5. NON-TILLAGE REMOVAL OF CREEPING RED FESCUE

By Garry Ropchan

INTRODUCTION

Increasing the adoption rates of sustainable farming practices (such as zero tillage for soil conservation) is the goal of CPCS. Achieving that goal will be dependent on producers being able to continue with a seeding program that is as close to their previous seeding program as possible. If the adoption of new practices (zero till) requires that a producer can no longer grow a crop that was used in their rotation then they may become less likely to adopt the new practice.

Crop rotations used vary from region to region. One particular crop grown within the Central Peace Region that may pose problems for full integration within a zero till system is creeping red fescue.

Creeping red fescue has played an important role in crop rotations in this region as it maintained high net profit status when annual crops (cereals and oilseeds) were depressed in price.

Although a perennial plant, creeping red fescue crops are only kept for a four year period, the usual life cycle being:

1) Under seeding with an annual crop.
2) Year of establishment.
3) First good seed harvest.
4) Second seed harvest, removal of fescue crop.

After the second seed crop, creeping red fescue produces very reduced yields so producers take the stand out of production. This is usually accomplished through intensive tillage. Although several different techniques are used with varying levels of success the traditional means of fescue removal consists of:

1) Plowing the field.
2) Repeated disking to break up sod.
3) Cultivation and harrowing.

This usually requires a year of summer fallow to fully eradicate the fescue that has a tenacious ability to survive and re-grow. There are some known disadvantages associated with this practice such as the soil is left open to damage from erosion, the soil/aggregate structure can be severely damaged. This produces some motivation to find techniques for non-tillage/reduced tillage removal of fescue. This desire for developing new techniques is hampered by the fact that creeping red fescue production is only undertaken in large acreage in western Canada within the Peace River region. Thus, bodies that are normally responsible for agricultural research (Agriculture Canada and Universities) do not have the resources to allocate towards addressing problems that occur only on a more limited regional basis.

Fortunately this is the type of situation that CPCS is capable of dealing with. CPCS can deal with problems that are of a local concern. For organizations like the CPCS the only difficulty lies in obtaining the funds necessary to do the work.

The main objective of CPCS is to get producers to adopt sustainable agriculture practices that have been proven to work within our region. The main focus is soil conservation. There are currently a number of producers who have fully converted to zero tillage for annual crop production; however, there are a number of producers for whom creeping red fescue production is an important component in their crop rotation. Maintaining the ability to produce this crop in a zero tillage seeding system will be required if they are to convert **at this time.** Dr. Martin Entz has indicated that those producers producing creeping red fescue seed in the province of Manitoba, who converted to zero tillage seeding dropped creeping red fescue from their rotations. The benefits that occurred from zero tillage seeding for the rest of the crops in their rotation far outweighed the benefits from selling creeping red fescue (personal communication).

Creeping red fescue will be seen by most producer's using zero till as a serious weed problem in their annual crop program. Zero till systems do not incorporate mechanical tillage for weed control (direct seeding may include a fall tillage pass for fertilizer application, but usually with narrow openers). As a result, there is usually no weed control benefit from the seeding operation; it requires the use of a "burnoff" herbicide for weed control prior to seeding the crop.

The current burnoff herbicide consists of glyphosate (most commonly under the trade name Roundup) applied at 0.5 l/ac rate. This rate is not effective in controlling volunteer patches of fescue that occur in land that is seeded to annual crops after the year of summer fallow/tillage.

The issue of using a herbicide to kill fescue has lead to a number of basic questions:

1) What rate of glyphosate is effective?
2) Does the time of application effect performance?
3) The effect of water volume.

4) The effect of surfactants.
5) Possible herbicides (other than glyphosate) that could be used?
6) What stage of fescue growth after summer harvest is required before herbicide application is effective?

One of the problems with herbicides that are systemic (ie. glyphosate) is the difficulty of getting the herbicide into the root system of the plant. Creeping red fescue is especially problematic from the herbicide absorption aspect. It has a very low level of leaf surface area (thus the question dealing with how much regrowth after harvest is required before there is enough leaf surface area to absorb enough herbicide to kill the plant). The leaf is orientated towards the vertical plane. This means that any herbicide droplets striking the surface of the leaf may not adhere to the leaf surface and may simply roll off. The waxy cuticle of the surface of the leaf adds to this problem. This leads to questions dealing with rolling prior to spraying to give a more horizontal leaf surface, the use of crowfoot or coil packers to damage the cuticle of the leaf prior to herbicide application. Paul Jungnitsch of FARA has studied the benefit of pre-spraying packing but did not find it beneficial.

NON-TILLAGE FESCUE REMOVAL OF CREEPING RED FESCUE

OBJECTIVES

Phase 1

CPCS has completed a four-year study from 1995 to 1998 to evaluate the potential for removing creeping red fescue without tillage. The results of this study did find that it was possible to remove the fescue without tillage after 3 or 4 consecutive springtime applications of 2 l/ac of Roundup. The final economics of this trial did not find that this practice produced as high a contribution margin compared to the traditional method of plowing followed by tillage.

The tillage treatment had an average contribution margin of $140.55 per year over the four-year period of the study compared to the spraying treatment that had a contribution margin of $103.99 per year.

The critical problem with this trial was the timing of the herbicide application. The original goal of wanting to seed an annual crop while removing the fescue created a real problem. There is a strong correlation between when you seed a crop and its yield; the earlier you seed it the higher the yield potential is. The problem lies with creeping red fescue. It is not a plant that is actively growing early in the season. The slower it is to grow, the longer it takes to develop a large leaf area. The leaf area of the fescue is an important factor, as it will play a role in determining the amount of herbicide that we will be able to get into the root system of the plant. The longer you wait to spray, the larger the leaf surfaces thus the greater the potential performance of the herbicide.

This project was terminated in 1998. There was very little fescue remaining at this time (after 3 years) and it would have been difficult to justify spraying the plot for the fourth year but there was some fescue in a number of spray misses along the boarders of the treatments that we wanted to control.

Phase 2

During the summer of 1998 some further control possibilities were considered. An additional window of opportunity to remove fescue might present itself after the final seed harvest of the crop. The Thomi project found that fescue could be eliminated by delaying the herbicide application until later in the season (late June). However, this also eliminates the possibility of growing an annual crop that year.

Phase 3

One of the most common observations that producers have related is the improved performance of the herbicide application in the wheel tracks of the tractor and sprayer. There has been a great deal of producer interest in the effect of rolling the fescue immediately prior to the spraying operation. The rational for this appears to be the transition of the fescue leaf from a vertical orientation to a horizontal orientation. This may improve the amount of herbicide that is translocated into the fescue roots and improve the control.

CPCS's experience with this phenomena does not support producer's observations. It is possible that the reduced control in the wheel tracks may have been a consequence of the severe drought and heat experienced in 1998 making the plant's xylem and phloem susceptible to damage from the vehicle wheels to the point where herbicide translocation was reduced rather than enhanced.

METHODS

The 2005 - 2006 trial was located at the following site:

Spirit River – RL 7 78 5 W6
Cooperator – Brett Young

2006 Activities

A burnoff herbicide operation consisting of 0.33 l/ac Roundup WeatherMax using a water volume of 5 gal/ac was applied on April 29th to treatments #1-#4. The major weeds were Canada thistle and volunteer fescue. For the most part it was hard to find green, actively growing fescue plants.

All seeding operations occurred on May 10th. LBD 449 RR canola treated with Prosper was seeded at a rate of 5.3 lb/ac at a depth of 0.5".

The soil test revealed the following information in the 0-6" layer:

- Nitrogen: 9 lb/ac, deficient
- Phosphorus: 41 lb/ac, marginal
- Potassium: 741 lb/ac, optimum
- Sulfur: 34 lb/ac, optimum

- pH: 6.6, neutral
- Organic Matter: 10.2%
- EC 0.21, good

Recommendation for a 40 bu/ac canola crop:

99 lb N, 25 lb P_20_5, 0 lb K_2O and 19 lb S /ac

The fertility program for canola consisted of 77-26-0-0 that was deep banded at the time of seeding.

The post-seeding herbicide application for Treatment #5 consisting of 0.33 l/ac Roundup WeatherMax using a water volume of 5 gal/ac was applied on June 7th when the crop was from the cotyledon to 4-leaf stage. The major weed was volunteer fescue. At this stage is was very easy to identify those two treatments that had not received the April 29th pre-seeding burnoff herbicide application as the fescue was noticeably green.

The incrop weed control program, applied to all six treatments, consisted of 0.33 l/ac Roundup WeatherMax using a water volume of 5 gal/ac. The first application date was June 10th when the crop was from the 1 to 4 leaf stage. The major weed was fescue. The second application, similar to the first, was made on June 26th. The major weed was fescue and the crop was just starting to bolt.

Above: A photo taken on April 29th, the day the pre-seeding burnoff was applied. On the LHS one of the areas that was sprayed in the fall. On the RHS is an area that was covered by bales thus was not sprayed in the fall and is green with growing fescue plants.

Above and below: A photo during seeding operations on May 10th. The fine job that the Haybuster 8000 does of seeding into heavy fescue sod can be clearly seen. The coulters do an excellent job of cutting the sod ahead of each shank resulting is a very smooth field after seeding operations.

Above: On the LHS one of the strips that did not receive a pre-seeding burnoff herbicide application on June 10th when the first incrop herbicide application was made. There is considerably more green fescue growth on this side compared to the RHS which received a pre-seeding herbicide application.

Above: The canola plant population was very satisfactory, however the lack of rain during the growing season limited yields.

A randomized complete block design with three replicates was used for this plot and the plot plan is given below.

Plot Plan:

North

#4 Late Fall
#1 Early Fall
#6 Late Fall
#2 Early & Late Fall
#3 Early & Late Fall
#5 Late Fall
#1 Early Fall
#3 Early & Late Fall
#6 Late Fall
#5 Late Fall
#4 Late Fall
#2 Early & Late Fall
#5 Late Fall
#2 Early & Late Fall
#1 Early Fall
#3 Early & Late Fall
#6 Late Fall
#4 Late Fall

South

Fescue control ratings were taken on June 12th and on August 23rd and are shown in Table 5.1 below.

TABLE 5.1 Fescue Control Ratings, June 12th and Brett Young Site, 2006

Treatment	% Control 06/12	% Control 08/23
#1 Early Fall	92a	75a
#2 Early & Late Fall	97a	73a
#3 Early & Late Fall	82ab	70ab
#4 Late Fall	85ab	58 bc
#5 Late Fall	67 b	55 c
#6 Late Fall	70 b	55 c
P	0.01	0.02
CV	10.5%	11.8%

The plots were swathed on August 21st and were combined on September 13th and weights recorded using a weigh wagon. Results are given in Table 5.2 and Figure 5.1 below.

Table 5.2 Results of Different Herbicide Treatments For Non-Tillage Removal Of Fescue, Brett Young Site, 2005

Treatment	Yield bu/ac*	% Moisture*	% Dockage*	% Green*	Bushel Weight lb/bu*	Treatment Cost $/ac	Contribution Margin $/ac*
#1 Early Fall	25.4a	12.4a	1.3a	0.8a	51.6a	29.09	148.71
#2 Early & Late Fall	26.2a	12.1a	1.2a	0.6a	51.8a	50.29	133.11
#3 Early & Late Fall	24.3ab	12.3a	1.3a	0.8a	51.8a	32.71	137.39
#4 Late Fall	23.5ab	12.3a	1.2a	0.7a	52.0a	29.09	135.41
#5 Late Fall	21.8 b	12.2a	1.3a	0.8a	52.0a	29.09	123.51
#6 Late Fall	22.9ab	11.8a	1.3a	1.1a	52.0a	21.20	139.10
P	0.02	0.56	0.73	0.5	0.68	0.63	0.81
CV	5.5%	3.4%	8.3%	39.2%	0.7%	1.1%	6.8%

*means followed by the same letter within each column do not differ significantly at P=0.05.
Canola @ $7.00/bu 1l of Roundup WeatherMax @ $13.30 sprayer costs @ $3.50/ac

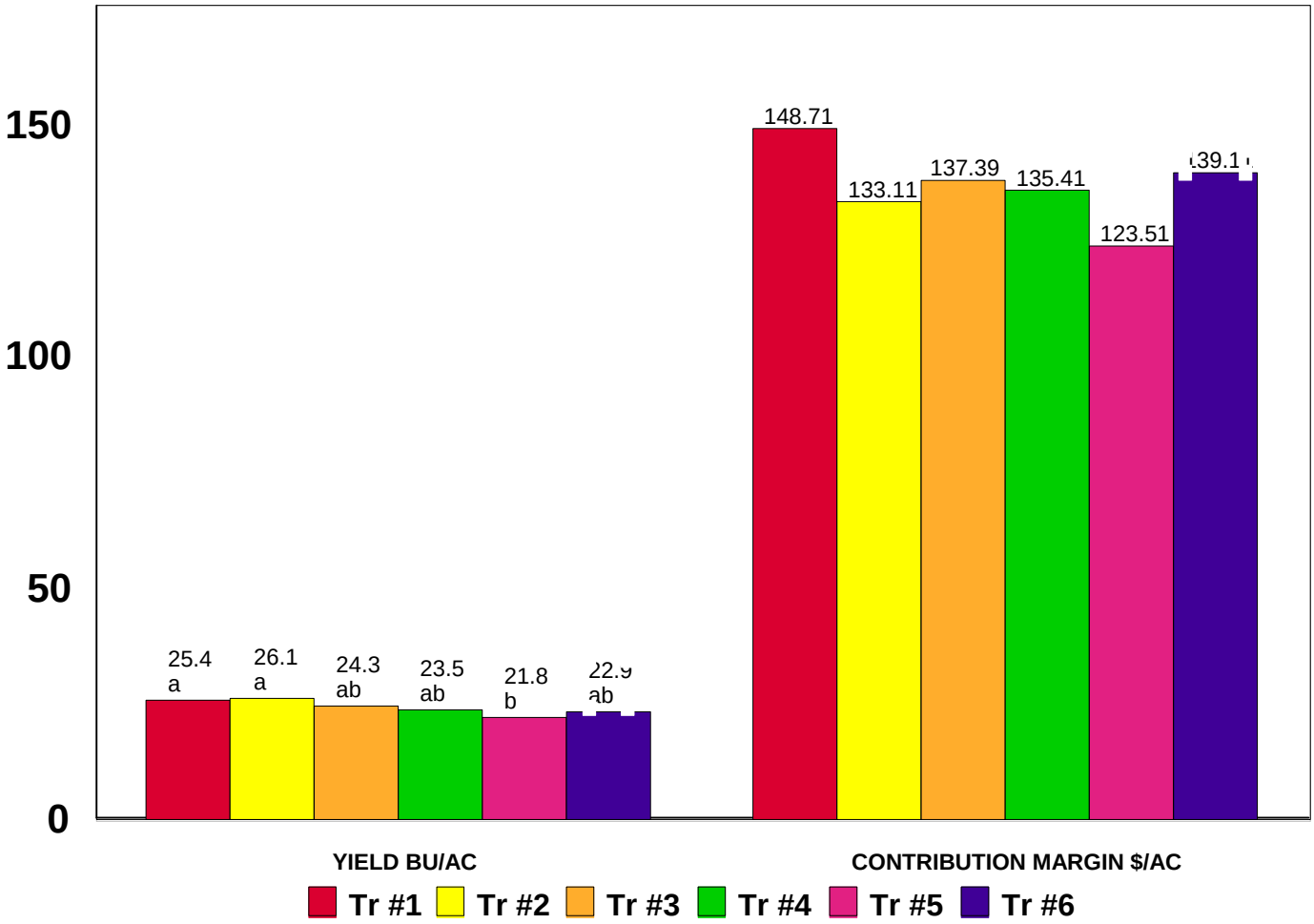

FIGURE 5.1 EFFECT OF HERBICIDE MANAGEMENT ON NON-TILLAGE

2005 Activities Brett Young Site

For this trial we elected to look at several different timings and rate combinations for their impact on controlling creeping red fescue. These treatments are given in Table 5.3 below. All herbicides were applied using a water volume of 5 gal/ac using 1.5 XR 110' nozzles.

Table 5.3 Herbicide Treatments For Controlling Fescue In A Direct Seeding System, Brett Young, 2005-2006.

Treatment	Date	Rate	Burnoff 2006*	Incrop 2006*
#1 Early Fall	Sept 28, 2005	1.33 l/ac	Pre-Seed	Twice
#2 Early & Late Fall	Sept 28/Oct 20, 2005	1.33 l/ac each time	Pre-Seed	Twice
#3 Early & Late Fall	Sept 28/Oct 20, 2005	0.67 l/ac each time	Pre-Seed	Twice
#4 Late Fall	Oct 20, 2005	1.33 l/ac	Pre-Seed	Twice
#5 Late Fall	Oct 20, 2005	1.33 l/ac	Post-Seed	Twice
#6 Late Fall	Oct 20, 2005	1.33 l/ac	None	Twice

* both burnoff 2006 and Incrop herbicide applications consisted of 0.33 l/ac of Roundup WeatherMax

2004 Activities Mortland Site

A burnoff herbicide operation consisting of 1.0 l/ac Roundup Transorb using a water volume of 5 gal/ac was applied on May 13th. The plot area was very clean with only a very few blades of fescue found growing. We questioned if this was an efficacious operation and subsequently we would learn it was.

All seeding operations occurred on May 17th. DKL 3235 RR canola was seeded at a rate of 7.5 lb/ac at a depth of 0.5-0.75". Morgan oats were seeded at a rate of 100 lb/ac at a depth of 1.0". Espace peas were seeded at a rate of 190 lb/ac at a depth of 0.75-1.0".

The soil test revealed the following information in the 0-6" layer:

- Nitrogen: 10 lb/ac, deficient
- Phosphorus: 17 lb/ac, deficient
- Potassium: 816 lb/ac, optimum
- Sulfur: 34 lb/ac, optimum

- pH: 6.7, neutral
- Organic Matter: 8.0%
- EC 0.23, good

Recommendation for a 80 bu/ac oat crop:

64 lb N, 34 lb P_20_5, 0 lb K_2O and 6 lb S /ac

Recommendation for a 40 bu/ac pea crop:

13 lb N, 49 lb P_20_5, 0 lb K_2O and 6 lb S /ac

Recommendation for a 35 bu/ac canola crop:

95 lb N, 37 lb P_20_5, 0 lb K_2O and 17 lb S /ac

The fertility program for oats consisted of:

80-28-21-0 that was deep banded at the time of seeding.

The fertility program for peas consisted of:

Soil Implant Inoculant applied at 7.5 lb/ac deep banded at the time of seeding.

The fertility program for canola consisted of:

80-28-21-0 that was deep banded at the time of seeding.

The incrop weed control program consisted of:

Field peas were sprayed on June 19th with the recommended rate of Odyssey using a water volume of 10 gal/ac. The crop was at the 3 to 6 node stage. The major weeds were volunteer fescue and dandelion.

RR canola was sprayed first June 21st with 0.33 l/ac Roundup WeatherMax using a water volume of 5 gal/ac. The canola was at the cotyledon to 5 leaf stage. The major weeds were dandelion and volunteer fescue. A second applied similar to the first was made on June 27th.

Oats have not been sprayed to date.

The plots were swathed on October 7th but due to weather problems we were unable to combine and weigh the trial.

On November 21st the site was rated for the degree of fescue control. The results are given in Table 5.4 below.

TABLE 5.4 Effect of Rolling Prior to Fall Glyphosate Application on Fescue, Mortland Site, 2004

Treatment	Rolled Fescue % Control	Fescue Not Rolled % Control
Oat	65	52
Pea	80	73
RR Canola	90	88
Average all crop types	78	71

2005 Activities Mortland Site

A burnoff herbicide operation consisting of 0.67 l/ac Roundup WeatherMax (for the oat and field pea stubble) and 0.67 l/ac Roundup WeatherMax and 250 ml/ac 2,4-D (for the RR canola stubble) using a water volume of 5 gal/ac was applied on May 22nd. The air temperature was 9' Celsius and the fescue was from 4 to 6" in height. The major weeds at this time were volunteer fescue, Canada thistle and volunteer canola.

All seeding operations occurred on May 30th. LBD 588 RR canola was seeded at a rate of 5.3 lb/ac at a depth of 0.5". Intrepid HRS wheat were seeded at a rate of 140 lb/ac at a depth of 0.5".

The fertility program for both RR canola and HRS wheat consisted of 60-20-10-10 that was deep banded at the time of seeding.

The incrop weed control program consisted of:

The wheat was sprayed with the recommended rate of Curtail M using a water volume of 5 gal/ac. The crop was at the 1 to 4 leaf stage. The major weeds were volunteer fescue (mainly in the pea stubble) and volunteer canola.

RR canola was sprayed first June 6th with 0.33 l/ac Roundup WeatherMax using a water volume of 5 gal/ac. The canola was at the cotyledon to 2-leaf stage. The major weeds were volunteer fescue and oats. A second application similar to the first was made on June 19th. The canola was at the cotyledon to 4-leaf stage. The major weeds were volunteer fescue and oats. A third application similar to the first was made on June 28th. The canola was at the 2 to 6 leaf stage. The major weeds were volunteer fescue and oats.

The plots were swathed on September 17th and combined on November 2nd. Samples were retained to determine the % moisture, % dockage, % green, % protein and bushel weight. Results are given in Table 5.5.

Table 5.5 Results of Rolling Prior to Spraying Fescue, Mortland Site, 2005

Crop 2004	Crop 2005	Rolled	Yield bu/ac*	% Moisture*	% Dockage*	% Green*	% Protein*	Bushel Weight*
Oat	RR Canola	Yes	14.1a	11.4a	12.0a	5.3a	N/A	N/A
Oat	RR Canola	No	9.6 b	12.1a	14.0a	6.0a	N/A	N/A
P			0.03	0.75	0.55	0.6		
CV			8.6%	19.8%	26.7%	24.5%		
Field Pea	Wheat	Yes	16.7a	24.3a	3.2a	N/A	13.2a	44.2a
Field Pea	Wheat	No	15.0a	24.1a	6.8 b	N/A	13.3a	43.6a
P			0.5	0.86	0.03		0.63	0.81
CV			16.1%	6.0%	17.0%		1.1%	6.8%
RR canola	Wheat	Yes	29.2a	24.3a	3.0a	N/A	13.2a	42.9a
RR canola	Wheat	No	28.6a	23.9a	2.3 b	N/A	13.3a	42.4a
P			0.79	0.19	0.01		0.67	0.82
CV			7.3%	1.1%	4.1%		3.1%	4.7%

*means followed by the same letter within each column AND crop type do not differ significantly at P=0.05.

On November 2nd the site was rated for the degree of fescue control. The results are given in Table 5.6 below.

TABLE 5.6 Effect of Rolling Prior to Fall Glyphosate Application on Fescue, Mortland Site, 2005

2004 Crop	2005 Crop	Rolled Fescue % Control	Fescue Not Rolled % Control
Oat	RR Canola	83	80
Pea	Wheat	30	30
RR Canola	Wheat	77	80
	Average all crop types	63	63

The 2002-2003 trial was located at the following site:

2. Silver Valley – NW 36 81 11 W6
Cooperator – Mel Derksen

2002 Activities

This field produced its' final seed crop in 2002. The crop was harvested and then allowed to regrow. On September 23rd the fescue had grown to be about 12" in height and the herbicide applications were made.

The 3 treatments were:

1) fall/spring tillage according to normal practices.
2) fall application of 2.0 l/ac Roundup Transorb without rolling.
3) fall rolling of fescue followed by application of 2.0 l/ac Roundup Transorb within 10 minutes.

2003 Activities

In the spring when we first returned to this site the effect of the fall herbicide application was very dramatic.

Seeding occurred on May 29th using a Haybuster 8000 zero till hoe drill. 8 lb/ac of DKL 3235 RR canola was seeded 0.5" deep and placed in a 3" wide paired row. Soil moisture was considered very good with moisture up to the soil surface. The fertilizer program consisted of 59-15-0-0 that was deep-banded 1.5" below the paired seed row. The plot area received showers several hours before the plot was seeded. There were some difficulties with the seeding operation with the drill plugging and straw building up on the shanks.

The in-crop weed control program consisted of the 0.5 l/ac Roundup Transorb applied in a water volume of 5 gal/ac applied on June 24th when the crop was at the cotyledon to 4-leaf stage. The major weeds at this time were dandelion and volunteer fescue. At this time we could see that there was some fescue regrowth occurring in the plot and that we were unable to achieve 100% control.

The crop establishment was disappointing. However it was uniformly disappointing for all three treatments including the tilled treatment.

Further observations made in August found that the plot area had been subject to severe grazing from deer during the summer. This made it impossible for yield data to be collected from this site.

Other Trials

The 1998 trial was located at the following site:

3. Codesa – NW 17 76 07 W6
Cooperator – Andy and Erika Thomi

This field produced its' final seed crop in 1997. The cooperator plowed the field and then seeded it to oats with his Haybuster 8000 drill in 1998. The cooperator did leave an acre for CPCS to use for some spraying treatments in 1998. There would be a greater number of treatments used that would allow us to look at product, timing and water volume combinations. Rates of Roundup were always 2 l/ac. All treatments used 5 gal/ac water volume unless stated otherwise. Ammonium sulfate was used in all treatments at a rate of 210 ml/ac (5 gal/ac water), 420 ml/ac (10-gal/ac water) and 840 ml/ac (20 gal/ac water). 110° extended range (ER) nozzles were used for all treatments.

The 12 treatments were:

1) 1998 spring, Roundup Original (R.O.)
2) 1998 spring, Roundup Transorb (R.T.)
3) 1998 spring plus summer, R.O.
4) 1998 spring plus summer, R.T.
5) 1998 spring, summer and fall, R.O.
6) 1998 spring, summer and fall, R.T.
7) 1998 spring, 1998 spring, R.O.
8) 1998 spring, fall, R.O.
9) 1998 summer, fall, R.O.
10) 1998 summer, fall, 1999 spring, R.O.
11) 1998 spring, 10 gal/ac water, R.O.
12) 1998 spring, 20 gal/ac water, R.T.

The spring 1998 herbicide applications were made on June 22nd. The fescue growth was considered to be fairly uniform and was 8 to 14 inches in height. The wind was blowing at 15 to 20 km/hr, higher than desired and there were fears this might affect our results (too much drift). Ammonium sulfate was applied with all of the treatments. 210 ml/ac with 5 gal/ac water, 420 ml/ac with 10 gal/ac water and 840 ml/ac with 20 gal/ac water.

On August 19th 1998 the results were observed. On the 10 sites that had been sprayed on June 22nd, there was no regrowth to warrant further herbicide applications. The poor growing conditions (drought and heat) had caused the fescue plants to stop active growth.

On August 25th 1998, two of the six June 22nd 1998 herbicide applications were made. On the other four treatments that had been sprayed on June 22nd 1998 there was insufficient growth to justify further applications.

The effect of the June 22nd herbicide applications on the fescue was felt to be very satisfactory. There was no further growth in the early fall of 1998 to warrant additional herbicide applications.

On June 1st, 1999 we returned to take further observations. All of the June 22nd 1998 treatments looked very effective. The August 25th applications were very poor in comparison.

The effectiveness of this treatment is very encouraging. There are some potential reasons for why this happened for producers to consider first.

The timing of application (June 22nd 1998) was later than had normally been used. With the four-year trial at the Barlund site the herbicide applications had been made as early as possible

given the goal of being able to seed an annual crop. With the Thomi site we were able to delay the herbicide application as long as we desired. This means that we could wait for a much greater degree of fescue growth to increase herbicide translocation. This is perhaps not the normal situation that most producers would find themselves in as we still lost a year of land use. The growing conditions we experienced in 1998 may have given us additional cultural control. While the fescue was placed under stress from the herbicide application on June 22nd, 1998, the heat and drought may have further hampered its ability to recover.

What have we learned from this?

1) The potential for controlling fescue by delaying herbicide applications until late June may increase herbicide performance.

2) Spraying fescue heading into a drought is helpful. Spraying fescue while it is under the stress of a drought is not an effective use of herbicide.

The ideal solution to dealing with non-tillage removal of fescue still eludes us. I believe that the optimal solution is to be able to harvest the final seed crop and to then use a very aggressive system of herbicide applications starting two weeks after harvest. This would allow for a second application late that fall if required. Another approach would be to wait until early fall to maximize fescue regrowth to achieve maximum herbicide translocation. CPCS will continue with its efforts in this area in 2000.

4. Codesa - SE 01 78 02 W6
Cooperator – Robert and Arlene Barlund

The initial tillage system in 1995 consisted of one pass with a plow followed by two passes with a disc and two passes with diamond harrows. In 1996 the tillage system consisted of two passes with a disc and two passes with diamond harrows. In 1997 the tillage system consisted of one pass with a disc and one pass with diamond harrows. In 1998 the tillage system consisted of one pass with a disc and two passes with diamond harrows.

The spraying treatment consisted of a herbicide application consisting of 2 liters of Roundup with ammonium sulfate. and 1.0 liter of ammonium sulfate was applied with 5 gallons of water per acre. 110° ER nozzles were used.

Oats were seeded for the first three years of the trial and barley was seeded in the forth and final year of the trial.

The plot was always seeded using a Haybuster 8000 zero till hoe drill with a 10" row spacing and paired row seeding (3" between rows).

The fertility program was the recommended rate of fertilizer to meet our yield goals according to the soil tests taken.

The results from the four-year fescue removal trial (1995 to 1998) at the Barlund site are included in Table 5.7.

Table 5.7 Results of Non-Tillage Removal of Fescue, 1995 to 1998, Barlund Site

Year	Crop	Treatment	Yield bu/ac*	% Moisture*	% Dockage*	Bushel Weight gm/hl*	Contribution Margin $/ac**
1998	Barley	Plowed Sod	19.5a	13.7a	2.8a	308.0a	13.45
		Sprayed Sod	35.2a	10.9a	0.5a	320.0a	16.87
1997	Oat	Plowed Sod	104.3a	18.2a	0.7a	243.3a	190.85
		Sprayed Sod	87.3a	18.5a	1.5 b	237.7a	135.17
1996	Oat	Plowed Sod	78.0	N/A	N/A	N/A	138.25
		Sprayed Sod	81.0	N/A	N/A	N/A	137.80
1995	Oat	Plowed Sod	124.7a	10.0a	0.5a	N/A	219.65
		Sprayed Sod	79.8 b	10.3a	0.5a	N/A	126.10

*means followed by the same letter within each column and year do not differ significantly at P=0.05.
**contribution margin =(yield*price)-expenses.

RESULTS AND DISCUSSION

BRETT YOUNG SITE, 2006

Lack of moisture during the middle of the growing season significantly reduced yield potential. Crop germination was very satisfactory due to excellent late May rain but the canola crop was unable to sustain the vegetative growth during the heat of July.

While we were able to find visual differences in terms of obvious fescue control between areas that were sprayed in the fall and adjacent missed areas, and likewise with areas that received a burnoff and those that did not, these did not translate into significant differences in yield. However, further work needs to be conducted to study the impact of the burnoff herbicide.

There were significant differences in yield (P=0.02) with Tr #1 and Tr #2 outyielding Tr #5. Tr #3, Tr #4, Tr #6 were not different from Tr #1, Tr #2 and Tr #5. There were no significant differences between the % moisture (P=0.56), % dockage (P=0.73), bushel weight (P=0.68) or % green seed (P=0.5) of the six treatments.

Looking at the contribution margin of the six treatments it provided greater differentiation between the six treatments. Tr #1, the early fall, full rate treatment with spring burnoff provided the highest contribution margin at $148.71/ac. The next highest was Tr #6, full rate, late fall, full rate without burnoff herbicide at $ 139.10/ac.

MORTLAND SITE, 2005

It was a disappointment that we were unable to collect yield data in 2004 from this site. We questioned the value of collecting yield data in 2005 as this would have been two years after the rolling and fall spraying operations had been performed. The differences between the rolled and unrolled strips, while visible, were not so dramatic that one would have expected there to be differences in the second year.

Where RR canola was seeded in 2005 on oat stubble there were significant differences between the yield (P=0.03) of the two treatments. The canola on the rolled sod yielded higher than the canola on the sod that was not rolled. There were no significant differences between the % moisture (P=0.75), % dockage (P=0.55) or % green seed (P=0.6) of the two treatments.

Where wheat was seeded in 2005 on RR canola stubble there were significant differences between the dockage (P=0.01) of the two treatments. The wheat on the rolled sod had a higher dockage content than the wheat on the sod that was not rolled. There were no significant differences between the % moisture (P=0.19), yield (P=0.79), % protein (P=0.67) or bushel weight (P=0.82) of the two treatments.

Where wheat was seeded in 2005 on pea stubble there were significant differences between the % dockage (P=0.03) of the two treatments. The wheat on the rolled sod had a lower dockage content than the wheat on the sod that was not rolled. There were no significant differences between the % moisture (P=0.86), yield (P=0.5), % protein (P=0.63) or bushel weight (P=0.82) of the two treatments.

MORTLAND SITE, 2003-2004

There are a number of observations that can be made based on the previous pictures. The only crop that showed significant fescue regrowth after both fall and spring glyphosate applications were oats. Both the pea and canola have available incrop herbicide options for effective control of fescue (Odyssey and Roundup). In the case of oats, there appears to be some benefit to be had by rolling prior to spraying. With the canola and pea crops the incrop herbicides gave effective enough control that we were not able to see differences between the rolling treatments.

Table 5.1 supports observations made during the summer that the rolling prior to fall spraying made be of significant value, especially when a crop like oats are planted and there are no incrop herbicide control options for further fescue control. The pea and canola crops did not show as dramatic a difference between the rolled and unrolled fescue.

DERKSEN SITE, 2002-2003

The Derksen trial was a disappointment as we were unable to gather any yield data to support our visual observations. The poor establishment of the crop was also disheartening, especially in light of previous success that we had in seeding crops directly into fescue. However, the canola establishment was poor across the entire plot site including the tilled treatments. Previous attempts were made with cereal crops but currently we do not think that opting to use canola was responsible for the failure.

THOMI SITE, 1998

The spring 1998 Roundup applications on creeping red fescue at the Thomi site gave excellent results. We did not find that there were any differences between Roundup Original and Roundup Transorb, nor did water volume seem to have an effect on the herbicide performance.

We were able to successfully remove the creeping red fescue at the Barlund site after four consecutive spring applications of Roundup. The magnitude of difference (in the revenue per acre) between the treatments after four years indicates that creeping red fescue can not be economically removed from rotation without the use of tillage equipment. The oat yield on the sprayed strips was adequate, but did not compare favorably to the oat yield on the plowed sod strips.

BARLUND SITE, 1995-1998

The long-term trial at the Barlund Site found that after a three-year period of spring glyphosate applications (2 l/ac) the fescue was completely eliminated. This was verified by continuing the trial for a 4th year and further using the site for other trials for a subsequent 2 year period – we could never find any signs of fescue growing back that had been sprayed out previously.

Unfortunately, while we were able to successfully remove the creeping red fescue at the Barlund site after three consecutive spring applications of Roundup, the economics did not support this protocol. The magnitude of difference (in the revenue per acre) between the treatments after four years indicates that creeping red fescue can not be economically removed from rotation without the use of tillage equipment. The oat yield on the sprayed strips was adequate, but did not compare favorably to the oat yield on the plowed sod strips.

CONCLUSIONS

At the Brett Young site in 2006 none of the treatments were fully effective in completely removing the fescue. Based on visual ratings, Tr #1 and Tr #2 provided the best control of fescue. Tr #4, Tr #5 and Tr #6 did not provide as effective control. Still this trial has demonstrated that it is possible to achieve sufficient control of fescue to establish an annual crop and to achieve reasonable yields, especially compared to the more costly, traditional practice of multiple tillage passes for removing the fescue.

It does appear that we can start to reach some conclusions regarding controlling fescue with herbicides in place of tillage. Most important is to utilize a system where the greatest number of herbicide application options are present to maximize the number of times during this program that fescue control can be effected. Using a fall-spring burnoff-incrop system would appear to be preferred.

We hope to use this site again in 2007 were we plan to seed RR canola again with different herbicide treatments to see to what degree we can further increase the fescue control.

At the Mortland site in 2005 we found out that rolling can make a difference in the yield of annual crops seeded into sprayed out fescue sod, even two years after the fall spraying operation was performed. The canola into oat stubble that was seeded into the sod that was rolled prior to spraying yielded around 4.5 bu/ac more. However, the other two crop combinations of wheat into pea stubble and wheat into RR canola stubble did not result in any yield differences from the rolling operation.

The selection of crop type to seed into sprayed out fescue sod is an important consideration. RR canola easily performed the best by virtue of allowing for incrop herbicide operations to be conducted for additional fescue control. Seeding peas allowed for the application of Odyssey for some incrop fescue control. Seeding oats did not allow for any incrop control of fescue. However, observations taken in the spring of 2005 found that the greater competitive habit of oats more than outperformed the pea crop competitiveness in combination with a herbicide application in terms of fescue control.

Therefore, it is our conclusion that producers should select RR canola as there most desired crop choice, followed by oats and peas should not be considered as a crop choice when elimination of a fescue crop in a zero till system is the goal.

At the Mortland site in 2004 we learned that crop selection and the ability to have incrop herbicide options for fescue control are critical components of being able to successfully remove fescue from rotation and to establish acceptable annual crop production.

At the Derksen in 2003 site we did see some differences in fescue control with the rolling and spraying appearing to be superior to spraying alone. This is sufficient encouragement to warrant continued work in 2004.

After four years of trials at the Barlund site removing the fescue without tillage is proving to be a difficult objective to accomplish economically. The level of fescue growth on both tilled and sprayed

ground is not yet to the point of either system being sufficient to call the fescue “removed” from rotation. The economics are higher for the tillage treatment (contribution margin of $140.55, average of four years) compared to the spraying treatment (contribution margin of $103.99, average of four years).

In 2006 CPCS will be continuing with a fescue removal trial at the Brett-Young site east of Rycroft. We will be looking at a number of different fall and spring herbicide treatments to further refine the protocols for non-tillage removal of creeping red fescue.

REFERENCES

N/A