ADOPT DEMONSTRATION REPORT

(**A**griculture **D**emonstration **o**f **P**ractices and **T**echnology)

AGRICULTURE RESEARCH

20120315

TIMING OF BURNOFF APPLICATION FOR PERENNIAL AND BIENNIAL GRASSY WEED CONTROL

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Project Title:

Timing of burnoff application for perennial and biennial grassy weed control

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South East Research Farm

Project Location(s):

RM of Antler

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Pictured Above: June 23ADOPT Demonstration. Left to right: Fall application, untreated control, spring application.

Objectives and Rationale

Project objectives:

This demonstration will compare three timings of application of glyphosate as a burn-off to control foxtail barley.

Project Rationale:

Producers in southeast Saskatchewan have been experiencing problems with heavy infestations of foxtail barley downy brome. They germinate following post-harvest burnoff and often are still dormant in the spring when glyphosate is typically applied as a pre-seeding burnoff. The purpose is to show the effect of a later fall burnoff to control fall flushes of these weeds.

Methodology and Results

Methodology:

Initial plan: Early fall, late fall, spring glyphosate applications compared with untreated control (4 treatments) at five locations (20 spray plots total with no within-site replication).

Adjusted plan for fall 2013 given delayed harvest: Late fall, spring glyphosate applications compared with untreated control (3 treatments) at two locations (24 plots total with four replicates at each site).

The reasons for this adjustment to the plan was the logistical challenges of conducting this trial during the harvest and seeding seasons on so many producer fields. Also, we decided that due to the patchy nature of the foxtail barley issue, replication at each site would be valuable.

Fall 2013

This project was initiated on October 2, 2013 when we applied the first application of glyphosate to four replicates at each of two locations in the Redvers area. This was applied after a late harvest of Canola onto canola stubble. Co-operating land managers were David Bouchard and Sally Sutter. The sites were set up with spray plots of 20 feet by 100 feet. Each replicate was situated beside the others in a single block at Sutters. At Bouchards the replicates were situated in two areas with significant foxtail, with two replicates in each area. Each replicate was randomized, so the trial was an RCBD. Both locations had heavy infestations of foxtail barley and there had been no pre-harvest or post-harvest applications of a burn-off product or tillage in the fall.

Spring 2014

Bouchard Location:

There was a problem with the Bouchard location in the spring of 2014. The co-operator had forgotten about the demonstration in the rush during seeding and we had contacted him too late. Unfortunately it was discovered that David Bouchard had already seeded the location to canaryseed where we had applied the fall treatment, and performing the spring treatmentwould have killed the newly emerged canaryseed when we were able to do the application. Also, the seeding operation had removed the stakes. This location was abandoned.

Sutter location:

In spring 2014, the spring glyphosate application was made to the Sutter location on May 30. This application was somewhat delayed due to excessive moisture in the area where the fall applications had been made. May 2014 was a very difficult spring season for getting plot work completed.

Glyphosate was applied as the burn-off at a 1L equivalent standard rate for both fall and spring application dates with adequate water volume. There was little to no drift, and the applications were obviously effective.

There was no wheat planted on this Sutter site as planned, as it was excessively wet. Much of the usual seeded acres in the Redvers area were too wet to seed, and this was in relatively low lying ground with a severe foxtail barley issue. The Sutter location was maintained through to August 2014. It was heavily flooded in late June 2014, but the treatments had been very effective by then. One replicate was lost at this site due to a tillage operation by the land owner, so data is only reported from three replicates.

Spring foxtail biomass was collected in lieu of plant counts because the foxtail was so thick, it was very difficult to tell what was a separate plant and what was a tiller. We intended to be counting foxtail plants between rows of wheat, but since no wheat was planted, there were no rows. There was no foxtail collected from the spring glyphosate application due to the fact that it was mainly dead material. Two quarter meters were collected and bulked in each fall application and untreated control plot. Data is presented from the fall application and control plots.

Head counts were made on July 31 on the fall burn-off, spring burn-off, and untreated control plots on three replicates at the Sutter location. Head counts of two quarter meter square were combined and heads were counted. The data presented is for heads per square meter averaged over three replicates. Single variable ANOVA was performed and significant differences were found ($P<0.05$).

In August, the trial was sprayed out and cultivated to try to reduce the seed bank contribution, since the foxtail growth was so excessive in the control treatments.

Results:

	Fall Application	Spring Application	Untreated Control
Fresh Biomass (kg/m^2) June 23 ($p<0.05$)	0.19	0	2.866667
Head Count (#/m^2) July 30 ($p<0.05$)	122	116	1179

First thing in the spring, it was evident that the fall burn-off treatment had been effective. Because the spring application was delayed due to high moisture conditions, it was more effective than we anticipated might be the case. Due to subsequent rainfall, this area of the field was not seeded to wheat following the last burn-off treatment. Even if it had been seeded, flooding would have definitely killed any wheat established there.

The June biomass collection showed a dramatic effect of the glyphosate applications. The fall applications killed the established plants and was quite adequate as a burn-off at the 1L rate in the fall. However, due to no crop being planted in the spring and the heavy seed bank of foxtail, there was a new crop of seedling foxtail barley growing by mid-June in the fall application treatments. In the spring application treatments, there was a very good top kill of established plants, but it was not yet evident if crown kill had been acheived. As a result, the June biomass collection had no foxtail collection of dead material, but the July 30 head collection had similar numbers of fresh foxtail heads evident, even if they were not as mature as in the other treatments. The established foxtail in the untreated control had much more growth than either of the glyphosate application timing treatments.

The fall treatment was more effective at killing off established foxtail than the spring treatment. The spring treatment accomplished topgrowth control and only partial killing of the perennial plants. It is common for producers to use higher rates than 1L of glyphosate for spring burn-off applications, so fall applications may reduce the need for chemical usage to control weeds. Fall applications weaken the plant and then winterkill finishes the plants off.

By August, the spring treatment had about the same amount of foxtail heads as the fall treatment. The seedling foxtail plants in the fall application treatment would likely have been less competitive in a crop of wheat than shoots coming from established plants in the spring application treatment, but we were unable to assess this. An untreated control was polluted with well-established foxtail and contributed many more seeds to the soil weed seedbank than either burn-off treatment, so either way the treatments were effective.

One thing that was very evident in July and August was that foxtail barley is much more tolerant to waterlogging and flooding than the crop, and wet spring conditions give the foxtail barley a competitive advantage. This trial was deep under water for 5 to 7 days. The foxtail plots recovered very well, but nearby wheat under water for fewer days was killed off.

Conclusions and Recommendations:

It is very important for producers to manage their foxtail areas, particularly in low lying areas. Access to these lower-lying areas of the fields can be much easier in the fall when dry conditions are usual. Spring application can conflict with seeding and, especially if done very early, may prove less effective. Leaving these areas inadequately treated will certainly reduce wheat yield. Excessive moisture has contributed to the increase in concern over this weed, as it is not only restricted to saline areas. It thrives in damp conditions and can withstand waterlogging and flooding much better than crops. Producers should target late fall applications of glyphosate for fields or parts of fields where foxtail barley is problematic, rather than assuming a spring burn-off will be sufficient.

Cultivation is often used in areas where foxtail barley are problematic, like around the edges of fields and around sloughs. It is unknown how effective this is, and whether the timing of glyphosate application combined with tillage treatments might alter the BMP for foxtail barley management. This could be an area for further study.

This demonstration served as a highly visible foxtail barley control trial and served to give producers more awareness and information about foxtail barley issues in Saskatchewan.

Supporting Information

Acknowledgements

This project was acknowledged as an ADOPT project at the South East Research Farm field day. It was one of the stops on the field day attended by about 30 people. Results will also be included in the SERF Annual Report, which is sent out to multiple RM's in the southeast area.

Abstract

Abstract/Summary

Fall and spring burn-off timing was evaluated at one replicated site. The fall treatment was most effective at killing off established plants and no regrowth was evident. In some areas, the May 30 application of glyphosate only provided top growth control. The number of foxtail heads was similar on July 30 between the two burn-off timings, but the foxtail from the fall burn-off treatment seemed to be mainly new, poorly established plants. The foxtail barley tolerated multiple days of flooding and produced many heads even under these adverse conditions. This is one of the reasons that during this wet cycle in Saskatchewan, foxtail barley is becoming an increasing problem.
