

EVALUATION OF HERBICIDES FOR ITALIAN RYEGRASS CONTROL IN WHEAT (UKREC 2006-2007)

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INTRODUCTION:

Six herbicides were evaluated for ryegrass control in one or more of four studies in 2006 – 2007 growing season. Their active ingredients and modes of action are listed Table 1.

The effects of such factors as application timing, tank mix partners, and preplant incorporation methods on ryegrass control and crop injury were evaluated. The freezing temperatures in early April injured wheat. Although wheat recovered and yielded reasonably well, it was difficult to make meaningful conclusions concerning treatment effects. Therefore wheat grain yields are not reported.

AXIAL, OSPREY, AND HOELON APPLIED ALONE OR IN TNAK MIX COMBINATION WITH HARMONY EXTRA OR SENCOR

(See Table 2)

Axial, Osprey, and Hoelon are used to control ryegrass in wheat but are limited in their ability to control broadleaf weeds. Including a herbicide for managing broadleaf weeds or wild garlic would help broaden the spectrum of weeds controlled.

This research was conducted to evaluate the risk of crop injury and antagonism to ryegrass control when tank mixed with Harmony Extra or Sencor.

Early season injury in the form of stunted and discolored plants occurred when Sencor was used as a tank mix partner with Axial, Osprey, and Hoelon (data not shown). Plants tended to recover, but stunting was still present by mid March (Table 2). It is believed the additives that were added with Axial and Osprey and the emulsifiers in Hoelon enhanced the injury from the Sencor. No injury occurred where Harmony Extra was used as a tank mix partner.

Early season ryegrass control was enhanced where Sencor was used with Axial, Osprey, and Hoelon. However, control at the end of the season was reduced by 4% when Sencor was mixed with Axial and by 16% when mixed with Osprey. Sencor did not limit ryegrass control with Hoelon.

Combinations with Harmony Extra did not affect crop injury or ryegrass control. However, previous research has shown reduced control where Harmony Extra was combined with Hoelon.

This research shows there is a risk of crop injury when mixing Sencor with Axial, Osprey, and Hoelon. Although ryegrass control was not affected where Harmony Extra was used as a tank mix partner in this study, there is evidence in previous studies that shows it reduced control when mixed with Hoelon.

The following is a list of some of the labeled tank mix partners for Axial, Osprey, and Hoelon in Kentucky:

Axial: Buctril, Finesse, Harmony Extra, Harmony GT, or MCPA ester.

OSPREY: Buctril, Finesse, Harmony Extra, or Harmony. When using herbicides not listed on the OSPREY label, apply sequentially 5 days prior to or 5 days after OSPREY.

Hoelon: Buctril. Reduced control may occur if other herbicides are applied within 5 days of Hoelon.

APPLICATION TIMING OF FINESSE GRASS & BROADLEAF AND OSPREY
(See Table 3)

This study was conducted to evaluate ryegrass control with Finesse Grass & Broadleaf or Osprey when applied at the following timings:

Timing	Date	Ryegrass Stage
EP (Early Post)	11-03-06	1 to 2 leaf
MP (Mid Post)	11-25-06	3-5 leaf
LP (Late Post)	1-11-07	3 leaf to 2 tillers

Ryegrass control at four weeks after application was better with the EP treatments compared with MP and LP treatments (Table 3). The cooler temperatures during the MP and LP treatments appeared to slow the activity of Finesse Grass & Broadleaf and Osprey. However, control improved by the end of the season.

Control at the end of the season for Finesse Grass & Broadleaf was best when applied

early before ryegrass exceeded 1 tiller stage. Both Finesse Grass & Broadleaf treatments provided better control than Osprey when applied as EP treatments. The high rate of Finesse Grass & Broadleaf provided greater control than the low rate when ryegrass had 1 tiller. Finesse Grass & Broadleaf provided more soil-residual control of ryegrass than Osprey when applied early in the season. However, Osprey provided better late-season control than Finesse Grass & Broadleaf when ryegrass had up to 2 tillers at the time of application.

CONTROL IN MINIMUM AND NO-TILL WHEAT WITH FAR-GO AND OSPREY
(See Tables 3 & 4)

Far-Go provides a unique mode of action compared with other ryegrass herbicides used in wheat. This could be an advantage for managing ryegrass populations resistant to current option used in Kentucky.

A potential limiting factor for Far-Go is that it must be mechanically incorporated with equipment such as culti-harrow, spring tooth cultivator, or duckfoot cultivator prior to planting. In some instances Far-Go may be applied after planting and incorporated at a shallow depth with such equipment as a spike tooth or spring tooth harrow. For best results, a second incorporation at right angles is recommended.

Far-Go is registered in Oregon and certain other states. Therefore this study was conducted to determine if Far-Go could be utilized in Kentucky. The main focus was to evaluate the following incorporation methods for minimum and no-till wheat:

Minimum tilled wheat:

Roterra: Apply Far-G; then incorporate with two passes with rotterra prior to planting.

Drill: Apply Far-Go; then drill wheat.
No-incorporation: Drill wheat; then apply Far-Go.

No-till wheat:

Drill: Apply Far-Go; then drill wheat.
No-incorporation: Drill wheat; then apply Far-Go.

Ryegrass control and wheat injury with Far-Go were compared with Osprey applied as a post emergence treatment on November 22 when ryegrass had 2 to 3 leaves.

Wheat injury in the form of stunted plants was observed November 2 (20 days after application) in no-till wheat when Far-Go was applied after planting and not incorporated (Table 5). Wheat recovered by 29 days after application (data not shown).

Far-Go tended to provide less ryegrass control than Osprey in both minimum and no-till wheat (tables 4 & 5). The use of the Roterra tended to be the best method for incorporating Far-Go in the minimum till wheat study. Although late-season control with Far-Go using the roterra was numerically less, it was statistically equal to that of Osprey in minimum till wheat. Far-Go did provide some early season suppression of ryegrass in the no-till wheat study.

The unique mode of action of Far-Go could be an advantage in managing herbicide resistant ryegrass. Additional research is needed to evaluate ryegrass control using Far-Go as a part of a planned program in conjunction with postemergence herbicides.

APPLICATION TIMING OF PROWL H2O PLUS OSPREY
 (See Table 6)

Prowl H2O is registered for postemergence applications to wheat after 1-leaf stage but

before flag is visible. Although it will not control established weeds, its soil residual activity will ‘suppress’ Italian ryegrass. For control of established ryegrass, Prowl H2O may be tank mixed with a postemergence herbicide.

This objective of this study was to determine if the soil-residual activity would enhance season-long ryegrass control when tank mixed with Osprey. The tank mix combination of Prowl H2O plus Osprey was compared with Osprey alone. These were sprayed at the following application timings:

Timing	Date	Stage
EP (Early Post)	11-02-06	Wheat 2 leaf
		Ryegrass 1 to 2 leaf
MP (Mid Post)	11-25-06	Wheat 3lf-1 tiller
		Ryegrass 1 lf – 2 tillers
LP (Late Post)	03-08-07	Wheat 5 tillers
		Ryegrass 3 tillers

Ryegrass control at three weeks after application was better with the EP treatments compared with MP and LP treatments (Table 6). The cooler temperatures during the MP and LP treatments appeared to slow the activity of the treatments. However, the level of ryegrass control by 8 weeks after treatment ranged from 92 to 98% and tended to be equal for all herbicide treatments. Prowl did not enhance control over that of Osprey alone, regardless of application timing. However, results in a previous study indicated ryegrass control was improved by 23% when Prowl was used as a tank mix partner with Beyond and applied to 2-leaf ryegrass.

Table 1. Ryegrass Herbicides Evaluated in 2006-2007 Studies

Product (Rate/A)	Active Ingredient	Mode /Site of Action	Application Timing Relative to Ryegrass
Axial	pinoxaden	ACCCase inhibitor	Foliar applied
Finesse Grass & Broadleaf	chlorsulfuron + flucarbazone	ALS inhibitor + ALS inhibitor	Foliar applied. Also has limited soil-residual activity.
Hoelon 3 EC	diclofop -methyl	ACCCase inhibitor	Foliar applied. Also has soil-residual activity. High rate may be applied preemergence at planting
Far-Go ¹	triallate	Cell division inhibitor	Preplant incorporated
Osprey	mesosulfuron	ALS inhibitor	Foliar applied
Prowl H2O	pendimethalin	Mitototic inhibitor	Applied after wheat emergence for residual control/suppression. Has no foliar activity.

¹ Far-Go is not registered for use in Kentucky.

Table 2. Comparison of Axial, Osprey, and Hoelon Applied Alone or in Combination with Harmony Extra or Sencor. (UKREC 2006-2007)

Treatment		Wheat Injury (%) (3-16-07)	Ryegrass	
			Seedheads (Heads/Ft ²) (05-31-07)	Control (%) (06-05-07)
Axial	8.2 oz/A	0	1	97
Adigor	9.6 oz/A			
Axial	8.2 oz/A	0	0	99
Adigor	9.6 oz/A			
Harmony Extra	0.4 oz/A			
Axial	8.2 oz/A	9	2	93
Adigor	9.6 oz/A			
Sencor DF	3 oz/A			
Osprey	4.75 oz/A	0	1	96
NIS	0.5 %			
AMS	3 lb/A			
Osprey	4.75 oz/A	0	1	93
NIS	0.5 %			
AMS	3 lb/A			
Harmony Extra	0.4 oz/A			
Osprey	4.75 oz/A	10	4	80
NIS	0.5 %			
AMS	3 lb/A			
Sencor DF	3 oz/A			
Hoelon	2.66 pt/A	0	0	98
Hoelon	2.66 pt/A	0	1	97
Harmony Extra	0.4 oz/A			
Hoelon	2.66 pt/A	8	0	97
Sencor DF	3 oz/A			
Non-treated Check		0	33	0
LSD ₁₀		6	7	3

1 Planted no-till wheat on 10-13-06. Variety Pioneer 25R35 at 35 viable seed/Ft²
Warrior insecticide was applied 11-21-06 and 3-6-07. Nitrogen: 41 units/A were applied on 2-23-07 and 80 units/A were applied on 3-23-07. Tilt fungicide was applied at 4 oz/A on 5-06-07.

2 Applied treatments in a spray volume of 10 GPA on 11-27-06.
Wheat: 3 leaf to 1 tiller, 3.5" tall
Ryegrass: 1 leaf to 2 tillers, 2.5" tall.

Table 4. Ryegrass Control and Crop Injury in Minimum Till Wheat with Far-Go or Osprey. (UKREC 2006-2007) ^{1 2}

Treatments ³		Ryegrass ⁴			Wheat Injury ⁵	
Herbicide	Incorporation/Application Method	Control (%)		(Seedheads/Ft ²)	Phyto (%)	Stunting (%)
		11/22/06	06-05-07	05-30-07	11-02-06	11-02-06
Far-Go	Roterra	94	88	4	0	8
Far-Go	Drill	91	80	5	0	0
Far-Go	No Incorporation	83	68	8	0	0
Osprey	Post	—	96	2	—	—
Check		0	0	29	0	0
	LSD ₍₁₀₎	7	9	5	NS	NS

4 Management Practices: No-till corn into ryegrass infested area on 2006. Applied 2 tons of lime/A Oct 6, 2006. Overseeded area with ryegrass to ensure uniform infestation. Tilled test area with 2 passes of a disk. There was approximately 50% ground cover of corn residue after disking. Warrior insecticide was applied 11-21-06 and 3-6-07. Nitrogen: 41 units/A were applied on 2-23-07 and 80 units/A were applied on 3-23-07. Tilt fungicide was applied at 4 oz/A on 5-06-07.

2 Wheat was planted 10-12-06. Variety was Pioneer 25R35. Seeding rate was 35 viable seeds/Ft².

3 Far-Go was applied at a rate of 3 pt/A on 10-12-06..

Incorporation methods for Far-Go:

Roterra: Made 2 passes approximately 1.5” deep immediately after application of Far-Go, then planted wheat

Drill: Applied Far-Go immediately prior to planting with Lilliston Drill (7” disc spacings)

No Incorporation: Applied Far-Go immediately after planting.

Osprey was applied at 4.75 oz/A + NIS + 28% Liq. N on 11-22-06. (Wheat 2-3 leaf stage 3” tall) (Ryegrass 2-3 leaf stage 2” tall)

4 Ryegrass control ratings and plant counts were made at various times during the season. Ryegrass densities at the time of applying Osprey (11-22-06) ranged from 5 to 8 plants /Ft² for Far-Go treatments and 44 plants/Ft² where Osprey was applied.

Wheat injury ratings for phytotoxicity and stunting were made at various times after planting. Wheat stands were not affected by Far-Go and averaged 35 plants/Ft².

**Table 5. Ryegrass Control and Crop Injury in No-Till Wheat with Far-Go or Osprey.
(UKREC 2006-2007) ^{1 2}**

Treatments ³		Ryegrass ⁴			Wheat Injury ⁵	
Herbicide	Incorporation/Application Method	Control (%)		(Seedheads/Ft ²)	Phyto (%)	Stunting (%)
		11/23/06	06-05-07	05-31-07	11-02-06	11-02-06
Far-Go	Drill	73	68	6	0	5
Far-Go	No Incorporation	60	50	11	0	13
Osprey	Post	—	93	2	—	—
Check		0	0	33	0	0
LSD ₍₁₀₎		14	9	12	NS	8

- Management practices: No-till corn into ryegrass infested area on 2006. Applied 2 tons of lime/A Oct 6, 2006. Overseeded area with ryegrass to ensure uniform infestation. Mowed corn stalks prior to planting. Warrior insecticide was applied 11-21-06 and 3-6-07. Nitrogen: 41 units/A were applied on 2-23-07 and 80 units/A were applied on 3-23-07. Tilt fungicide was applied at 4 oz/A on 05-06-07.
- Wheat was planted 10-13-06. Variety was Pioneer 25R35. Seeding rate was 35 viable seeds/Ft².
- Far-Go was applied at a rate of 3 pt/A on 10-13-06.
Incorporation methods for Far-Go:
 Drill: Applied Far-Go immediately prior to planting with Lilliston Drill (7" disc spacings)
 No Incorporation: Applied Far-Go immediately after planting.
 Osprey was applied at 4.75 oz/A + NIS + 28% Liq. N on 11-23-06. (Wheat 3-leaf stage 3" tall) (Ryegrass 3-leaf stage 2" tall)
- Ryegrass control ratings and plant counts were made at various times during the season. Ryegrass density at the time of applying Osprey (11-23-06) was 26 plants /Ft² for check plots.
- Wheat injury ratings for phytotoxicity and stunting were made at various times after planting. Wheat stands were not affected by Far-Go and averaged 30 plants/Ft².

Table 6. Ryegrass Control and Crop Injury in No-Till Wheat with Prowl H2O Plus Osprey or Osprey Alone When Applied at Different Times. (UKREC 2006-2007) ^{1, 2, 3}

Treatments		Ryegrass Control (%) ⁶			Ryegrass Seedheads (Heads/Ft ²)	Wheat Injury (%)	
Herbicide ⁴	Timing ⁵	3 WAT	8 WAT	06-05-07	05-30-07	3 WAT	8 WAT
Osprey	EP	95	98	97	0.7	23	17
Osprey + Prowl H2O	EP	95	95	100	0.2	20	0
Osprey	MP	63	95	100	0.0	0	0
Osprey + Prowl H2O	MP	67	93	100	0.0	17	3
Osprey	LP	40	92	99	0.0	0	0
Osprey + Prowl H2O	LP	60	96	100	0.2	0	0
Non-treated Check	—	0	0	0	26.7	0	0
LSD _(0.10)		16	5	NS	8.7	4	5

1. Management practices: Fallow ryegrass in spring and no-till soybean in summer of 2006. Applied 2 tons of lime/A on 10-6-06. Overseeded area with ryegrass to ensure uniform infestation. Mowed corn stalks prior to planting. Warrior insecticide was applied 11-21-06 and 03-06-07. Nitrogen: 41 units/A were applied on 2-23-07 and 80 units/A were applied on 3-23-07. Tilt fungicide was applied at 4 oz/A on 05-06-07.

2. Wheat was planted 10-13-06. Variety was Pioneer 25R35. Seeding rate was 35 viable seeds/Ft²

3 Wheat Stand: 29 plants/Ft² on 10-30-06. Ryegrass Density: 26 plant/Ft² on 11-23-06

4 Osprey applied at 4.75 oz/A + NIS 0.5% + Liquid N 1.5 qt/A
Prowl H2O applied at 2.1 pt/A

5 Application Timing: EP (11-02-06) MP (11-25-06) LP (03-08-07)
 Wheat 2 Lf 2-4" tall 3 Lf – 1 tiller, 3" tall 5 tillers
 Ryegrass 1-2 Lf, 2-2.5" tall 1 Lf-2 tillers up to 10 tillers (Avg. 3 tillers, 3.25" tall)

6 WAT = Weeks After Treatment.