

# A COMPARISON OF SEEDING EQUIPMENT FOR WHEAT PRODUCTION IN SOUTHWEST SASKATCHEWAN

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A 6-year study was conducted to compare the airseeder, the discer, both followed by a harrow packer, with a hoe drill with preseeding tillage for fallow and stubble seedbeds in the Brown soil zone of southwest Saskatchewan. The discer and the hoe drill are consistently good performers, while the airseeder yields are somewhat lower, but reasonable. The airseeder and the discer offer lower cost seeding than the hoe drill for the minimum till farmer. The airseeder, when the cultivator is used for other tillage operations, offers the lowest equipment investment for a straight grain operation.

## INTRODUCTION

Three of the most common pieces of seeding equipment for cereal grains are the discer, the airseeder and the hoe press drill. The popularity of discers is declining, except in areas of heavy clay soils, while the popularity of the hoe drill and of airseeders is increasing. This is probably due to the dead furrows and ridges left in the field by discers. On the other hand, airseeders are readily transported from field to field, clear heavy trash in stubble seeding, and have the convenience of central hopper filling of seed and fertilizer and provide greater utilization of the cultivator, a common farm machine. This may provide an opportunity to minimize equipment investment somewhat. The main attraction of the hoe press drill is the capability of precise seed placement and adequate packing in the seed zone.

Many producers have enquired as to which machine to purchase. Two of the machines had been tested previously (Anderson 1969, 1975), but no data was available for the airseeder. To help answer this question an experiment was set up at the Swift Current Research Station to compare these machines for seeding wheat in both fallow and stubble seedbeds.

### Experimental Procedure

A randomized plot design of 3 treatments and 4 replicates was used for the experiment. Fertilizer was applied in accordance with soil test recommendations in the form of 11-51-0 and 34-0-0, both of which were broadcast, except for 1986 and 1987 the 11-51-0 was placed with the seed.

Treatments (fallow and stubble):

1. Hoe press drill with preseeding tillage by a heavy duty cultivator.
2. Discer, direct seeded with harrow packer after seeding.
3. Airseeder with sweeps and mounted harrows, direct seeded with harrow packer after seeding.

The fallow plots were seeded on conventional tilled fallow with the exception of 1986 when the plots were on chemical fallow. The plot size was

15 by 30 m for 1982-85 and 9 by 15 m for 1986 and 1987. Herbicides were applied as necessary for weed control. The machines were calibrated to operate at a seed rate of 67 kg/ha using Leader hard red spring wheat. For the years 1982-1984 the plots were located on the Research Station south farm, which has very level topography. For 1986 and 1987 the plots were on City property directly south of the Research Station building site which is slightly rolling and not as uniform. However, plot sites were selected to provide good operating conditions for all three machines. Plant counts were taken after emergence was complete and depth of seeding was determined by measuring the length of the subcoronal internodes.

#### OBSERVATIONS AND RESULTS

A cost analysis of the various treatments is shown in Tables 1 and 2. When 75% of the cultivator fixed cost are attributed to other tillage operations on the farm the costs for treatment one are the lowest. Treatment two is only slightly higher. If a post-seeding operation of just harrowing was practiced in place of harrow packing, the costs would be very similar to treatment one. This is a very common procedure for many producers.

Table 1. Summary of economic assumptions

Implement	Replace- ment Cost	Fixed Cost		Variable Cost	Total Cost	\$/ac
		Implement	Tractor			
	(\$)	----- (\$/ha) -----				
Hoe Press Drill	38120	6.35	3.08	8.43	17.75	7.25
Discer/w packers	22500	3.75	3.08	8.43	15.25	6.20
Airseeder/w harrows	27800*	2.83	3.08	7.85	13.75	5.60
	17000*					
Heavy Duty Cultivator/ w harrows	14400	2.40	3.08	4.52	10.00	4.00
Harrow packer	15300	0.08	1.13	2.39	3.60	1.45

+ Replacement costs are for 9 m equipment, except for the harrow packer which is 18 m.

\* Only 25% of the cultivator cost is attributed to the seeding operation.

Table 2. Treatment costs

Treatment	Total cost	
	\$/ha	\$/ac
1. Airseeder + HP	17.35	7.00
2. Discer + packers + HP	18.85	7.60
3. Hoe press + preseeding till	27.75	11.25

Costs for treatment three are significantly higher and are not warranted by yields (Tables 3 and 4) obtained in this test under our conditions. Performance for the hoe drill may show better on rolling fields with side hills and gullies which result in varying depth of seed placement for many airseeders and discers. The hoe drill has the capability of being used for zero till seeding of winter wheat and other crops, which may make it attractive to many producers.

Table 3. Seeding implement test on fallow

Year	Treatment	Plants/ sq m	Seed depth (cm)	Stnd dev of seed depth	Yield kg/ha	bu/acre
1982	Airseeder				2617.50	38.91a
	Discer				2692.50	40.04a
	Hoe drill				2679.31	39.83a
Seeded June 6						
1983	Airseeder	124.9a	7.3b	1.30c	2674.17	39.77a
	Discer	135.0a	5.0a	1.12b	2600.83	38.67a
	Hoe drill	132.1a	3.9a	.88a	2263.79	33.67a
Seeded May 18						
1984	Airseeder	123.2b	7.5b	1.46a	1435.83	21.35a
	Discer	78.4a	6.5a	1.47a	1399.17	20.84a
	Hoe drill	97.3ab	6.2a	1.11a	1573.22	23.38a
Seeded May 15						
1985	Airseeder	63.6a	4.9a	1.07a	1236.67	18.80a
	Discer	81.4a	4.0a	1.21a	1222.08	18.12a
	Hoe drill	210.8b	4.0a	.93a	1264.28	18.45a
Seeded May 7						
1986	Airseeder	172.0ab	5.6b	1.17a	2456.70	36.50b
	Discer	194.3bc	5.8b	1.07a	3009.10	44.70a
	Hoe drill	199.3c	3.8a	1.23a	2581.10	38.40ab
Seeded April 24						
1987	Airseeder	189.8a	5.3b	1.09a	2682.50	39.90b
	Discer	189.0a	5.9ab	1.08a	2878.30	42.80ab
	Hoe drill	192.3a	6.7a	1.28a	3032.30	45.00a
Seeded April 30						
1982-	Airseeder	134.7a	5.9a	1.22a	2183.96	32.40c
1987	Discer	135.6a	5.4b	1.19a	2300.30	34.20a
	Hoe drill	166.4b	4.9c	1.09b	2232.90	33.10b

45 kg/ha of 11-51-0 was applied on all treatments.

Note: plants/sq m, mean seed depth, standard deviation mean from 1983-1987.

Means with the same letter are not significantly different (5% significance level).

Table 4. Seeding implement test on stubble

Year	Treatment	Plants/ sq m	Seed depth (cm)	Std dev of seed depth	Yield kg/ha	bu/acre
1982	Airseeder				2297.67	34.15a
	Discer				2630.00	39.09a
	Hoe drill				2667.50	39.84a
Seeded June 6 45 kg/ha 11-51-0 and 170 kg/ha 34-0-0 were broadcast						
1983	Airseeder	91.1a	7.2b	1.58b	1892.50	28.14a
	Discer	111.9a	2.4a	.85a	1851.67	27.33a
	Hoe drill	121.2a	5.1b	1.46b	1899.77	28.25a
Seeded May 18 45 kg/ha 11-51-0 and 170 kg/ha 34-0-0 were broadcast						
1984	Airseeder	160.3a	5.7c	1.07a	490.21	7.28a
	Discer	178.1a	3.1a	1.03a	449.17	6.67a
	Hoe drill	162.5a	4.3b	1.20a	612.42	9.10a
Seeded May 15 45 kg/ha 11-51-0 and 145 kg/ha 34-0-0 were broadcast						
1985	Airseeder	73.8a	4.6a	.99a	770.41	11.45a
	Discer	122.2b	3.9a	1.08a	807.08	12.00a
	Hoe drill	217.0c	4.0a	1.02a	938.97	13.97a
Seeded May 7 160 kg/ha 26-13-0 was broadcast						
1986	Airseeder	136.0a	5.0c	1.38b	2496.70	37.10a
	Discer	188.5bc	3.8b	.77a	2341.70	34.80a
	Hoe drill	212.5c	2.6a	.79a	2416.60	36.00a
Seeded April 24 45 kg/ha 11-51-0 with seed and 56 kg/ha 34-0-0 were broadcast						
1987	Airseeder	103.1b	3.9a	1.36a	1182.50	17.57a
	Discer	121.0ab	2.7b	.80a	1135.83	16.89a
	Hoe drill	145.5a	3.0b	.84a	1107.68	16.47a
Seeded April 30 45 kg/ha 11-51-0 with seed and 85 kg/ha 34-0-0 were broadcast						
1982-	Airseeder	112.9b	5.3a	1.28a	1521.67	22.60a
1987	Discer	144.3c	3.1c	.91b	1535.90	22.80a
	Hoe drill	171.7a	3.8b	1.06b	1607.87	23.90b

Note: plant/sq m, mean seed depth, standard deviation mean from 1983-1986.

Means with the same letter are not significantly different (5% significance level).

Plant counts for the hoe drill were consistently highest for both fallow and stubble conditions, whereas both the discer and airseeder occasionally had low plant densities, the airseeder being the lowest. The lower density

figures did not generally result in significantly lower yields.

Seeding depth is the greatest and the deviation of seed depth is also the greatest for the airseeder (Tables 3 and 4) indicating it is the least precise of the three machines. We have also had the greatest problem in setting and adjusting and getting consistent operation from the airseeder. Many producers have also complained of poor stands. Despite this, while the yields for the airseeder are the lowest, the differences are not great.

The discer shows the highest yield for fallow conditions and the hoe drill the highest for stubble conditions, although the differences are significant, they are not large. Anderson (1969, 1975) found essentially the same yield for a variety of seeding equipment, including the discer and hoe drill, in earlier tests at Swift Current.

#### CONCLUSIONS

The discer and the hoe drill are consistently good performers for seeding wheat in the Brown soil zone. Airseeder performance, while lower, is reasonable.

The discer and airseeder offer lower cost seeding than the hoe drill for the conventional or minimum till farmer. The airseeder, when the cultivator is used for other tillage operations, offers the lowest possible equipment inventory for a straight grain operation in the Brown soil zone.

#### REFERENCES

- Anderson, C.H. 1975. Comparison of preseeding tillage with total and minimal tillage by various seeding machines on spring wheat production in southern Saskatchewan. *Can. J. Plant Sci.* 55: 59-67.
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