United States Department of Agriculture

Soil Health Demonstrations Enter 4th Season

The soil health demonstrations at the PMC have begun their fourth season. Cotton was harvested in October and the yield is shown in figure 1. In the 2015 irrigated demonstration, the cotton following a winter cover mix of 60% legumes and forbs and 40% grasses and the monoculture of cereal rye produced over 100 pounds more cotton per acre than the block following conventional tillage. Although all three demonstration blocks produced less cotton than in previous years, this is the second consecutive year that the conventional tillage block produced less than the cover mix and monoculture blocks.

The dryland demonstration showed similar results for 2015. Above average rainfall contributed to the highest yield production to date for our dryland demonstration. This was the first year that the cover mix and the monoculture produced more yield than the conventional tillage. We anticipate the dryland blocks following the same pattern as of the irrigated demonstration, but will need additional years of data to confirm this. Table 1 shows the soil analysis results in the cotton demonstrations before cotton planting. After four years, there is not much difference between the different management scenarios.

The wheat rotation with a summer mix demonstration is a year behind the cotton demonstrations. After three wheat harvests, the results are similar. In the initial years, the blocks that are tilled each year seem to produce more yield. We hope that this year, we will begin to see a change and the mix and monoculture blocks will begin to produce more wheat. Our hope is that over time, we can show the advantages of cover crops as well as expectations and challenges produces may encounter.

Figure 1. Soil health demonstration yields for 2012-2015 under different management scenarios taken at the USDA-NRCS James E. "Bud" Smith Plant Materials Center in Knox City, TX.

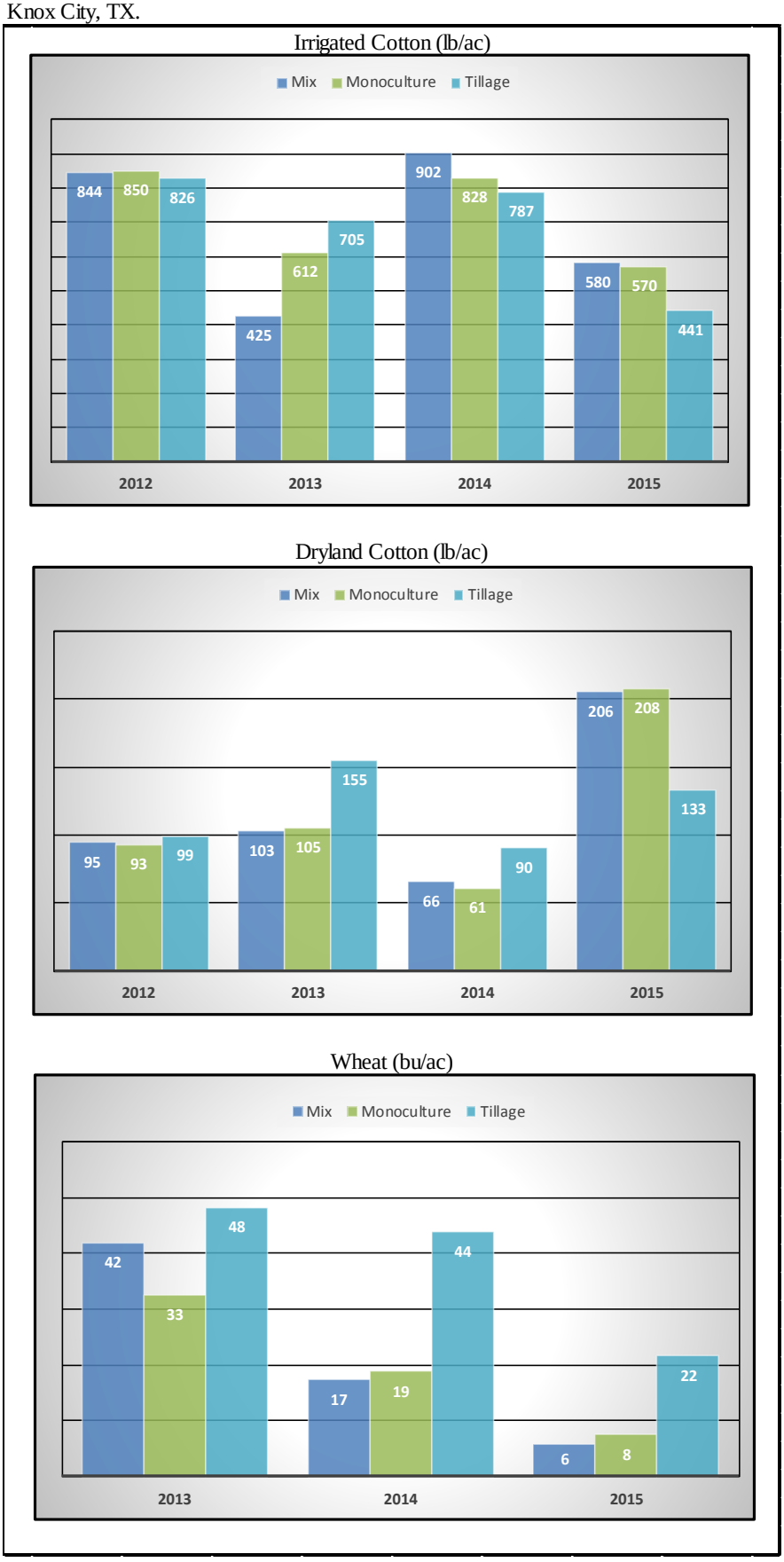


Table 1. Soil analysis for soil health demonstrations at the USDA-NRCS James E. "Bud" Smith PMC in Knox City, TX, taken in April of 2012-2015.

Irrigated Cotton/ Winter Mix

						Organic				Nitrogen			Phosphorus		
	Nitrogen	Phosphate	Potassium	Nutrient value/ac	Solvita 1-day CO2-C	C	N	C:N	Soil Health Calculation	Total	Inorganic	Organic	Total	Inorganic	Organic
2012															
Cover Mix	23.16	84.40	400.40	223.46	23.70	143.44	11.24	12.76	1.71	30.78	8.30	22.48	103.50	82.16	21.34
Wheat	20.84	61.43	566.80	261.02	27.70	166.78	11.02	15.13	1.94	33.14	11.10	22.04	89.70	60.12	29.58
Tillage	16.07	64.09	598.00	271.81	31.00	152.27	8.90	17.11	1.82	28.00	10.20	17.80	95.68	63.85	31.83
2013															
Cover Mix	9.69	76.35	458.90	334.60	8.50	104.95	10.31	10.18	2.92	23.99	3.37	20.62	98.21	75.11	23.10
Wheat	11.84	60.77	609.70	415.46	12.79	105.40	9.60	10.98	3.18	23.90	4.69	19.21	89.47	59.10	30.37
Tillage	17.72	63.93	673.40	459.42	6.78	95.71	9.12	10.50	2.51	30.99	12.76	18.23	93.61	62.98	30.63
2014															
Cover Mix	13.01	69.58	460.46	232.44	8.80	139.93	17.17	8.15	4.20	38.80	4.45	34.35	84.27	67.59	16.69
Wheat	13.74	52.24	530.53	250.43	14.56	151.71	18.14	8.36	5.07	38.08	1.80	36.27	68.71	49.00	19.71
Tillage	24.40	54.82	614.68	290.96	14.88	158.15	19.97	7.92	5.46	49.69	9.74	39.94	70.38	51.37	19.01
2015															
Cover Mix	17.50	83.10	79.70	117.00	17.70	120.00	12.00	10.00	4.20	27.60	3.70	23.90	83.10	77.80	5.30
Wheat	19.70	63.10	79.60	101.30	20.70	131.30	12.50	10.50	4.60	29.30	4.20	25.10	63.10	58.20	5.00
Tillage	15.90	75.90	92.80	115.90	14.20	135.00	12.00	11.20	4.00	30.90	6.80	24.10	75.90	71.20	4.70

Dryland Cotton/ Winter Mix

						Organic				Nitrogen			Phosphorus		
	Nitrogen	Phosphate	Potassium	Nutrient value/ac	Solvita 1-day CO2-C	C	N	C:N	Soil Health Calculation	Total	Inorganic	Organic	Total	Inorganic	Organic
2012															
Cover Mix	22.37	30.98	529.10	222.71	23.50	127.42	7.45	17.10	1.53	27.94	13.04	14.90	57.04	30.80	26.24
Wheat	22.71	29.10	512.20	215.36	18.20	131.23	5.80	22.63	1.51	27.70	16.10	11.60	54.28	29.10	25.19
Tillage	15.11	22.52	429.00	176.85	23.50	132.57	7.11	18.65	1.57	27.76	13.54	14.22	42.55	22.52	20.03
2013															
Cover Mix	14.80	35.57	599.30	393.36	13.45	98.70	9.58	10.30	3.25	24.95	5.78	19.16	62.56	33.63	28.93
Wheat	10.53	27.36	526.50	341.37	10.23	85.03	7.68	11.07	2.54	19.71	4.35	15.36	49.68	26.04	23.64
Tillage	21.46	25.81	464.10	309.40	5.68	94.88	8.59	11.05	2.32	33.50	16.33	17.17	46.23	25.08	21.15
2014															
Cover Mix	28.60	29.65	531.76	244.80	13.10	114.76	15.54	7.38	4.48	40.03	8.94	31.09	52.76	26.47	26.29
Wheat	11.16	21.89	490.80	215.04	10.52	90.44	12.16	7.44	3.53	25.17	0.85	24.32	34.96	19.35	15.61
Tillage	14.00	26.26	556.47	245.34	8.08	111.89	14.76	7.58	3.33	34.30	4.77	29.53	41.49	24.33	16.69
2015															
Cover Mix	17.60	34.20	77.90	74.70	17.60	103.30	11.20	9.20	3.90	24.80	2.30	22.50	34.20	29.30	4.90
Wheat	17.90	33.40	76.30	73.50	18.60	100.20	10.60	9.50	3.90	23.40	2.20	21.20	33.40	28.20	5.20
Tillage	18.60	32.10	64.80	67.50	16.80	92.60	9.60	9.70	3.60	24.70	5.50	19.10	32.10	27.40	4.70

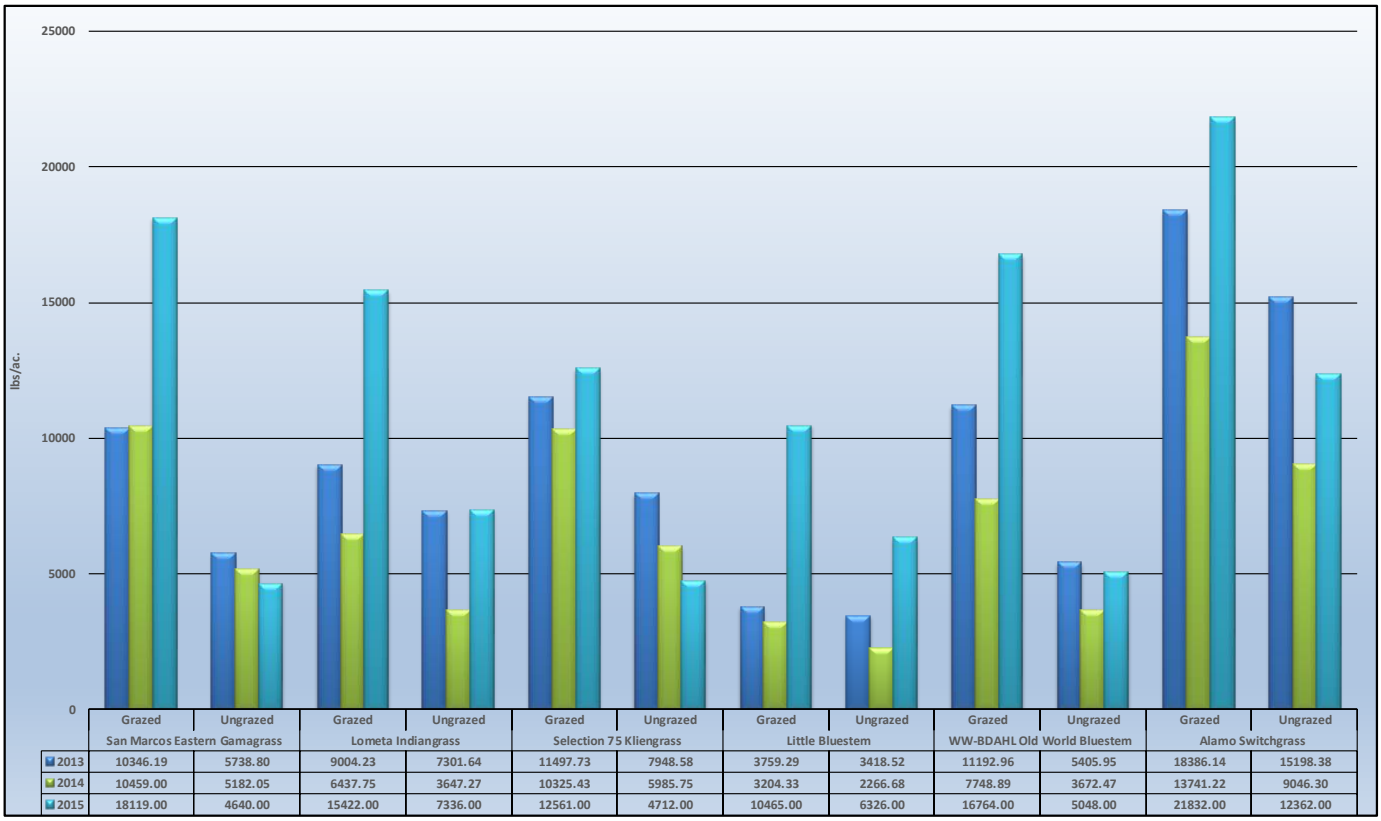
Evaluation of Grazing Management and Winter Stockpiling of Warm Season Grasses in North-Central Texas and Southwestern Oklahoma

Rangeland plantings are designed with the intent to provide grazing in both the growing and dormant seasons. Forage quality of adapted grasses has been extensively studied, but little work has been done during the dormant season. This study, with collaboration from the Texas Coalition Grazing Land Conservation Initiative (GLCI), compares the forage quantity and quality of warm season grasses to assist producers with management decisions on supplementation needed to meet dietary requirements for cattle production.

Range and pasture plantings should be grazed for part of the growing season in order to reap the benefit of the maximum production potential of the forage. Data collected showed that in all cases, the total yearly biomass was higher in plots with grazing simulation compared to season long growth. Figure 2 shows the comparison of the different management strategies for the 2013-2015 growing seasons. The increase in biomass for 2015 is contributed to the above average amount of rainfall through the spring months. Preliminary data has shown that forage amounts decline from October to February. One main reason for this decline is the effect weather, such as wind, rain, and snow, has on the pasture. The quality of the forage also changed throughout the dormant season. In these species, the crude protein decreased from October to November in both the grazed and un-grazed scenarios due to nutrient loss from weathering. The stem to leaf ratio will be lower in pastures that are not grazed compared to the grazed pastures. While the digestibility did change, it was insignificant.

The final year of data is currently being recorded so a comparison between forage qualities is not available at this time. While these grasses will provide ample dry matter for cattle, preliminary conclusions indicate that nutrient supplementation may still be necessary depending on specific producer objectives.

Figure 2. 2013-2015 forage production (lb/ac) of six perennial, warm-season grasses collected at the end of the growing season under different management scenarios.



	Grazed	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed
	San Marcos Eastern Gamagrass		Lometa Indiangrass		Selection 75 Kliengrass		Little Bluestem		WW-BDAHL Old World Bluestem		Alamo Switchgrass	
2013	10346.19	5738.80	9004.23	7301.64	11497.73	7948.58	3759.29	3418.52	11192.96	5405.95	18386.14	15198.38
2014	10459.00	5182.05	6437.75	3647.27	10325.43	5985.75	3204.33	2266.68	7748.89	3672.47	13741.22	9046.30
2015	18119.00	4640.00	15422.00	7336.00	12561.00	4712.00	10465.00	6326.00	16764.00	5048.00	21832.00	12362.00

*Grazed is biomass produced from spring greenup to July 1st combined with biomass produced from July 1st to killing frost.
**Ungrazed is biomass produced from greenup in the spring to killing frost.

Program Emphasis

The mission of the James E. "Bud" Smith PMC is to develop and transfer effective state-of-the-art plant science technology to meet customer and resource needs. The PMC conducts plantings and studies at the Center and off center with cooperating partners. Plant and technology development objectives of the PMC include:

- Soil Health
- Erosion Control - wind and water
- Range and Pasture Improvement
- Wildlife Habitat Improvement
- Water Quality Improvement on Agricultural Land
- Biofuels
- Saline Site Restoration

James E. “Bud” Smith Plant Materials Center

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) James E. “Bud” Smith Plant Materials Center (PMC) located near Knox City, Texas, was establish in 1965. It is one of the 27 Centers located throughout the United States. The Center is responsible for developing conservation plants and cultural techniques for use within targeted Major Land Resource Areas (MLRA) in Texas, Oklahoma, Kansas, Colorado, and New Mexico. The Center is also responsible for producing Breeder and Foundation seed of plant releases and assisting in commercial development and promoting their use in natural resource conservation. The PMC serves all or portions of 136 counties in Texas that comprises parts of 25 MLRAs, and the areas served in all or portions of 39 counties in southwestern Oklahoma comprising parts of thirteen MLRAs. The PMC also serves a portion of seven counties in southwestern Kansas including parts of four MLRAs, a portion of one county in the southeastern corner of Colorado comprising parts of three MLRAs, and a portion of seven counties in eastern New Mexico comprising parts of seven MLRAs. The PMC is located approximately four and a half miles northwest of Knox City, Texas, in the Rolling Red Plains MLRA.

James E. “Bud” Smith PMC Personnel

- Dr. Gary Rea- Manager
- Brandon Carr- Soil Conservationist
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Visit the PMC website for more information and publications:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/plantmaterials/pmc/central/txpmc/