APPLICATION TIMING OF NITROGEN FERTILIZER RELATIVE TO OSPREY

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Introduction:

Osprey (mesosulfuron methyl) is a relatively new foliar applied herbicide used to manage weedy gasses after wheat emergence. It is an ALS (Acetolactate Synthase) inhibitor that can injure wheat; consequently, it is formulated with the safener, menfenpyr diethyl, in order to limit the risk of phytotoxicity.

There have been isolated cases where Osprey injured wheat, particularly when it was applied near the time of topdressing nitrogen fertilizer. The herbicide label for Osprey cautions against making applications within 14 days of topdressing ammonium nitrogen fertilizer, otherwise crop injury may occur.

The objective of this research was to evaluate crop injury and possible effects on wheat yield relative to using Osprey near the same time as nitrogen fertilizer applications.

'Pioneer 25R35' wheat was planted October 13, 2006 using no-tillage practices. In order to help eliminate variability from other pests, Warrior insecticide was applied in the

fall and spring and Tilt fungicide was applied in the spring.

Osprey was applied March 7, 2007 with a boom sprayer; whereas, 28% liquid nitrogen was applied as a topdress application at a rate of 40 gallons (120 units of N)/A with stream bars at –14 days, -7 days, 0 day, + 7 days and + 14 days relative to Osprey. Each nitrogen treatment that was associated with Osprey, received the same nitrogen fertilizer treatment but without Osprey.

Results:

Injury in the form of stunted plants and yellowing of leaf tissue occurred in selected treatments where Osprey was applied (Figure 1).

Plant Height: Wheat plants were stunted in all plots within 1 week after Osprey was applied (Table 1). The amount of stunting was usually greater when nitrogen fertilizer was topdressed the same day as spraying Osprey (i.e. 0-day timing of N fertilizer) as well as 14 days ahead of Osprey (i.e. – 14 days).

Osprey tended to cause stunting for all timings through 6 weeks after application. However, the only timings where stunting was statistically significant were the +14, +7 and 0 day timing of N. The degree and duration of stunting was greater when topdressing N was done before than after Osprey.

It is interesting to note that by maturity, the Osprey treated plants tended to be taller than the plants that did not receive Osprey. It is likely that the initial injury from Osprey delayed the development of wheat; consequently plants were able to tolerate the freezing temperatures that occurred during April 6-10.

Discolor Ratings: Wheat vegetation was chlorotic to necrotic within 1 week after applying Osprey. Visual ratings on a 0 to 5 scale (0 = no discoloration; 5 = completely yellow or brown) indicated the greatest discoloration occurred when spraying Osprey and topdressing N occurred the same day (Table 2). Most Osprey treatments had some discoloration at 1 week after Osprey was sprayed. The only treatment that had significant discoloration at 3 weeks after spraying Osprey was 0-day timing of topdressing. Plants recovered from discoloration by 4 weeks after spraying Osprey.

The visual ratings for discoloration showed an opposite trend by 6 weeks after Osprey treatment. It is likely that plants that were not treated with Osprey were further in their development and more prone to the freezing temperatures in early April. These plants began to dieback from the freeze injury and turn yellow or brown on April 18 (6 weeks after Osprey). However, the Osprey treated plants that had discoloration in early to mid March were delayed in their development and were more tolerant to the low temperatures in early April.

Wheat Yield: In spite of the freeze injury, wheat yields were high and ranged from 89 to 101.3 bu/A (Figure 2). As much as 11 % increase occurred when Osprey was applied the same day as topdressing. Other Osprey-treated wheat tended to yield greater than wheat that did not receive Osprey, yet the differences were not statistically significant.

The delay in the growth caused by Osprey injury allowed plants to tolerate the low temperatures and yielded better than plants that did not receive Osprey.

Summary:
Wheat injury in the form of stunted and yellow to necrotic plants occurred where Osprey was applied and was dependant on the timing of topdressing nitrogen fertilizer relative to Osprey. The level of injury was greatest when Osprey and nitrogen were applied the same day. Plants that were injured the greatest recovered from discoloration by 4 weeks, but remained stunted through 6 weeks after being treated with Osprey.

The unexpected higher yield where plants were injured the greatest from Osprey, compared with plants that did not receive Osprey, is attributed to the unusual freezing temperatures in early April. Plants that were injured from the March application of Osprey were delayed in growth and less prone to the freezing temperatures in early April. Osprey-treated plants were able to recover more quickly from the freeze injury and yielded better. There was a greater tendency to affect growth and yield of wheat when nitrogen was topdressed before or the same day as Osprey application than after Osprey application.

Figure 1. **WHEAT INJURY SYMPTOMS**
Osprey & Topdressing N Same Day
(Photos 1 week After Application)

OSPREY 3-10-06 **NO OSPREY**

***Table1*. Impact of Topdressing Nitrogen at Different Timings on Wheat Height at 1 to 6 Weeks After Osprey and at maturity (UKEC 2006-2007)**

Treatment		Wheat Plant Height (Inches)[3]						
Topdressing Timing [1]	Osprey[2] Application	1 WAT (3-14-07)	2 WAT (3-21-07)	3 WAT (3-28-07)	4 WAT (4-04-07)	5 WAT (4-11-07)	6 WAT (4-18-07)	Maturity (6-7-07)
-14 Days	Osprey	4.2 d	5.6 cd	10.6 c	13.7 de	13.4 d	14.7 d	29.3 bcd
	No Osprey	6.4 a	6.9 ab	13.4 a	15.8 a	16.8 a	17.2 a	28.8 cd
- 7 Days	Osprey	4.4 d	4.7 e	9.9 d	13.2 e	13.9 d	14.8 d	29.5 bc
	No Osprey	5.9 b	7.4 a	13.6 a	15.5 ab	15.8 b	16.9 ab	28.5 cd
0 Day	Osprey	3.2 e	3.3 f	7.5 f	10.1 f	11.3 e	12.9 e	31.0 a
	No Osprey	5.2 c	7.1 a	12.7 b	14.8 bc	15.8 bc	16.1 bc	28.3 d
+ 7 Days	Osprey	4.3 d	5.0 de	9.7 d	13.2 e	13.5 d	15.2 cd	30.3 ab
	No Osprey	5.3 c	6.2 bc	12.1 b	14.2 cd	15.9 b	15.5 cd	28.5 cd
+14 Days	Osprey	4.5 d	4.3 e	8.9 e	13.2 e	14.0 d	15.0 d	29.5 bc
	No Osprey	5.3 c	5.0 de	10.3 cd	14.3 cd	15.1 c	15.7 cd	28.5 cd

1 Application timing of topdressing relative to Osprey. Liquid nitrogen (28%) applied at 120 units/A with stream bars.

- 14 Days 02-21-07
- 7 Days 02-28-07
0 Day 03-07-07
+ 7 Days 03-14-07
+ 14 Days 03-21-07

2 Osprey at 4.75 oz/A+ Surfactant 0.5% + Liquid N 2 qt/A applied in water with a sprayer in 20 gal/acre volume on 03-07-07.

3 Wheat plant heights at 1, 2, 3, 4, 5, and 6 weeks after Osprey treatment and at maturity (06-07-07). Determined from 5 random plants per plot.

Table 2. **Impact of Topdressing Nitrogen at Different Timings on Visual Rating of Discoloration of Wheat at 1 to 6 Weeks After Osprey (UKEC 2006-2007)**							
Treatment		Discoloration Index Rating [3]					
Topdressing Timing [1]	Osprey[2] Application	1 WAT (3-14-07)	2 WAT (3-21-07)	3 WAT (3-28-07)	4 WAT (4-04-07)	5 WAT (4-11-07)	6 WAT (4-18-07)
-14 Days	Osprey	1.8 c	1.0 de	0.0 b	0.0 a	0.0 a	1.5 b
	No Osprey	0.0 f	0.0 f	0.3 b	0.0 a	0.0 a	2.0 a
- 7 Days	Osprey	2.5 b	1.8 bc	0.0 b	0.0 a	0.0 a	1.3 bc
	No Osprey	0.0 f	0.0 f	0.3 b	0.0 a	0.0 a	2.0 a
0 Day	Osprey	4.0 a	4.0 a	1.0 a	0.0 a	0.0 a	1.0 c
	No Osprey	1.5 c	0.3 f	0.0 b	0.0 a	0.0 a	2.0 a
+ 7 Days	Osprey	1.3 cd	2.3 b	0.0 b	0.0 a	0.0 a	1.3 bc
	No Osprey	0.8 de	1.0 de	0.0 b	0.0 a	0.0 a	2.0 a
+14 Days	Osprey	1.3 cd	1.5 cd	1.0 a	0.0 a	0.0 a	1.5 b
	No Osprey	0.5 ef	0.5 ef	1.0 a	0.0 a	0.0 a	2.0 a

1 Application timing of topdressing relative to Osprey. Liquid nitrogen (28%) applied at 120 units/A with stream bars.

- 14 Days 02-21-07
- 7 Days 02-28-07
0 Day 03-07-07
+ 7 Days 03-14-07
+ 14 Days 03-21-07

2 Osprey at 4.75 oz/A+ Surfactant 0.5% + Liquid N 2 qt/A applied in water with a sprayer in 20 gal/acre volume on 03-07-07.

3 Rating 0 to 5 index with 0 = no discoloration, 5 = completely yellow or brown at 1, 2, 3, 4, 5, and 6 weeks after Osprey treatment.

Figure 2. Impact of Topdressing Nitrogen at Different Timings Relative to Osprey on Wheat Yield (UKREC 2006-2007)