

Agricultural Demonstration of Practices and Technologies (ADOPT)

FINAL REPORT

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EVALUATION OF INTERCROPPED RR CORN AND SOYBEAN FOR GRAIN AND FORAGE

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Evaluation of intercropped RR corn and soybean for grain and forage

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Introduction

The purpose of this demonstration is to evaluate the possibility and practicality of intercropping corn and soybeans for grazing. Corn grazing is generally an economical option for cattle producers in Saskatchewan, especially in higher heat areas like Redvers. However, the production costs can be quite high relative to other forage crops and this can be a barrier to some producers. By planting corn with soybeans, it may be possible to reduce some of the fertilizer requirement while increasing the nutritional value and protein content. Cattle producers usually have to supplement with alfalfa bales and straw bales to make sure that cattle stay healthy. Nitrate poisoning and acidosis is a risk. Growing corn with another glyphosate resistant crop makes sense from the standpoint of weed control. It increases the biodiversity of the cropping rotation, and this could be a consideration for cattle producers who tend to have limited cropland available in convenient locations for grazing corn production.

Materials and Methods

Table 1. Treatment list with seed used and glyphosate application

<u>Treatments</u>	<u>Corn</u>	<u>Soy</u>	<u>2nd Glyphosate Application</u>
1	X	X	X
2	X	X	
3	X		X
4	X		

2016

The trial site was located 1 km from the SERF farm on Donald Busey's land on a busy rural intersection. He has a small mixed cattle and grain operation and has not grown corn previously.

The trial was seeded on May 29. A fertilizer rate of 50 lb/ac N, 20 lb/ac P, and 5 lb/ac was applied in bands using the Seedmaster prior to seeding in the plot area. The trial was seeded using the Seedmaster. Treatments 1 and 2 included 33 lb/ac or about 100,000 seeds per acre. Corn was seeded for each treatment at 16 lb/ac or 28,000 seeds per acre. The corn and soybean were seeded on single alternate rows by modifying the Seedmaster. Spacing between each corn row was 20 inches. The soybean variety was TH33003, a glyphosate resistant variety and was treated with liquid inoculant. Glyphosate resistant corn was seeded.

Liquid fertilizer UAN (50 lb/ac actual N) was applied to treatments 3 and 4 using dribble banders on June 14 shortly after emergence of the corn. No additional N was applied to the corn-soy intercrop. The trial was sprayed with glyphosate on June 22. Treatments 1 and 3 received an additional glyphosate application on July 14. There was little weed pressure after the first glyphosate application and no noticeable difference in weed control between the two treatments.

Two meter rows per plot were counted for plant population on July 27. Corn heights were measured at biomass harvest. Biomass was collected on October 14 following a killing frost in early October. Two rows of corn from the middle of the plot were harvested for a total of 1.55 m² per plot. Weight of corn and soybean was measured separately. Weights were determined using a digital hanging weight scale. Subsamples of whole plants were mulched and dried for moisture determination for the corn and the soybean. Biomass is adjusted to dry matter basis. The soybeans were mature before the frost. Corn was around 50% milk line and about 60% moisture. Samples of corn and soybean will be sent this spring for forage analysis and results will be included in the final report.

2017

The trial site was again located on Donald Buisse's land south of the research farm on canola stubble. It was seeded on May 30 by putting the corn down the seed shanks with granular inoculant and Dario soybean down the fertilizer shanks on the Seedmaster. Fertilizer at 175 lb/ac of a 28.5-15-4-2 blend for 50 lb/ac N, 26 lb/ac P, 7 lb/ac K, 3.5 lb/ac was applied to all plots. The corn seeding rate was 16 lb/ac and the soybean seeding rate was 140,000 plants/ac. Plot size was 50 ft by 20 ft. Glyphosate was applied to all plots on June 26.

Treatments 3 and 4 (corn monocrops) received an additional 50 lb/ac N as urea broadcast by hand on July 7. Treatments 1 and 3 were sprayed twice with glyphosate. The second glyphosate application was on July 7.

Biomass was collected on October ____ by cutting 10 feet by 2 feet along one row. Height was measured at the same time on five plants per plot. The cobs had reached about 65% moisture level. Biomass samples were taken from each treatment for moisture determination and biomass is reported as MT/ac.

Results

2016

The demonstration grew well and was productive for all treatments. This trial site and another corn trial were grazed during a blizzard and cold snap in December with hay supplementation.

Emergence rates of the soybean was about 70,000 plants per acre, which was 70% of the target seeded rate. Due to higher than expected competition from the corn and fairly high seed or seedling mortality, there was not a large contribution of soybean to total yield. By contrast, the average plant population for all treatments for corn was 42,000 plants per acre, which was considerably higher than the target rate of 28,000 plants. There was likely a miscalculation in seeding rate for the corn. The plant populations take into account the fact that the crops were seeded on alternate rows. If the seeding rates of the corn and soybeans had been closer to the original target, there may have been a different results.

Biomass was similar between treatments and quite variable. Data was analysed using Statistix with an RCBD analysis.

2017

Corn growth was good but there was obvious nitrogen deficiency symptoms, particularly in the intercropped corn that only had 50 lb/ac of N. There was no apparent difference in maturity and the development of cobs was similar between treatments. Soybean grew quite tall. There was very good weed control from the first glyphosate application, so there was minimal weed growth controlled by the second glyphosate application. There were no significant differences due to the second glyphosate application, but there might have been if weed pressure was higher. There was visually better ground cover and light interception with having soybean between the rows. Data was analysed using Statistix with an RCBD analysis. Most parameters were not statistically significantly different for treatment.

Table 2. Dry biomass yield for 2016 and 2017 for corn and soybean.

Trt #	2016			2017		
	Corn Biomass	Soy Biomass	Total Biomass	Corn Biomass	Soy Biomass	Total Biomass
1	6.1	0.40	6.4	2.9	0.77	3.7
2	5.1	0.46	5.6	3.1	0.75	3.8
3	7.2	N/a	7.2	5.1	N/a	5.1
4	7.0	N/a	7.0	5.0	N/a	5.0
p	0.16		0.377	0.045		0.23
LSD	ns			1.9		NS

Table 3. Corn and soybean height

Trt #	2016	2017	
	Corn Height	Corn Height	Soy Height
1	247.02	210.1	43.995
2	233.68	194.35	40.905
3	251.46	219.25	N/a
4	249.24	264.8	N/a
p	0.16	0.20	-
LSD	NS	NS	-

Discussion and Extension

In general the trial worked out well in 2016. If the seeding rates of the corn and soybeans had been closer to the original target, there may have been a larger impact of the soybeans. We will try to get closer to the target in 2017.

Biomass yields were similar in 2016 for intercrop and monocrop corn, even though the intercrop had 50 lb/ac less nitrogen added. The corn biomass yield for 2017 was significantly lower in the intercrop than in the monocrop and this was likely due partially to the difference in N application rate. For future trials, trying both monocrop and intercrop under three or four nitrogen rates and perhaps varying phosphate rate would provide a better comparison of productivity potential. In a fill-in area beside this demonstration, there were some areas that were intercropped but had high nitrogen rates. These areas looked visually more productive than the intercropped trial that only had 50 lb/ac of N. It did not appear in those areas that the presence of soybean between the corn rows was negatively affecting corn

growth. The soybean was shorter than the corn all season and did capture light between the rows. If there had been more herbicide resistant weeds, soybean may have helped to reduce their growth.

The site was visited on Oct 6, 2016 by reporter Kelly Running from the Carlyle Observer and two cattle producers. Even though it was a wet, cold period, there were not many producers who wanted to come out during harvest to see the final results of the trial in the field. A photograph of this trial with Lana Shaw was featured on the front page of the newspaper shortly after, along with a discussion of the innovative intercropping and cover crop projects that SERF is currently conducting. It was also visited as part of the SERF Annual Field Tour on July 20, 2016 and July 19, 2018. There were about 70 participants each year.

<http://www.carlyleobserver.com/community/agriculture/south-east-research-farm-committed-to-producers-1.2364598>