

# Grain Sorghum Cost-Return Budget in Western Kansas

Department of Agricultural Economics — [www.agmanager.info](http://www.agmanager.info)



## Kansas State University Agricultural Experiment Station and Cooperative Extension Service

**Troy J. Dumler**  
Agricultural Economist

**Daniel M. O'Brien**  
Agricultural Economist

**Brian L.S. Olson**  
Crops and Soils, NW

**Kent L. Martin**  
Crops and Soils, SW

Kansas consistently ranks as the number one grain sorghum producing state in the nation. During the 1995 to 2001 period, on average 33 percent of dryland grain sorghum harvested acreage (1,112,533 acres per year) and 25 percent of Kansas dryland grain sorghum production (67,566,883 bushels per year) came from the western one-third of the state. Grain sorghum is well suited to the arid climate of western Kansas, especially as part of intensive wheat-grain sorghum-fallow cropping systems.

During 1996, grain sorghum harvested acreage in the western one-third of Kansas increased by 153 percent from 557,400 acres the previous year to 1,413,500 acres. This one-time dramatic acreage increase came in response to a late spring freeze that severely damaged the western Kansas wheat crop. Opportunistic farmers then quickly adopted no-till practices and planted grain sorghum and other summer crops on acreage where severe wheat freeze damage occurred. Dryland grain sorghum planted acreage declined from 1996 levels in following years, but has remained above pre-1996 levels. However, drought conditions in 2002 caused Kansas harvested acreage of grain sorghum to decline to 3.1 million acres, equal to 1995 levels.

In parts of southwest Kansas, grain sorghum has been cropped continuously on sandy soils. Planting with a lister has been the long-accepted practice, but in recent years some

producers have switched to a reduced tillage, surface-planted system. Farmers may plant grain sorghum with listers for two primary reasons: 1) potential wind damage is reduced because the crop is protected between the ridges; and 2) mechanical tillage moves a lot of soil, uprooting and covering broadleaf and grassy weeds. Pre-emergence soil-applied herbicides are not effective in this system. The high ridges between rows are subject to erosion from wind and rain, and can cover young, growing grain sorghum. In an average year in this region, farmers usually plan on replanting a significant number of listed acres. Another negative aspect of lister-planting is that it requires numerous tillage operations leading to high machinery operation expenses. It is also a labor-intensive cropping system.

In contrast, reduced tillage continuous grain sorghum appeals to some producers because of the reduced number of tillage operations, lower machinery requirements, and lower operating expense. The likelihood of wind- and rain-induced replantings are also reduced in a surface-planted system. Herbicides substitute for pre-plant tillage in the surface-planted system, making this system more herbicide intensive. Soil-applied herbicides can also be effective in this system. However, the use of triazine herbicides on sandy soil can cause significant crop injury. This budget provides cost and return estimates for continuous lister- and surface-planted

**Table 1A. Production Inputs — Continuous Sorghum**

| Item                     | Yield Level (bu)          |                            |            |
|--------------------------|---------------------------|----------------------------|------------|
|                          | Lister Planted<br>30 bu/a | Surface Planted<br>45 bu/a |            |
| Seed, lbs*               | 2.66                      | 2                          | \$3.29/lb  |
| Fertilizer:              |                           |                            |            |
| N (anhydrous)            | 38                        | 0                          | \$0.24/lb  |
| N                        | 0                         | 56                         | \$0.39/lb  |
| P                        | 14                        | 21                         | \$0.44/lb  |
| K                        | 0                         | 0                          | \$0.59/lb  |
| Lime                     | 0                         | 0                          | \$0.01/lb  |
| Herbicide                |                           |                            |            |
| Marksman                 | 2.0                       | 0.0                        | \$3.85/pt  |
| Roundup Weather Max      | 0.0                       | 22.0                       | \$0.52/oz  |
| + Atrazine 4L + crop oil | 0.0                       | 1.0                        | \$4.86/qt  |
| Dual II Magnum           | 0.0                       | 1.2                        | \$14.35/pt |
| Insecticide / Fungicide  |                           |                            |            |

\* *Concep and Gaucho treated* -- Lister rate assumes one-third of acres are replanted.

**Table 1B. Production Inputs — Wheat-Sorghum-Fallow**

| Item                       | Yield Level (bu) |     |     |           |
|----------------------------|------------------|-----|-----|-----------|
|                            | 60               | 80  | 100 |           |
| Seed, lbs*                 | 3                | 3   | 3   | \$2.87/lb |
| Fertilizer:                |                  |     |     |           |
| N (anhydrous)              | 0                | 0   | 0   | \$0.24/lb |
| N                          | 45               | 70  | 95  | \$0.39/lb |
| P                          | 27               | 37  | 46  | \$0.44/lb |
| K                          | 0                | 0   | 0   | \$0.59/lb |
| Lime                       | 0                | 0   | 0   | \$0.01/lb |
| Herbicide                  |                  |     |     |           |
| RT3 + 2,4-D + Atrazine 4L  | 1.0              | 0.0 | 0.0 | \$18.25/a |
| RT3 + Additives            | 1.0              | 1.0 | 1.0 | \$5.40/a  |
| RT3 + Bicep Lite II Magnum | 0.0              | 1.0 | 1.0 | \$24.55/a |
| Insecticide / Fungicide    |                  |     |     |           |

\* *Gaucho treated.*

grain sorghum in southwest Kansas as well as for no-till grain sorghum in a wheat-grain sorghum-fallow system for the entire western one-third of the state.

### Income Per Acre

Crop production costs per unit and net returns are highly dependent on yields. The following estimated budgets include three different yield levels, which are intended to represent expected yields for land of varying quality for a given level of management. Producers can compare the profitability of crop enterprises on farmland tracts with varying yield potential by considering alternative expected yield scenarios. Land values and government payments have been adjusted for alternative yield levels in this budget. In customizing a budget to your farm, attention should be given to using land values representative of your farm's productive capacity and local farmland market conditions.

Price per bushel represents an expected harvest price in Scott City, Kan., accounting for government marketing loan price support levels. Grain sorghum producers in other regions of western Kansas should use an expected price that is representative for their location.

Crop insurance was not included as an input expense in this budget because yields reflect an average of all years (good and bad). If crop insurance is included as an input expense, then an expected value for indemnity payments should be included in the returns section. Historically, crop insurance indemnity payments have typically exceeded premiums due to government subsidies.

### Costs Per Acre

Production costs at the three production levels are shown on lines 1 through 13. Kansas Custom Rates for specific field operations are used to represent fuel and labor costs as well

**Table 2A. Machinery and Land Resources — Continuous Sorghum**

| Item                                    | Lister Planted<br>30 bu/a | Surface Planted<br>45 bu/a | Custom<br>Rate |
|-----------------------------------------|---------------------------|----------------------------|----------------|
| Tillage/Planting/Chemical Applications: |                           |                            |                |
| Sweep                                   | 0                         | 0                          | \$6.76/a       |
| Disk                                    | 0                         | 0                          | \$7.88/a       |
| Lister plant                            | 1                         | 0                          | \$12.00/a      |
| Surface plant                           | 0                         | 1                          | \$11.79/a      |
| Anhydrous application                   | 1                         | 0                          | \$8.91/a       |
| Fertilizer application                  | 0                         | 1                          | \$4.34/a       |
| Herbicide application                   | 1                         | 2                          | \$4.38/a       |
| Insecticide application                 | 0                         | 0                          | \$4.43/a       |
| Harvest                                 |                           |                            |                |
| Base charge                             | 1                         | 1                          | \$20.09/a      |
| Extra charge for yields exceeding       | 36                        | 36                         | \$0.189/bu     |
| Hauling                                 | 30                        | 45                         | \$0.173/bu     |
| Non-machinery labor                     | 0.44                      | 0.47                       | \$13.00/hr     |
| Land charge/rent                        | \$37.00                   | \$37.00                    |                |
| Interest on capital                     |                           |                            | 7.5%           |

**Table 2B. Machinery and Land Resources — Wheat-Sorghum-Fallow**

| Item                                    | Yield Level (bu) |         |         | Custom<br>Rate |
|-----------------------------------------|------------------|---------|---------|----------------|
|                                         | 60               | 80      | 100     |                |
| Tillage/Planting/Chemical Applications: |                  |         |         |                |
| Sweep                                   | 0                | 0       | 0       | \$6.76/a       |
| Disk                                    | 0                | 0       | 0       | \$7.88/a       |
| Field cultivate                         | 0                | 0       | 0       | \$7.82/a       |
| No-till plant                           | 1                | 1       | 1       | \$11.79/a      |
| Anhydrous application                   | 0                | 0       | 0       | \$8.91/a       |
| Fertilizer application                  | 1                | 1       | 1       | \$4.34/a       |
| Herbicide application                   | 3                | 3       | 3       | \$4.38/a       |
| Insecticide application                 | 0                | 0       | 0       | \$4.43/a       |
| Harvest                                 |                  |         |         |                |
| Base charge                             | 1                | 1       | 1       | \$20.09/a      |
| Extra charge for yields exceeding       | 36               | 36      | 36      | \$0.189/bu     |
| Hauling                                 | 60               | 80      | 100     | \$0.173/bu     |
| Non-machinery labor                     | 0.56             | 0.62    | 0.68    | \$13.00/hr     |
| Land charge/rent                        | \$48.00          | \$60.00 | \$72.00 |                |
| Interest on capital                     |                  |         |         | 7.5%           |

as machinery repair, depreciation, and interest expenses in these budgets. Tables 1A and 1B identify the typical seed, fertilizer, herbicide, and insecticide requirements (rate and cost/unit) for grain sorghum in continuous and wheat-grain sorghum-fallow cropping systems, respectively. Herbicide requirements include both pre-crop and in-crop treatments. Tables 2A and 2B outline the machinery and land resources used for grain sorghum in these alternative cropping systems. Each tillage, planting, and harvest operation is identified.

## Other Grain Sorghum Production Management Resources

K-State Research and Extension has a number of resources available relating to grain sorghum production management. *The Kansas Grain Sorghum Production Handbook*, C-687, provides information on recommended production practices. More information on grain sorghum variety performance, insect, weed and disease management, market prospects, sorghum residue and yield estimation, and other sorghum production and marketing information can be obtained through K-State Research and Extension offices or via the K-State Research and Extension Web site, [www.ksre.ksu.edu](http://www.ksre.ksu.edu).

### COST-RETURN PROJECTION — GRAIN SORGHUM — (CONTINUOUS) WESTERN KANSAS

|                                             | Lister<br>Planted<br>30 bu/a | Surface<br>Planted<br>45 bu/a | Your<br>Farm |
|---------------------------------------------|------------------------------|-------------------------------|--------------|
| <b>INCOME PER ACRE</b>                      |                              |                               |              |
| A. Yield per acre .....                     | 30                           | 45                            |              |
| B. Price per bushel .....                   | \$ 3.45                      | \$ 3.45                       |              |
| C. Net government payment .....             | \$ 8.13                      | \$ 8.13                       |              |
| D. Indemnity payments .....                 | \$                           | \$                            |              |
| E. Miscellaneous income.....                | \$                           | \$                            |              |
| F. Returns/acre ((A × B) + C + D + E) ..... | \$ 111.63                    | \$ 163.38                     |              |
| <b>COSTS PER ACRE</b>                       |                              |                               |              |
| 1. Seed .....                               | \$ 8.75                      | \$ 6.58                       |              |
| 2. Herbicide .....                          | 7.70                         | 33.52                         |              |
| 3. Insecticide / Fungicide .....            |                              |                               |              |
| 4. Fertilizer and Lime .....                | 15.21                        | 30.98                         |              |
| 5. Crop Consulting .....                    |                              |                               |              |
| 6. Crop Insurance .....                     |                              |                               |              |
| 7. Drying .....                             |                              |                               |              |
| 8. Miscellaneous.....                       | 5.50                         | 5.50                          |              |
| 9. Custom Hire / Machinery Expense.....     | 50.57                        | 54.47                         |              |
| 10. Non-machinery Labor .....               | 5.71                         | 6.15                          |              |
| 11. Irrigation                              |                              |                               |              |
| a. Labor .....                              |                              |                               |              |
| b. Fuel and Oil.....                        |                              |                               |              |
| c. Repairs and Maintenance .....            |                              |                               |              |
| d. Depreciation on Equipment and Well.....  |                              |                               |              |
| e. Interest on Equipment.....               |                              |                               |              |
| 12. Land Charge / Rent.....                 | 37.00                        | 37.00                         |              |
| G. SUB TOTAL .....                          | \$ 130.45                    | \$ 174.20                     |              |
| 13. Interest on ½ Nonland Costs .....       | 3.50                         | 5.14                          |              |
| H. TOTAL COSTS.....                         | \$ 133.95                    | \$ 179.34                     |              |
| I. RETURNS OVER COSTS (F - H) .....         | \$ -22.32                    | \$ -15.96                     |              |
| J. TOTAL COSTS/BUSHEL (H ÷ A) .....         | \$ 4.47                      | \$ 3.99                       |              |
| K. RETURN TO ANNUAL COST (I + 13) ÷ G ..... | -14.42%                      | -6.21%                        |              |

**COST-RETURN PROJECTION — GRAIN SORGHUM — (W-S-F ROTATION)  
WESTERN KANSAS**

|                                             | Yield Level (bu) |           |           | Your Farm |
|---------------------------------------------|------------------|-----------|-----------|-----------|
|                                             | 60               | 80        | 100       |           |
| INCOME PER ACRE                             |                  |           |           |           |
| A. Yield per acre.....                      | 60               | 80        | 100       |           |
| B. Price per bushel .....                   | \$ 3.45          | \$ 3.45   | \$ 3.45   |           |
| C. Net government payment .....             | \$ 11.22         | \$ 12.20  | \$ 13.17  |           |
| D. Indemnity payments .....                 | \$               | \$        | \$        |           |
| E. Miscellaneous income.....                | \$               | \$        | \$        |           |
| F. Returns/acre ((A × B) + C + D + E) ..... | \$ 218.22        | \$ 288.20 | \$ 358.17 |           |
| COSTS PER ACRE                              |                  |           |           |           |
| 1. Seed .....                               | \$ 8.61          | \$ 8.61   | \$ 8.61   |           |
| 2. Herbicide .....                          | 23.65            | 29.95     | 29.95     |           |
| 3. Insecticide / Fungicide .....            |                  |           |           |           |
| 4. Fertilizer and Lime .....                | 29.30            | 43.40     | 57.06     |           |
| 5. Crop Consulting.....                     |                  |           |           |           |
| 6. Crop Insurance .....                     |                  |           |           |           |
| 7. Drying .....                             |                  |           |           |           |
| 8. Miscellaneous.....                       | 5.50             | 5.50      | 5.50      |           |
| 9. Custom Hire / Machinery Expense.....     | 64.28            | 71.52     | 78.76     |           |
| 10. Non-machinery Labor .....               | 7.26             | 8.08      | 8.90      |           |
| 11. Irrigation                              |                  |           |           |           |
| a. Labor .....                              |                  |           |           |           |
| b. Fuel and Oil.....                        |                  |           |           |           |
| c. Repairs and Maintenance .....            |                  |           |           |           |
| d. Depreciation on Equipment and Well.....  |                  |           |           |           |
| e. Interest on Equipment.....               |                  |           |           |           |
| 12. Land Charge / Rent.....                 | 48.00            | 60.00     | 72.00     |           |
| G. SUB TOTAL .....                          | \$ 186.59        | \$ 227.05 | \$ 260.77 |           |
| 13. Interest on ½ Nonland Costs .....       | 5.20             | 6.26      | 7.08      |           |
| H. TOTAL COSTS.....                         | \$ 191.79        | \$ 233.31 | \$ 267.85 |           |
| I. RETURNS OVER COSTS (F - H) .....         | \$ 26.43         | \$ 54.89  | \$ 90.32  |           |
| J. TOTAL COSTS/BUSHEL (H ÷ A) .....         | \$ 3.20          | \$ 2.92   | \$ 2.68   |           |
| K. RETURN TO ANNUAL COST (I + 13) ÷ G ..... | 16.95%           | 26.93%    | 37.35%    |           |

Publications from Kansas State University are available on the World Wide Web at: [www.ksre.ksu.edu](http://www.ksre.ksu.edu).

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Troy J. Dumler et al., *Grain Sorghum Cost-Return Budget in Western Kansas*, Kansas State University, December 2009.

**Kansas State University Agricultural Experiment Station and Cooperative Extension Service**

MF-904

December 2009

K-State Research and Extension is an equal opportunity provider and employer. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Fred A. Cholick, Director.