

EVALUATION OF HERBICIDES FOR ITALIAN RYEGRASS CONTROL IN WHEAT (UKREC 2007-2008)

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Introduction:

Six herbicides were evaluated for ryegrass control in one or more of five studies during the 2007 – 2008 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 were evaluated.

Program Approach Using Osprey or Atlantis Alone or as a Companion with Axiom (see Table 2):

Osprey and Atlantis are limited in their ability to provide soil-residual control of ryegrass. In contrast, Axiom offers limited soil-residual activity, but is limited in its ability to control emerged ryegrass plants.

This research was conducted to compare ryegrass control with Atlantis or Osprey when applied alone, or as a tank mix, or sequential companion with Axiom.

Based on December ratings, ryegrass control with Axiom was 73 to 80% when applied as an Early Post, prior to Osprey or Atlantis. However, if Axiom was applied Mid Post as a tank mix partner with either Osprey or Atlantis, control on December 6 was 10 to 13%.

Control ratings at the end of the season ranged from 93 to 100% for all herbicide treatments.

Control was slightly better when Axiom was applied Early Post, prior to Osprey or Atlantis, compared with Axiom applied Mid Post as a tank mix partner with Osprey or Atlantis. When applied alone, Atlantis provided 99% control compared to 95% with Osprey.

Wheat yield for herbicide treatments ranged from 120.4 to 130.7 bu/A compared with 59.8 bu/A for the non-treated check.

In summary, the enhanced fall control with Axiom applied Early Post did not translate into better control at the end of the season or higher wheat yields compared with the other treatments. Nevertheless, Axiom may be a viable option to limit the development of ALS or ACCase resistant ryegrass.

Impact of Tank Mixing Broadleaf Herbicides with Axial XL (see Table 3):

Axial XL is used to control weedy grasses in wheat, but is limited in its ability to control broadleaf weeds. Including an herbicide for managing broadleaf weeds or wild garlic would help broaden the spectrum of weeds controlled.

This research was conducted to determine if such broadleaf herbicides as Harmony Extra, Peak, or Orion caused antagonism to Axial for ryegrass control.

Ryegrass control ranged from 98 to 100% for all herbicide treatments. Henbit control was

93% with the treatment containing Harmony Extra. The poor henbit control observed with Peak and Orion treatments was expected since these herbicides are not effective in controlling henbit.

Wheat yield ranged from 107.6 to 120.3 bu/A for herbicide treatments, compared with 69 bu/A for the non-treated check. The slightly lower yield with Axial XL applied alone may be due to lack of henbit control.

In summary, broadleaf herbicides such as Harmony Extra, Peak, or Orion did not cause antagonism to Axial XL for controlling Italian ryegrass.

Ryegrass Control Programs with Prowl H₂O and Osprey (see Table 4):

Prowl H₂O is registered for post emergence applications to wheat after 1-leaf stage but before flag is visible. Although Prowl H₂O 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.

The objective of this study was to determine if the soil-residual activity of Prowl H₂O would enhance season-long ryegrass control when tank mixed with or applied prior to Osprey or Axial.

Prowl H₂O applied alone before wheat emergence as a PRE or Delayed PRE provided 68 to 70 % control at four weeks after application. By spring time, control with these treatments ranged from 48 to 50%.

Applying Prowl H₂O as a Delayed PRE, followed by a sequential application of either Osprey or Axial at 1 to 2 tillers, resulted in 100% ryegrass control. Early applications of tank mixes of Prowl H₂O with postemergence herbicides at 1-2 leaf wheat tended to be less effective

compared with other treatments applied 1 to 2 tillered wheat, especially with Osprey treatments.

In summary, Prowl H₂O provides suppression in the fall but requires a foliar applied herbicide either as a tank mix partner or sequential application to achieve maximum ryegrass control. There may be a risk of late-season escapes if tank mix treatments of Prowl H₂O, plus a post herbicide, are applied too early in the fall.

Ryegrass Control in Minimum and No-Till Wheat Using Different Incorporation Methods for Far-Go (see Tables 5 and 6):

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 options 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 evaluate opportunities for using Far-Go in Kentucky. Some factors evaluated included incorporation methods and use of Osprey at a reduced rate as a sequential application to Far-Go. The following methods of incorporation were studied:

Minimum tilled wheat:

Roterra: Apply Far-Go; then incorporate with two passes with Roterra 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.

Far-Go at 3 pt/A provided 63 to 79% control in minimum tilled wheat. The Roterra provided best results with Far-Go in the minimum tillage system. The use of reduced rates of Far-Go and sequential application of Osprey provided similar control to that of the full rate of Osprey in the minimum till system.

Far-Go at 3 pt/A provided 50 to 63% ryegrass control in no-till wheat. Incorporating Far-Go in no-till wheat with the grain drill followed by a reduced rate of Osprey provided slightly better control compared with Osprey applied alone at the full labeled rate.

In summary, Far-Go appeared to provide better ryegrass control in minimum till wheat compared with no-till wheat. The Roterra provided the best incorporation of Far-Go in minimum till wheat. Depending on cost of herbicides, Far-Go may be a viable option as a part of a planned program for managing Italian ryegrass, especially as a tool for limiting the development of herbicide-resistant populations.

Table 1. Ryegrass Herbicides Evaluated in 2007-2008 Studies

Product (Rate/A)	Active Ingredient	Mode /Site of Action	Application Timing Relative to Ryegrass
Atlantis	mesosulfuron + iodosulfuron	ALS inhibitor ALS inhibitor	Foliar applied
Axial	pinoxaden	ACCase inhibitor	Foliar applied
Axiom	flufenacet metribuzin	Inhibits cell division Photosynthesis inhibitor	Applied after emergence to 3 leaf wheat but prior to 1 leaf ryegrass for suppression
Far-Go 1	triallate	Cell division inhibitor	Preplant incorporated
Osprey	mesosulfuron	ALS inhibitor	Foliar applied
Prowl H ₂ O	pendimethalin	Mitotic 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. Ryegrass Control and Wheat Yield with Osprey & Atlantis Applied Alone or as a Tank Mix or Sequential Companion with Axiom.
(UKREC 2007-2008)

Chemicals ¹	Application Timing ²	Ryegrass		Wheat Yield (Bu/A)
		Control (%) 12/06/07	Control (%) 06/07/08	
Osprey (4.76 oz/A)	MP	12	95	130.7
Axiom (6 oz/A)	EP	73	100	121.8
Osprey (4.76 oz/A)	Sequential			
Axiom (6 oz/A)	MP	13	93	121.7
Osprey (4.76 oz/A)	MP			
Atlantis (5.95 oz/A)	MP	13	99	127.9
Axiom (6 oz/A)	EP	80	99	120.4
Atlantis (5.95 oz/A)	Sequential			
Axiom (6 oz/A)	MP	10	96	125.3
Atlantis (5.95 oz/A)	MP			
Non-treated Check		0	0	59.8
	LSD (0.05)	7	2	16.7

¹ Nonionic surfactant + liquid N at 4 pt/A were included as additives with Osprey & Atlantis.

² Application Timings:

EP: 10/09/07 (wheat 1-2 leaves and ryegrass 1 leaf.)

MP: 11/28/07 (wheat 4 leaves - 1 tiller and ryegrass 1 tiller)

Sequential: 12/04/07: (wheat 1-2 tillers and ryegrass 1-2 tillers)

Table 3. Henbit & Ryegrass Control and Wheat Yield with Axial XL Applied Alone or as a Tankmix Partner with Harmony Extra, Peak, or Orion.

(UKREC 2007-2008)

Herbicides ¹	Henbit Control (1/26/08)	Ryegrass Control (6/07/08)	Wheat Yield (Bu/A)
Axial XL (16.4 oz./A)	0	100	107.6
Axial XL (16.4 oz./A) + Harmony Extra XP (0.4 oz./A)	93	98	115.7
Axial XL (16.4 oz./A) + Peak (0.25 oz./A)	17	100	120.3
Axial XL (16.4 oz./A) + Orion (17 fl oz./A)	77	100	118.4
Non-treated Check	0	0	69.0
LSD _(0.05)	15	2.5	6.3

1 Treatments applied 12/01/07.

Table 4. Italian Ryegrass Control Programs with Prowl H₂O and Osprey.

(UKREC 2007-2008)

Herbicides ¹	Application Timing ²	Ryegrass Control (%) ³		Wheat Yield (Bu/A)
		28 DAT	6/07/08	
Prowl H ₂ O (2.1 pt/A)	PRE	68	58	96.4
Prowl H ₂ O (2.1 pt/A)	Delayed PRE	70	43	93.9
Osprey (4.7 oz./A)	1-2 Lf	80	78	132.2
Prowl H ₂ O (2.1 pt/A)	1-2 Lf	83	78	135.6
Osprey (4.7 oz./A)	1-2 LF			
Osprey (4.7 oz./A)	1-2 Till	55	96	141.9
Prowl H ₂ O (2.1 pt/A)	1-2 Till	53	100	137.4
Osprey (4.7 oz./A)	1-2 Till			
Prowl H ₂ O (2.1 pt/A)	PRE	75	100	133.2
Osprey (4.7 oz./A)	1-2 Till			
Prowl H ₂ O (2.1 pt/A)	Delayed PRE	70	100	138.7
Osprey (4.7 oz./A)	1-2 Till			
Axial (8.2 oz./A)	1-2 Till	75	98	118.1
Prowl H ₂ O (2.1 pt/A)	1-2 Lf	90	90	131.0
Axial (8.2 oz./A)	1-2 Lf			
Prowl H ₂ O (2.1 pt/A)	Delayed PRE	80	100	134.7
Axial (8.2 oz./A)	1-2 Till			
Non-treated Check		0	0	77.0
	LSD _(0.05)	7	4	17.2

¹ Additives were included with Osprey & Axial according to label directions

² Application Timings:

PRE 10/15/07

Delayed PRE: 10/19/07

1-2 Lf: 10/29/07

1-2 Till 11/28/07

³ Control ratings were 28 days after last application and on June 7, 2008.

**Table 5. Ryegrass Control & Wheat Yield in a Minimum Tillage System
Using Different Incorporation Methods for Far-Go.
(UKREC 2007-2008) ¹**

Treatments		Ryegrass ³			Wheat Yield (Bu/A)
Herbicide	Incorporation & Application Method ²	Control (%)		(Seedheads per Ft ²)	6/19/08
		11/28/07	06/07/08	06/11/08	
Far-Go 3Pt/A	No Incorporation	65	63	17.1	84.6
Far-Go 3 Pt/A	Drill	75	68	15.5	92.9
Far-Go 3 Pt/A	Roterra	89	79	7.8	102.7
Far-Go 2 Pt/A	No Incorporation	63	98	0	118.1
Osprey 3.2 oz/A	Post				
Far-Go 2 Pt/A	Drill	70	100	0	123.3
Osprey 3.2 oz/A	Post				
Far-Go 2 Pt/A	Roterra	85	100	0	121.9
Osprey 3.2 oz/A	Post				
Osprey 4.75 oz/A	Post	0	96	0.3	123.3
Check		0	0	22.5	53.4
LSD (10)		6	5	6.3	6.7

¹ **Management Practices:** Tilled test area with two passes of a disk. There was approximately 65% ground cover of corn residue after disking. Wheat was planted 10/15/07. Variety was Pioneer 25R54. Seeding rate was 39 viable seeds/ft².

² **Incorporation / Application Methods:**

Roterra: Made two passes approximately 1.5" deep immediately after 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.

Post: Osprey was applied 11/28/07 with surfactant at 0.5% + 28% Liq. N at 2 qt/A (Wheat 2 tillers 3.5" tall) (Ryegrass 2 tillers 2.5" tall)

³ Ryegrass control ratings were made on 11/28/07 (the time of Osprey application) and on 6/7/08. Ryegrass head counts determined from two random locations per plot.

Table 6. Ryegrass Control & Wheat Yield in a No Tillage System Using Different Incorporation Methods for Far-Go.¹
(UKREC 2007-2008)

Treatments		Ryegrass ³			Wheat Yield (Bu/A)
Herbicide	Incorporation & Application Method ²	Control (%)		(Seedheads per Ft ²)	6/19/08
		11/28/07	06/07/08	06/11/08	
Far-Go 3Pt/A	No Incorporation	70	50	12.3	113.6
Far-Go 3 Pt/A	Drill	78	63	9.9	120.0
Far-Go 2 Pt/A	No Incorporation	63	96	0.3	134.1
Osprey 3.2 oz/A	Post				
Far-Go 2 Pt/A	Drill	73	100	3.8	144.0
Osprey 3.2 oz/A	Post				
Osprey 4.75 oz/A	Post	0	95	0.4	137.0
Check		0	0	13.1	99.6
LSD (10)		9	4	6.2	15.4

¹ Management Practices: Wheat was planted no-till 10/13/07. There was approximately 92% ground cover of corn residue after disking. Variety was Pioneer 25R54. Seeding rate was 39 viable seeds/Ft².

² Incorporation / Application Methods:

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

No Incorporation: Applied Far-Go immediately after planting.

Post: Osprey was applied 11/28/07 with surfactant at 0.5% + 28% Liq. N at 2 qt/A (Wheat 2 tillers 4.5" tall) (Ryegrass 1 to 2 tillers 2.9" tall)

³ Ryegrass control ratings were made on 11/28/07 (the time of Osprey application) and on 6/7/08. Ryegrass head counts determined from two random locations per plot.