Project Title: Evaluation of wheat and barley yield response to previous crop cover

Project Leader: D.M. Wichman (pre-July 8) and P.M. Carr (post-July 8)

Project Personnel: S. Briar Cereal Grains Research Associate

Objectives:
To determine the impact of cover crops on subsequent small-grain crops in a sequence

Results:
The 2015-16 growing season at CARC was drier (13.1 inches) than the long-term average (15.3 inches; Table 1). Less-than-average amounts of precipitation occurred each month over the winter, but timely precipitation in April along with greater than average amounts of precipitation in May (4.5 vs. 2.6 inches) created favorable conditions for spring planting and early season growth small-grain crops. Dry conditions developed again in June (1 inch vs. a long-term average of 3.1 inches) while average amounts of precipitation (1.7 inches) was received during July. August was slightly drier than average, with 87% of the long-time average (1.6 inches) received. Mean air temperature was warmer than the long-term average (46^{o}F vs. 43^{o}F). We were unable to detect differences in grain yield of spring barley following winter wheat or two years after cover crops first were grown (Table 2). Similarly, no differences were detected when winter wheat was grown following cover crop treatments. These results failed to identify any impact of various cover crop treatment on performance of subsequent small-grain crops. There was no difference in winter wheat performance following any cover crop treatment with fallow.

Cover crop treatments established in 2014 were again established in 2016 (Table 2), in anticipation of small-grain crops being grown in subsequent years. Above-ground dry matter (DM) produced by cover crops ranged from 397 lb/ac for radish to 685 lb/ac for flax ($P < 0.05$). By comparison, over 1200 lb/ac of above-ground DM was produced by both cover crops in 2014. We speculate that cover crop treatments grown in 2016 will have little if any impact on subsequent performance of small-grain crops, based on results of the study in previous years and the limited amounts of above-ground DM produced by cover crops in 2016.

Summary:
Less than 1000 lb/ac of above-ground DM was produced by contrasting cover crop treatments in 2016. Cover crops planted in 2014 failed to affect a subsequent wheat crop (2015) or barley crop (2016) planted two years after cover crops were planted. These results indicate that performance of small-grain crops is unaffected by contrasting cover crop treatments in some environments in central Montana.

Funding Summary:
An expenditure summary will be provided by OSP. No additional grant support was provided for this project.

MWBC FY 2017 Grant Submission Plans:
A request for continuing this project was submitted for funding consideration for the next fiscal year. Funding was awarded. Thank you!

Table 1. Monthly precipitation and temperature data during the 2015-16 growing season and the long-term average at the Central Ag. Research Center in Moccasin, MT.

Month	Year	Precipitation, in		Air Temperature, °F	
		Current Year	*1909-2016*	*Current Year*	*1911-2016*
Sep	*2015*	0.8	1.4	57.8	54.9
Oct	"	0.6	0.9	48.7	44.9
Nov	"	0.5	0.6	33.4	32.8
Dec	"	0.4	0.5	27.2	25.0
Jan	*2016*	0.3	0.5	27.9	21.8
Feb	"	0.3	0.4	35.8	24.7
Mar	"	0.6	0.7	38.4	30.6
Apr	"	1.2	1.2	45.3	40.8
May	"	4.5	2.6	50.4	50.1
Jun	"	1.0	3.1	61.7	57.9
Jul	"	1.7	1.7	66.0	65.9
Aug	"	1.4	1.6	64.3	64.9
Total\Average		13.3	15.3	46.4	42.9

Table 2. First-year cover crop (2014) followed by wheat (2015) and then barley (2016), and a second planting of cover crops (2016) at CARC in Moccasin, MT.

	2014 Cover Crop		*2015 Winter Wheat*		*2016 Barley*		*2016 Cover Crop*	
Crop	**Canopy Height**	**Dry Matter Yield**	**Grain Yield**	**Test Weight**	**Grain Yield**	**Test Weight**	**Canopy Height**	**Dry Matter Yield**
	inches	lb/ac	bu/ac	lb/bu	bu/ac	lb/bu	inches	lb/ac
*Cocktail**	52.5	921.0	51.9	56.6	35.1	50.9	41.0	531.5
Flax	57.8	1283.4	44.3	56.0	26.8	49.9	49.8	684.7
No Crop	-	-	46.4	55.0	33.9	50.4	-	-
Radish	79.8	1339.0	50.0	56.7	29.7	50.5	65.3	396.6
Safflower	69.8	1442.4	43.4	55.8	35.4	49.9	51.8	520.5
Sweet Clover	34.0	974.6	52.4	55.1	28.9	51.1	18.3	329.3
Turnip	14.3	431.6	43.3	55.8	37.5	50.8	9.5	404.9
Yellow Mustard	75.0	2010.0	49.7	56.4	35.4	50.3	52.5	508.8
All								
P-Value	< 0.001	< 0.001	0.101	0.235	0.215	0.780	< 0.001	0.018
Mean	54.7	1200.3	47.6	55.9	32.8	50.5	41.1	482.3
CV%	9.4	4.4	11.3	1.9	16.0	2.1	10.0	26.0
LSD (0.05)	7.1	341.8	NS	NS	NS	NS	6.1	186.5

*Safflower, clover, flax, turnip, radish