

Energy Consumption and Agronomic Benefits of Conventional and Zero Tillage Seeding Systems, Part 2

Partners: Richard Michaud
Francois Hebert
Lee Pederson
Energy Conservation and Energy Efficiency (ECEE)
County of St. Paul

Objectives

1. To determine the fuel usage and yield differences in four different seeding systems, seeding into sod.

Background

This is the second year LARA has worked in cooperation with local farmers to compare the fuel usage in different seeding systems when seeding into hay or pasture land. There used to be a need to 'break' the land through tillage when planting annual crops into perennial forage stands. Conventional tillage is still an effective method of land preparation but with the advent of reduced tillage seeders it is no longer the only option.

Methods:

On May 16, 2011 Richard Michaud sprayed his hay field south of Mallaig with 2 L/ac of RoundUp Transorb. He decided to spray the whole field, including the tillage treatment, because of the amount of quackgrass in the field.

Richard tilled an area of 13 acres twice with a Krause 5812WR Breaking Disc (Table 1). The area was then heavy harrowed by a neighbor who did not have his fuel measured. After calling the neighbour, a good estimate was made the fuel usage.

The field was seeded on May 27 and 28 using Morgan oats with a seeding rate of 3 bu/ac. Fertilizer was banded at 155 lbs/ac (33-10-8). There was no soil test done on the field.

Richard seeded the tilled land (13ac) and part of the untilled land (31 ac) with his Hay Buster 8000. Francois Hebert seeded 23 ac with a 2011 John Deere ConservaPak. A John Deere disc air drill was also brought to the field but because of the dry soil condition it was unable to sink deep enough into the soil for seeding. At the time of seeding there had been no rainfall. Fuel use was recorded (Table 2).

Plant stand counts were taken at the end of June (Table 3). The field was combined on Sept 27 and 28. Fuel usage was not recorded for spraying, rolling and harvest because the fuel usage would have been the same over the whole field. Richard left a strip the length of the field in each treatment for yield analysis. Four samples were taken from each strip with LARA's small plot combine from which yields were determined and then averaged (Table 4). Bushel weights and 1000 kernel weights were also taken.

Table 21. Seeding Systems

Treatment	Tillage	Tillage System	Row Spacing	Date Seeded	Total Acres
1	Direct	ConservaPak	12"	May 28	23

2	Conventional	Conventional	10"	May 27-28	13
3	Direct	Haybuster 8000	10"	May 27-28	31

Table 22. Fuel Usage

	Treatment 1 (ConservaPak) Fuel (L/acre)	Treatment 2 (Tillage) Fuel (L/acre)	Treatment 3 (Haybuster) Fuel (L/acre)
Spraying	N/A	N/A	N/A
Discing	-	23.08	-
Heavy Harrow	-	1.70	-
Seeding	3.78	2.73	2.73
Rolling	N/A	N/A	N/A
Harvest	N/A	N/A	N/A
Total	3.78	27.51	2.73

Table 3. Plant Stand Counts

Counts (plants/m ²)	Conserva Pak	Haybuster	Conventional Tillage
1	293	192	224
2	373	243	234
3	293	256	259
4	331	269	211
Average	323	240	232

Table 4. Harvest Data

Seeding System	Yield (bu/ac)	Significance	lbs/bu	1000 k (g)
ConservaPak 2010	105	a	35	35
Conventional	96	a	36	35
Haybuster	90	a	37	35

Observations:

When I walked the fields on June 8 I noticed some germination of the oats but it had been slow to come because of the lack of moisture and cool weather. Visually I thought the ConservaPak did a better job of seed placement than the Haybuster, there were areas of seed on the surface in the Haybuster treatment.

Plant stand counts were higher in the ConservaPak treatment than the other two. There was very little difference between the Haybuster and Conventional tillage treatments.

The main story in this trial is the amount of fuel that is needed to break land that has been in hay or pasture. The fuel usage was 10 times higher with conventional tillage! The conventional tillage treatment was also a lot rougher than the rest of the field and may require more prep next year to get it ready.

This is similar to the trial LARA was a part of last year near Goodridge, Alberta. The fuel usage at the Goodridge site was about 5 times higher in the conventional tillage treatment than the direct seeded

treatments. The Goodridge site was sprayed in the fall and this year's site at Mallaig was sprayed in the spring. The higher fuel on the conventional treatment this year was probably due to the extra effort needed to break land that was sprayed out in spring. The two trials point towards a potential for large fuel savings if you spray out your hay in fall as opposed to spring. You also can get a better kill on perennials with a fall spray because they are translocating nutrients to their roots for winter.

The yield data in Table 4 shows no difference in yields between treatments. The drought would have favored the direct seeding treatments but the cold weather probably gave the conventional tillage treatment an advantage. At the end of the year there was no statistical difference between treatments and Richard said he did not notice any yield difference while he was combining.

Funding for this trial was provided by Energy Conservation and Energy Efficiency (ECEE) through Alberta Agriculture.

Thanks to Richard Michaud and Francois Hebert for partnering with us on this trial!



Table 2. Fuel Usage

	Treatment 1 (ConservaPak) Fuel (L/acre)	Treatment 2 (Tillage) Fuel (L/acre)	Treatment 3 (Haybuster) Fuel (L/acre)
Spraying	N/A	N/A	N/A
Discing	-	23.08	-
Heavy Harrow	-	1.70	-
Seeding	3.78	2.73	2.73
Rolling	N/A	N/A	N/A
Harvest	N/A	N/A	N/A
Total	3.78	27.51	2.73