Cover crop report MWCC

In 2016 we conducted two experiments that were funded by the

South Dakota Soybean Research and Promotion Council. Reports of these project are below.

Objective 3.3b In-season cover crops.
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In South Dakota, few options exist for seeding cover crops after soybean harvest due to the limited growing season that remains. Interseeding cover crops into a growing soybean crop may provide additional time for growth. However, interseeding too soon may reduce soybean yield and/or interfere with soybean harvest. In 2015 and 2016, strip trials were initiated in a soybean production field near Volga (2016) and northeast South Dakota (near Bristol) in fields that had slight (1 to 3%) to moderate slopes (1- to 9%) slopes. A cool-season mix of annual ryegrass (*Lolium multiflorum*) (30%), forage radish (*Raphanus sativus*) (20%), turnip (*Brassica rapa rapa*)(20%), crimson clover (*Trifolium incarnatum*) (20%), and dwarf essex rapeseed (*Brassica napus*) (10%) was drilled at 6.2 kg/ha in a single row half-way between 76 cm soybean rows on August 6, 2015 [soybean at R3 (beginning pod)] and at Volga on August 26, 2016, when soybean was canopied. Three 15-row wide strips were seeded using a 5-row drill modified for the interrow seeding (Figure 1). Seed was also surface broadcast by hand at 16.8 kg ha^{-1} onto 3 m x 3 m areas adjacent to the strips at the footslope and backslope landscape positions. The soybean crop was harvested on using a combine at physiological maturity in late September or early October. Cover crop biomass was collected in November from 1 m^2 song the strips and broadcast sites where cover crop was present. At least 4 areas were harvested per landscape position and each position was replicated through the three strips (Figures 2 and 3). Soybean was direct combine and there was no interference of cover crop growth noted during harvest. Yields in areas with cover crops were not impacted by cover crop as syield were similar to areas adjacent areas with no cover crops at all landscape positions. The highest cover crop yields were measured from footslope positions each year. Biomass was similar in the drilled and broadcast treatments, although seeding rate in the drilled area was one-third the broadcast seeding rate. The drilled treatment had almost three times the biomass in the backslope areas compared with the broadcast treatment. Cover crop species selection also may be beneficial, as turnip biomass was greater in the backslope areas, whereas radish biomass was greater in the footslope position.

Figure 1. Cover crop seeder in soybean 2015 (right) and 2016 (left).

Figure 2. Soybean yield and cover crop growth at Bristol site, 2015.

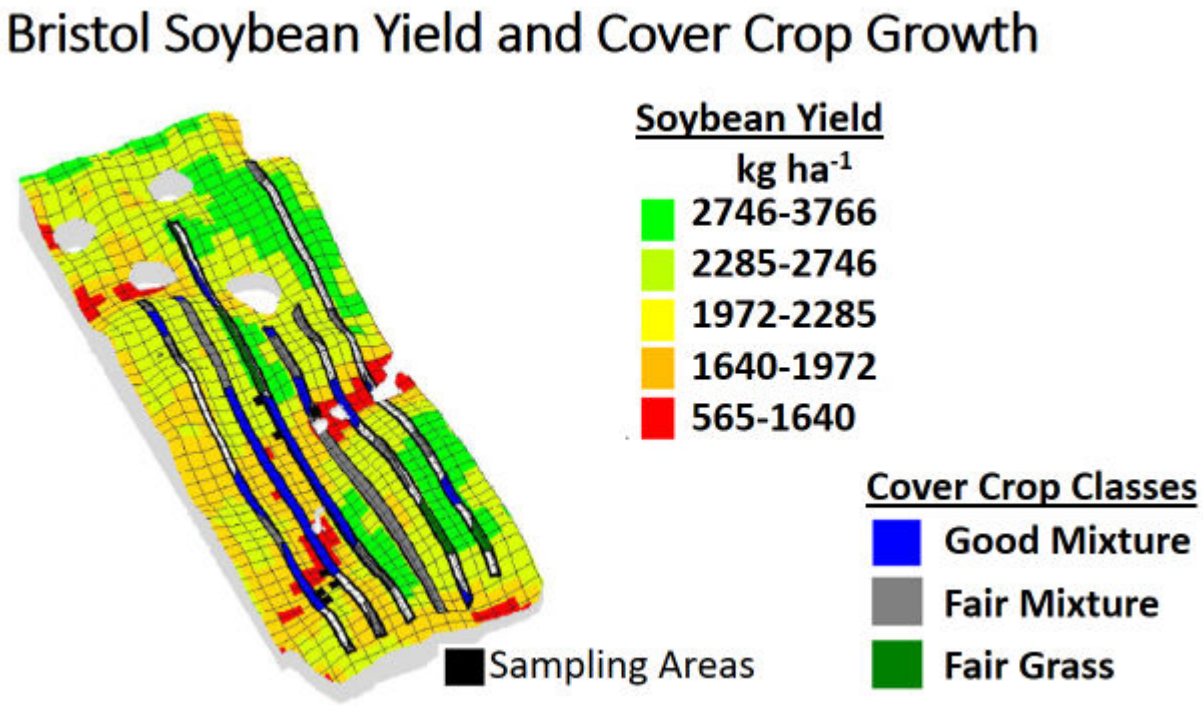

Figure 3. Soybean yield and cover crop growth at Volga site, 2016.

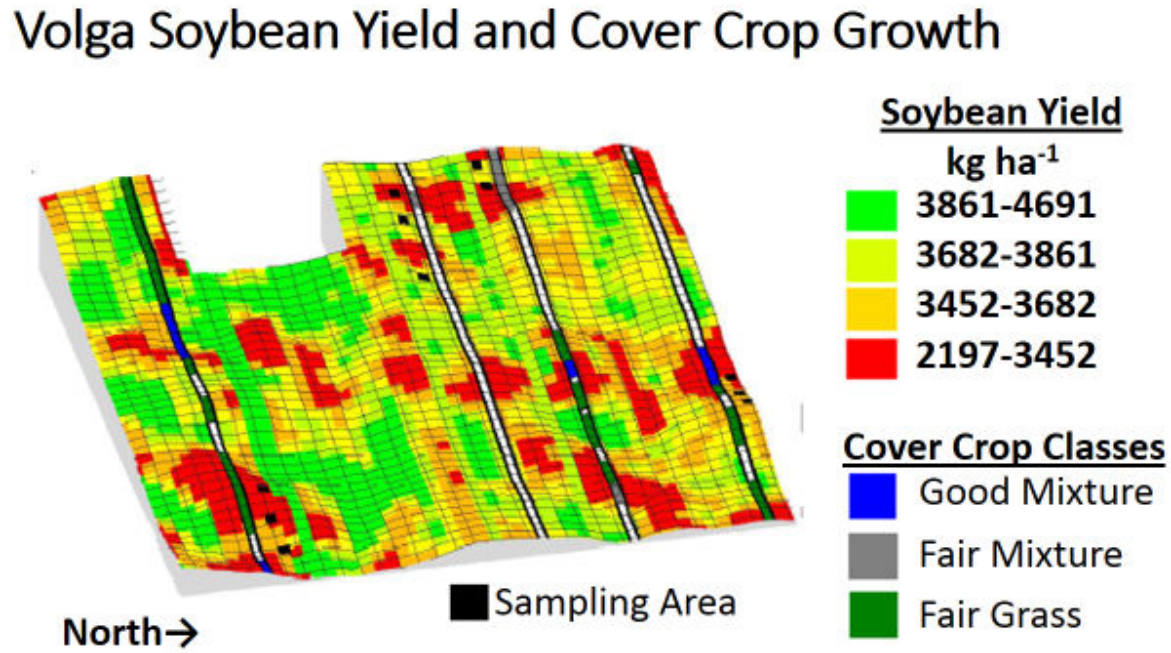

Figure 4. Example of cover crop growth at the Bristol site in 2015 (early November after soybean harvest)

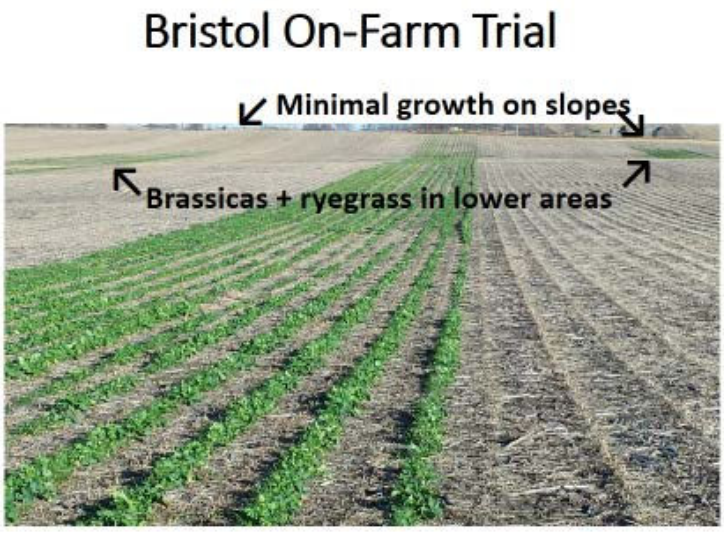

Figure 5. Example of cover crop growth at the Volga site in 2016. (early November after soybean harvest)

Objective 5: Testing the feasibility of utilizing coated cover crop seeds in rotations that include soybeans. David Karki

Background

Mixes of cover crop seeds coated with 34%, 50%, and 70% (by wt.) of limestone with and without water absorbent were used along with seeds without any coating for this study. A total of seven coat treatments of different cover crop species were used in-season on corn, soybean, and small grain fields. The seeds were hand broadcast and applied in three replicates at each site-crop on 10' x 20' size plots.

A mix of Annual Ryegrass, German Millet, Mungbean, Rapeseed, and Sorghum Sudan grass was applied on corn at V6 growth stage at five sites. The same mix was broadcast on small grains (oat, spring and winter wheat) at milk to soft dough stage time at seven sites. Early season spreading of cover crops seeds (V6 corn and milk stage small grains) were completed by the third week of June. The test sites included two SDSU Research Farms and six farmer cooperators' fields across Eastern South Dakota. Field data collection of cover crop establishment from early season trials is completed and is being gathered from different collaborators at this time. It will soon be analyzed and shared in future reports/meetings.

Further, we applied coated cover crop seeds later in the season, i.e. on soybeans at leaf drop stage (five sites) and corn at physiological maturity stage (five sites). The cover crops used in the mix for late season broadcast were mostly cool-season species- lentil, pea, flax, oat, peas. This application was completed during second week of September. Data is being collected at this time and will be continued until after corn is harvested.

Results and Summary

In early and late fall, we collected data on total number of emerged plants for each cover crop species in the blend. Highest number of plants established in each trial did not show any trend for any single coating level. The growth of cover crop species seeded into corn at V6 was negligible which could be due to shade effects imposed by corn on young growing plants. The same blend used in small grains showed significantly higher rate of emergence. Further, blend used in corn at half milkline and soybean at leaf drop showed moderate emergence in the late fall.

Table 1. Average number of broadcast seeded cover crop plants emerged after 60 days after seeding into small grains at soft dough stage.

Clark, SD

Coating	Rape	S.Sudan	G. Millet	Mungbean
Bare	24	7	17	2
34	16	3	12	2
34A	24	7	17	2
50	21	3	14	3
50A	26	3	18	2
70	25	1	10	2

70A	22	0	7	2
Bruce, SD				
Bare	0	12	24	7
34	4	11	18	3
34A	1	10	19	6
50	4	4	18	4
50A	2	14	34	7
70	5	12	26	6
70A	4	9	14	8
Henry, SD				
Bare	3	1	0	0
34	6	1	0	0
34A	6	1	0	0
50	8	0	1	0
50A	12	1	0	0
70	9	0	0	0
70A	6	0	0	0
Arlington, SD				
Bare	0	13	5	5
34	0	3	5	4
34A	0	5	5	6
50	0	6	9	10
50A	0	9	6	17
70	0	1	3	10
70A	0	2	2	8
South Shore, SD				
Bare	0	10	16	0
34	0	2	10	0
34A	0	5	9	0
50	0	4	10	1
50A	0	5	14	0
70	2	0	5	1
70A	1	2	3	2

Underlined numbers are the highest number within the column at each location. A= seed coating with water Absorbent.

Table 2. Average number of broadcast seeded cover crop plants emerged after 60 days after seeding into corn at half milkline stage.

South Shore, SD

Coating	Oat	Pea	Lentil	Flax	Rape
Bare	11	3	5	2	11
34	10	4	4	2	6
34A	10	7	5	1	15
50	11	8	4	1	10
50A	9	4	6	2	13
70	7	7	4	1	7
70A	2	1	3	0	6

Arlington, SD

Bare	44	15	0	2	16
34	54	10	4	3	11
34A	63	8	3	1	21
50	67	9	4	3	23
50A	48	20	6	3	40
70	38	6	1	1	33
70A	46	8	5	4	39

Crooks, SD

Bare	42	4	5	1	3
34	34	5	5	1	3
34A	26	2	4	0	2
50	28	2	2	0	2
50A	13	6	5	1	2
70	13	4	2	0	0
70A	14	2	2	0	2

Garretson, SD

Bare	27	4	9	3	35
34	47	4	8	1	15
34A	31	3	15	5	29
50	41	2	12	5	24
50A	25	6	6	2	39
70	21	4	4	1	25
70A	23	1	5	1	29

Underlined numbers are the highest number within the column at each location. A= seed coating with water Absorbent.

Table 3. Average number of broadcast seeded cover crop plants emerged after 60 days after seeding into soybean at leaf drop stage.

Bruce, SD

Coating	Oat	Pea	Lentil	Flax	Rape

Bare	29	4	8	2	5
34	56	3	6	3	6
34A	54	5	3	2	8
50	46	3	4	0	5
50A	31	4	6	1	10
70	25	2	1	0	2
70A	19	2	1	0	5

Arlington, SD					
Bare	19	4	9	0	1
34	19	4	9	0	2
34A	29	4	9	0	3
50	25	2	5	0	1
50A	13	3	11	0	6
70	12	2	8	0	2
70A	6	2	5	0	1

Crooks, SD					
Bare	33	12	9	1	1
34	30	18	12	1	2
34A	20	12	7	1	1
50	24	11	10	1	2
50A	12	16	11	3	1
70	10	11	7	2	4
70A	10	6	8	1	2

Underlined numbers are the highest number within the column at each location. A= seed coating with water Absorbent.