POST-HARVEST RESIDUE MANAGEMENT METHODS IN KENTUCKY BLUEGRASS SEED PRODUCTION ON THE EASTERN CANADIAN PRAIRIES

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ABSTRACT
Studies were conducted to evaluate methods of crop residue management in seed production fields of Kentucky bluegrass (Poa pratensis L.). Five residue management systems were evaluated at two sites for effectiveness of maintaining seed yield in comparison to the traditional method of burning crop residues. At Selkirk, MB, open burning applied shortly after harvest was the most effective, followed closely by dethatching of the stand. A later implemented trial at Stead, MB indicated that late season burning of residues reduced the seed yield compared to baling the residue only. All residue removal methods increased the seed yield over bale only. Time of residue management can play an important role in determining the appropriate renovation method.

KEYWORDS
Kentucky bluegrass, residue management, burning

INTRODUCTION
Production of Kentucky bluegrass (Poa pratensis L.) seed requires that crop residue be adequately removed after seed harvest to enable tiller development before winter. Tillers must reach a minimum size in order for vernalization to occur. Residue restricts the development of tiller size by restricting light penetration. Without the removal of crop residue, new tillers must elongate through the residue to reach sunlight, with the resulting tillers being smaller than the size required for vernalization.

The traditional renovation practice is to burn the residue after combining. This method has the advantage of being an inexpensive means of removing residue and destroying weed seeds, overwintering insects, and the host material for overwintering pathogens. However, there are several disadvantages to burning. Due to the smoke that is produced, regulations on field burning near large urban centres can make it difficult to conduct this procedure. Another disadvantage is in getting an adequate burn when environmental conditions are not favourable. New growth on the fields occurring after swathing can make it difficult to burn. Wet cool fall weather can prevent the residue from drying sufficiently to be burned. Alternatives to field burning are being investigated to find an acceptable method of removing residue that will reduce air pollution and allow renovations to be executed under all environmental conditions, while not decreasing yields.

METHODS
In 1994, five different post harvest residue management methods were applied at two sites. The first site was implemented on August 24 at Selkirk, MB, on a 4 year old field of 'Park' Kentucky bluegrass. The second site at Stead, MB. was initiated on September 20 on a 2 year old stand of 'Sydsport' Kentucky bluegrass. The Selkirk location is on a Red River Clay soil while the Stead site is on an peat soil. Fertilizer was applied in October to both sites supplying 110 kg N, 44 kg P_2O_5, 55 kg K_2O and 22 kg SO_4 ha^{-1}. Treatments were applied using either a hand held propane powered burner, a lawn mower or a combination of both. The following treatments were applied in a randomized complete block design with four replicates, each individual plot being 3m by 7m:

1. Clip to 1" and burn residue. Standing material was mowed and the litter was allowed to dry before burning. The aim of this treatment is to reduce the volume of smoke produced by lowering the water content of the crop residue.

2. Open burn. Standing material was ignited and allowed to burn. Remaining unburned patches were reignited afterwards with propane torches to create a complete burn.

3. Dethatched. A spring toothed lawnmower blade was utilized to shred material down to the soil surface and the material was raked off.

4. Check - Remove threshed residue left by combine. Loose material was hand raked off of the plots.

5. Clip at 2" and remove residue. Standing material was mowed to two inches and the litter raked off.

6. Clip at 1" and remove residue. Standing material was mowed to one inch and the litter raked off.

RESULTS AND DISCUSSION
Trial results are shown in Table 1. At Selkirk, all treatments produced a significant increase in yield over the check (treatment 4), with the exception of cutting at one inch and removing the residue. This treatment, while showing a similar trend for yield, was not significantly different from the check. The highest yielding treatment was the open burn followed by dethatching. Dethatching removed more residue than the non-thermal methods and the mowing plus burning treatment, but slightly less than the open burn (no data).

The renovation trial at Stead conducted later in the season produced different results. Although not statistically significant, burning tended to reduce the yield relative to the check, while the non-thermal systems tended to increase yield. Clipping at one inch and removing the residue significantly increased the yield over all other treatments. Burning late in the season may have damaged the tillers that were already present, leaving insufficient time for new tiller growth and development before winter. The highest yielding treatment, mowing at one inch, had more residue removal than clipping at two inches but less than dethatching, the two closest treatments (no data). This may indicate that dethatching late in the season also injures tillers that are already present. This treatment may have been the optimum amount of residue removal for renovation at a later than optimal date.

When residue management is conducted soon after harvest, open burning looks to be the most effective method, with the most aggressive non-thermal method (dethatch) producing similar results. As residue management is delayed, less aggressive residue removal methods become the better option. Early residue management provides more time for growth and development of the tillers, therefore the use of aggressive renovation methods can provide a greater return. Early renovation allows more time for tiller development and increases yield potential.

These trials were continued in 1995 with the same treatments being reapplied over their respective plots. An additional trial was established at Minnedosa, MB using the most promising treatments. A trial looking at the timing of burning or clipping at one inch and removing the residue was also initiated in 1995. These results will be available in late 1996.

Table 1
Seed Head Production and Yield of Kentucky Bluegrass under Different Post Harvest Residue Management Systems.

	Selkirk		Stead	
	Heads	Yield[1]	Heads	Yield
Trt	(0.5 m^2)	(% of check)	(0.5 m^2)	(% of check)
1. Mow+Burn	114	147 ab_2	92 bcd	83 b
2. Open Burn	100	176 a	69 d	74 b
3. Dethatch	105	163 ab	96 bc	151 b
4. Check	76	100 c	112 abc	100 b
5. 2" cut	91	145 ab	116 ab	135 b
6. 1" cut	115	132 bc	121 a	250 a
sign	ns[3]	0.05	0.05	0.05
cv (%)	26.9	18.7	18.0	50.6

[1] Yield - expresses as a percentage of the check, Bale only (corrected to 10 % seed moisture content).
[2] Mean separation - numbers followed by the same letter do not differ significantly.
[3] ns - not significantly different.