

Influence of Seeding Date on Forage Dry Matter Yield and Quality of Four Annual Crops Cut for Greenfeed in Northeastern Saskatchewan

A. Foster¹, S. S. Malhi², L. McFarlane² and D. Leach²

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

²Agriculture and Agri-Food Canada, Research Farm,
Melfort, Saskatchewan, Canada; E-mail: sukhdev.malhi@agr.gc.ca

Introduction

- There are a number of crop options to consider when seeding a crop for green feed, silage or swath grazing in northeast Saskatchewan.
- The most reliable have been oat and barley. Interest in triticale for silage has grown over the past few years.
- Recent research has indicated that some millets may be well adapted to use as swath grazing crops.
- Millets are warm season crops that need warmer temperatures to mature than cool season crops like oat and barley.
- Past experience with millets and other warm season crops have shown when they are seeded in the spring and harvested in early August when cool season crops are in the soft dough stage, the warm season crops tend to produce less dry matter.

Objective

To determine the effects of seeding date on forage dry matter yield (DMY) and quality [protein and acid detergent fiber (ADF) content] of four annual crops (barley, oat, triticale and millet) with various maturities as well as different growing season temperature and moisture requirements.

Materials and Methods

- Field experiments were conducted at the Agriculture and Agri-food Canada Melfort Research Farm near Melfort, Saskatchewan (52°44'N 104°47'W) on a thick Black Chernozem (Udic Boroll) silty clay soil.
- The monthly rainfall and average temperature for 2002 and 2003 growing seasons and long term averages are presented in Table 1.
- One variety of oat (cv. Foothill), barley (cv. Ranger), triticale (cv. AC Ultima) and foxtail millet (cv. Golden German) were each sown on May 24, June 22 and July 3 in 2002, and May 15, June 15 and July 3 in 2003 at 17.5 cm row spacing.
- Plots (2 m x 10 m) were arranged in a randomized complete block design with four replications seeded on wheat stubble.
- All plots received blanket applications of fertilizers to supply 162 kg N ha⁻¹ broadcast-incorporated in soil prior to seeding.
- Seeding rate was 114 kg ha⁻¹ for oat, 108 kg ha⁻¹ for barley, 125 kg ha⁻¹ for triticale and 22 kg ha⁻¹ for millet.

- Crops were cut at soft dough stage for cereals and the early heading stage for Golden German foxtail millet.
- Dry matter yield (DMY) was determined by clipping the centre 1.5 metres of each plot at the appropriate harvest date to 5 cm using a sickle type forage harvester.
- Samples were weighed and sub-samples of each plot were oven dried in a forced air oven at 50° C and analysed for protein content (PC), and acid detergent fibre (ADF).

Summary

- Seeding date had a significant effect on forage DMY of all four crops in each 2002 and 2003.
- In 2002, the highest forage DMY for barley, oat, triticale Golden German millet was achieved on July 3, June 22, July 3 and May 24 seeding dates, respectively.
- In 2003, the highest forage dry matter yields were from the May 15 seeding date for all four crops.
- In 2002, there was no clear trend in protein content to seeding date, but in 2003 protein content of each crop tended to increase with the later seeding date, as DMY declined.
- In 2002 there was no clear trend in ADF to seeding date, but in 2003 ADF of each crop tended to decline as DMY declined.
- The seeding date for maximum DMY of cool season crops was greatly influenced by the growing season conditions, whereas the seeding date of the one warm season crop was not.

Conclusions

- The findings suggest that date of seeding of annual forage crops would affect dry matter yield. As long as there is precipitation later in the growing season, as there was in 2002, seeding late can result in good forage yields.
- However when precipitation comes early in the growing season and conditions turn dry later on, as was the case in 2003, late seeding can drastically reduce forage yields of cool season crops like oat, barley and triticale.
- Golden German millet was the only crop that had the highest yield in both years with the earlier seeding date. This is because Golden German millet is a warm season crop needing a long growing season, and if seeded early it is able to take advantage of moisture received throughout the growing season because of its late maturity.
- Long term precipitation data from Melfort, in northeast Saskatchewan, would indicate that precipitation is distributed relatively evenly from May to September.
- As a result late May seeding of annual crops for forage, including late maturing millets would generally result in the highest forage yield.
- The concern with this early seeding date is Golden German millet does not compete well with weeds in the early part of the growing season. Seeding into a clean seedbed is important if seeding early.

Acknowledgements

We thank L. McFarlane and D. Leach for technical help.

Table 1. Temperature and precipitation for the 2002 and 2003 growing seasons and the long-term average for Melfort, Saskatchewan

Month	Average daily temperature (°C)			Total monthly precipitation (mm)		
	2002	2003	Long-term average*	2002	2003	Long-term average*
April	-2.5	3.4	2.2	17.3	28.7	20.7
May	6.8	12.1	10.6	5.0	45.0	41.4
June	17.1	15.9	15.5	56.2	64.0	61.9
July	19.8	18.1	17.6	57.8	35.8	66.7
August	16.0	19.9	16.3	130.6	24.4	53.1
September	11.0	11.1	10.4	24.6	23.2	41.4
October	-2.2	5.9	4.0	25.4	0	26.6

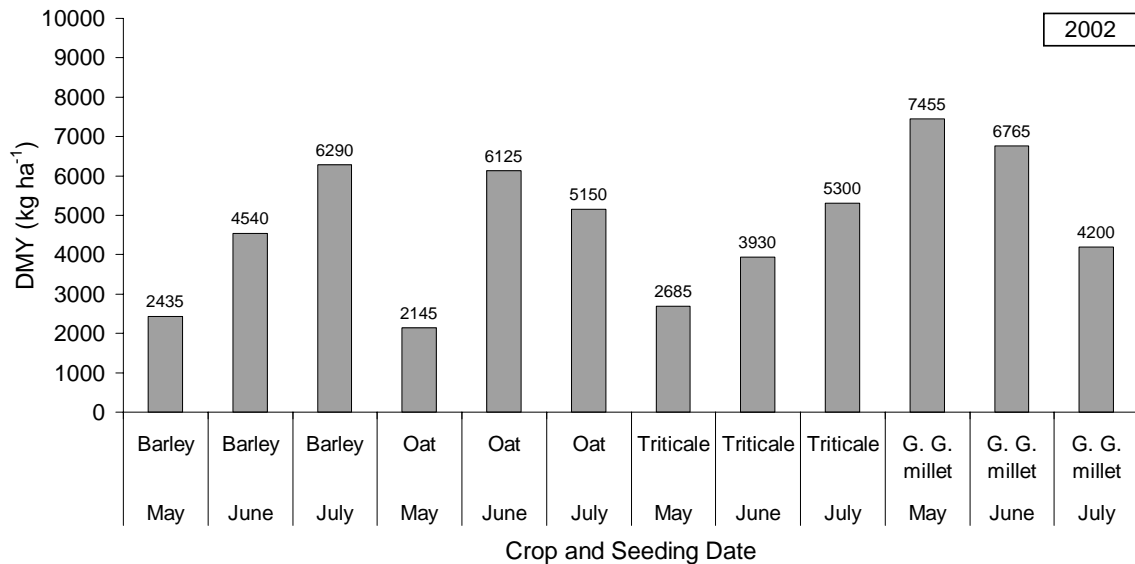


Figure 1. Forage dry matter yield (DMY) of barley, oat, triticale and Golden German millet (G. G. millet) at three seeding dates in 2002 at Melfort, Saskatchewan.

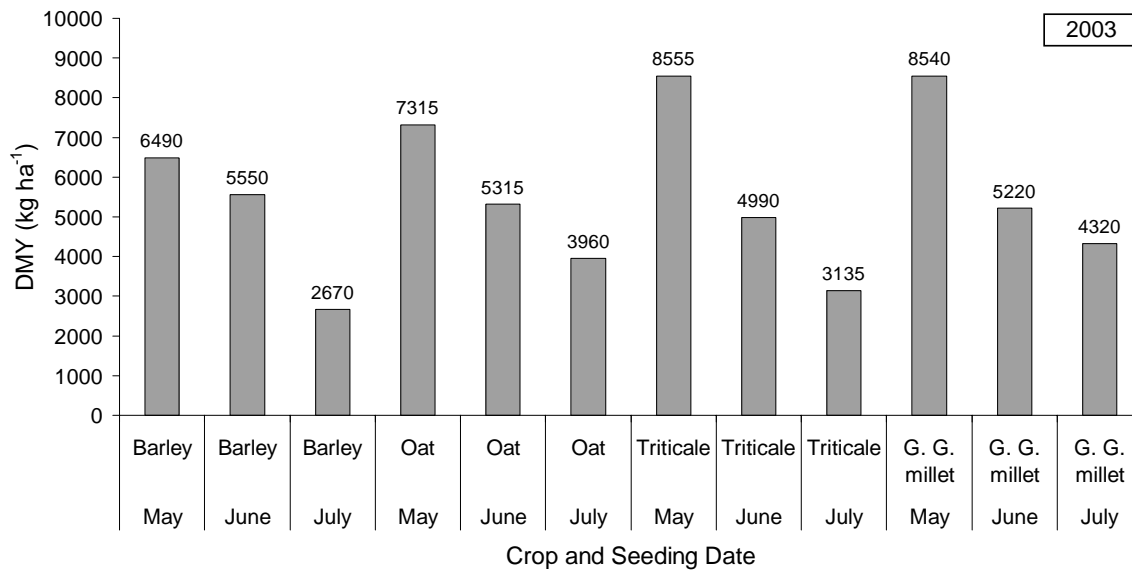


Figure 2. Forage dry matter yield (DMY) of barley, oat, triticale and Golden German millet (G. G. millet) at three seeding dates in 2003 at Melfort, Saskatchewan.

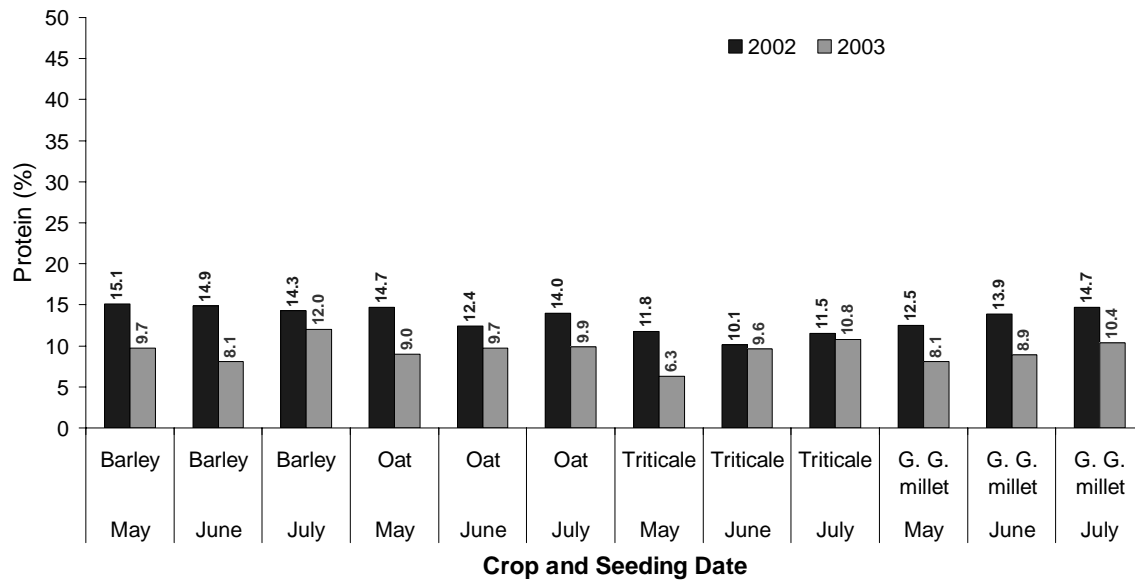


Figure 3. Protein (%) in barley, oat, triticale and Golden German millet (G. G. millet) at three seeding dates in 2002 and 2003 at Melfort, Saskatchewan.

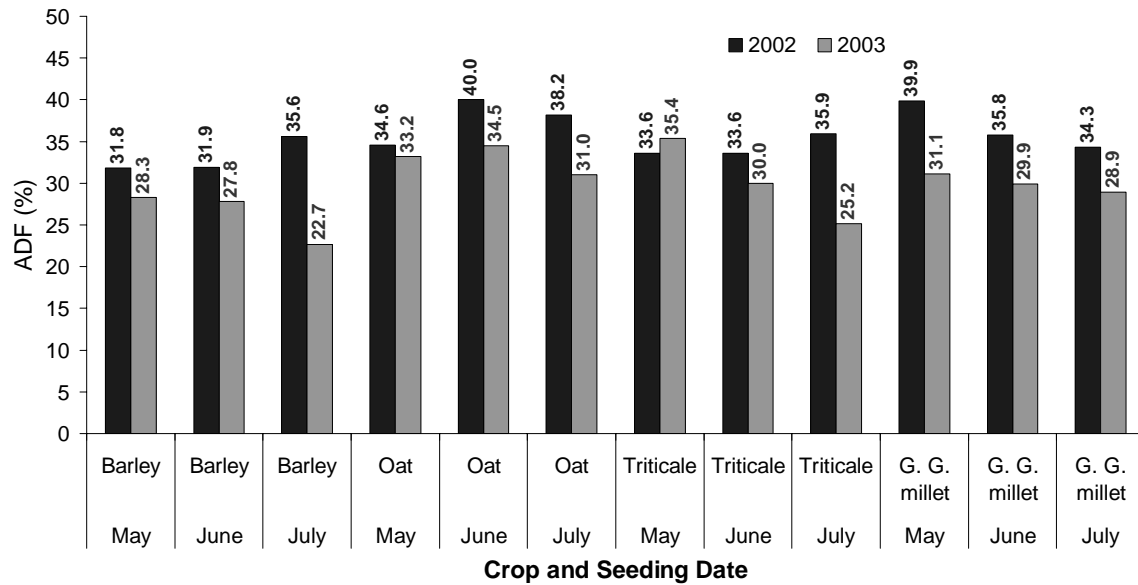


Figure 4. ADF (%) in barley, oat, triticale and Golden German millet (G. G. millet) at three seeding dates in 2002 and 2003 at Melfort, Saskatchewan.

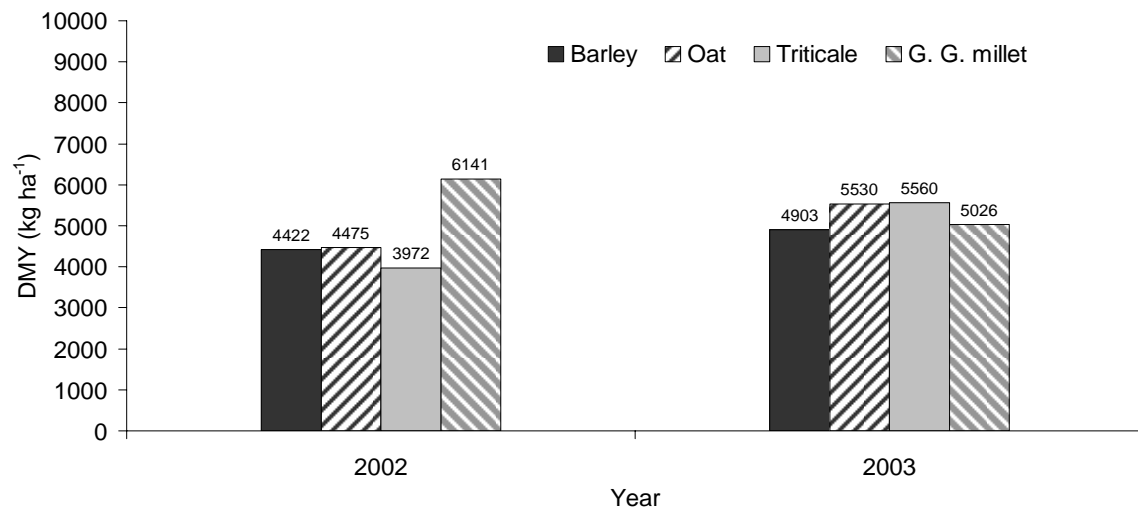


Figure 5. Mean forage dry matter yield (DMY) of barley, oat, triticale and Golden German millet (G. G. millet) (averaged across 3 seeding dates in May, June and July) in 2002 and 2003 at Melfort, Saskatchewan.

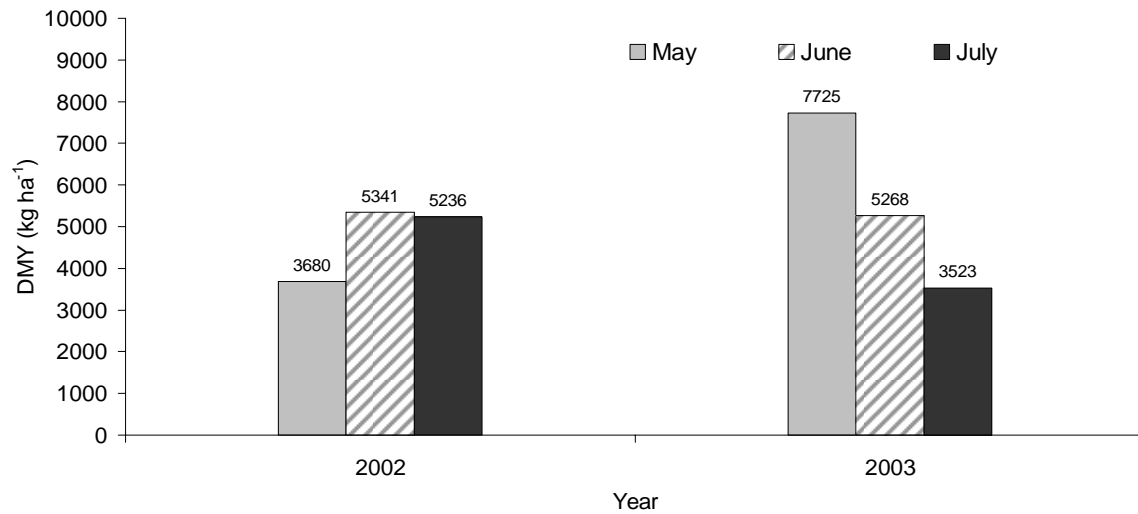


Figure 6. Mean forage dry matter yield (DMY) of 3 seeding dates (May, June and July) (averaged across 4 crops, barley, oat, triticale and Golden German millet) in 2002 and 2003 at Melfort, Saskatchewan.

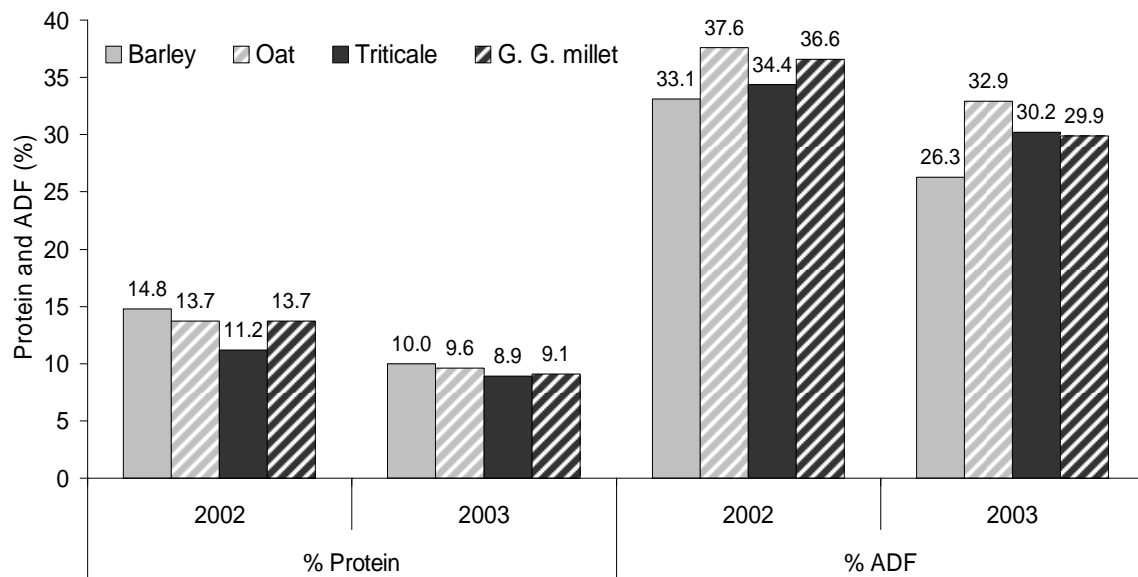


Figure 7. Mean quality of barley, oat, triticale and Golden German millet (G. G. millet) (averaged across 3 seeding dates in May, June and July) in 2002 and 2003 at Melfort, Saskatchewan.

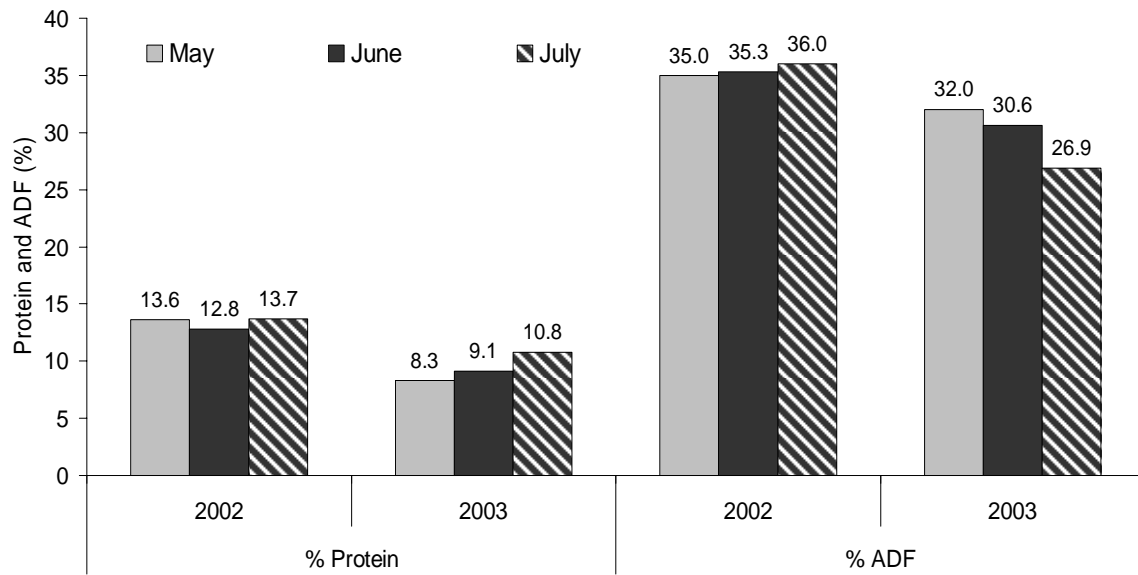


Figure 8. Mean quality of 3 seeding dates (May, June and July) (averaged across 4 crops, barley, oat, triticale and Golden German millet) in 2002 and 2003 at Melfort, Saskatchewan.