

Southwest North Dakota cover crop demonstrations

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Many producers were unable to seed due to excessive precipitation during the critical spring seeding season in southwest North Dakota in 2011. Several producers chem-fallowed prevented plant acres but some producers took advantage of the opportunity to sow cover crops on these acres. The use of cover crops in southwest North Dakota is relatively new with producers asking questions such as 1) Do cover crops use more water than can be replaced with seasonal precipitation? 2) Do cover crops require more nutrients than are available in the soil? 3) What is the cost of establishing cover crops? 4) Will cover crops improve the bottom line?

Cover crop demonstrations were established in Bowman, Golden Valley and Slope Counties during the growing season in 2011 to acquaint producers with cover crop concepts and to develop local information about cover crop use.

Cooperating organizations included: Bowman County Extension Service, Bowman-Slope Conservation District, Natural Resource Conservation Service, Golden Valley Extension Service, Golden Valley County Conservation District, Slope County Extension Service, Dickinson Research Extension Center, North Dakota Sustainable Agriculture Research and education and several producers in cooperating counties.

Events and materials were planned and delivered during the "Triple C's" (Cover Crop, Coffee, and Caramel Rolls) meetings held at the Paul White Farm near Bowman and the Ernie Holzemer Farm near Amidon in August 2011. Producers attending these events learned about soil quality from Jon Stika, NRCS soil scientist, and cover crop seeding information from Extension agents and specialists. Samples of some of the materials developed for these programs are available from Roger Ashley's web page.

The Ernie Holzemer Farm 2011 cover crop site was followed throughout the 2011 growing season and 2012 cropping season. Establishment information can be found in the Twenty-eighth annual Western Dakota Crops Day Research Report 2011 on pages 69 - 70. It should be noted following establishment of the cover crop treatment two additional burn-down applications of herbicide were applied to the summer-fallow treatment of this demonstration. Estimated costs of these additional applications of herbicide were \$18.45 per acre. Considering seed costs in the bulk seeded cover crop demonstration of \$21.45 per acre costs were essentially similar.

The 2011-2012 winter was warmer and drier than normal followed by a warmer and drier than normal growing season. Percent water content of soil by weight was determined by extracting soil cores from similar soil mapping units adjacent to each other in the cover crop and chem-fallowed areas of the field on 23 March 2012. Soil cores were weighed wet, then oven dried, then weighed dry and percent water content calculated. Spring wheat was seeded in 2012 across the entire cover crop and chem-fallowed area of the field. The producer at planting time added an additional 30 pounds of N per acre to the cover crop area compared to the chem-fallowed portion of the field. Grain yield was 30.2 bushel per acre on the cover crop demonstration and grain yield on the chem-fallowed treatment was 31.0 bushels per acre. Less than 3% difference. The producer indicated that there was no noticeable difference between cover crop and chem-fallow treatment grain yields. Spring wheat grain test weight was 58.7 lbs/bu from the cover crop treatment compared to 56.8 lbs/bu for the grain harvested from the chem-fallow treatment, a 3% difference in test weight. Protein content of grain from the chem-fallow treatment was 17.7% while the protein content of the grain from the cover crop treatment was 17.4% or less than a 2% difference. Essentially the hard red spring wheat grain produced in this demonstration had similar yields, test weights and proteins. It would appear the soybean + millet + sunflower + turnip cover crop did not have a negative impact on grain yield and quality in the short term.

This demonstration received financial support from the ND SARE.

Seed costs per pound of dry matter produced and nutrients captured, Ernie Holzemer Farm, Amidon, ND, 2011.

Crop Species	Crop Variety Name	Planting rate	Seed Costs	Dry Weight	Seed Cost/lb dwt/acre	N+P+K	Seed ¹
		(percent in mix by wt)					cost/lb NPK/acre
		lb/acre (%)	\$/acre	lb/acre	\$/lb/acre	lb/acre	\$/lb/acre
Radish	Tillage	8.2 (100)	26.24	518	0.051	24.8	1.058
Radish	Graza	5 (100)	16.00	516	0.031	21.8	0.734
Winter Brassica	Winfred	5 (100)	30.00	452	0.066	21.0	1.429
Winter Brassica	Winfred	10 (100)	30.00	503	0.060	23.4	1.282
Ethiopian Cabbage ²	PG584	2 (100)	10.00	516	0.019	18.3	0.546
Alfalfa	Not stated	3.5 (100)	11.38	360	0.032	24.3	0.468
Soybean	Not stated	60 (100)	51.00	427	0.119	19.8	2.576
Cowpea	Iron & Clay	70 (100)	98.00	222	0.441	10.4	9.423
Field Pea	4010 Forage Pea	86 (100)	29.41	661	0.044	35.1	0.838
Sunflower	Viper	17 (100)	13.06	628	0.021	34.6	0.377
Oat	Morton	75 (100)	24.61	692	0.036	27.7	0.888
Millet	Siberian Foxtail	20 (100)	9.20	551	0.017	16.6	0.554
Black Lentil	Indianhead	26 (100)	26.00	376	0.069	23.1	1.126
Teff Grass	Tiffany	4 (100)	14.40	554	0.026	17.8	0.809
Soybean + Sorghum Sudangrass	Not stated + Sweet Thing	60 (63 + 37)	56.85	931	0.061	46.4	1.225
Soybean + Millet	Not stated + Siberian Foxtail Millet	45 (80 + 20)	34.74	798	0.044	32.6	1.066
Cowpea + Soybean + Millet + Winter Brassica + Radish + Sunflower	Iron & Clay + not stated + Siberian Foxtail + Tillage + Viper	45 (27 + 41 + 20 + 3 + 3 + 6)	47.36	1274	0.037	59.4	0.797
Field pea + Lentil + Oat + Winter Brassica + Radish + Sunflower	4010 Forage pea + Indianhead + Morton, + Winfred + Tillage + Viper	75 (52 + 17 + 24 + 2 + 2 + 3)	43.02	1443	0.030	70.3	0.612
Soybean + Millet + Sunflower + Turnip	Not stated + Manta Siberian + Black Oil + Purple Top	28 (55 + 30 + 11 + 4)	21.45	1245	0.017	59.8	0.359

Planted July 22, 2011

¹Seed cost per pound of nutrient (N+P+K) captured.

²Ethiopian Cabbage was noted to be severely infested with Checkered White (*Pontia protodica*) on Sept 2.

Cover crop dry matter yield and nutrient content on the Ernie Holzemer Farm, Amidon, ND, 2011.

Strip No	Species	----- Sept 23 -----							Nov 3
		Dry wt by sp.	Dry wt by mix	N	Ca	P	Mg	K	Dry wt by sp.
		----- lbs./acre -----							
1	Tillage radish	518	-	13.1	7.5	1.1	2.7	10.6	528
2	Graza radish	516	-	9.4	14.5	0.9	3.2	11.5	527
3	Winfred winter brassica	452	-	8.3	8.7	1.0	2.7	11.7	574
4	Winfred winter brassica	503	-	9.3	9.7	1.1	3.0	13.0	661
5	Ethiopian cabbage	516	-	8.6	3.8	0.8	2.2	8.9	421
6	Alfalfa	360	-	14.1	7.3	0.8	1.4	9.4	111
7	Soybean	427	-	11.6	7.8	1.2	2.9	7.0	-
8	Cowpea	222	-	4.8	4.3	0.7	1.6	4.9	-
9	Field pea	661	-	23.1	6.7	1.4	2.5	10.6	-
10	Sunflower	628	-	11.5	9.7	1.8	3.8	21.3	-
11	Oat	692	-	13.3	1.4	1.2	1.2	13.2	-
12	Millet	551	-	6.8	1.1	0.9	1.4	8.9	-
13	Black lentil	376	-	13.3	3.6	1.1	1.5	8.7	245
14	Teff grass	554	-	8.0	1.6	1.1	1.2	8.7	-
15	Soybean	370	931	20.0	6.0	1.8	4.6	24.6	-
15	Sorghum-sudan	561							-
16	Soybean	396	798	15.8	6.5	1.6	3.6	15.2	-
16	Millet	403							-
17	Cowpea	259	1274	23.6	14.8	2.7	6.4	33.1	-
17	Soybean	324							-
17	Winfred winter brassica	344							349
17	Millet	346							-
18	Field pea	323	1443	24.7	16.6	2.6	5.8	43.0	-
18	Oat	287							-
18	Lentil	264							-
18	Graza radish	257							-
18	Winfred winter brassica	312							323
19	Millet	347	1245	20.3	11.1	2.4	4.9	37.1	-
19	Sunflower	340							-
19	Purple top turnip	295							295
19	Soybean	264							-

Soil Water % by Mass

Site - 1 Rhoades-Belfield Complex

Depth	Chem-fallow	Cover crop
0-1	18%	18%
1-2	18%	11%
2-3	24%	16%
3-4	24%	23%

Site -2 Vebar-Talley fine sandy loam

Depth	Chem-fallow	Cover crop
0-1	13%	12%
1-2	14%	13%
2-3	19%	15%
3-4	23%	23%

