Herbicide Screening for Seed Forages in the Establishment Year

2013 Annual Report

By Northeast Agriculture Research Foundation

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We would also like to thank Dow Agrosciences, NuFarm Agriculture, Bayer Cropscience and BASF Canada for providing herbicides for the trials as well as Pickseed Canada for supplying the seed.

Special thanks go to Stu Brandt and Brett Mollison of the Northeast Agriculture Research Foundation for their efforts and expertise.

For a list of the herbicide treatments used and the 2013 results, please contact the SFSDC Office at sfsdc05@gmail.com or 306 789-1958.

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SUMMARY:

Weed control is critical in the establishment year for forages grown for seed production. With that in mind we initiated a research trial to identify herbicide options that provide adequate weed control while posing acceptable risk of crop damage for selected forage species where suitable weed control treatments do not currently exist. These species include grasses; hybrid brome, timothy, perennial ryegrass, slender wheatgrass and tall fescue as well as forage legumes; red clover, alsike clover, sweet clover, cicer milkvetch and birdsfoot trefoil. A secondary objective was to provide data on herbicide tolerance that can be used to support minor use registrations for herbicides found to have acceptable crop tolerance. Despite rather intense weed competition in the 2013 trials we were able to identify numerous potential crop – herbicide combinations that held potential for minor use registration on nine of the ten forage species evaluated.

There are some limitations to the dataset that we need to point out. First: Weed numbers were very high at herbicide application time, and shading may have limited the amount of herbicide that came into contact with the crop. This could have the effect of reducing the level of damage experienced by the crop compared with more typical weed competition. Second: the data is for a single year at a single site. Under different climatic conditions, crop damage or weed control effectiveness could vary. For this reason, we need to conduct additional crop tolerance trials to validate results obtained to date. In addition to meeting these objectives, we have established additional area to accommodate trials in future on established forages.

Readers of this report should be cautioned that this is just a report of research results to date and does not constitute a recommendation by either the Northeast Agriculture Research Foundation or the Saskatchewan Forage Seed Development Commission.

INTRODUCTION:

Forages grown for seed production require protection against competition from weeds in the establishment year for several reasons:

- Seedling forages are slow to establish so they are poor at supressing weed growth
- Seedling forages are poor competitors and can fail to establish due to weed competition.
- Competition by weeds in the establishment year can reduce seed yield in subsequent years
- Weed seeds are a contaminant in forage seed reducing its grade and value

For some forage species, several herbicide options are available for use, but for others there are few if any products available even with minor use registrations. For these species, use of companion crops is often the only option. However most companion crops act in much the same manner as weeds and can reduce forage establishment and subsequent seed yield. Even where companion cropping is practiced, weed competition can pose risk during forage establishment. For these reasons it is important that herbicides are available for use on seedling forages.

OBJECTIVE:

The objective of this project is to identify herbicide options that provide adequate weed control while posing acceptable risk of crop damage for selected forage species where suitable weed control treatments do not currently exist or to control herbicide resistant weeds such as group 2 resistant cleavers. These species include grasses; hybrid brome, timothy, perennial ryegrass, slender wheatgrass and tall fescue as well as forage legumes; red clover, alsike clover, sweet clover, cicer milkvetch and birdsfoot trefoil.

A secondary objective is to provide data on herbicide tolerance that can be used to support minor use registrations for herbicides found to have acceptable crop tolerance.

MATERIALS AND METHODS:

In spring 2013 we selected a site on summerfallow land at the Melfort Research Farm where there was adequate space for the trials. The site had previously been in canola production so we expected to have volunteer canola. The site was tilled with a field cultivator after the first flush of weeds emerged, and again after a second flush occurred, followed by harrow packing. Thereafter the field was not disturbed to provide a firm seedbed. Just prior to seeding glyphosate was applied to control the third flush of weeds.

Four strips of each forage, 150 feet long by 24 feet wide were seeded to each of the 10 forage species between June 10 and June 13. Perennial ryegrass was seeded at 20-25 seeds per foot of row and slender wheatgrass at 12–20 seeds per foot of row on June 10. Hybrid brome was seeded at 12-20 seeds per foot of row, timothy at 25-30 and tall fescue also at 25-30 seeds per foot of row on June 11. Sweet clover, red clover, alsike clover and cicer milkvetch were seeded June 12, all at 12-20 seeds per foot of row and birdsfoot trefoil June 13 at 12-20 seeds per foot of row. Perennial ryegrass emerged June 18, and all other forages emerged June 24.

Herbicide treatments were applied in a 4 replicate randomized complete block design, with an untreated check along with a full recommended rate plus a 2X rate (to simulate what might happen where sprayer overlaps occur) for each herbicide by crop combination. On July 4 herbicides were applied to perennial ryegrass, and other grass species were treated July 8, while all forage legume species were treated either July 9 or 10.

Crop tolerance ratings were planned for 4-7 days after herbicide application and to be repeated at 28-35 days after application and again just prior to forage harvest.

The first crop tolerance ratings were done July 18, 2013 using a 0-100% rating system to rate the percentage of leaf area showing symptoms of leaf burn or other discoloration. After the ratings were done, weeds were cut above the forage canopy and removed to reduce weed competition. After regrowth, ratings of weed control and crop tolerance were done on September 10. Weed control ratings were done on a 1-10 scale where 1= full control and 10 = no control.

Weed densities were very high, and weed ratings are relative to untreated. A rating of 1 means that the species was more than 95% controlled. A rating of 5 means 50% control. Ratings greater than 10 indicate that species was worse than untreated (eg. 15 means that it was 50%

worse than untreated). This reflects the fact that removal of one species often allowed another to proliferate.

Numerous species were present, but ratings were done only on the 5 most abundant and uniformly distributed species. This rating scale was converted into a 0-100% control rating because the original rating system proved too confusing when presenting the data. This was done by assigning a value of 0 to a 10 rating, 50% to a rating of 5, and 95% to a rating of 1, etc.

Crop tolerance ratings were made based on crop density, color and regrowth on Sept 10, 2013. Density was rated from 1-5 with 1= no rows visible, 5= all rows clearly visible. Vigor was rated from 1-5 with 1= regrowth not evident and 5= regrowth 2x or more of cutting height. Crop color was rated 1-5 as well where 1= pale yellow with some browning and 5= dark green.

Forage yield after the first killing frost or Sept 20 whichever occurs first was planned, but there was very little regrowth after the second mowing done to reduce weed competition. For that reason, forage harvest was not done.

RESULTS AND DISCUSSION:

The 2013 growing season started very wet, but warm dry conditions during May allowed seeding to progress normally. June and July were wetter and cooler than normal. Warm dry conditions during August and September resulted in an overall growing season that was very near normal.

CONCLUSIONS:

Despite rather intense weed competition in the 2013 trials we were able to identify numerous potential crop by herbicide combinations that held potential for minor use registration on nine of the ten forage species evaluated.

There are some limitations to the dataset that we need to point out. First: Weed numbers were very high at herbicide application time, and shading may have limited the amount of herbicide that came into contact with the crop. This could have the effect of reducing the level of damage experienced by the crop compared with more typical weed competition. Second: the data is for a single year at a single site. Under different climatic conditions, crop damage or weed control effectiveness could vary. For this reason, we need to conduct additional crop tolerance trials to validate results obtained to date.

It should also be noted that in order to obtain reliable tolerance ratings, it is essential to have weed free plots. Considering the weed problems we encountered in 2013, it would be advisable to select land at least 1 year in advance to ensure weed seed banks are as low as possible. It would also be useful to use smaller plots for tolerance trials to facilitate hand weeding if necessary.

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ACKNOWLEDGEMENTS:

The Northeast Agriculture Research Foundation would like to express their gratitude to the Saskatchewan Forage Seed Development Commission for financial support for this project. In addition the support of Brett Mollison, Debbie Schick, Shelby O'Brien and Kerry O'Brien for technical assistance and of Clayton Myhre (Pickseed) and Al Foster (Saskatchewan Ministry of Agriculture) in selecting herbicide – crop combinations for testing and in developing trial protocols and editing this report is acknowledged.

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