum%20Production%20-%20Spotlight%20-%20DEKALB.pdf>

## Legal Statement

Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

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