

## Cultural and chemical weed management in native fine fescue roughs

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- Weed control in native areas composed of fine fescue presents agronomic and economic challenges.
- Three trials have been initiated to evaluate the impact of cultural and chemical practices on grassy and broadleaf weed control in native areas.
- Mowing and herbicide use resulted in the lowest weed populations, but if no herbicide is applied, mowing increases total weed population.
- Preliminary results indicate several products are effective for controlling weeds common to native areas in Wisconsin, including low rates of glyphosate when applied in May.

As native fine fescue rough areas grow, finding effective chemical and cultural management of weeds is becoming a high priority (Figure 1). These areas are intended or are perceived to reduce maintenance costs and environmental impact; however, a solid understanding of how to manage them is lacking which has led to possibly excessive inputs of chemicals and labor to obtain the desired visual effect. The objective of this project is to evaluate various cultural and chemical management strategies in a fine fescue rough.

This project is being conducted at Hawks Landing Golf Club in Madison, WI. At Hawks Landing, we have initiated three separate trials. The first trial investigates the impact of three cultural management strategies (mowing and removing material, mowing and returning material, and not mowing) on weed and desirable grass composition. Each strategy is evaluated either with or without chemical control. A second trial evaluates the performance of five different herbicides on weed composition. Finally, a third trial evaluates the efficacy of various rates and timings of glyphosate on spring weed control. The hypothesis is that glyphosate at low rates can be useful for controlling early season weeds (i.e. quackgrass) without harming desirable grasses such as fine fescue. For all three studies plot size is 6 ft. by 10 ft. with each treatment replicated four times and arrayed in a randomized complete block design. Visual estimates of plant populations are made in spring, summer, and fall. The trials will continue for at least three years after initiation.

For the cultural management trial, we observed that the combination of mowing and herbicide use resulted in the lowest weed populations. However, if no herbicide is applied, mowing increased weed populations (Table 1). The chemical efficacy trial showed good control of broadleaf weeds in the first two years of the study as all treatments resulted in substantially lower weed populations than the non-treated control (Table 2). The third trial (in its first year) has found that May-applied glyphosate (at a low rates) and Barricade resulted in similar weed control and increased playability than fall applied broadleaf herbicides in July (Table 3). However, these differences disappeared by October (Table 4).



Figure 1. Weed control in native areas remains problematic for many golf course superintendents.

Table 1. Grass and weed composition of plots under various mowing and chemical management on October 8, 2015. Mowing treatments and chemical applications were initiated on May 20, 2014.

<b>Mowing</b>	<b>Herbicide* Applied</b>	<b>Desirable Grasses</b>	<b>Bare Soil</b>	<b>Grassy Weeds</b>	<b>Broadleaf Weeds</b>	<b>Total Weeds</b>
Mowed, Returned	Yes	92.5 A	3.8 A	2.5 A	1.3 B	3.8 C
Mowed, Returned	No	49.5 C	1.8 A	11.3 A	37.5 A	48.8 A
Mowed, Removed	Yes	88.8 A	3.8 A	6.3 A	1.3 B	7.5 C
Mowed, Removed	No	62.5 BC	3.8 A	2.5 A	31.2 A	33.8 AB
Not Mowed	Yes	82.5 AB	5.0 A	11.3 A	1.3 B	12.5 BC
Not Mowed	No	82.5 AB	3.8 A	1.3 A	12.5 B	13.8 BC

\* Herbicide treatment included Barricade (1 lb/A), SpeedZone (1.5 oz/1000 sq. ft.), and Milestone (4.0 oz/1000 sq. ft.) in sprayed at 2 gallons/1000 sq. ft.

Table 2. Grass and weed composition on October 8, 2015 as affected by herbicide application. Chemical applications were made on May 20, 2014.

Herbicide Treatment	Desirable Grasses	Bare Soil	Grassy Weeds	Broadleaf Weeds	Total Weeds
Exp. Tmt 1 (4 pts/A)	92.3 A	2.5 A	1.8 B	0.5 B	2.3 C
Confront (2 pts/A)	90.8 A	1.8 A	3.8 AB	3.8 B	7.5 BC
Confront (4 pts/A)	82.5 A	1.3 A	15.0 A	1.3 B	16.3 B
Milestone (6 oz/A)	93.8 A	1.3 A	1.3 B	3.8 B	5.0 BC
SpeedZone (2 pts/A)	88.8 A	1.3 A	2.5 B	7.5 B	10.0 BC
Non-treated control	43.3 B	1.8 A	6.3 AB	48.8 A	55.0 A

Table 3. Grass and weed composition on July 1, 2015 as affected by herbicide application. Chemical applications were made in Spring 2015 with the exception of ForeFront and Chapparral which were applied in Fall 2014.

Herbicide Treatment	Desirable Grasses	Bare Soil	Grassy Weeds	Broadleaf Weeds	Total Weeds	Playability**
Non-treated control	65 AB	3 D	10 A	23 BC	32 BC	3 A
ForeFront (fall applied)	82 A	4 CD	11 A	3 D	14 C	2.5 ABC
Chapparral (fall applied)	79 AB	5 BCD	7 A	9 CD	16 C	2.75 AB
Glyphosate 1 lb Al/acre in April*	36 C	4 CD	5 A	55 A	60 A	2.75 AB
Glyphosate 2 lb Al/acre in April*	45 C	6 BCD	9 A	40 AB	49 AB	3.0 A
Glyphosate 1 lb Al/acre in May*	75 AB	10 B	8 A	8 CD	15 C	1.75 C
Glyphosate 2 lb Al/acre in May*	57 ABC	21 A	3 A	19 BCD	22 BC	2.0 BC
Glyphosate 1 lb Al/acre in June*	63 ABC	8 BC	5 A	24 BCD	29 ABC	2.75 AB

\* also included Barricade at 1 lb of product/acre

\*\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 4. Grass and weed composition on October 8, 2015 as affected by herbicide application. Chemical applications were made in Spring 2015 with the exception of ForeFront and Chapparral which were applied in Fall 2014.

Herbicide Treatment	Desirable Grasses	Bare Soil	Grassy Weeds	Broadleaf Weeds	Total Weeds	Playability**
Non-treated control	75 A	0.0 A	15 A	10 B	25 A	3.0 A
ForeFront (fall applied)	65 A	2.5 AB	20 A	13 AB	33 A	3.0 A
Chapparral (fall applied)	80 A	1.3 AB	6.3 A	13 AB	19 A	3.0 A
Glyphosate 1 lb Al/acre in April*	53 A	2.5 AB	6.3 A	39 A	45 A	3.0 A
Glyphosate 2 lb Al/acre in April*	54 A	10.0 A	8.8 A	28 AB	36 A	3.0 A
Glyphosate 1 lb Al/acre in May*	83 A	1.3 AB	5.0 A	11 AB	16 A	3.0 A
Glyphosate 2 lb Al/acre in May*	74 A	3.8 AB	1.3 A	21 AB	23 A	2.5 B
Glyphosate 1 lb Al/acre in June*	79 A	1.3 AB	5.0 A	15 AB	20 A	3.0 A

\* also included Barricade at 1 lb of product/acre

\*\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

----- 2016 Data -----

Table 5. Grass and weed composition of plots under various mowing and chemical management on May 11, 2016. Mowing treatments and chemical applications were initiated on May 20, 2014.

<b>Mowing</b>	<b>Herbicide* Applied</b>	<b>Desirable Grasses</b>	<b>Bare Soil</b>	<b>Grassy Weeds</b>	<b>Broadleaf Weeds</b>	<b>Total Weeds</b>	<b>Playability*</b>
Mowed, Returned	Yes	82.3 AB	8.0 AB	8.8 AB	0.5 C	9.3 BC	1.3 C
Mowed, Returned	No	65.0 BC	8.8 A	9.5 AB	16.8 B	26.3 AB	1.5 BC
Mowed, Removed	Yes	85.5 A	7.5 AB	5.8 B	1.3 C	7.0 C	1.0 C
Mowed, Removed	No	57.5 C	7.5 AB	7.5 AB	27.5 A	35.0 A	1.0 C
Not Mowed	Yes	76.0 ABC	3.8 AB	19.3 A	1.0 C	20.3 ABC	2.8 A
Not Mowed	No	85.5 A	3.0 B	3.0 B	8.5 BC	11.5 BC	2.0 B

\*\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 6. Grass and weed composition of plots under various mowing and chemical management on July 12, 2016. Mowing treatments and chemical applications were initiated on May 20, 2014.

<b>Mowing</b>	<b>Herbicide* Applied</b>	<b>Desirable Grasses</b>	<b>Bare Soil</b>	<b>Grassy Weeds</b>	<b>Broadleaf Weeds</b>	<b>Total Weeds</b>	<b>Playability*</b>
Mowed, Returned	Yes	89.5 A	9.3 A	1.3 B	0 B	1.3 B	2.3 A
Mowed, Returned	No	38.8 B	7.5 A	1.3 B	52.5 A	53.8 A	2.5 A
Mowed, Removed	Yes	81.3 A	11.3 A	7.5 A	0 B	7.5 B	2.3 A
Mowed, Removed	No	52.5 B	6.3 A	0 B	41.3 A	41.3 A	2.3 A
Not Mowed	Yes	85.8 A	8.0 A	5.0 AB	1.3 B	6.3 B	2.8 A
Not Mowed	No	77.0 A	8.0 A	1.3 B	13.8 B	15.0 B	2.0 A

\*\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 7. Grass and weed composition of plots under various mowing and chemical management on October 14, 2016. Mowing treatments and chemical applications were initiated on May 20, 2014.

<b>Mowing</b>	<b>Herbicide* Applied</b>	<b>Desirable Grasses</b>	<b>Bare Soil</b>	<b>Grassy Weeds</b>	<b>Broadleaf Weeds</b>	<b>Total Weeds</b>	<b>Playability*</b>
Mowed, Returned	Yes	55.8 C	3.0 B	2.5 AB	38.8 A	41.3 A	3.0 A
Mowed, Returned	No	76.5 B	2.5 B	1.8 B	19.3 B	21.0 B	2.8 AB
Mowed, Removed	Yes	87.3 AB	3.0 B	5.0 AB	4.8 C	9.8 BC	2.0 B
Mowed, Removed	No	81.8 AB	6.0 AB	8.5 A	3.8 C	12.3 BC	2.5 AB
Not Mowed	Yes	88.3 AB	8.8 A	1.3 B	1.8 C	3.0 C	2.0 B
Not Mowed	No	91.0 A	2.0 B	1.3 B	5.8 C	7.0 C	2.3 AB

\*\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 8. Grass and weed composition on May 11, 2016 as affected by herbicide application. Chemical applications were made in May 2014, and 2015.

Herbicide Treatment	Desirable Grasses	Bare Soil	Grassy Weeds	Broadleaf Weeds	Total Weeds	Playability*
Exp. Tmt 1 (4 pts/A)	91.3 A	4.8 A	1.8 B	2.3 BC	4.0 B	1.0 A
Confront (2 pts/A)	85.5 AB	9.3 A	4.3 B	1.0 BC	5.3 B	1.0 A
Confront (4 pts/A)	72.0 BC	10.0 A	18.0 A	0 C	18.0 B	1.0 A
Milestone (6 oz/A)	83.5 AB	10.0 A	3.0 B	3.5 BC	6.5 B	1.0 A
SpeedZone (2 pts/A)	84.0 AB	5.5 A	3.3 B	7.3 B	10.5 B	1.3 A
Non-treated control	56.3 C	8.8 A	13.8 AB	21.3 A	35.0 A	1.3 A

\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 9. Grass and weed composition on July 12, 2016 as affected by herbicide application. Chemical applications were made in May 2014, 2015, and 2016.

Herbicide Treatment	Desirable Grasses	Bare Soil	Grassy Weeds	Broadleaf Weeds	Total Weeds	Playability*
Exp. Tmt 1 (4 pts/A)	83.5 A	15.0 B	0.3 A	1.3 B	1.5 B	1.3 BC
Confront (2 pts/A)	84.0 A	13.0 BC	3.0 A	0.0 B	3.0 B	1.5 BC
Confront (4 pts/A)	80.5 A	10.0 BC	9.5 A	0.0 B	9.5 B	1.8 ABC
Milestone (6 oz/A)	73.8 A	25.0 A	0 A	1.3 B	1.3 B	1.0 C
SpeedZone (2 pts/A)	65.8 A	10.0 BC	6.8 A	17.5 B	24.3 B	2.0 AB
Non-treated control	39.5 B	5.5 C	2.5 A	52.5 A	55.0 A	2.5 A

\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 10. Grass and weed composition on October 14, 2016 as affected by herbicide application. Chemical applications were made in May 2014, 2015, and 2016.

Herbicide Treatment	Desirable Grasses	Bare Soil	Grassy Weeds	Broadleaf Weeds	Total Weeds	Playability*
Exp. Tmt 1 (4 pts/A)	85.5 A	1.5 A	0.5 B	12.5 B	13.0 B	3.0 A
Confront (2 pts/A)	83.3 AB	2.3 A	11.3 AB	3.3 B	14.5 B	2.8 A
Confront (4 pts/A)	61.5 ABC	2.3 A	5.0 B	31.3 A	36.3 AB	3.0 A
Milestone (6 oz/A)	59.5 BC	5.5 A	31.3 A	3.8 B	35.0 AB	3.0 A
SpeedZone (2 pts/A)	51.3 C	3.5 A	6.5 B	38.8 A	45.3 A	3.0 A
Non-treated control	85.3 A	3.0 A	10.5 AB	1.3 B	11.8 B	3.0 A

\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 11. Grass and weed composition on May 11, 2016 as affected by herbicide application. Chemical applications were made in Spring 2015 and 2016 with the exception of 2DQ, ForeFront, and Chapparral which were applied in Fall 2014 and 2015.

Herbicide Treatment	Desirable Grasses	Bare Soil	Grassy Weeds	Broadleaf Weeds	Total Weeds	Playability**
Non-treated control	86.0 A	3.3 B	7.8 B	3.0 B	10.8 AB	1.0 B
2DQ (fall applied)	72.0 A	4.5 B	23.0 A	0.5 B	23.5 A	1.5 A
ForeFront (fall applied)	90.0 A	3.0 B	6.3 B	0.8 B	7.0 B	1.0 B
Chapparral (fall applied)	82.0 A	5.0 B	6.0 B	7.0 AB	13.0 AB	1.0 B
Glyphosate 1 lb AI/acre in April*	72.3 A	21.3 A	2.3 B	4.3 AB	6.5 B	1.0 B
Glyphosate 2 lb AI/acre in April*	73.0 A	21.3 A	2.3 B	3.5 AB	5.8 B	1.0 B
Glyphosate 1 lb AI/acre in May*	81.0 A	6.3 B	6.3 B	6.2 AB	12.8 AB	1.0 B
Glyphosate 2 lb AI/acre in May*	78.5 A	6.3 B	3.0 B	12.3 A	15.3 AB	1.3 AB
Glyphosate 1 lb AI/acre in June*	84.3 A	6.3 B	5.5 B	4.0 AB	9.5 AB	1.0 B

\* also included Barricade at 1 lb of product/acre

\*\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 12. Grass and weed composition on July 12, 2016 as affected by herbicide application. Chemical applications were made in Spring 2015 and 2016 with the exception of 2DQ, ForeFront, and Chapparral which were applied in Fall 2014 and 2015.

Herbicide Treatment	Desirable Grasses	Bare Soil	Grassy Weeds	Broadleaf Weeds	Total Weeds	Playability**
Non-treated control	84.0 A	4.3 C	2.5 B	9.3 B	11.8 B	2.5 AB
2DQ (fall applied)	80.5 A	4.3 C	7.5 A	7.8 B	15.3 B	2.5 AB
ForeFront (fall applied)	76.3 A	6.3 BC	0 B	17.5 B	17.5 B	2.5 AB
Chapparral (fall applied)	76.3 A	6.3 BC	0 B	17.5 B	17.5 B	2.5 AB
Glyphosate 1 lb AI/acre in April*	45.0 B	6.3 BC	0 B	48.8 A	48.8 A	3.0 A
Glyphosate 2 lb AI/acre in April*	39.5 B	5.0 BC	0.5 B	55.0 A	55.5 A	2.8 AB
Glyphosate 1 lb AI/acre in May*	80.8 A	11.3 B	0.5 B	7.5 B	8.0 B	1.8 CD
Glyphosate 2 lb AI/acre in May*	68.0 A	26.3 A	0 B	5.8 B	5.8 B	1.5 D
Glyphosate 1 lb AI/acre in June*	83.6 A	7.5 BC	0.5 B	8.8 B	9.3 B	2.3 BC

\* also included Barricade at 1 lb of product/acre

\*\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.

Table 13. Grass and weed composition on October 14, 2016 as affected by herbicide application. Chemical applications were made in Spring 2015 and 2016 with the exception of 2DQ, ForeFront, and Chapparral which were applied in Fall 2014 and 2015.

<b>Herbicide Treatment</b>	<b>Desirable Grasses</b>	<b>Bare Soil</b>	<b>Grassy Weeds</b>	<b>Broadleaf Weeds</b>	<b>Total Weeds</b>	<b>Playability**</b>
Non-treated control	95.0 A	1.5 D	1.0 ABC	2.5 C	3.5 C	3.0 A
2DQ (fall applied)	90.3 A	1.5 D	3.3 A	5.0 BC	8.3 BC	3.0 A
ForeFront (fall applied)	86.0 AB	2.0 D	3.0 AB	9.0 ABC	12.0 ABC	3.0 A
Chapparral (fall applied)	85.8 AB	2.5 D	0.8 ABC	11.0 ABC	11.8 ABC	3.0 A
Glyphosate 1 lb AI/acre in April*	76.5 BC	7.5 B	2.3 ABC	13.8 AB	16.0 AB	3.0 A
Glyphosate 2 lb AI/acre in April*	68.8 C	11.3 A	1.3 ABC	18.8 A	20.0 A	3.0 A
Glyphosate 1 lb AI/acre in May*	92.0 A	3.5 CD	1.8 ABC	2.8 C	4.5 C	3.0 A
Glyphosate 2 lb AI/acre in May*	89.0 A	6.3 BC	0.5 BC	4.3 BC	4.8 C	2.3 B
Glyphosate 1 lb AI/acre in June*	93.5 A	2.3 D	0 C	4.3 BC	4.3 C	3.0 A

\* also included Barricade at 1 lb of product/acre

\*\*A subjective assessment of the ability of an average golfer to play a shot out of the treatment and back into play with a reasonable chance of success. Rated on a 1 to 3 scale with 1 being playable, 3 being unplayable, and 2 intermediate.