Alternative Enterprise Opportunities for Western Kansas in the Face of Declining Water Availability: The Case of Sesame

Adji Zamtato and Vincent Amanor-Boadu
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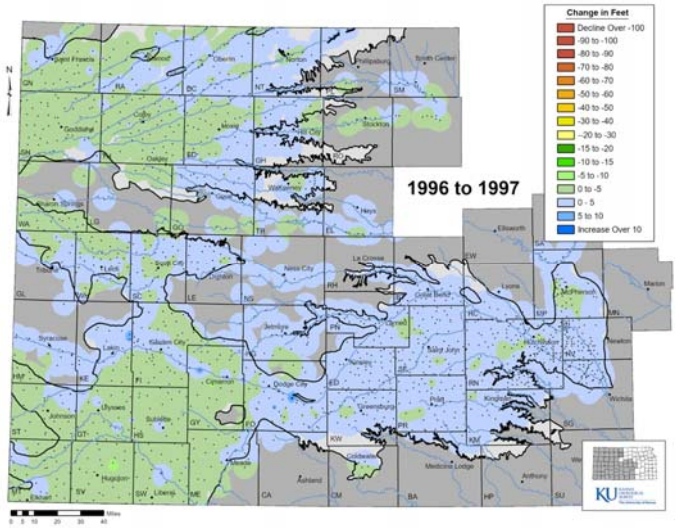
Your Farm, Your Future: Why Water Matters



Imagine irrigation costs doubling in 5 years while available water declines.

Water levels in the Ogallala Aquifer have fallen an average of 2.7 feet since 1996. (Brownie Wilson, 2025)

Problem:

- Increasing irrigation costs in Western KS are adversely affecting potential crop yield and production costs, leading to farm profitability challenges

Research Question:

- What crop and enterprise strategies can help Western Kansas farmers remain economically viable while reducing reliance on groundwater irrigation?

Tackling Water Scarcity: Your Options

Options for water management scarcity:

- Improve irrigation efficiency (e.g., soil moisture sensors).
- Adopt water-saving technologies (e.g., cover crops).
- Adjust rotations or increase fallowing to conserve water.
- Grow drought-resistant crops (e.g., sesame, sorghum).

Drip systems

Precision agriculture

Crop rotation

Sesame

The Alternative Enterprise Project for Enhancing Water Security is exploring the economic feasibility of crops that have not yet been considered in Western Kansas.

Objective

To what extent is sesame an economically feasible alternative crop for Western Kansas, given the increasing water insecurity condition?

Threshold for feasibility

Using no more resources than currently used, Sesame enterprise must replace the average income of farmers who choose to grow it

What is Sesame?

Sesame is the most widely produced oilseed crop with the highest oil content (45%–65%) in Asia, Africa. (Mahajan et al., 2025)

- Very drought-tolerant, heat-tolerant, and insect-resistant
- Can reach 6’ tall with some irrigation
- Average daily soil planting temperature, 70°F
- Physiological maturity, 95-110 days after planting
- Yields of 1,100 to 1,400 pounds per acre

Tostle, 2022

Sesame: The Plant

Tostle, 2022

Tostle, 2022

Sesame Works with What You Have

- Rotations: Wheat–sesame–fallow, wheat–sorghum–sesame.
- Benefits: Pest break, soil health, compatible harvest timing.
- Equipment: Most combines are adaptable; custom harvesters in Texas/Oklahoma.
- Weed control (Tostle, 2022):
  - Sesame is vulnerable early (first 4–6 weeks); yields drop up to 65% without control.
  - Use pre-emergence pendimethalin (0.67 lb/acre, 73.5% weed control).

Tostle, 2022

Three Types of Sesame

White Seed
Oil content: 53-58%

Black Seed
Oil content 48-51%

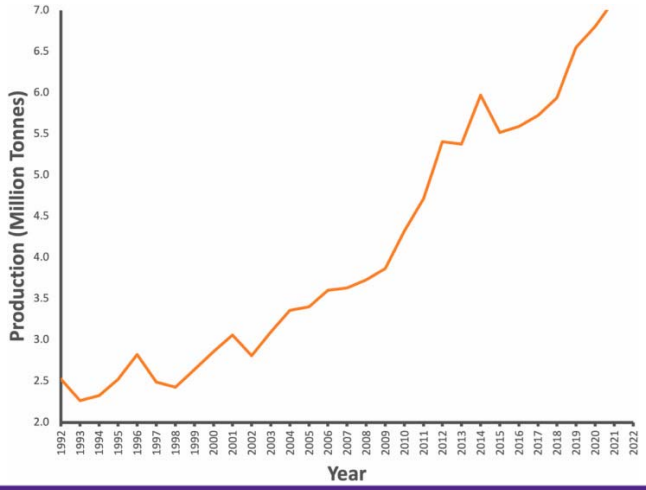
Brown Seed
Oil content 53-58%

Selling Sesame in the U.S.

- **Major Buyer**: Sesaco Corporation – primary U.S. sesame buyer.
- **Production Model**: Contract-based – Sesaco provides seed varieties, handles processing & marketing.
- Demand:
  - U.S.: Food products (e.g., baked goods, snacks).
  - Export: Sesame oil for international markets.
- Infrastructure needs: Cleaning, sorting, and transport facilities – currently concentrated in Texas & Oklahoma.

Sesame oil

Sesame global production



Africa and Asia produced over 95 % of the world's 7 MMT sesame output

Sesame Global Production (Anyogu et al. 2024)

Hypothesis

H1: The net farm income from sesame production in Western KS is the same as that produced by traditional crops

H2: Water demand in sesame production in Western KS is the same as water demand by traditional crops

Methods

We use simulation to assess the economic feasibility of sesame production in Western Kansas

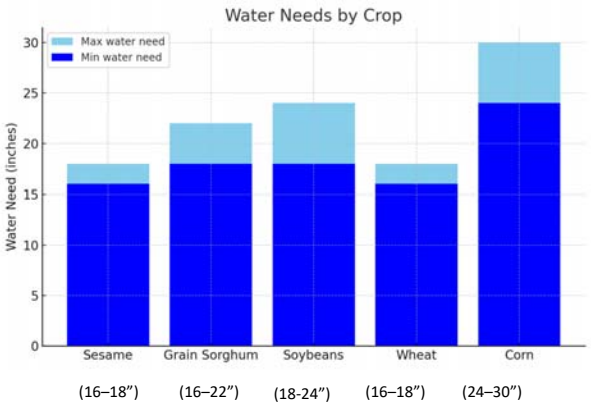
- Employ Monte Carlo Simulation to explore net income distribution probabilities

We explore several scenarios and conduct several sensitivity analyses

- Yield
- Sesame prices and input costs

Sesame: Half the Water, Same Potential

Kansas farmers have adapted wheat and sorghum; Sesame could be next.



Wheat–Sesame–Fallow rotation could save 8–12" water vs. corn.

Analysis

2024 Texas A&M AgriLife Extension irrigation budgets for District-10

Crop Acres	122				
Corn	**Quantity**	**Units**	**$/Unit**	**Total**	**Total**
Energy Cost	1650	kWh	$0.17	$280.50	$34,221
Irrigation Labor	0.2	Hour	$17.50	$3.50	$427
Total irrigation cost					$34,648
Irrigation costs/acre					**$284**

Sesame	**Quantity**	**Units**	**$/Unit**	**Total**	**Total**
Energy Cost	561	kWh	$0.17	$95.37	$11,635
Irrigation Labor	0.07	Hour	$17.50	$1.23	$149
Total irrigation cost					$11,785
Irrigation costs/acre					**$97**

Difference in variable irrigation cost per acre (Corn – Sesame)	**$187**

Results

Western Kansas Average Farm Acres	1,631

Crop	Yield	Price	Acreage	Production (Bu)	Revenue ($/acre)	Total Revenue ($)
Wheat (bu)	70	5.47	708	49,560	383	271,093
Grain Sorghum (bu)	159	4.12	369	58,560	654	241,268
Corn (bu)	218	4.45	481	105,002	971	467,260
Soybeans (bu)	65	9.1	73	4,745	592	43,180
Rotation 1: W-GS-C-S					**2,600**	**1,022,801**

Crop	Yield	Price	Acreage	Production	Revenue ($/acre)	Total Revenue ($)
Wheat (bu)	70	5.47	731	51,172	383	279,912
Grain Sorghum (bu)	159	4.12	380	60,347	654	248,628
Corn (bu)	218	4.45	277	60,469	971	269,087
Sesame (lb)	1100	0.4	277	304,700	440+187	173,791
Rotation 2: W-GS-C-S					**2,636**	**971,418**

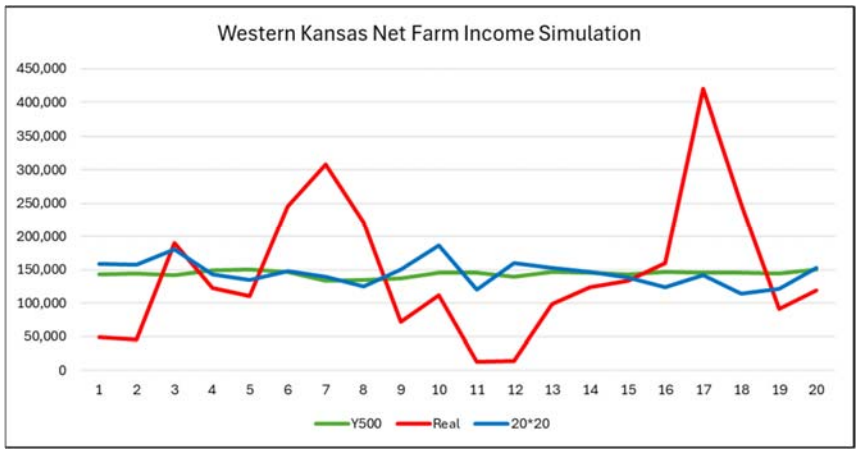
Revenue difference :	**(51,383)**

Rotation 2: W-GS-C-S	Corn	Sesame	Saving/acre (inches)	Total Saving
Water requirement	24-30	16–18	10	**2,770**
Profit per inch of water	36.0	36.9		

- Corn + Soybeans: 554 acres total
- Reallocates 554 acres → 277 Corn + 277 Sesame
- Sesame Revenue per acre = Sesame Revenue + Saving from irrigation cost per acre ($187)

Trade-Off: Lower revenue but significant water conservation

Net Farm Income Simulation



KFMA data, 2025

Preliminary Results

Preliminary simulation results indicate that sesame production has the potential to produce a net income at least as high as the average net farm income in Western Kansas over the past two decades.

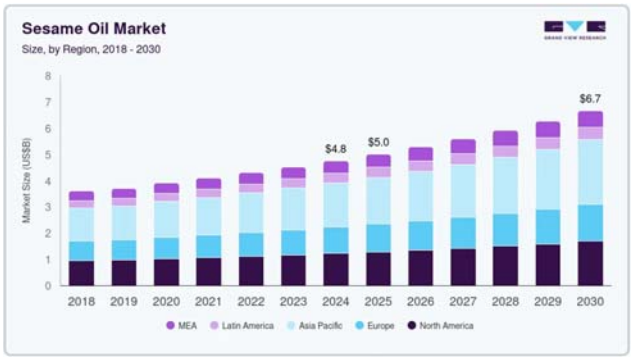
Sesame has proven success in Texas and Oklahoma, with some initiatives beginning to unfold in Kansas.

Success due to its 16-18 inches water requirement and its deep-root and lower use levels of fertilizers and pesticides.

More importantly, a short-season crop.

Implications

Sesame offers a realistic profitability path for dryland producers facing reduced irrigation capacity. In a region where water scarcity is now a permanent constraint, profitability must come from crops that thrive with less water, fewer inputs, and modest infrastructure.



Sesame Global Demand (Grand View Research 2024)

Sesame Success: From Oklahoma to Your Backyard

- Case study: Oklahoma farmer
- Matt Braun produces 1,000 acres of sesame in Hobart, OK.
- "I think sesame has proved to be a profitable crop and helps with rotation."

Michael D. Tedesco/Farm Flavor Media


Thank You!
Q&A