

Energy Consumption and Agronomic Benefits of Conventional and Zero Tillage Seeding Systems

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Objectives:

- To compare different seeding equipment in a sod seeding situation.
- Track fuel usage for four seeding methods.
- Compare the agronomics of a seeded crop between four seeding methods.
- Compare final yields of the different seeding systems.

Methods:

A quarter section near Goodridge, Alberta (NE 5 63-09 W4) was used for this demonstration. The field was sprayed out in the fall of 2009; it had been a hay field (alfalfa/grass mixture) for about 10 years. Soil was tested in the spring to determine field nutrient levels.

The field was divided into 4 treatment areas based on 4 seeding systems. (Table 23)

- Treatment 1- Conventional tillage (23.42 acres)
- Treatment 2 - ConservaPak (15.3acres)
- Treatment 3 - John Deere 750 disc drill (16.6 acres)
- Treatment 4 - Agrowdrill (17.65 acres)

Fuel meters were used to measure fuel consumption during seeding and any subsequent activity in the field (Table 24).

All treatments were seeded to oats (AC Morgan) at 110 lbs/ac using the same seed lot, fertilizer blend and rate. The area of the treatments was measured using GPS. Plant counts were taken after the crop emerged on May 27, 2010 (Table 25). Observations were taken throughout the season on the treatments.

The trials were harvested at the beginning of October with a John Deere pull type combine. The oats were augered into a feed wagon to be weighed and then transferred to a grain bin. Final yield was taken from the total weights and bushel weights of the treatments (Table 26).

Results:

Table 23. Seeding Systems

TRT	Tillage System	Seeder	Row Spacing	Date Seeded	Fertilizer (200 lbs/ac)	Fuel Usage (L/ac) as of Aug 1, 2010
1	Conventional	International Press Drill	6"	15-May-10	100% Broadcast	15.93
2	Direct	ConservaPak	12"	17-May-10	100% Side Banded	3.57
3	Direct	John Deere 750	7.5"	14-May-10	50% With seed & 50% mid-row band	3.05
4	Direct	AgrowDrill	7.5"	14-May-10	57% With seed and 43% Broadcast	3.82*

* Estimated.

Table 24. Fuel Usage

Seeding System	Operation	Fuel Usage (L/ac)
Conventional	Plow	6.52
	Disc	5.72
	Vibrashank	1.88
	Harrow	0.46
	Seed	1.07
	In Crop Spray	0.28
	Total	15.93
	ConservaPak	Seed
Roll		0.40
In Crop Spray		0.28
Total		3.57
John Deere 750	Seed	2.77
	In Crop Spray	0.28
	Total	3.05
AgrowDrill	Seed	2.83*
	Fertilizer	0.31
	Roll	0.40
	In Crop Spray	0.28
	Total	3.82

***This amount is an estimate**

Table 25. Plant Counts (pl/ft²)

Seeding System	Count 1	Count 2	Count 3	Count 4	Average
Agrowdrill	23	13	28	26	23
John Deere	35	36	19	26	29
ConservaPak	17	17	17	17	17
Conventional	27	30	19	35	28

Table 26. Harvest Data

Seeding System	Total lbs	Acres	lbs/bu	bu/acre
Agrowdrill	70460	17.65	38	104
John Deere	77180	16.60	40	117
ConservaPak	76430	15.30	39	129
Conventional	131970	25.42	38	135

Observations:

After seeding there were good visuals as to the amount of disturbance each seeding system produced. The John Deere and Conventional tillage treatments were very smooth while the AgrowDrill and ConservaPak had more disturbance; these two treatments were rolled.

The ConservaPak treatment was seeded later than the other treatments but had “caught up” by the time the plant counts were completed (Table 25). The ConservaPak had the most uniform plant stand although on average it had the least amount of plants per unit area.

The AgrowDrill needed a broadcast application of fertilizer and at the time of the tour (June 29) there appeared to be many spots on the field where the oats were lighter in color. This may have been due to a fertilizer deficiency brought on by the broadcast application. This made the treatment the poorest treatment visually.

The ConservaPak treatment took the longest to canopy. This was especially evident at the time of the plot tour. This was probably due to the wider seed rows.

As expected the fuel consumption is a lot higher in the conventional seeded treatment (Table 24). There were so many more passes that were made and many more hours spent seeding. The fuel consumption of the AgrowDrill was not recorded so an estimate was made. This number is the average of the other two zero till seeding systems.

The final yields showed an advantage for the Conventional and ConservaPaK systems. Visually the cooperators could only see a difference in the Agrowdrill treatment.

There was some concern from the cooperator that the ConservaPak treatment would not provide enough support for a swath since the row spacing was so wide. This did not happen when the crop was harvested as the swath combined just as easily as the other treatments at the same moisture content.

