

RESPONSE OF WHEAT TO OSPREY AND NITROGEN FERTILIZER APPLICATIONS (2006-2007 & 2007-2008)

James Martin, Charles Tutt, and Dottie Call
Plant & Soil Sciences Department
University of Kentucky, Princeton, KY 42445
PH: (270) 365-7541, Ext. 203; Email: jamartin@uky.edu

Osprey (proposed common name mesosulfuron methyl) is a foliar-applied herbicide used to manage weedy grasses after wheat emergence. It is an Acetolactate Synthase (ALS) inhibitor that can injure wheat; consequently, it is formulated with the safener, mefenpyr diethyl. There have been isolated cases in Kentucky 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 due to the risk of crop injury.

This research was conducted over a two-year period during the 2006-2007 and 2007-2008 growing seasons to evaluate wheat response when nitrogen fertilizer was topdressed at different times relative to spring application of Osprey. Liquid nitrogen was applied with stream bars at 120 units/A. The commercial formulation of Osprey with the safener, was applied in mid-March at a rate of 4.75 oz/A plus surfactant at 0.5% (v/v), plus 28% liquid nitrogen at 1 qt/A in water at spray volume of 20 GPA with 8003 flat fan tips. The timing for topdressing nitrogen in the first study occurred over a period of five weeks at weekly intervals designated as -14, -7, 0, +7, and +14 days relative to timing of Osprey. The timings for the second study also included -21 and +21 days; consequently, topdressing timings occurred over a period of seven weeks. Each nitrogen treatment that was associated with

Osprey, had the same nitrogen fertilizer treatment but without Osprey.

Results:

Wheat injury in the form of yellow or necrotic leaves and stunted plants tended to be greatest where Osprey and 28% liquid nitrogen were applied the same day (Tables 1 & 2). When topdressed the same day as Osprey, wheat plants recovered from discoloration within 3 weeks after the herbicide was applied in 2007 and 4 weeks after treatment in 2008.

Wheat plants were numerically shorter than the non-treated checks within one to two weeks after Osprey in both studies. 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). In 2007, Osprey tended to cause stunting for most timings through 6 weeks after application. Freezing temperatures during April 6 -10 caused substantial freeze damage to plants that were rapidly growing and not injured from the Osprey. By the time wheat matured in 2007, the plants that were initially injured from Osprey tended to be taller than the plants that did not receive Osprey. It is likely that the initial injury from the herbicide delayed the development of wheat; consequently, these plants were able to tolerate the freezing temperatures that occurred during early April.

In the 2008 study, the herbicide-treated plants were numerically shorter than the non-treated checks up to 6 weeks after Osprey and remained stunted up to maturity, when nitrogen was topdressed at 0 and + 7 days.

The unexpected greater yield in the first study 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 (Figure 1). 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 than plants that did not receive the herbicide.

Herbicide injury in the second study limited wheat yield by 8.3 and 9.6 bu/A when liquid nitrogen was topdressed the same day as Osprey and seven days after Osprey, respectively (Figure 2). In spite of herbicide

injury, the best overall wheat yield in the second study occurred for nitrogen topdressed February 21 or 14 days before Osprey.

In summary, Osprey caused wheat to be stunted and have yellow or necrotic leaves, especially when applied the same day as topdressing nitrogen fertilizer. The plants recovered from discoloration by five weeks after the herbicide was applied; however, stunting occurred up to maturity for some treatments in the second study. The freezing temperatures in April of 2007 distorted treatment effects on end-of-season growth and yield. The only treatments where Osprey limited wheat yield in the second study was when nitrogen was topdressed the same day as Osprey and seven days after the herbicide.

Acknowledgements:

Appreciation is expressed to Kentucky Small Grains Promotion Council for helping sponsor this research.

Table 1. Wheat Height Reduction When Topdressed with N at Different Times Relative to Osprey (UKREC 2006-2007 and 2007-2008)

	TIMING FOR TOPDRESSING	1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	MATURITY
		Wheat height reduction in inches beginning 1 week after Osprey and ending at maturity						
2006 – 2007 STUDY	- 14 Days	- 2.2	- 1.3	- 2.8	- 2.1	- 3.4	- 2.5	+ 0.5
	- 7 Days	- 1.5	- 2.7	- 3.7	- 2.3	- 1.9	- 2.1	+ 1.0
	0 Day	- 2.0	- 3.8	- 5.2	- 4.7	- 4.3	- 3.9	+ 2.7
	+ 7 Days	- 1.0	- 1.2	- 2.4	- 1.0	- 2.4	- 0.3	+ 1.8
	+ 14 Days	- 0.8	- 0.7	- 1.4	- 1.1	- 1.1	- 0.7	+ 1.1
2007 – 2008 STUDY	- 21 Days	- 0.4	- 0.9	- 1.4	- 0.9	- 0.7	- 0.3	- 0.7
	- 14 Days	- 0.3	- 1.2	- 1.5	- 0.9	- 0.5	- 0.9	- 1.4
	- 7 Days	- 0.5	- 1.4	- 1.8	- 1.8	- 0.8	- 0.7	- 0.2
	0 Day	- 0.7	- 1.7	- 2.6	- 2.4	- 1.9	- 2.2	- 1.8
	+ 7 Days	- 0.3	- 0.7	- 1.6	- 1.7	- 1.9	- 2.2	- 1.9
	+ 14 Days	+ 0.8	+ 0.3	+ 0.1	- 0.4	- 0.1	0.0	- 0.1
	+ 21 Days	- 0.2	- 0.7	- 0.6	- 0.2	- 0.1	- 0.6	- 0.3

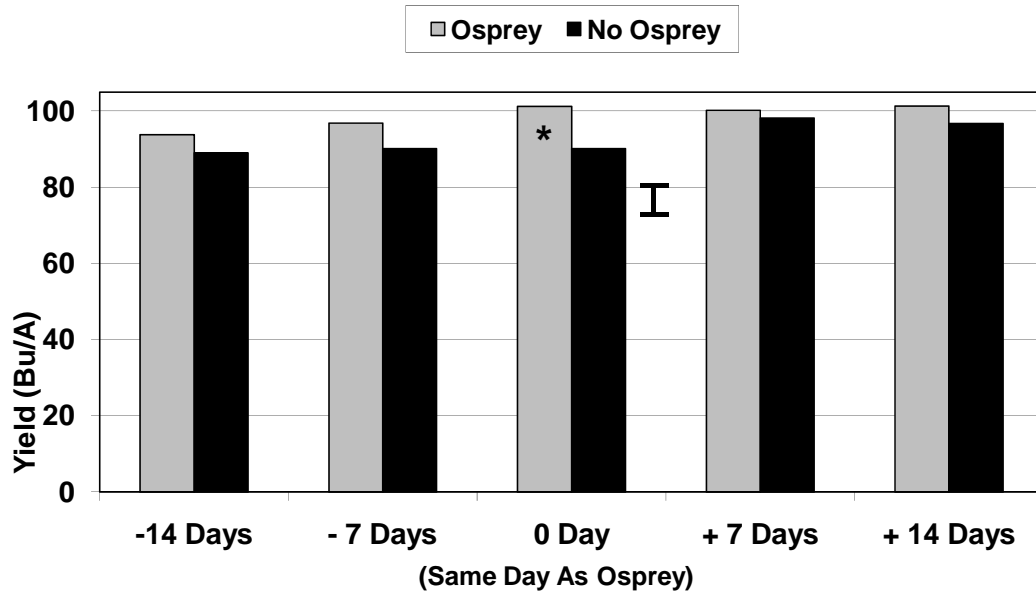
Heights measured at 1 through 6 weeks after Osprey treatment and at maturity
Shaded cells indicate statistical significant height reduction relative to Nitrogen checks.

Table 2. Wheat Discoloration Ratings When Topdressing with N at Different Times Relative to Osprey (UKREC 2006-2007 and 2007-2008)

	TIMING FOR TOPDRESSING	1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT
		Discoloration ratings at 1 through 6 weeks after Osprey					
2006 – 2007 STUDY	- 14 Days	2	1	0	0	0	0
	- 7 Days	3	2	0	0	0	0
	0 Day	4	4	1	0	0	0
	+ 7 Days	1	2	0	0	0	0
	+ 14 Days	1	2	1	0	0	0
2007 – 2008 STUDY	- 21 Days	0	1	0	0	0	0
	- 14 Days	0	1	0	0	0	0
	- 7 Days	1	2	0	0	0	0
	0 Day	3	4	2	1	0	0
	+ 7 Days	0	2	1	0	0	0
	+ 14 Days	0	1	3	0	0	0
	+ 21 Days	0	1	1	0	0	0

Discoloration rating on a 0 to 10 scale 0 = no discoloration 10 = complete loss of green color
Shaded cells indicate statistical significant discoloration relative to nitrogen checks.

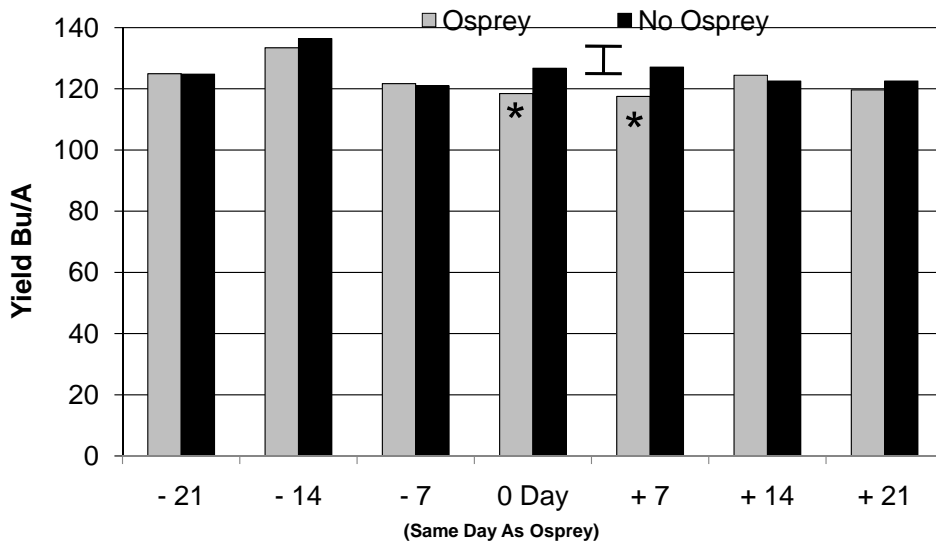
Figure 1. Wheat Yield (2006-2007)



Timing of topdressing nitrogen in days relative to Osprey application

(* Significant yield increase at 0 Day)

Figure 2. Wheat Yield (2007-2008)



Timing of topdressing nitrogen in days relative to Osprey application

(* Significant Yield reduction at 0 Day and + 7 Days)