higher populations (see Keeping Up With Research 62: High Population, Narrow-Row Sorghum for Southwest Kansas), but the yield potential of such hybrids is low. A planting date slightly later than usual (June 15-20) may aid in avoiding stress.

Because of the probability of variable yields, only a limited acreage should be planted each year, and continuous sorghum should be thought of as part of a balanced operation.

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# Continuous Cropping of Dryland Grain Sorghum

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Most dryland crops in western Kansas are grown after fallow. Although fallowing results in the storage of only 20 to 30 percent of precipitation, this is usually sufficient to provide a full or nearly full profile of soil moisture at planting. Because of the need to store moisture, the dominant cropping system in western Kansas is fallow-wheat. In recent years, considerable research has been performed to adapt the wheat-sorghum-fallow system (two crops in 3 years) to western Kansas (refer to Report of Progress 482: Wheat-Grain Sorghum-Fallow Using Reduced Tillage with Herbicides). On the sandy soils in Morton, Stevens, and Seward counties, considerable continuous grain sorghum is grown, because these soils do not have the water-holding capacity to make fallowing practical. Continuous sorghum is generally not grown on the loam or silt loam (hardland) soils in western Kansas, because it is believed that fallowing is necessary to store water.

## Procedure

In order to obtain data on the various cropping systems, a study was started on the Southwest Kansas Branch Station in 1981. Continuous grain sorghum was compared with fallow-sorghum, fallow-wheat, and combined sorghum and wheat in the WSF system. The study was conducted on a Satanta loam having a pH of 7.0 and an organic matter content of 1.1 percent.

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**Table 1. Effect of cropping system on the yield of grain sorghum, 1981-86.**

| | Sorghum Yield, bu/acre | | | | | | |
|---|---|---|---|---|---|---|---|
| System | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | Avg |
| Fallow-sorghum | 84 | 79 | 35 | 68 | 64 | 61 | 65 |
| Continuous sorghum | 44 | 71 | 29 | 51 | 45 | 39 | 46 |
| Wheat-sorghum-fallow | 62 | 74 | 34 | 65 | 72 | 72 | 63 |
| LSD (0.05) | 8 | ns | ns | 15 | 19 | 18 | 5 |

**Table 2. Annual grain yield as affected by cropping system, 1981-86.**

| | Annual Yield, lbs/acre | | | | | | |
|---|---|---|---|---|---|---|---|
| System | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | Avg |
| Fallow-wheat | 915 | 1,662 | 1,552* | 994 | 1,109 | 1,031 | 1,210 |
| Fallow-sorghum | 2,345* | 2,219 | 979* | 1,897 | 1,798 | 1,698 | 1,823 |
| Wheat-sorghum-fallow | 1,620 | 2,388 | 1,349* | 1,931 | 2,081* | 2,007* | 1,896 |
| Continuous sorghum | 2,451* | 3,984* | 1,617* | 2,880* | 2,548* | 2,171* | 2,608* |
| LSD (0.05) | 259 | 595 | ns | 290 | 599 | 472 | 174 |

*Indicates top yielding system

## Results

Sorghum yields from that study are compiled in Table 1. In 1982 and 1983, there was no difference in yield between systems. Greater than normal rainfall in 1982 resulted in continuous sorghum yields as high as those of fallow-sorghum, whereas dry weather in 1983 reduced the yield of all systems. Continuous sorghum yielded significantly less than either fallow- or WSF sorghum in 3 of the 6 years (1981, 1985, and 1986). In 1984, fallow-sorghum yielded more than continuous, but not WSF sorghum; 1981 was the only year in which fallow-sorghum yielded more than both continuous and WSF sorghum.

A more definitive test is to compare the grain yield of the various systems on an annual basis, taking the fallow period into consideration. Table 2 includes both sorghum and wheat yields from all cropping systems, converted to an annual basis. Fallow sorghum and fallow wheat yields were divided by two, while wheat and sorghum yields in the WSF system were added together and divided by three. The data in Table 2 are summarized below:

1. Continuous sorghum yielded more than WSF sorghum in 3 of 6 years.
2. Continuous sorghum yielded more than fallow-sorghum in 4 of 6 years.
3. Continuous sorghum yielded more than fallow-wheat in 5 of 6 years.
4. Continuous sorghum produced the most grain during the 6-year period.
5. In the years when continuous sorghum did not yield more than the other systems, it yielded as much.

## Recommendations

Continuous sorghum performed well in this study. However, any deviation from accepted cropping practices should be considered with caution. In western Kansas, stored soil moisture and growing season precipitation are the two major factors determining yield. Precipitation between crops of continuous sorghum will only wet the soil to a depth of 18 to 24 inches or less, rather than the 3 to 4 feet thought necessary for most crops. Good management and weed control, both between crops and in the growing sorghum, are necessary to maximize moisture storage and use. Selection of sorghum hybrids and appropriate plant population are critical. Days to half bloom should not exceed 60-63 days, and drought-tolerant hybrids should be selected. Plant population should not exceed 25,000 plants per acre. Hybrids with fewer days to half bloom can be planted at