Post-Harvest Management of Grass Seed Crops

Agriculture and Agri-Food Canada Agriculture et Agroalimentaire Canada

Beaverlodge Research Farm, Lacombe-Beaverlodge

Introduction

The perennial growth habit is an important characteristic of many of our amenity and forage grasses. It allows us to enjoy the fruits of a one-time establishment for many years into the future -- in our lawns, golf courses, sports fields, pastures, etc. Most seed growers would also like to take advantage of that perennial growth habit but the production of several, successive, seed crops of most grass species presents a number of major challenges, particularly with respect to the maintenance of economic yields of high-quality seed. Post-harvest crop management therefore becomes an important aspect of the seed production of any grass crop.

Objectives

To conduct a study in the Peace River region of north-western Canada:

- To compare the effects of a diverse set of post-harvest management (PHM) treatments on the yield and quality of three, consecutive, seed crops of 'Boreal' creeping red fescue (CRF), 'Safari' and 'Tomahawk' tall fescue (TF) and 'Midnight' Kentucky bluegrass (KBG).
- To identify strategies for enhancing and maintaining the seed productivity and quality of each grass over three harvest years (HY).

Post-Harvest Management treatments

1. The removal of all crop/straw residue at a height of 8-10 cm with a flail-type forage harvester immediately after seed harvest (**Standard**) and again, about mid-October just prior to winter, if regrowth was excessive (**Control**);

2. Standard + single burn at 3 kph with a propane burner (Rear's Manufacturing Company, Eugene, Oregon, USA; 3-m wide with nozzles spaced 15 cm apart) (**Single Burn**);

3. Standard + double burn at 3 kph with the propane burner, the first burn being scheduled on the same day as the single burn treatment and the second 2-4 days later (**Double Burn**);

4. Standard + 2.8 kg/ha Karmex DF herbicide (80% diuron) in 250 L/ha water sprayed in early spring the following year, after snow-melt but before greening-up of the grass (**Diuron**);

5. Standard + mechanical stand conditioning with a power harrow immediately after the seed harvest and removal of crop residue (**Power Harrow**). The Power Harrow treatment was applied using a 3-m wide Amazone KG30 with a tine rotor speed of 145/minute driven at a forward speed of 3 kph and a working depth for the vertical tines of 3-5 cm; these settings were selected in order to clean out crop residue and volunteer/weed seedlings from around the plants of each grass, and deter the excessive creeping of the rhizomatous grasses (creeping red fescue and Kentucky bluegrass) while leaving the plants of the bunch-grasses, the two tall fescues, basically intact.

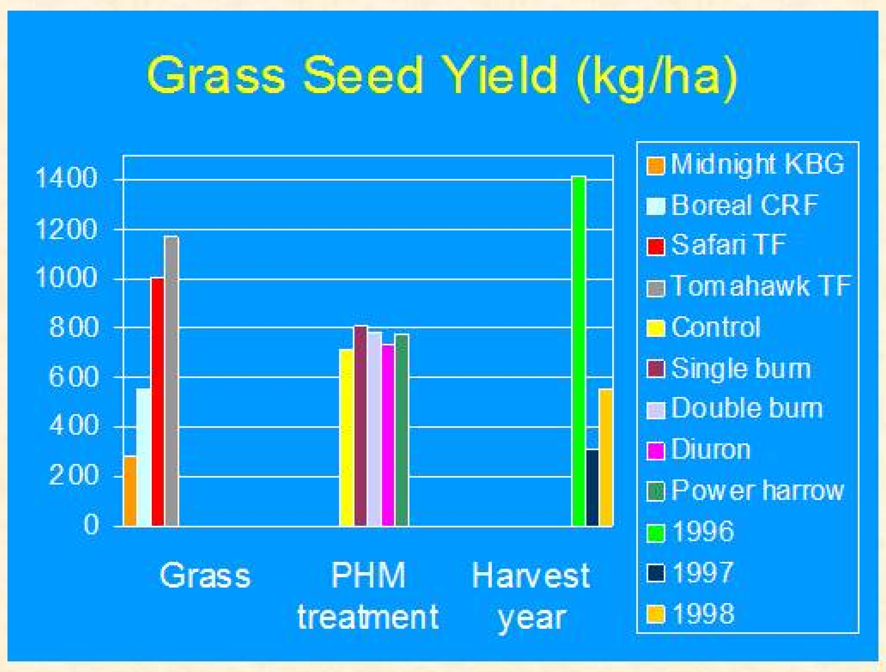
The PHM treatments were applied to the full area of each plot, i.e. 3 x 30 m, immediately after the seed harvest in 1996 (14-19 Aug) and 1997 (8-14 Aug) or in the subsequent spring for the Diuron treatment (29 Apr., 1997, and 16 Apr., 1998). Each treatment was replicated three times.

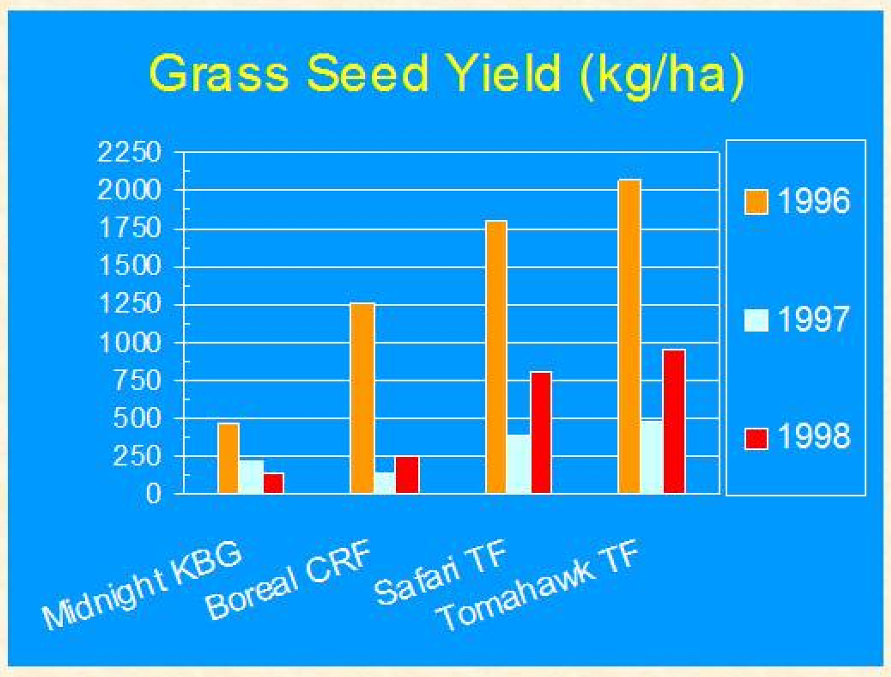
Results

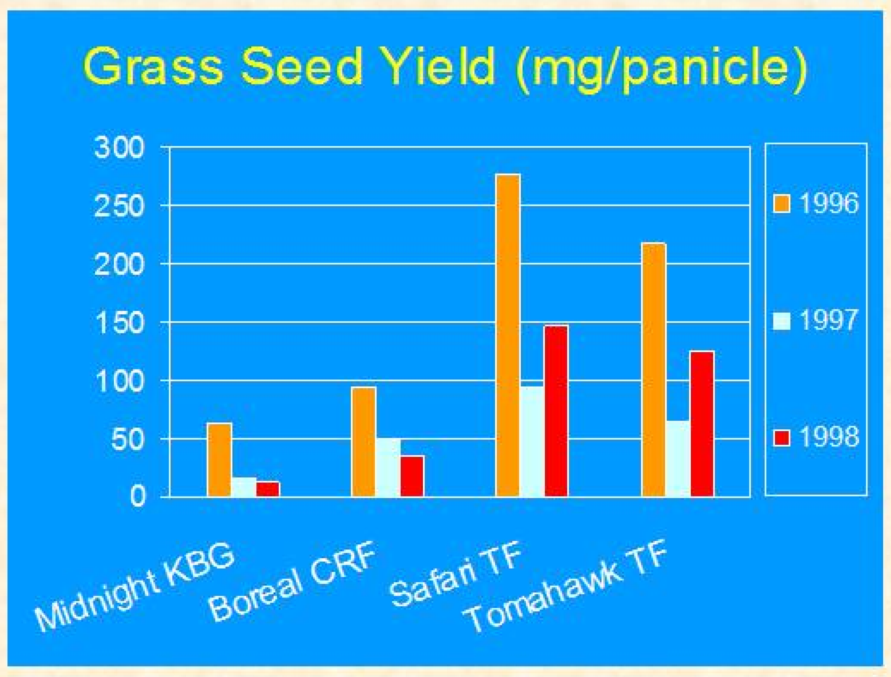
The treatment effects were determined for 10 characteristics of seed yield and quality of the four grass seed crops (GSC). The GSC x PHM x HY and the PHM x HY interactions were not statistically significant (P=0.05) for any characteristic, with the exception of a PHM x HY interaction for specific seed weight. The GSC x HY interaction was significant (P=0.05) for each of the 10 characteristics and the GSC x PHM interaction was significant (P=0.05) for the seed yield of individual panicles, harvest index, seed dockage and thousand-seed weight but not for whole-plant or grass seed yield (per unit land area), panicle density, time of seed maturity, specific seed weight or germination capacity. Furthermore, the main effect of PHM was only statistically significant (P=0.05) for specific seed weight and germination capacity but the differences among the PHM means were small and of no agronomic importance, viz. 24.3-26.1 kg/hL for specific seed weight and 76.8-81.0 % for germination capacity.

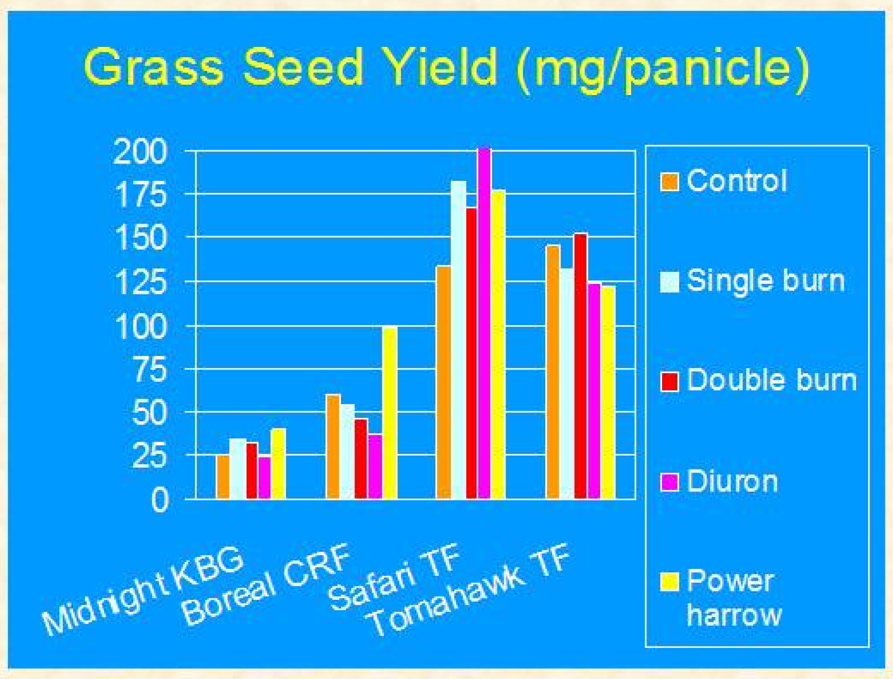
Results continued

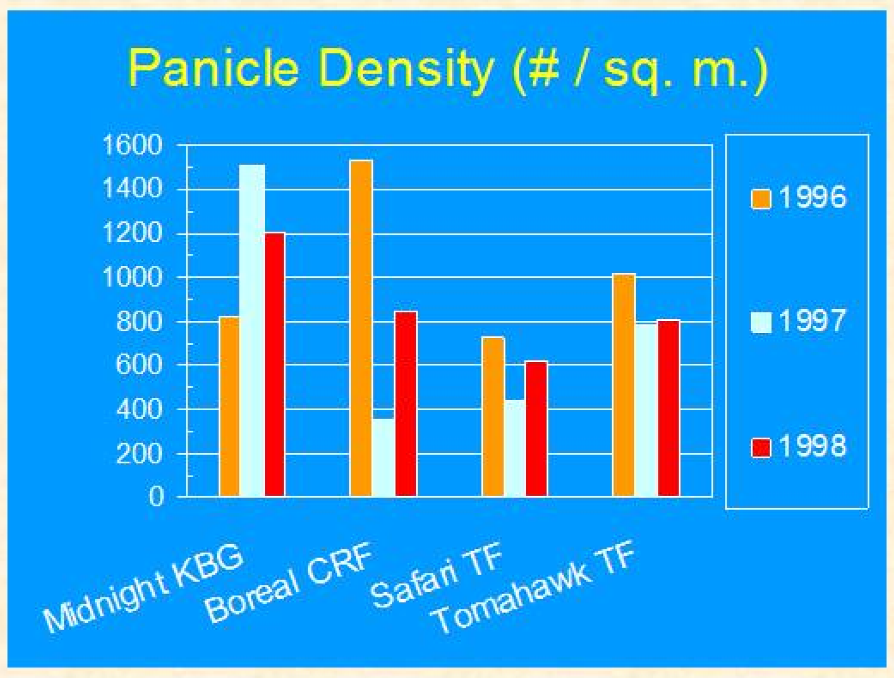
Of particular note, among the characteristics for which the GSC x PHM interaction was statistically significant (P=0.05), was the relatively large increase in seed yield per panicle with the Power Harrow treatment for Boreal CRF, the relatively high thousand-seed weight for Midnight KBG with the Control treatment, and the relatively low harvest index and high seed dockage for Tomahawk TF with the Power Harrow treatment. Some treatment effects on seed yield and panicle density are shown below.











24 July 1996

Boreal CRF

First seed crop

Conclusions

1. Over three consecutive harvest years, the seed yield and quality of Midnight KBG, Boreal CRF, and Safari and Tomahawk TF were only marginally influenced by the diverse set of post-harvest management treatments.
2. The effect of the harvest year on seed yield and quality characteristics differed among the four grasses, primarily because of the differential responses of the bluegrass as compared to the fescue grasses.
3. Seed yield of Midnight KBG was limited in the first harvest year by its inability to colonise the land area between the 30 cm wide rows and produce a high density of panicles. In the subsequent two harvest years, despite a higher density of panicles than the other three grasses, its seed yield per panicle and per unit land area were lower than that of the other three grasses.
4. The mechanical thinning of Boreal CRF increased the seed yield of individual panicles (to 165% of the control) but decreased their density such that seed yield per unit land area was not increased.
5. Averaged over three consecutive harvest years and five PHM treatments, the annual seed yield of the two TF cultivars was approximately twice that of Boreal CRF and four times that of Midnight KBG.
6. In this northerly latitude, the effects of any post-harvest crop management practice on the seed productivity of grasses may be limited by the short period of environmental conditions, between seed harvest and the onset of winter, that are conducive to vegetative and reproductive tiller development.

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