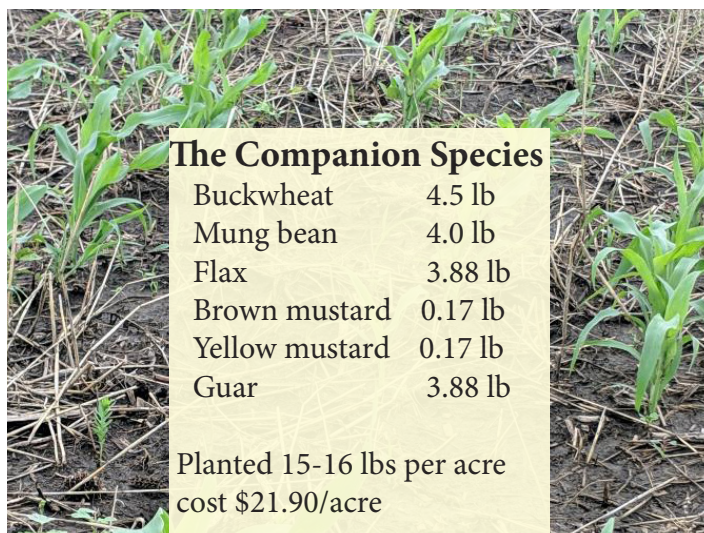# ALTERNATIVE WEED CONTROL STRATEGIES IN SORGHUM WITH COMPANION CROPS

Four Kansas grain sorghum producers planted 15 acre plots of sorghum with a multi-species companion crop. Species in the companion crop mix were chosen primarily to improve weed control during the growing season. The species were low canopy species that would not compete with the sorghum for light. The same mix was planted in all four plots.

Two of the four sites deployed soil moisture probes inside and outside of the plots. The probes provided daily volumetric water content readings at three different depths: 8, 18, and 36 inches.

Project objectives

- Demonstrate appropriate companion crops can be viable alternatives to crop protection products
- Demonstrate which families of companion crops can benefit sorghum production
- Provide demonstration plots available for others to observe
- Document results of yield variance and economic differences between companion plots and non-companion fields along with soil health benefits ie: total carbon, infiltration, bulk density, penetration resistance, soil respiration and macro-invertebrate population counts.
- Demonstrate moisture use by companion crops

Ford county sorghum with companions prior to sorghum heading out

Planting Information

- Sorghum planted at 45,000-60,000 seeds per acre.
- Some of the plots had pre-residual herbicides prior to planting but nothing after planting on plots.
- All but one of the plots had a cover crop planted ahead of the sorghum.
- 3 of the 4 plots had companions planted in the same furrow as the sorghum, one plot had the companions planted between the rows.
- All but 1 of the plots had nitrogen applied as starter fertilizer with the sorghum, no post planting fertilizer was applied.
- 3 of the 4 plots required on additional crop protection chemical applications outside of the plots. The Osage Co. farm had one post-planting herbicide application outside the plot at $40 per acre.
- No additional herbicides or insecticides were applied to the plots.
- At the Osage and Mitchell county plots soil moisture probes were used to measure the volumetric water content of the soil at 8, 18 and 36 inches.
- **Due to wet spring and early summer, all of the plantings were delayed**. Plant dates were June 7, 18, 29 and July 2, 2019, 15-30 days later than "normal".

The Companion Species

Buckwheat	4.5 lb
Mung bean	4.0 lb
Flax	3.88 lb
Brown mustard	0.17 lb
Yellow mustard	0.17 lb
Guar	3.88 lb

Planted 15-16 lbs per acre cost $21.90/acre

Osage county sorhum with companions

General Observations

- Planting date makes big impact on the success of this combination.
- Pre-plant soil cover maybe the most important factor for early weed control without a quick germinating companion species.
- In both plot areas with moisture sensors, the plot with the companion crops did show greater moisture use even with early saturated soil conditions.
- The mix did have positive benefits on weed populations in some of the demonstration plots, but not in every case.
- Companion mix did have benefit to soils.

Figure 1. Available Moisture Inside and Outside Test Plot Mitchell County 8 inches below surface
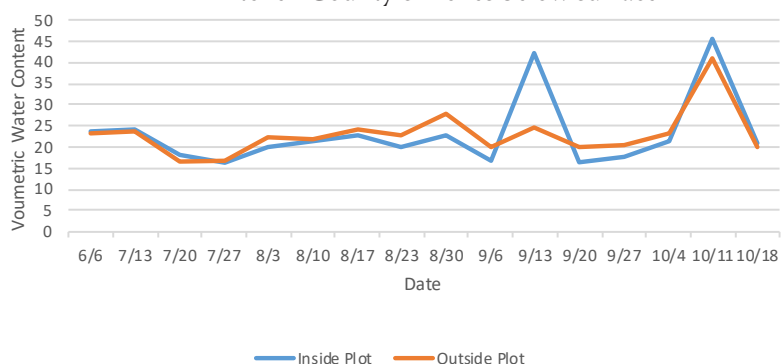
Saline Co. sorghum with companions

Figure 2. Available Moisture Inside and Outside Test Plot Osage County 18 inches below surface

Ford Co. sorghum emerges with companions

Table 1. Yield Comparison Inside and Outside Test Plot

Site	Yield Inside Plot (bu/ac)	Yield Outside Plot (bu/ac)
Ford County	70	78
Mitchell County	72	77
Osage County	25	35
Saline County	103	121

Table 2. Soil Sampling Results Inside and Outside the Test Plots

Sample	Management	July 19			November 19		
		% Aggregates	Total C	Active C	% Aggregates	Total C	Active C
Mitchell Co.	No Companion	58.84	2.5	493	36.66	2.0	415
	Companion Crop	53.47	2.2	477	22.63	2.1	440
Ford Co.	No Companion	69.42	2.9	479	64.03	2.7	406
	Companion Crop	25.13	1.2	344	18.29	1.4	369
Osage Co.	No Companion	64.05	2.7	678	54.99	2.0	676
	Companion Crop	57.22	3.3	687	58.65	1.4	703
Saline Co.	No Companion	26.75	2.5	556	28.03	2.0	528
	Companion Crop	26.33	2.6	530	16.79	1.8	432

Soil moisture probe being installed