Grain Sorghum to Diversify Crop Rotations and Protect Soil Quality and Conserve Water

Brent Bean, Director of Agronomy, United Sorghum Checkoff Program

Cotton/Soybean Monoculture

Cotton (*Gossypium hirsutum*) and soybean (*Glycine max*) provide very little residue for ground cover following harvest. The addition of sorghum (*Sorghum bicolor*) into a cotton/soybean monoculture provides producers greater, more resilient ground cover that reduces both wind and water erosion. In addition, the fibrous root system of grain sorghum forms complex mats that binds to the soil reducing erosion especially in sandy soils (1).

Sorghum residue provides protection to cotton and soybean seedlings that are subject to damage from blowing soil particles following emergence. Sorghum residue captures water from rain and snow events allowing for more water stored in the soil profile that can be utilized by cotton and soybeans in semi-arid regions of the U.S.

Nematodes rob yield from both cotton and soybeans. Crop rotation is one of the best ways to reduce soil nematode populations to an acceptable level. Sorghum is a nonhost to soybean cyst, reniform and ring nematodes making it an excellent crop choice to be rotated with cotton and soybeans (2, 3).

Soil born diseases such as Verticillium wilt and black root rot in cotton build with each consecutive cotton crop. Rotation with sorghum breaks this cycle reducing these pathogen populations.

Insect pest populations are reduced when cotton and soybeans are rotated with sorghum.

Rotating to sorghum allows for use of different herbicides that are beneficial in controlling problem weeds in cotton and soybeans and reduces the development of resistant weeds.

Wheat

A ten year study conducted in the Southern High Plains clearly showed the advantage of including sorghum in a rotation with wheat in a dryland cropping system (4). In a wheat/sorghum/fallow rotation, water use efficiency was improved 44 percent over a wheat/fallow system and 15 percent over continuous wheat. Also, rotating sorghum with wheat reduces soil pathogens and insect pests that reduce yields. Examples are root rots and wheat streak mosaic virus – vectored by wheat curl mite.
Limited Irrigated Corn
Sorghum is more drought tolerant than corn and typically yields better under high water demanding environments where water sources are limited. It normally takes only six inches of water before a sorghum plant will begin to make grain. In contrast, 10 to 11 inches are needed before corn produces grain (5). Irrigation water resources can be reserved by planting the less water demanding sorghum on a portion of acres that would otherwise be planted to corn. Water use efficiency of both corn and sorghum can be improved by adjusting the planting date of each in a way that allows the crops to reach their peak water demand at different times. Irrigation water can then be diverted to each crop at its critical water demanding stage.

References
1) Vannoppen, W., De Baets, S., Keeble, J., Dong, Y., Poesen, J. How do root and soil characteristics affect the erosion-reducing potential of plant species? Ecological Engineering, Volume 109, December 2017