

Other Crops and Cocktail Cover Crop Demonstrations

Summary

During 2018 special crops (quinoa, soybeans and cocktail cover crops) were planted in Oyen at the Donna Scory Estate site (NW 35 27 04 W4) and the Olsen site (SW 29-28-06-W4) to evaluate their performances in east-central Alberta. Research activities to evaluate soil amendments were also planted for wheat and barley (Activate and Crop Aid). Soil analysis and precipitation data are reported in previous reports.

Quinoa Variety Evaluation:

Twenty five varieties of quinoa were evaluated. Quinoa pest issues might be a serious problem for this crop, including mildew at the mid stage and stem borer at a later stage of the crop development. Picture 1 show lower leaves with mildew chlorotic symptoms and picture 2 shows stem damage caused by the borer. To control insect issues in quinoa, there is not a good selection of registered products in the province. Quinoa varieties yielded an average of 635 lb/A with a ranged quinoa yield from 200 to 1100 lb/A. Saskatchewan farmers have reported quinoa yields anywhere from 300 to 2000 lb/A in 2014. Picture 3 shows different varieties at the grain filling stage



Picture 1 Quinoa Mildew



Picture 2 Quinoa stem borer



Picture 3 Quinoa Variety grain filling stage.

Soybean Variety Demo:

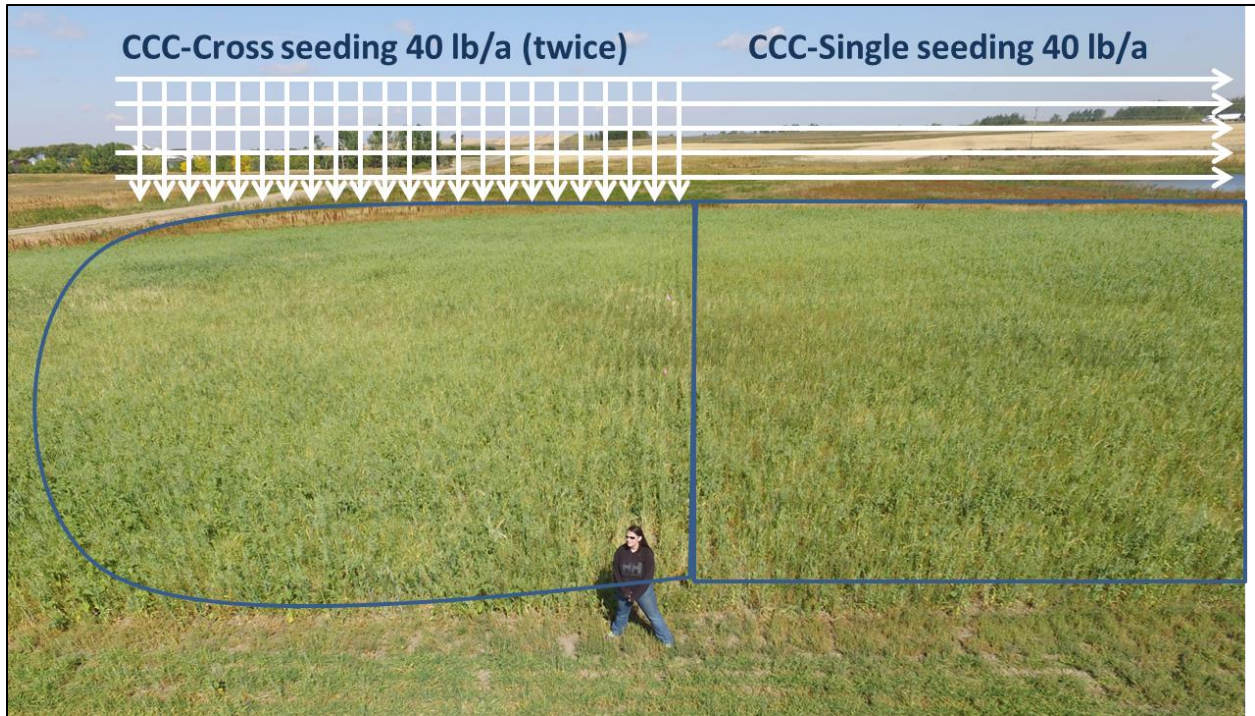
Eight varieties of soybeans were planted at the Olsen site as a demo to evaluate their performance. Soybean plants showed to have a good growth and started to flower but they needed more light hours to complete their full growth for seed production. Picture 4 shows the growth development of the soybean varieties after 2 months of been seeded.



Picture 4. **Soybean Demo at Olsen site**

Cover Crop Cocktail Demo Evaluation:

A cover crop cocktail (CCC) mixture consisted of 9 species (oats, triticale, fababeans, lentils, field peas, tillage radish, millet, tillage radish and sunflower) were planted June 25 with 60 lb/A of 11-52-0 placed between the paired seed rows. The seeding depth was 1 inch. Two systems of seeding were evaluated in this demo: 1) single pass of 40 lb/A and 2) cross seeding of 40 lb/A each (Picture 5). On August 30 an evaluation on weed incidence, compaction and infiltration measurements were done. Cocktails were terminated (mowed) October 10th.



Sampling Collection:

One meter square metal quadrant was selected and evaluations were done randomly in each seeding system. Four quadrants with three (3) readings for compaction and one (1) reading for 1" of water for infiltration assessment were done (Picture 6). Soil samples were also collected in each of the 4 quadrants for future evaluation. Biomass was also harvested. An assessment on weed pressure was measured using the 1 meter quadrant in 15 locations within each system.



Picture 6. Quadrant measurements

Weed Assessment:

The evaluation of the weed incidence was done randomly in each location. A square meter metal quadrant was used. Weeds were counted in each quadrant and separated by species for each seeding system. Kochia (*Bassia scoparia* (L)), Canada thistle (*Cirsium arvense*), buckwheat (*Fagopyrum esculentum*), scarlet pimpernel (*Anagallis arvensis*), pigweed (*Amarantus sp*) and yellow clover (*Melilotus officinalis*) were the main species of plants which were found and they were not part of the intended cocktail mix. For this reason, these plants are considered to be weeds. Picture 7 and 8 show the two sites seeded (single and cross). Pictures were taken at the same time at ~2 ½ months after planting. Notice the weed pressure on the single seeded area when compared with the cross seeded.



Picture 7. Single seeding area



Picture 8. Cross seeding area

Table 1 shows the total weed distribution for seeding system by name and location.

Table 1. Weeds distribution by location and seeding system

Cross Seeding				Single Seeding							
Loc	Kochia	CT	Total	Loc	Kochia	CT	BW	PW	YC	SP	Total
1	9		9	1	68						68
2			0	2	30	16					46
3			0	3	39	6					45
4			0	4	50	2					52
5	5		5	5	63						63
6	3		3	6	7	12	3			1	23
7		2	2	7	10	10					10
8	1		1	8	73	1					74
9			0	9	14						14
10			0	10	59		1				60
11			0	11	5	11					16
12		1	1	12	6	3	3	3			15
13			0	13	62	3	3				68
14			0	14	6			3	2		11
15	2		2	15	113	2	4				119
Total	20	3	23	Total	605	66	14	6	2	1	684

CT= Canadian thistle, BW= Buck wheat, PW= Pig weed, YC= yellow clover, SP= scarlet pimpernel, Loc= Location

Weeds were counted and identified in each of the fifteen locations which were randomly selected. The Single Seeding area presented a very large number of weeds and weed species (684 plants, and 6 species). All the locations sampled had Kochia (605 plants) with an average of 40 kochia plant/m². Canada thistle was found in 10 locations with an average of 7 plants/m². Pigweed and Buckwheat had both 3 plant/m² in 5 and 3 locations, respectively. Yellow clover and scarlet pimpernel were found only in one location with 2 and 1 plant/m², respectively.

On the contrary the Cross Seeding area only had 23 weed plants in total for the 15 locations. Eight of the randomly assessed locations were weed free. Kochia and Canadian thistle were the only weeds present in this area and they did not appear in the same location. Kochia was presented in 5 locations with an average of 4 kochia plants/m². Canadian thistle was only found in two locations with an average of 2 Canadian thistle plants/m².

Table 2 shows the average for compactions, water infiltration and dry biomass data for the two seeding demos. Average depth for compaction measurements, 200 and 300 PSI, indicated that the single seeding area had a compaction layer at 4.07 inches and the cross seeding area at 2.93 inches. However, the timing for the water infiltration of 1 inch of water was faster in the cross seeding demo, 2.48 minutes compared with 4.33 minutes of the single seeding demo. Biomass dry matter was similar for both areas.

Table 2 **Compaction, Water Infiltration and Biomass Summary**

	Penetrometer		Infiltration	Biomass
	Depth (inches)			
	200 psi	300 psi	(Min)	Dry gr/m ²
Evaluation		Single Seeding		
Average	3.33	4.07	4.33	0.58
Standard Deviation	0.80	0.87	2.85	0.08
Range	2.5-4.5	3-5.75	1.3-6.51	0.49-0.67
Evaluation		Cross Seeding		
Average	2.48	2.93	2.48	0.64
Standard deviation	0.74	0.73	2.51	0.06
Range	1-3.25	1.8-4.25	1.1-6.14	0.56-0.69

General comments:

The information generated with this evaluation shows that there was a positive response on weed suppression when the CCC was cross seeded. This area will have more surface area covered with plants than the single seeding. Plants might have been competing with weeds growth. The faster water infiltration in this area could be attributed to a more diverse architecture of the plant rooting systems at the soil surface which might allow more water to infiltrate. Root diversity will feed more microbes in the soil improving soil aggregation. More studies need to be done to continue monitoring and to corroborate these findings along with soil health assessments.