
Effect of Oat and Barley Cover Crop Seeding Rate on Greenfeed and Forage Yield in Northeast Saskatchewan

Allan Foster¹, S. S. Malhi², Randy Pastl³ and Linden McFarlane²

¹Saskatchewan Ministry of Agriculture, Tisdale, Saskatchewan, Canada;

²Agriculture and Agri-Food Canada, P.O. Box 1240, Melfort, Saskatchewan, Canada S0E 1A0

(sukhdev.malhi@agr.gc.ca)

³Saskatchewan Forage Council, Saskatoon, Saskatchewan, Canada

Introduction

- In northeast Saskatchewan, the majority of forage crops are still seeded with a cover crop.
- Quite often this is done to provide some return in the year of forage establishment. But it is also done to protect fragile soils from wind erosion, and when mixed with chaffy forage seed the cover crop can prevent bridging in the seed box or tank.
- The main concern with cover crops has always been that they compete with the establishing forage plants for light moisture and nutrients. As a result when a cover crop is used, it is often recommended it be seeded at less than ½ the normal seeding rate.
- However, some producers feel that oat and barley greenfeed production would suffer if the seeding rate is reduced. As a result they tend to seed the cover crop heavier than recommended in order to ensure an adequate greenfeed crop for harvesting.

Objective

- The purpose of this project was to determine how various seeding rates of a cover crop of oat and barley affect the yield of the cover crop for greenfeed and forage yield, and establishment of an under seeded meadow bromegrass and alfalfa crop in northeast Saskatchewan.

Materials and Methods

- The experiment was seeded at Nipawin in 2000 and 2001, and Melfort in 2002 and 2003. The cover crops were cut in the year seeded. The under seeded alfalfa bromegrass plots were cut the year following seeding.
- The experiment consisted of a low, medium and high cover crop seeding rate treatment for each of barley and oat cover crop along with a no cover crop treatment. Three seeding rates of Rosser barley (31, 62 and 124 kg ha⁻¹) and CDC Baler oat (19, 38 and 112 kg ha⁻¹), plus the no cover crop treatment were seeded in a randomized completed block design with four replications.
- Seeding occurred in late May of each year. The experiment was seeded on summerfallow at Nipawin and wheat stubble at Melfort. The Nipawin site was

unfertilized, the plots at Melfort received 56 kg N kg ha⁻¹ as 34.5-0-0, broadcast four days after seeding.

- The entire experiment was under seeded, perpendicular to the cover crop seeding, with a mixture of 9 kg ha⁻¹ meadow brome grass and 1.1 kg ha⁻¹ alfalfa. All cover crop plots were 1.2 m wide x 6.0 m long. Row spacing for the cover crop and under seeded forage mixture was 30 cm at Nipawin and 15 cm at Melfort.
- The cover crops were harvested with a plot harvester to a height of 5 cm in either late July or early August. At harvest the barley was in the soft dough stage and the oat in the late milk stage.
- The alfalfa-brome grass plots were harvested the year after seeding.
- At Nipawin, these plots were harvested in late July or early August of 2001 and 2002 for the 2000 and 2001 seeding.
- At Melfort the alfalfa-brome grass plots were harvested in early July of 2003 for the 2002 seeding. The experiment was terminated after the July 2003 harvest.

Summary

- Yield results for the under seeded forage crop and the cover crops are provided in Figures 1 and 2. The 2001 cover crop data only included 3 replications, which had high variability due to dry conditions and location of the plot at the Nipawin site.
- The no cover crop treatment yielded significantly less total dry matter in the year of seeding than the cover crop treatments. The very low yield of the no cover crop treatment in 2003 was probably a result of a heavy grasshopper infestation.
- There was no significant difference in oat greenfeed yield when seeded at 19 or 38 kg ha⁻¹ in any of the 4 years of this project. Oat seeded at 112 kg ha⁻¹ produced higher yield than oat seeded at 19 or 38 kg ha⁻¹ in all 4 years.
- There was no significant difference in barley greenfeed yield at any of the three seeding rates in 2000, 2001, and 2002. In 2003, barley seeded at 62 or 124 kg ha⁻¹ yielded more greenfeed than barley seeded at 31 kg ha⁻¹. Barley yields were not significantly different between the 62 kg ha⁻¹ and the 124 kg ha⁻¹ seeding rates in 2003.
- The cover crop seeding rate had no effect on the yield of the forage crop the year after seeding for 2000 and 2001 (Figure 2). The use of a cover crop did reduce brome grass-alfalfa yield for the 2002 seeding, however the type of cover crop or the seeding rate did not appear to affect yields in any of the three years of this project.
- The quality of the no cover crop treatment was consistently better than the cover crop treatments. There was no consistent trend in the quality of the cover crop treatments, indicating seeding rate or crop had little effect on quality (Table 1).

Conclusion

- In the four years, oat appeared to be more sensitive to seeding rate than barley. For the three seeding rates used in this study, barley greenfeed yield varied from 8

to 19% between the low and high seeding rate and in only one year was this variation significant. For oat, greenfeed yield varied from 19 to 39% between the low and high seeding rate. In all four years, the high seeding rate yielded significantly more greenfeed than the low and medium seeding rate.

- Seeding 31 kg ha⁻¹ of barley for greenfeed was adequate to maximize greenfeed yield in three of four years. Oat, on the other hand, produced the best greenfeed yields in all four years when seeded at 112 kg ha⁻¹. There was no significant difference between oat seeded at the medium and low rate.
- Seeding rate of the cover crop did not significantly affect the second year (first production year) forage yield of the meadow brome alfalfa mixture in two of three years.
- In this project, meadow brome and alfalfa were cut in late July or early August of 2001 and 2002 when the greenfeed was cut. In both these years, there was no significant effect of the cover crop on the forage crop yield. In 2003, the meadow brome alfalfa mixture was cut in early July. In that year there was a reduction in forage yield as a result of the preceding cover crop.
- The reduction in yield experienced in 2003 by the forage crop probably reflects the competition experienced by the under seeded forage. However, it may also reflect the difference in harvest date. The early harvest in 2003 may have resulted in the under seeded forage not having sufficient time to compensate for the cover crop competition experienced the previous year.

Acknowledgements

- We thank Darwin Leach for preparing and Erin Cadieu for printing the poster.

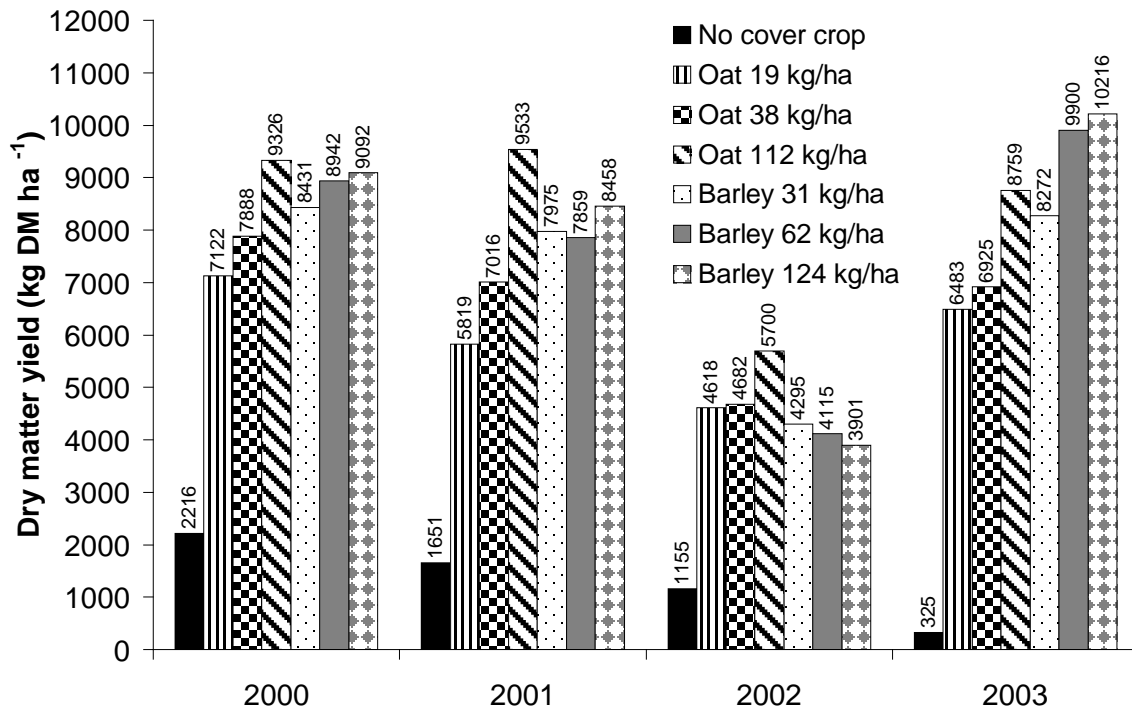


Figure 1. Dry matter yield (kg ha^{-1}) of oat and barley cover crop cut as greenfeed in each of four years in northeast Saskatchewan.

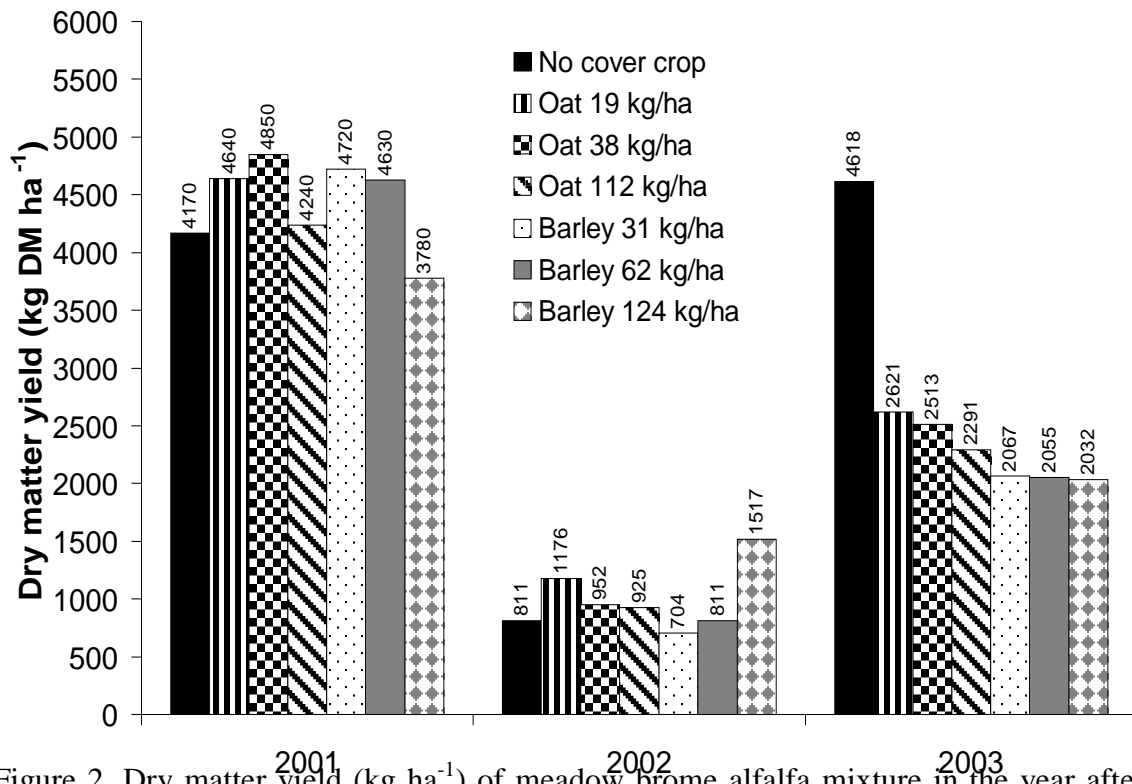


Figure 2. Dry matter yield (kg ha^{-1}) of meadow brome alfalfa mixture in the year after seeding for each of three seeding years in northeast Saskatchewan.

Table 1. Percent crude protein (%CP) and acid detergent fibre (%ADF) levels in greenfeed and alfalfa/bromegrass in the year of seeding for each of four years in northeast Saskatchewan

Treatment	%							
	2000		2001		2002		2003	
	CP	ADF	CP	ADF	CP	ADF	CP	ADF
No cover crop	21	36	19	28	24	30	16.5	27.3
Oat 19 kg ha ⁻¹	11	39	12	32	14	36	9.2	26.1
Oat 38 kg ha ⁻¹	11	38	13	32	14	37	9.7	26.7
Oat 112 kg ha ⁻¹	12	38	12	34	14	41	8.8	26.5
Barley 31 kg ha ⁻¹	12	34	12	28	16	33	7.6	32.5
Barley 62 kg ha ⁻¹	11	34	11	34	14	34	7.0	33.4
Barley 124 kg ha ⁻¹	10	35	11	30	15	31	6.2	34.6