2005
Annual Research Report

Refinement of Roadside Vegetation Management Practices in Oklahoma

Produced under
OSU/ODOT Joint Project: 2157

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Introduction

The intent of this research report is to supply ODOT personnel with the latest evaluations of products being developed for use in roadside vegetation management programs. Each of these studies have products or treatments being evaluated that could potentially have an impact on ODOT roadside vegetation management programs. All of the research presented in this report has been conducted using today's most modern research techniques and procedures and every attempt has been made to minimize research error so that product performances may be evaluated. All research studies were conducted on state highway system roadsides and under normal roadside conditions. As with all herbicide research conducted under field conditions, there are many variables that influence the effects of the various herbicide treatments other than the herbicides themselves. Every attempt has been made to evaluate both positive and negative treatment results taking into consideration the specific field conditions at each study site. All data collected from treated plots were compared to nearby untreated plots for comparison. All data collected was completely unbiased as to product and manufacturer.

Title: Preemergence and Postemergence control of roadside weeds with DE-750
Trial ID: 4-H-59-05
Date Treated: 3/14/05 **Study Directors:** Doug Montgomery/Craig Evans
Location: Garfield Co. **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-81, 0.7 miles south of Waukomis (west side of highway)
Trial Objective: The objective of this study was to evaluate an experimental herbicide from Dow AgroSciences for preemergence and postemergence weed control of various broadleaf and grassy weeds and common bermudagrass tolerance.

Application Description	
Number of Replications:	3
Plot Size:	10 ft. x 20 ft.
Application Date:	3-14--05
Time of Day:	7:25 a.m.
Application Timing:	Pre & Post
Air Temperature:	39 F
% Relative Humidity:	78
Wind Velocity:	2-3 mph
Dew Present:	No
Soil Temperature:	43 F
Soil Moisture:	Good
% Cloud Cover:	40
Application Equipment:	CO2 bicycle
Operating Pressure:	25 psi
Nozzle Type:	Flat fan
Nozzle Size:	8002 VS
Ground Speed:	1.8 mph
Carrier Rate:	20

Soil Description	
% Sand: NA	% OM: 3.18
% Silt: NA	pH: 7.3
% Clay: NA	
Soil Name: Pond Creek silt loam	

Weed Stage At Each Application	
Weed 1:	Common chickweed
Stage Scale:	0.5-1 inch
Weed 2:	Carolina geranium
Stage Scale:	1-2 inch
Weed 3:	Black medic
Stage Scale:	0.5-1 inch
Weed 4:	Downy brome
Stage Scale:	2-4 inch
Weed 5:	Cheat
Stage Scale:	2-4 inch
Weed 6:	Annual ryegrass
Stage Scale:	2-4 inch
Weed 7	Common ragweed
Stage Scale:	Not yet emerged
Weed 8:	marestail
Stage Scale:	Not yet emerged

Results & Discussion: (refer to Tables 1a & 1b)

Treatments were applied on March 14, 2005. At this time winter annual weeds present were common chickweed , Carolina geranium , black medic , downy brome , cheat , and annual ryegrass . Even though there were a few other winter annual weeds present these were the only ones with enough uniformity and density to evaluate for postemergence control. Preemergence control data was also collected for common ragweed and marestail which had not emerged at the time of application. Common bermudagrass injury data was also collected. This study was under dry conditions for April and early May with moderate to good soil moisture conditions

during the remainder of the trial.

At 28 DAA all treatments, excluding DE-750 at 5 oz., were producing better control of chickweed than the standard treatment of Campaign + AMS. At 56 DAA all treatments including DE-750 were producing 99% control of chickweed while the standard treatment of Campaign + AMS was producing 60% control. AT 28 DAA all treatments including DE-750 were producing better Carolina geranium control than the Campaign + AMS standard. At 56 DAA all treatments including DE-750 were producing 99% control of geranium while the standard treatment of Campaign + AMS was producing 65% control. AT 28 DAA all treatments including DE-750 were producing better black medic control than the Campaign + AMS standard. At 56 DAA all treatments including DE-750 were producing at least 95% control of black medic while the standard treatment of Campaign + AMS was producing 60% control. Treatments of DE-750 alone did not provide acceptable control of downy brome, cheat, or annual ryegrass throughout the duration of this study. AT 28 DAA DE-750 combination treatments including Oust, Campaign, and the Campaign + AMS standard were producing good (.80%) to excellent (>90%) control of brome. The Outrider combination treatment was producing moderate brome control. By 56 DAA DE-750 combination treatments, and the standard, were producing moderate to excellent control of both brome and cheat. At 56 DAA the DE-750 combination treatment with Oust was the only treatment providing acceptable ryegrass control. The DE-750 combination treatment including Oust was the only treatment in this study which produced excellent control of all winter annual weed species in this study. Early 28 DAA preemergence control of common ragweed has shown that all treatments were producing good to excellent control as compared to the standard Campaign + AMS. At 56 DAA ragweed had produced significant growth in untreated plots while all DE-750 alone or combination treatments were showing near complete control of ragweed. AT 85 DAA all DE-750 treatments were maintaining excellent control of ragweed as compared to the standard Campaign + AMS. Marestail control was evaluated at 56 and 85 DAA and was very similar to ragweed control with one exception. The standard treatment of Campaign + AMS produced moderate control of marestail which would likely mean that some of the marestail could have been emerged at treatment time as this treatment should produce little if any preemergence control. Common bermudagrass greenup was evaluated on 28 and 56 DAA at which times only the DE-750 combination treatment with Oust was producing unacceptable greenup delay. No other treatments were producing an unacceptable delay in bermudagrass greenup. At 85 DAA all bermudagrass had achieved 100% greenup however the DE-750 combination treatment with Oust was producing very noticeable bermudagrass stunting which was allowing large crabgrass to infest. All other treatments were producing little if any bermudagrass stunting had very little encroachment of large crabgrass.

In recent conversations with Dow AgroSciences, the manufacturer of DE-750 (soon to be labeled as Milestone VM), they are expecting a full EPA label sometime in late 2005. The weed control achieved from this product during the last 2 years of study has shown that Milestone VM could provide some very useful preemergence control of summer broadleaf weeds. With the loss of atrazine in the recent past ODOT has very few products that provide this type of weed control. We will closely monitor the labeling of Milestone VM and are hopeful it will receive its full label very soon. If Milestone VM receives its EPA label it will be a product that will be highlighted in the summer 2006 Roadside Vegetation Management Bus Tour.

Table 1a. Postemergence broadleaf weed control and common bermudagrass injury with DE-750 tank mixes.

Treated On: March 14, 2005
Trial ID: 4-H-59-05 Study Dir.: Montgomery/Evans
Location: Garfield County

Weed Code Rating Data Type Rating Unit Rating Date Trt-Eval Interval				Bermuda greenup percent 4/11/2005 28 DA-A		Bermuda greenup percent 5/9/2005 56 DA-A		Bermuda injury percent 6/7/2005 85 DA-A		C. chickweed control percent 4/11/2005 28 DA-A		C. chickweed control percent 5/9/2005 56 DA-A		C. geranium control percent 4/11/2005 28 DA-A		C. geranium control percent 5/9/2005 56 DA-A		B. medic control percent 4/11/2005 28 DA-A		B. medic control percent 5/9/2005 56 DA-A		D. brome control percent 4/11/2005 28 DA-A		D. brome control percent 5/9/2005 56 DA-A		Cheat control percent 5/9/2005 56 DA-A		A. ryegrass control percent 5/9/2005 56 DA-A	
Trt No.	Treatment Name	Rate	Rate Unit																										
1	DE-750	5	FL OZ/A	18	bc	79	ab	1	b	66	c	99	a	70	b	99	a	85	a	99	a	1	c	2	c	1	c	5	c
	Activator 90	0.25	% V/V																										
2	DE-750	7	FL OZ/A	18	b	83	a	0	b	85	b	99	a	83	ab	99	a	93	a	95	a	7	c	42	b	40	b	23	bc
	Activator 90	0.25	% V/V																										
3	DE-750	5	FL OZ/A	5	d	38	c	13	a	92	a	99	a	95	a	99	a	93	a	99	a	88	a	95	a	93	a	95	a
	Glypro Plus	8	FL OZ/A																										
	Oust XP	0.33	OZ WT/A																										
	Activator 90	0.25	% V/V																										
4	DE-750	5	FL OZ/A	14	c	82	a	3	b	93	a	99	a	88	ab	99	a	95	a	99	a	70	b	75	a	73	a	60	ab
	Glypro Plus	8	FL OZ/A																										
	Outrider	1.33	OZ WT/A																										
	Activator 90	0.25	% V/V																										
5	DE-750	5	FL OZ/A	15	bc	67	b	5	b	93	a	99	a	95	a	99	a	94	a	99	a	88	a	76	a	70	ab	48	b
	Campaign	32	FL OZ/A																										
	Ammonium Sulfate	17	LB/100 GAL																										
6	Campaign	32	FL OZ/A	23	a	80	ab	2	b	72	c	60	b	40	c	65	b	50	b	60	b	91	a	80	a	73	a	57	ab
	Ammonium Sulfate	17	LB/100 GAL																										
7	Untreated Check			23		75		0		0		0		0		0		0		0		0		0		0		0	
LSD (P=.10)				4.6		14.1		5.8		6.3		14		23.1		11.6		25.2		17.5		17.5		30.4		32.4		42.9	
Standard Deviation				3.1		9.6		3.9		4.2		9.4		15.4		7.7		14.5		7.5		11.7		20.3		21.6		28.7	
CV				18.67		13.4		97.42		5.08		10.1		19.63		8.3		17.05		8.12		20.4		32.98		37.03		59.75	
Replicate F				11.409		2.235		0.527		3.09		0.934		2.216		0.917		0.407		0.6		1.135		0.467		0.354		1.238	
Replicate Prob(F)				0.0021		0.1533		0.6076		0.0952		0.4279		0.1649		0.4342		0.6903		0.495		0.3634		0.6413		0.7114		0.3349	
Treatment F				11.988		8.078		4.785		23.669		8.725		5.568		9.662		4.355		8.848		38.999		8.497		6.963		3.532	
Treatment Prob(F)				0.0003		0.0016		0.0207		0.0001		0.0029		0.0131		0.002		0.0895		0.0513		0.0001		0.0032		0.0063		0.0482	

Means followed by same letter do not significantly differ (P=.10, LSD).
Controls were excluded from analysis.

Table 1b. Preemergence broadleaf weed control with DE-750 tank mixes.

Treated On: March 14, 2005
Trial ID: 4-H-59-05 Study Dir.: Montgomery/Evans
Location: Garfield County

Weed Code				C. ragweed	C. ragweed	C. ragweed	C. ragweed	Marestail	Marestail	Marestail
Rating Data Type				control	control	control	control	control	control	control
Rating Unit				percent	percent	percent	percent	percent	percent	percent
Rating Date				4/11/2005	5/9/2005	6/7/2005	7/20/2005	5/9/2005	6/7/2005	7/20/2005
Trt-Eval Interval				28 DA-A	56 DA-A	85 DA-A	128 DA-A	56 DA-A	85 DA-A	128 DA-A
Trt No.	Treatment Name	Rate	Rate Unit							
1	DE-750	5	FL OZ/A	88 ab	99 a	94 a	97 a	99	94 a	96 a
	Activator 90	0.25	% V/V							
2	DE-750	7	FL OZ/A	93 ab	99 a	97 a	96 a	99	97 a	98 a
	Activator 90	0.25	% V/V							
3	DE-750	5	FL OZ/A	93 ab	99 a	100 a	99 a	99	100 a	99 a
	Glypro Plus	8	FL OZ/A							
	Oust XP	0.33	OZ WT/A							
	Activator 90	0.25	% V/V							
4	DE-750	5	FL OZ/A	95 a	99 a	100 a	97 a	99	100 a	99 a
	Glypro Plus	8	FL OZ/A							
	Outrider	1.33	OZ WT/A							
	Activator 90	0.25	% V/V							
5	DE-750	5	FL OZ/A	94 a	99 a	100 a	99 a	99	100 a	99 a
	Campaign	32	FL OZ/A							
	Ammonium Sulfate	17	LB/100 GAL							
6	Campaign	32	FL OZ/A	0 c	7 b	38 b	0 b	71	68 b	76 b
	Ammonium Sulfate	17	LB/100 GAL							
7	Untreated Check			0	0	0	0	0	0	0
LSD (P=.10)				6.6	7.4	9	4.5	N.S.	15.9	13.2
Standard Deviation				4.4	4.9	6	3	12.8	10.6	8.8
CV				5.71	5.89	6.79	3.71	13.52	11.37	9.35
Replicate F				0.091	1.01	0.765	0.867	0.905	0.772	0.969
Replicate Prob(F)				0.9142	0.4021	0.4933	0.4526	0.4386	0.4906	0.4158
Treatment F				221.936	175.971	50.5	523.808	2.36	4.13	3.092
Treatment Prob(F)				0.0001	0.0001	0.0001	0.0001	0.1243	0.0316	0.0674

Means followed by same letter do not significantly differ (P=.10, LSD).
Controls were excluded from analysis.

Title: Scotch thistle control with Overdrive herbicide
Trial ID: 5-H-60-05
Date Treated: 3/29/05 **Study Directors:** Doug Montgomery/Craig Evans
Location: Beckham Co. **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: Trial was located on I-40, 0.5 mile west of Sayre exit 25 (north side of intestate)
Trial Objective: The objective of this study was to evaluate the effectiveness of Overdirve for its effectiveness in controlling scotch thistle at sub-labeled rates.

Application Description	
Number of Replications:	3
Plot Size:	5 ft. x 10 ft.
Application Date:	3-29-05
Time of Day:	7:45 a.m.
Application Timing:	Post
Air Temperature:	57 F
% Relative Humidity:	59
Wind Velocity:	2 mph
Dew Present:	No
Soil Temperature:	55 F
Soil Moisture:	Moderate
% Cloud Cover:	90
Application Equipment:	CO2
Operating Pressure:	24 psi
Nozzle Type:	Flat fan
Nozzle Size:	8002 VS
Ground Speed:	2.1
Carrier Rate:	20

Soil Description	
% Sand: NA	% OM: NA
% Silt: NA	pH: NA
% Clay: NA	
Soil Name: Obara silt loam	

Weed Stage At Each Application	
Weed 1:	Scotch thistle
Stage Scale:	2-23 inch, average 6”
Weed 2:	
Stage Scale:	
Weed 3:	
Stage Scale:	
Weed 4:	
Stage Scale:	
Weed 5:	
Stage Scale:	

Results & Discussion: (refer to Table 2)

Overdrive herbicide has proven to be very effective at low rates in controlling labeled thistle species. In previous research the 2 oz. prod./A rate has been very effective in controlling musk thistle. This finding prompted the request and subsequent Oklahoma 2ee state-issued label amendment to legalize the sub-label rate. Research has been conducted the past two years to expand the data base of the Overdrive 2 oz. rate to evaluate if it was also effective in controlling other state noxious weeds such as scotch thistle. In 2004 trials, the 2 oz. rate worked well in preventing scotch thistle from flowering. However, a few scotch thistles did not completely die in test plots. In this year’s study, the sub-label Overdrive rate of 2 oz. prod./A did not completely prevent scotch thistles from flowering. This treatment produced severe plant growth suppression at 56 days-after-application (DAA), but, some of the thistles were able to produce small stunted seedheads. We do not know if any viable seed was produced in these seedheads, however, we

assume the worst case scenario, that seed was produced. To fully comply with the Oklahoma Noxious Weed Law, control methods must prevent seed production. The lowest federally labeled rate of 4 oz. prod./A completely prevented seedheads while producing 82% control of scotch thistle (good control with a small amount of thistle leaves remaining green and/or yellow and severely stunted). Overdrive at 6 oz. prod./A produced complete control of scotch thistle seedheads and 97% control of the thistle plants. With the 2005 data showing less control (inconsistent) than the previous year using the sub-labeled 2 oz. prod. rate it is unlikely at this time that the manufacturer of Overdrive (BASF) would entertain the idea of adding scotch thistle to the 2ee state-issued label. At this point we do not support approaching the manufacturer with such a request. It is not completely surprising that the sub-labeled rated of 2 oz./A did not provide consistent high levels of scotch thistle control. In past research at OSU we have found scotch thistle to be more difficult to control than musk thistle. The Overdrive product does provide very good economical control of scotch thistle at the minimum labeled rate of 4 oz. prod./A. We would encourage ODOT personnel to use Overdrive in both broadcast or handgun applications to control scotch thistle, a state noxious weed.

Table 2. Scotch thistle control with Overdrive herbicide.

Treated On: March 29, 2005
Trial ID: 5-H-60-05 Study Dir.: Montgomery/Evans
Location: Beckham County

Weed Code Rating Data Type Rating Unit Rating Date Trt-Eval Interval				S. thistle thistle count per plot 3/29/2005 0 DA-A		S. thistle control percent 4/27/2005 28 DA-A		S. thistle control percent 5/26/2005 56DA-A	S. thistle seedheads per plot 4/27/2005 56 DA-A
Trt No.	Treatment Name	Rate	Rate Unit						
1	Untreated Check			6		0		17	31
2	Overdrive Surf King	2 0.25	oz. prod/A % V/V	9	a	32	b	57	12
3	Overdrive Surf King	4 0.25	oz. prod/A % V/V	6	ab	48	a	82	0
4	Overdrive Surf King	6 0.25	oz. prod/A % V/V	4	b	50	a	97	0
LSD (P=.10) Standard Deviation CV				3.2 1.9 28.8		9.4 5.4 12.46		N.S. 20.8 26.57	N.S. 8.6 210.34
Replicate F Replicate Prob(F) Treatment F Treatment Prob(F)				1.581 0.312 5.452 0.072		2 0.25 10.571 0.0253		1 0.4444 2.827 0.1717	1 0.4444 2.034 0.2458

Means followed by same letter do not significantly differ (P=.10, LSD).
Controls were excluded from analysis.

Title: Katana johnsongrass control study
Trial ID: 4-H-61-05
Date Treated: 5-24-05 **Study Directors:** Doug Montgomery/Craig Evans
Location: Noble Co. **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-60, 0.5 miles west of junction SH-156 (south side of highway)
Trial Objective: The objective of this study was to evaluate the effectiveness of Katana (flazasulfuron) tank mixtures for johnsongrass control and common bermudagrass tolerance.

Application Description	
Number of Replications:	3
Plot Size:	5 ft. x 15 ft.
Application Date:	5-24-05
Time of Day:	7:30 a.m.
Application Timing:	Post
Air Temperature:	71 F
% Relative Humidity:	89
Wind Velocity/Direction:	6 mph
Dew Present:	No
Soil Temperature:	75 F
Soil Moisture:	Good
% Cloud Cover:	100
Application Equipment:	CO2 bicycle
Operating Pressure:	25
Nozzle Type:	Flat fan
Nozzle Size:	8002 VS
Ground Speed:	1.4
Carrier Rate:	30

Soil Description	
% Sand: NA	% OM: 7.89
% Silt: NA	pH: 6.9
% Clay: NA	
Soil Name: Tabler silt loam	

Weed Stage At Each Application	
Weed 1:	Bermudagrass
Stage Scale:	100% greenup
Weed 2:	Johnsongrass
Stage Scale:	6-20 inch, ~ 14”
Weed 3:	
Stage Scale:	
Weed 4:	
Stage Scale:	
Weed 5:	
Stage Scale:	

Results & Discussion: (refer to Table 3)

Treatments were applied on May 24 to johnsongrass (6-20" tall) and common bermudagrass (100% greenup) that was actively growing under ideal conditions. Environmental conditions were ideal throughout the duration of this trial.

Common bermudagrass injury at 31 days-after-application (DAA) ranged from 10-15% for all of the treatments. This level of injury is acceptable for roadside areas. Common bermudagrass injury was not present at later evaluations.

Johnsongrass control at 31 DAA ranged from 77-86% for all of the treatments. Each of the flazasulfuron tank mixes were producing similar johnsongrass control compared to that of the standards at 31 DAA. The level of johnsongrass control at 31 DAA would be acceptable (80% or greater) for each of these treatments. Johnsongrass control at 59 DAA dropped significantly

for all treatments. Johnsongrass control at 59 DAA was unacceptable for all of the treatments in this trial. The standard treatments in this trial, as well as the flazasulfuron tank mixes, typically will maintain acceptable levels of johnsongrass for at least 2 months and usually through 3 month evaluations. With the break in johnsongrass control at 59 DAA, johnsongrass control continued to decrease up to the final 92 DAA evaluation.

All herbicide treatments in this study failed to provide the level of johnsongrass control that was expected. When weed control in a study is far from expected levels, it is important to investigate the study parameters to determine if any clerical or application errors occurred. After thorough investigation of this study, no errors were found.

In recent conversations with the manufacturer of Katana (ISK BioSciences), it appears the company may not pursue an EPA label for this product. However, they will likely sell the entire herbicide portfolio to another company that will pursue an EPA label and is better equipped to market a new herbicide. ISK BioSciences has very few sales and market development personnel that work in the non-crop roadside vegetation management area. This is a practice that is becoming more and more commonplace in our market segment. We will continue to monitor the labeling of Katana as it has performed similarily to both Oust and Outrider in many OSU roadside weed control trials. If it is priced competitively it would be a strong candidate for ODOT summer weed control programs.

Table 3. Katana johnsongrass control study.

Treated On: May 24, 2005
Trial ID: 4-H-61-05 Study Dir.: Montgomery/Evans
Location: Kay County

Trt No.	Treatment Name	Rate	Rate Unit	Bermuda injury percent 6/24/2005 31 DA-A		Johnsongrass control percent 6/24/2005 31 DA-A	Johnsongrass control percent 7/22/2005 59 DA-A		Johnsongrass control percent 8/24/2005 92 DA-A	
1	Untreated Check			0		0	0		0	
2	Roundup Pro Concentrate Oust XP	0.5 0.047	LB A/A LB A/A	13	a	83	45	b	27	c
3	Roundup Pro Concentrate Outrider	0.5 0.047	LB A/A LB A/A	10	b	82	68	a	56	a
4	Roundup Pro Concentrate Flazasulfuron	0.5 0.0234	LB A/A LB A/A	15	a	83	58	ab	45	ab
5	Roundup Pro Concentrate Flazasulfuron	0.5 0.035	LB A/A LB A/A	13	a	77	50	b	30	c
6	Roundup Pro Concentrate Flazasulfuron	0.5 0.047	LB A/A LB A/A	15	a	86	53	b	33	bc
LSD (P=.10)				2.4		N.S.	13.8		13	
Standard Deviation				1.6		7.5	9.1		8.5	
CV				11.86		9.13	16.51		22.37	
Replicate F				2.667		0.905	0.242		4.966	
Replicate Prob(F)				0.1296		0.4422	0.7903		0.0396	
Treatment F				5		0.66	2.879		6.03	
Treatment Prob(F)				0.0257		0.6367	0.0949		0.0154	

Means followed by same letter do not significantly differ (P=.10, LSD).
Controls were excluded from analysis.

Title: Glyphosate formulation study
Trial ID: 4-H-62-05
Date Treated: 5/27/05 **Study Directors:** Doug Montgomery/Craig Evans
Location: Noble County **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-60, 0.5 mile west of Ponca City (south side of highway)

Trial Objective: The objectives of this study were to evaluate the effectiveness of various glyphosate formulations when combined with Outrider for johnsongrass control and common bermudagrass tolerance.

Application Description	
Number of Replications:	3
Plot Size:	5 ft. x 15 ft.
Application Date:	5-27-05
Time of Day:	7:20 a.m.
Application Timing:	Post
Air Temperature:	67 F
% Relative Humidity:	66
Wind Velocity/Direction:	1 mph
Dew Present:	Yes, light
Soil Temperature:	71 F
Soil Moisture:	Good
% Cloud Cover:	90
Application Equipment:	CO2 bicycle
Operating Pressure:	25 psi
Nozzle Type:	Flat fan
Nozzle Size:	8003 Turbojet
Ground Speed:	1.9
Carrier Rate:	30

Soil Description	
% Sand: NA	% OM: 7.89
% Silt: NA	pH: 6.9
% Clay: NA	
Soil Name: Tabler silt loam	

Weed Stage At Each Application	
Weed 1:	Common bermudagrass
Stage Scale:	100% greenup
Weed 2:	Johnsongrass
Stage Scale:	14-26 inch, ~ 20 inch
Weed 3:	
Stage Scale:	
Weed 4:	
Stage Scale:	
Weed 5:	
Stage Scale:	

Results & Discussion: (refer to table 4)

Visual evaluations were made 7, 14, 28, and 56 days-after-application (DAA) for both johnsongrass control and common bermudagrass injury. Evaluations were also made on marestail control at 7, 14, and 28 DAA. Temperature and soil conditions were ideal throughout the duration of this study. Both adequate rainfall and moderate air temperatures persisted which created very little if any climatic stress on plants.

Common bermudagrass injury was very low throughout all evaluations. At 7 DAA there was only minimal visual change to bermudagrass growth as compared to the untreated check. At 14 DAA bermudagrass injury, or growth suppression, increased slightly. It appeared that the treatments including the higher glyphosate rates, were producing a little more growth suppression than lower rates. At 28 DAA evaluations the peak of bermudagrass injury was noticed which ranged from 8-12% for treatments with the higher glyphosate rates versus 5-7% for the lower glyphosate rates.

The injury for the higher glyphosate rates consisted mainly of growth suppression with very slight chlorosis. At 56 DAA there was no visible injury to common bermudagrass for any of the treatments.

At 7 DAA johnsongrass control from all treatments was ranging between 62-80% (which is very good for 7 days). All of the higher glyphosate rates had separated slightly from their lower rates, however only the higher rate of MON 79730 produced significantly more johnsongrass control than its lower rate treatment. At 14 DAA johnsongrass control had increased for all treatments and was ranging between 68-87%. At this point all of the higher glyphosate rate treatments were producing satisfactory control (>80%) of johnsongrass with the lower glyphosate rate treatments producing 4-16% less control. AT 28 DAA johnsongrass control had increased again for all treatments and was ranging between 73-93%. At this time only the low rate of MON 79786 was not producing satisfactory control (73%) of johnsongrass. At 28 DAA the lower glyphosate rate treatments were producing 4-17% less control than the higher glyphosate rates. AT 28 DAA all of the high glyphosate rate treatments were producing from 90-93% control of johnsongrass. At 56 DAA there was a slight decrease in johnsongrass control for some treatments with control ranging from 69-94%. At this time all treatments were producing satisfactory control except for the low glyphosate rate treatment of MON 79786 (69%). The experimental area received good rainfall in late June through early July which should have promoted mid-summer johnsongrass seedling germination and/or growth from rhizome johnsongrass that was not controlled by the herbicide treatments. There were subtle differences in johnsongrass control from the various glyphosate formulations in this study but a superior treatment is difficult to point out. There were more noticeable differences between low and high glyphosate rates within the same MON formulation than between MON formulations. Ranking their performance from best-to-worst johnsongrass control would be as follows:
MON 79786 = MON 78754 > MON 79730 > MON 79670 > MON 79748

The significance of the glyphosate formulation studies that have been conducted the past 3 years is to prepare ODOT for a possible shift in product line from Monsanto. There are many considerations that Monsanto is dealing with before they pull the current isopropyl amine glyphosate formulations from the market and replace them with the potassium salt formulations. This research is significant as it will prepare ODOT for any market changes that would affect the most important herbicide in ODOT herbicide programs, Roundup Pro or Roundup Pro Concentrate (glyphosate).

Table 4. Glyphosate formulation tank mixes for johnsongrass control.

Treated On: May 27, 2005
Trial ID: 4-H-62-05 Study Dir.: Montgomery/Evans
Location: Kay County

Weed Code				Bermuda	Bermuda	Bermuda	Johnsongrass	Johnsongrass	Johnsongrass	Johnsongrass	Johnsongrass	Marestail	Marestail	Marestail
Rating Data Type				injury	injury	injury	control	control	control	control	control	control	control	control
Rating Unit				percent	percent	percent	percent	percent	percent	percent	percent	percent	percent	percent
Rating Date				6/3/2005	6/10/2005	6/24/2005	6/3/2005	6/10/2005	6/24/2005	7/22/2005	8/19/2005	6/3/2005	6/10/2005	6/24/2005
Trt-Eval Interval				7 DA-A	14 DA-A	28 DA-A	7 DA-A	14 DA-A	28 DA-A	56 DA-A	84 DA-A	7 DA-A	14 DA-A	28 DA-A
Trt No.	Treatment Name	Rate	Rate Unit											
1	MON 78754 (IPA salt)	0.29	LB AE/A	5 a	5 c	5 d	67 bc	75 cd	83 bcd	84 a	73 c	42 abc	75 abc	80 abc
	Outrider	0.047	LB A/A											
2	MON 78754 (IPA salt)	0.377	LB AE/A	5 a	8 ab	10 ab	75 ab	87 a	93 a	93 a	90 a	47 abc	88 abc	80 abc
	Outrider	0.047	LB A/A											
3	MON 79670 (K salt)	0.29	LB AE/A	5 a	5 c	5 d	68 bc	75 cd	80 de	83 a	79 abc	42 abc	78 abc	73 bc
	Outrider	0.047	LB A/A											
4	MON 79670 (K salt)	0.377	LB AE/A	5 a	7 bc	8 bc	70 abc	87 a	91 ab	89 a	89 a	47 abc	83 abc	80 abc
	Outrider	0.047	LB A/A											
5	MON 79730 (K salt)	0.29	LB AE/A	5 a	7 bc	7 cd	62 c	80 abc	89 abc	86 a	82 abc	30 c	89 abc	97 ab
	Outrider	0.047	LB A/A											
6	MON 79730 (K salt)	0.377	LB AE/A	5 a	10 a	12 a	80 a	87 a	93 a	90 a	89 a	45 abc	91 ab	80 abc
	Outrider	0.047	LB A/A											
7	MON 79748 (K salt)	0.29	LB AE/A	5 a	5 c	5 d	67 bc	78 bc	82 cde	84 a	76 bc	32 bc	66 c	78 abc
	Outrider	0.047	LB A/A											
8	MON 79748 (K salt)	0.377	LB AE/A	5 a	7 bc	10 ab	72 abc	82 abc	90 abc	89 a	85 ab	48 ab	96 a	93 ab
	Outrider	0.047	LB A/A											
9	MON 79786 (K salt)	0.29	LB AE/A	3 ab	5 c	7 cd	65 bc	68 d	73 e	69 b	70 c	38 abc	70 bc	60 c
	Outrider	0.047	LB A/A											
10	MON 79786 (K salt)	0.377	LB AE/A	5 a	7 bc	10 ab	75 ab	84 ab	90 abc	94 a	89 a	50 a	90 ab	100 a
	Outrider	0.047	LB A/A											
11	Untreated Check			2 b	0 d	0 e	0 d	0 e	0 f	0 c	0 d	0 d	0 d	0 d
LSD (P=.10)				1.7	2.3	2.5	10.8	8	8.6	11.8	11.9	17.5	23.1	25.4
Standard Deviation				1.2	1.6	1.8	7.6	5.7	6.1	8.4	8.4	12.4	16.3	18
CV				26.39	27.16	25.35	12.02	7.82	7.77	10.7	11.28	32.47	21.77	24.09
Replicate F				1.579	6.176	0.233	1.399	0.703	4.261	5.06	11.905	6.159	6.652	14.926
Replicate Prob(F)				0.2308	0.0082	0.7946	0.27	0.5071	0.0287	0.0167	0.0004	0.0087	0.0065	0.0001
Treatment F				2.421	7.353	10.279	24.246	57.095	57.834	30.679	28.016	3.954	7.976	6.851

Treatment Prob(F)	0.0443	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0049	0.0001	0.0002

Means followed by same letter do not significantly differ (P=.10, LSD).

Title: Overdrive broadleaf weed control study
Trial ID: 4-H-63-05
Date Treated: 5/20/05 **Study Directors:** Doug Montgomery/Craig Evans
Location: Garfield County **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-81, 0.7 mile north of Bison (center median)
Trial Objective: The objective of this study was to evaluate the effectiveness of Overdrive tank mixtures for broadleaf weed control.

Application Description	
Number of Replications:	3
Plot Size:	5 ft. x 15 ft.
Application Date:	5-20-05
Time of Day:	8:20 a.m.
Application Timing:	Post
Air Temperature:	78 F
% Relative Humidity:	76
Wind Velocity/Direction:	5 mph
Dew Present:	No
Soil Temperature:	72 F
Soil Moisture:	Good
% Cloud Cover:	15
Application Equipment:	CO2 bicycle
Operating Pressure:	25
Nozzle Type:	Flat fan
Nozzle Size:	8002 VS
Ground Speed:	2.0
Carrier Rate:	20

Soil Description	
% Sand: NA	% OM: 1.92
% Silt: NA	pH: 7.3
% Clay: NA	
Soil Name: Kirkland silt loam	

Weed Stage At Each Application	
Weed 1:	Common bermudagrass
Stage Scale:	100% greenup
Weed 2:	Kochia
Stage Scale:	1-20 inch, ~10 inch
Weed 3:	Field bindweed
Stage Scale:	1-6 inch, ~50% flower
Weed 4:	
Stage Scale:	
Weed 5:	
Stage Scale:	

Results & Discussion: (refer to Table 5)

Treatments were applied on May 20 to kochia (1-20" tall) and field bindweed (1-6" tall, 50% bloom) growing under ideal conditions. At this time common bermudagrass was at 100% greenup and actively growing.

Common bermudagrass injury was evaluated at 14 and 31 days-after-application (DAA). At 14 DAA the small amount of bermudagrass injury ranged from 3-10% for all treatments and would be acceptable for roadside areas. At 31 DAA bermudagrass injury had decreased for nearly all treatments and was barely noticeable.

Kochia control at 14 DAA ranged from 48-67% for all treatments and mainly consisted of severe epinasty with the beginning of necrosis. At 31 DAA kochia control had significantly increased for all treatments. All treatments were producing good to excellent kochia control ranging form 87-95%. At both 61and 91 DAA all of the Vista + Overdrive treatments were maintaining at least 96% kochia control. We expected to see more separation in kochia control in this trial because of the range of Vista rates but it was not apparent under these trial conditions. All of the treatments in

this study produced good kochia control early at 31 DAA (>80%) and even better control at latter evaluations (>90%).

At 14 DAA field bindweed control was good to excellent ranging from 75-93%. Field bindweed control increased to 91-99% by 31 DAA and decreased slightly to 83-93% by the last bindweed evaluation at 61 DAA. Field bindweed evaluations were not available at 91 DAA as 80-90 percent of field bindweed had declined in the untreated check plots.

Rainfall was adequate at this trial site to maintain good weed growth throughout most if not all of the summer.

This study is a result of the continued development of Overdrive herbicide by BASF. The Overdrive product includes a unique mixture of dicamba + diflufenzypur that can produce very good control of problem broadleaf weeds at low rates. The increased activity of this product at low rates may yield significant beneficial tank mixtures. BASF is active in the development of both the Overdrive product and diflufenzypyr mixtures. Findings of this research will likely manifest itself in future label use amendments to Overdrive. Part of this years research with the diflufenzypyr product was conducted under a confidentiality agreement with BASF and the data will not be available this year to ODOT (4-H-64-05).

Table 5. Broadleaf weed control with Overdrive tank mixes.

Treated On: May 20, 2005
Trial ID: 4-H-63-05 Study Dir.: Montgomery/Evans
Location: Garfield County

Weed Code				Bermuda	Bermuda	Kochia	Kochia	Kochia	Kochia	F. bindweed	F. bindweed	F. bindweed
Rating Data Type				injury	injury	control	control	control	control	control	control	control
Rating Unit				percent	percent	percent	percent	percent	percent	percent	percent	percent
Rating Date				6/3/2005	6/20/2005	6/3/2005	6/20/2005	7/20/2005	8/19/2005	6/3/2005	6/20/2005	7/20/2005
Trt-Eval Interval				14 DA-A	31 DA-A	14 DA-A	31 DA-A	61 DA-A	91 DA-A	14 DA-A	31 DA-A	61 DA-A
Trt No.	Treatment# Name	Rate	Rate Unit									
1	Untreated Check			0 a	0 a	0 d	0 c	0 b	0 b	0 c	0 c	0 b
2	Vista	0.281	LB A/A	3 a	2 a	48 c	91 ab	98 a	99 a	75 b	93 b	89 a
	Overdrive	0.175	LB A/A									
3	Vista	0.281	LB A/A	3 a	3 a	67 a	95 a	99 a	96 a	93 a	99 a	93 a
	Overdrive	0.262	LB A/A									
4	Vista	0.187	LB A/A	4 a	0 a	57 bc	88 ab	99 a	98 a	78 ab	91 b	88 a
	Overdrive	0.175	LB A/A									
5	Vista	0.187	LB A/A	4 a	0 a	58 ab	92 ab	99 a	99 a	82 ab	93 ab	83 a
	Overdrive	0.262	LB A/A									
6	Vista	0.14	LB A/A	8 a	2 a	52 bc	87 b	99 a	99 a	82 ab	93 ab	89 a
	Overdrive	0.175	LB A/A									
7	Vista	0.14	LB A/A	10 a	5 a	53 bc	87 b	98 a	98 a	81 ab	95 ab	85 a
	Overdrive	0.262	LB A/A									
8	Vista	0.094	LB A/A	3 a	0 a	53 bc	93 ab	99 a	96 a	75 b	95 ab	89 a
	Overdrive	0.175	LB A/A									
9	Vista	0.094	LB A/A	5 a	2 a	53 bc	95 a	99 a	96 a	83 ab	95 ab	93 a
	Overdrive	0.262	LB A/A									
LSD (P=.10)				6	4.4	9.3	7.5	1.6	3.3	16.4	5.9	10.9
Standard Deviation				4.2	3.1	6.5	5.3	1.1	2.3	11.5	4.1	7.7
CV				91.94	209.21	13.24	6.51	1.28	2.69	15.99	4.93	9.75
Replicate F				2.601	0.675	6.597	0.771	0.471	0.878	6.806	0.99	6.84
Replicate Prob(F)				0.1052	0.5232	0.0081	0.479	0.633	0.4349	0.0073	0.3931	0.0071
Treatment F				1.364	0.964	25.945	100.578	2577.736	584.311	17.115	174.189	44.948
Treatment Prob(F)				0.2836	0.496	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Means followed by same letter do not significantly differ (P=.10, LSD).

*Each treatment contained methylated seed oil at a rate of 1.25% volume per volume.

Title: Diflufenzypyr broadleaf weed control study
Trial ID: 4-H-64-05
Date Treated: 5/20/05 **Study Directors:** Doug Montgomery/Craig Evans
Location: Garfield County **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-81, 0.7 miles north of Bison (center median)
Trial Objective: The objective of this study was to evaluate diflufenzypyr tank mixtures for broadleaf weed control and common bermudagrass tolerance.

Results & Discussion:

This study was performed under a confidentiality agreement between OSU Roadside Vegetation Management personnel and BASF. Under the agreement, OSU cannot publish or share any data or study information until it is released by BASF. Agreements of this nature are standard operating procedure when a herbicide is in the early stages of development by the manufacturer. While OSU cannot share the data with ODOT at this point, OSU personnel will retain this data and at the earliest point possible will inform ODOT personnel of the performance of any and all products evaluated in this study that have any significance to ODOT vegetation management programs.

Title: Sulfomax johnsongrass control study
Trial ID: 4-H-65-05
Date Treated: 5/24/05 **Study Directors:** Doug Montgomery/Craig Evans
Location: Noble County **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-60, west of Ponca City (south side of highway)
Trial Objective: The objective of this study was to evaluate the effectiveness of Sulfomax (generic sulfometuron) for johnsongrass control and common bermudagrass tolerance.

Application Description	
Number of Replications:	3
Plot Size:	5 ft. x 15 ft.
Application Date:	5-24-05
Time of Day:	8:05 a.m.
Application Timing:	Post
Air Temperature:	71 F
% Relative Humidity:	89
Wind Velocity/Direction:	6 mph
Dew Present:	No
Soil Temperature:	75 F
Soil Moisture:	Good
% Cloud Cover:	100
Application Equipment:	CO2 bicycle
Operating Pressure:	25
Nozzle Type:	Flat fan
Nozzle Size:	8002 VS
Ground Speed:	2.0
Carrier Rate:	20

Soil Description	
% Sand: NA	% OM: 7.89
% Silt: NA	pH: 6.9
% Clay: NA	
Soil Name: Tabler silt loam	

Weed Stage At Each Application	
Weed 1:	Common bermudagrass
Stage Scale:	100% greenup
Weed 2:	Johnsongrass
Stage Scale:	6-18 inch, ~ 14 inch
Weed 3:	
Stage Scale:	
Weed 4:	
Stage Scale:	
Weed 5:	
Stage Scale:	

Results & Discussion: (Refer to Table 6)

Treatments were applied on May 24 to johnsongrass (6-18" tall) and common bermudagrass (100% greenup) that were actively growing. Environmental conditions were ideal throughout the duration of this trial.

Common bermudagrass injury at 31 days-after-application (DAA) was acceptable (<30%) for all treatments on roadside areas. Sulfomax, alone or tank-mixed, produced similar bermudagrass injury to the comparative standard treatments. No bermudagrass injury was present at later evaluation dates.

Johnsongrass control at 31, 59, and 92 DAA for both Sulfomax and Oust XP alone treatments was not acceptable and produced only a small amount of growth suppression (very little if any control was produced). Typically sulfometuron used alone for johnsongrass control would be at a rate of at least 0.094 lb. a.i../A to produce actual control of rhizome johnsongrass. At 31 DAA both tank-mix treatments were producing very good to excellent control of johnsongrass. At 59 DAA johnsongrass control dropped 12-17% for the tank-mixtures and fell slightly below the 80%

(acceptable) level. Johnsongrass control continued to drop at 92 DAA to 62% for both tank-mixture treatments. Clear explanation as to why the johnsongrass control from the tank-mixture treatments dropped below the acceptable level so early and continued to drop is lacking. Typically these treatments would produce johnsongrass control levels at least 15-20% higher than what was evaluated through 92 DAA. Other nearby trials of similar nature also had less johnsongrass control from standard treatments than what was expected. Regardless, the Sulfomax product produced similar results whether applied alone or in combination with glyphosate when compared to similar Oust XP treatments.

The significance of this study is that the BASF product Sulfometuron Max is currently labeled for use in forestry production areas but not labeled for use on roadsides. The manufacturer is considering pursuing an amendment to the current EPA Sulfometuron Max label that would add roadsides as a use site or pursuing a stand alone labeled product Sulfomax. This in turn would bring another generic sulfometuron product to the market and provide additional herbicide pricing competition. In this study the Sulfomax product provided the same level of johnsongrass control as the comparative name brand Oust XP treatment. It would be our recommendation to ODOT to place the Sulfomax product on the AHAL if the manufacturer receives the amended EPA label or new product label and submits the necessary documents to qualify for the AHAL.

Table 6. Johnsongrass control with Sulfomax tank mixes

Treated On: May 24, 2005
Trial ID: 4-H-65-05 Study Dir.: Montgomery/Evans
Location: Kay County

Weed Code Rating Data Type Rating Unit Rating Date Trt-Eval Interval				Bermuda injury percent 6/24/2005 31 DA-A	Bermuda injury percent 7/22/2005 59 DA-A	Johnsongrass control percent 6/24/2005 31 DA-A	Johnsongrass control percent 7/22/2005 59 DA-A	Johnsongrass control percent 8/24/2005 92 DA-A
Trt No.	Treatment Name	Rate	Rate Unit					
1	Untreated Check			0	0	0	0	0
2	Sulfomax	0.047	LB A/A	8 c	0	7 b	13 b	10 b
	Surf King Surfactant	0.25	% V/V					
3	Oust XP	0.047	LB A/A	13 b	0	7 b	7 b	0 b
	Surf King Surfactant	0.25	% V/V					
4	Sulfomax	0.047	LB A/A	18 a	0	88 a	76 a	62 a
	Roundup Pro Concentrate	0.5	LB A/A					
	Surf King Surfactant	0.25	% V/V					
5	Oust XP	0.047	LB A/A	20 a	0	92 a	75 a	62 a
	Roundup Pro Concentrate	0.5	LB A/A					
	Surf King Surfactant	0.25	% V/V					
LSD (P=.10)				4	N.S.	12.4	11.8	14.9
Standard Deviation				2.5	0	7.8	7.5	9.4
CV				16.67	0	16.16	17.4	28.17
Replicate F				1	0	0.891	2.688	0.591
Replicate Prob(F)				0.4219	1	0.4584	0.1467	0.5833
Treatment F				13.333	0	113.934	78.022	36.976
Treatment Prob(F)				0.0046	1	0.0001	0.0001	0.0003

Means followed by same letter do not significantly differ (P=.10, LSD).
Controls were excluded from analysis.

Title: Postemergence broadleaf weed control with DE-750
Trial ID: 4-H-66-05
Date Treated: 5/10/05 **Study Directors:** Doug Montgomery/Craig Evans
Location: Garfield County **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-81, 0.5 miles north of Bison (center median)
Trial Objective: The objectives of this study were to evaluate DE-750 tank mixtures for summer broadleaf weed control and common bermudagrass tolerance.

Application Description	
Number of Replications:	3
Plot Size:	10 ft. x 20 ft.
Application Date:	5-10-05
Time of Day:	6:45 a.m.
Application Timing:	Post
Air Temperature:	67 F
% Relative Humidity:	89
Wind Velocity/Direction:	5 mph
Dew Present:	Yes, light
Soil Temperature:	68
Soil Moisture:	Dry
% Cloud Cover:	0
Application Equipment:	CO2
Operating Pressure:	25 psi
Nozzle Type:	Flat fan
Nozzle Size:	8002 VS
Ground Speed:	2.0
Carrier Rate:	20

Soil Description	
% Sand: NA	% OM: 1.92
% Silt: NA	pH: 7.3
% Clay: NA	
Soil Name: Kirkland silt loam	

Weed Stage At Each Application	
Weed 1:	Common bermudagrass
Stage Scale:	100% greenup
Weed 2:	Kochia
Stage Scale:	1-8 inch, ~ 4 inch
Weed 3:	Field bindweed
Stage Scale:	1-4 inch, 20% bloom
Weed 4:	
Stage Scale:	
Weed 5:	
Stage Scale:	

Results & Discussion: (refer to table 7)

Treatments were applied on May 10, 2005 at which point kochia was 1-8 inches tall (average 5 inch) and field bindweed was 1-4 inches tall (20% bloom). At the time of treatment air temperatures were mild and soil conditions were dry. Three days after treatment the area received a 1 inch rain, after which the experiment had adequate water until mid to late July.

The data shows little bermudagrass phototoxicity for all treatments throughout the duration of this study. At the 28 DAA evaluation a few treatments caused slight chlorosis and stunting that ranged from 2-13%. Little if any effects were noticed on bermudagrass after 28 DAT.

Kochia control for DE-750 alone, or tank-mixed with either Garlon 3A or 2,4-D amine did not provide satisfactory control throughout the duration of the study. The 3-way mix of DE-750, Garlon 3A, and Vista produced good control of kochia at 28 DAA (87%) that was maintained out to the 84 DAA evaluation (80%). The DE-750 mixture with the lower rate of Vanquish produced good 28 DAA kochia control (83%) but control fell slightly by 84 DAA (72%). The standard

treatment of Vanquish at 1 pt/A produced excellent kochia control of 93% or greater throughout the duration of the study.

DE-750 alone produced moderate levels of field bindweed control during this study which ranged from 40-78%. All DE-750 tank-mixes and the standard Vanquish treatment produced excellent control of field bindweed at both 26 and 56 DAA evaluations. Field bindweed control was at least 93% through 56 DAA. Field bindweed control was beginning to break somewhat by the 84 DAA evaluations as noted by the reduced control in the standard treatment. Field bindweed control evaluations at 84 DAA were very difficult as field bindweed was beginning to desiccate from hot dry conditions in all paired checks.

In recent conversations with Dow AgroSciences, the manufacturer of DE-750, they have recently received EPA registration for both Milestone and Milestone VM (active ingredient DE-750/aminopryalid). The weed control achieved from this product during the last 2 years of study has shown that either the Milestone or Milestone VM could provide very useful preemergence control of summer broadleaf weeds. The postemergence summer broadleaf weed control benefits is yet to be determined.

Table 7. Postemergence summer broadleaf weed control with DE-750 tank mixes.

Treated On: May 10, 2005
Trial ID: 4-H-66-05 Study Dir.: Montgomery/Evans
Location: Garfield County

Weed Code				Bermuda	Bermuda	Kochia	Kochia	Kochia	F. bindweed	F. bindweed	F. bindweed
Rating Data Type				injury	injury	control	control	control	control	control	control
Rating Unit				percent	percent	percent	percent	percent	percent	percent	percent
Rating Date				6/7/2005	7/6/2005	6/7/2005	7/6/2005	8/2/2005	6/7/2005	7/6/2005	8/2/2005
Trt-Eval Interval				28 DA-A	56 DA-A	28 DA-A	56 DA-A	84 DA-A	28 DA-A	56 DA-A	84 DA-A
Trt No.	Treatment Name	Product Rate	Product Rate Unit								
1	DE-750	5	FL OZ/A	2	0	38 d	20 c	0 d	65 b	78 b	40 b
	Activator 90	0.25	% V/V								
2	DE-750	5	FL OZ/A	5	0	68 bc	27 c	32 c	96 a	98 a	95 a
	Garlon 3A	32	FL OZ/A								
	Activator 90	0.25	% V/V								
3	DE-750	5	FL OZ/A	2	3	87 ab	77 ab	80 ab	95 a	93 a	92 a
	Garlon 3A	12.8	FL OZ/A								
	Vista	8.5	FL OZ/A								
	Activator 90	0.25	% V/V								
4	DE-750	5	FL OZ/A	0	0	60 c	57 b	67 b	96 a	97 a	95 a
	2,4-D	22.2	FL OZ/A								
	Activator 90	0.25	% V/V								
5	DE-750	5	FL OZ/A	13	0	83 ab	56 b	72 b	93 a	93 a	90 a
	Vanquish	8	FL OZ/A								
	Activator 90	0.25	% V/V								
6	Vanquish	16	FL OZ/A	7	0	94 a	93 a	96 a	96 a	96 a	80 a
	Activator 90	0.25	% V/V								
7	Untreated Check			3	0	0	0	0	0	0	45
LSD (P=.10)				9	3.5	20.6	25.5	19.5	7.8	9.4	18.5
Standard Deviation				6.1	2.4	13.9	17.2	13.2	5.3	6.4	12.5
CV				129.2	424.26	19.37	31.41	22.79	5.82	6.87	15.22
Replicate F				1.94	1	0.833	2.659	2.017	2.461	2.926	0.679
Replicate Prob(F)				0.1941	0.4019	0.4626	0.1186	0.1837	0.1352	0.0999	0.5292
Treatment F				1.918	1	6.655	8.015	21.747	16.963	4.237	8.73
Treatment Prob(F)				0.1781	0.4651	0.0056	0.0028	0.0001	0.0001	0.025	0.002

Means followed by same letter do not significantly differ (P=.10, LSD).
Controls were excluded from analysis.

Title: Preemergence and postemergence control of roadside weeds with DE-750 (2004 study)
Trial ID: 4-H-61-04
Date Treated: 3-19-05 **Study Directors:** Doug Montgomery
Location: Garfield County **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-81, 3.7 miles north of Bison (center median)
Trial Objective: The objective of this study was to evaluate the effectiveness of DE-750 for preemergence and postemergence weed control and common bermudagrass tolerance.

Application Description	
Number of Replications:	3
Plot Size:	7 ft. x 15 ft.
Application Date:	3-10-04
Time of Day:	7:30 a.m.
Application Timing:	Pre & Post
Air Temperature:	57 F
% Relative Humidity:	78
Wind Velocity/Direction:	4 mph
Dew Present:	No
Soil Temperature:	54 F
Soil Moisture:	Good
% Cloud Cover:	100
Application Equipment:	CO2 ATV
Operating Pressure:	24
Nozzle Type:	Flat fan
Nozzle Size:	8003 turbojet
Ground Speed:	3.0
Carrier Rate:	20

Soil Description	
% Sand: 30	% OM: 3.8
% Silt: 50	pH: 7.7
% Clay: 20	
Soil Name: Grant silt loam	

Weed Stage At Each Application	
Weed 1:	Common bermudagrass
Stage Scale:	2% greenup
Weed 2:	Carolina geranium
Stage Scale:	1-2 inch
Weed 3:	Wheat
Stage Scale:	2-5 inch
Weed 4:	Downy brome
Stage Scale:	1-3 inch
Weed 5:	Marestail
Stage Scale:	Not yet emerged
Weed 6:	F. bindweed
Stage Scale:	Not yet emerged
Weed 7:	P. amaranth
Stage Scale:	Not yet emerged

Results & Discussion: (refer to Tables 8a & 8b)

Applications were made at dormancy break of bermudagrass. At the time of treatment common bermudagrass greenup was approximately 2%. Applications were made between 7:30 a.m. and 8:45 a.m. after which a light mist fell for approximately 1 hour. Mist was light and evaporated from leaves as quickly as it fell. No water runoff was noted from the surfaces of any sprayed vegetation.

At 32 DAA evaluations all treatments including DE-750, along with the standard treatment of Campaign + AMS, were producing good to excellent control of Carolina geranium. AT 45 DAA Carolina geranium control had increased for all treatments except for Glypro Plus + Outrider which was producing only moderate control. AT 32 and 45 DAA good to excellent control of downy brome was produced from all treatments excluding treatments of DE-750 alone and when mixed with Oust. DE-750 alone has very little activity on grassy weeds. At 32 DAA good to excellent control of prickly lettuce was achieved by all treatments excluding Glypro Plus +

Outrider. Prickly lettuce control had increased at 45 DAA for all treatments. Most of the treatments in this study provided good (80% or better) to excellent (90% or better) control of the winter annual weeds.

Prior to the initiation of this study, it was a goal to try and collect preemergence weed control evaluations on summer broadleaf weeds that would emerge during the months following application. The experimental area chosen in early spring had a good stand of cool season weeds already present but the area was thought to present itself as also having potential to have a good stand of summer annual broadleaf weeds. One to two months following applications it was evident that the experimental area did not produce a good stand of summer broadleaf weeds (this was evident by the lack of summer broadleaf weeds growing in the untreated check plots). Data collection during the summer was difficult because of the low to very low populations of summer annual weeds. The cool season data collected at 32 and 45 DAA is much more useful. It is unfortunate that summer weed populations were so low in this study area that useful control data could not be collected. We do not consider the summer weed control data (Table 8b) in this study to be very useful based on the difficulty of the evaluations. Every effort is made to select the best possible research sites to evaluate herbicides including considerations of the criteria within a study.

While this data was collected during the spring and summer of 2004 it was not available earlier to ODOT due to a research confidentiality agreement between OSU and Dow AgroSciences.

Table 8a. Preemergence and postemergence control of roadside weeds with DE-750 (2004 study).

Date Treated: 3-19-04
Trial ID: 4-H-51-04 Study Dir.: Montgomery
Location: Garfield County

Trt No.	Treatment Name*	Product Rate	Product Rate Unit	Bermuda greenup percent 4/20/2004 32 DA-A	Bermuda greenup percent 5/3/2004 45 DA-A	Bermuda greenup percent 5/17/2004 56 DA-A	Bermuda greenup percent 6/15/2004 85 DA-A	C. geranium control percent 4/20/2004 32 DA-A	C. geranium control percent 5/3/2004 45 DA-A	D. brome control percent 4/20/2004 32 DA-A	D. brome control percent 5/3/2004 45 DA-A	P. lettuce control percent 4/20/2004 32 DA-A	P. lettuce control percent 5/3/2004 45 DA-A
1	DE-750	5	fl oz/a	33	78	70	72 ab	93 ab	98 ab	60 b	78 b	95 a	99 a
2	DE-750	7	fl oz/a	30	65	63	76 ab	88 bc	99 a	35 c	47 c	88 a	99 a
3	DE-750	5	fl oz/a	35	73	72	77 ab	92 abc	99 a	93 a	98 a	88 a	99 a
	Glypro Plus	8	fl oz/a										
	Outrider	1.33	oz wt/a										
4	DE-750	5	fl oz/a	33	80	75	83 a	95 a	99 a	85 a	82 ab	95 a	99 a
	Outrider	1.33	oz wt/a										
5	DE-750	5	fl oz/a	28	70	67	67 bc	93 ab	99 a	90 a	93 ab	95 a	99 a
	Glypro Plus	8	fl oz/a										
	Oust	0.33	oz wt/a										
6	DE-750	5	fl oz/a	20	63	62	78 ab	87 c	99 a	23 c	55 c	95 a	99 a
	Oust	0.33	oz wt/a										
7	DE-750	5	fl oz/a	32	73	63	71 abc	95 a	99 a	90 a	95 ab	95 a	99 a
	Campaign	32	fl oz/a										
	Ammonium sulfate	17	lb/100 gal										
8	Glypro Plus	8	fl oz/a	23	67	55	57 cd	27 e	60 c	92 a	98 a	63 b	83 b
	Outrider	1.33	oz wt/a										
9	Glypro Plus	8	fl oz/a	25	70	67	70 abc	63 d	91 b	88 a	88 ab	95 a	99 a
	Oust	0.33	oz wt/a										
10	Campaign	32	fl oz/a	18	68	53	67 bc	95 a	98 ab	95 a	95 ab	95 a	99 a
	Ammonium sulfate	17	lb/100 gal										
11	Untreated Check			27	68	53	48 d	0 f	0 d	0 d	0 d	0 c	0 c
LSD (P=.10)				N.S.	N.S.	N.S.	14.6	5.7	7.5	21.8	19.3	18	12
Standard Deviation				8.4	9.3	11.3	10.3	4	5.3	15.4	13.7	12.8	8.5
CV				30.21	13.24	17.85	14.88	5.35	6.23	22.6	18.18	15.53	9.64
Replicate F				0.81	2.402	10.732	7.535	1.308	0.071	0.518	0.941	0.877	1
Replicate Prob(F)				0.459	0.1161	0.0007	0.0036	0.2924	0.9312	0.6036	0.4069	0.4313	0.3855
Treatment F				1.337	0.94	1.299	2.811	195.411	99.138	14.306	14.751	15.323	36.526
Treatment Prob(F)				0.2776	0.5195	0.2956	0.0236	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Means followed by same letter do not significantly differ (P=.10, LSD).
*All treatments included Activator 90 at a rate 0.25% volume per volume.

Table 8b. Preemergence broadleaf weed control with DE-750 (2004 study).

Date Treated: 3-19-04
Trial ID: 4-H-51-04 Study Dir.: Montgomery/Evans
Location: Garfield County

Trt No.	Treatment Name*	Product Rate	Product Rate Unit	Marestail control percent 5/3/2004 45 DA-A	Marestail control percent 5/17/2004 56 DA-A	Marestail control percent 6/15/2004 85 DA-A	F. bindweed control percent 4/20/2004 32 DA-A	F. bindweed control percent 5/3/2004 45 DA-A	F. bindweed control percent 5/17/2004 56 DA-A	F. bindweed control percent 6/15/2004 85 DA-A	P. amaranth control percent 5/17/2004 56 DA-A	P. amaranth control percent 6/15/2004 85 DA-A
1	DE-750	5	fl oz/a	99 a	99 a	98 a	80 a	25 a	90 a	0 a	40 a	0 c
2	DE-750	7	fl oz/a	99 a	99 a	97 a	45 b	5 a	33 b	0 a	45 a	92 a
3	DE-750	5	fl oz/a	99 a	99 a	98 a	23 bcd	10 a	0 b	0 a	0 a	0 c
	Glypro Plus	8	fl oz/a									
	Outrider	1.33	oz wt/a									
4	DE-750	5	fl oz/a	99 a	99 a	98 a	35 bc	40 a	15 b	0 a	0 a	29 b
	Outrider	1.33	oz wt/a									
5	DE-750	5	fl oz/a	99 a	99 a	97 a	20 cd	0 a	20 b	0 a	0 a	19 bc
	Glypro Plus	8	fl oz/a									
	Oust	0.33	oz wt/a									
6	DE-750	5	fl oz/a	98 b	99 a	96 a	15 cd	0 a	3 b	0 a	40 a	22 bc
	Oust	0.33	oz wt/a									
7	DE-750	5	fl oz/a	99 a	99 a	97 a	15 cd	0 a	10 b	49 a	0 a	12 bc
	Campaign	32	fl oz/a									
	Ammonium sulfate	17	lb/100 gal									
8	Glypro Plus	8	fl oz/a	99 a	99 a	89 ab	5 d	0 a	3 b	0 a	0 a	0 c
	Outrider	1.33	oz wt/a									
9	Glypro Plus	8	fl oz/a	99 a	98 a	70 b	0 d	0 a	3 b	0 a	0 a	35 b
	Oust	0.33	oz wt/a									
10	Campaign	32	fl oz/a	99 a	76 b	40 c	0 d	0 a	3 b	0 a	0 a	0 c
	Ammonium sulfate	17	lb/100 gal									
11	Untreated Check			0 c	0 c	0 d	0 d	0 a	0 b	0 a	0 a	0 c
LSD (P=.10)				1	17	25.8	24.4	N.S.	35.6	N.S.	N.S.	25.3
Standard Deviation				0.7	12.1	18.3	12.9	21	18.8	19.9	32	17.5
CV				0.77	13.74	22.93	59.54	288.51	116.53	449.59	281.42	92.06
Replicate F				1	0.937	0.079	1.547	0.836	0.389	0.55	0.218	3.016
Replicate Prob(F)				0.3855	0.4084	0.9239	0.2536	0.3909	0.5527	0.592	0.6507	0.0839
Treatment F				5499.213	18.44	9.163	7.144	0.803	3.983	1.633	0.744	7.384
Treatment Prob(F)				0.0001	0.0001	0.0001	0.008	0.6362	0.0398	0.2166	0.6755	0.0007

Means followed by same letter do not significantly differ (P=.10, LSD)

*All treatments included Activator 90 at a rate of 0.25% volume per volume.

Title: Postemergence broadleaf weed control with DE-750 (2004 study)
Trial ID: 4-H-56-04
Date Treated: 5-25-04 **Study Directors:** Doug Montgomery/Craig Evans
Location: Garfield County **Investigator:** OSU Roadside Vegetation Mgmt. Program
Directions: US-81, 3.7 miles north of Bison (center median)
Trial Objective: The objective of this study was to evaluate the effectiveness of DE-750 for postemergence broadleaf weed control and common bermudagrass tolerance.

Application Description	
Number of Replications:	3
Plot Size:	5 ft. x 15 ft.
Application Date:	5-25-04
Time of Day:	9:00 a.m.
Application Timing:	Post
Air Temperature:	63 F
% Relative Humidity:	83
Wind Velocity/Direction:	8 mph
Dew Present:	No
Soil Temperature:	72 F
Soil Moisture:	dry
% Cloud Cover:	100
Application Equipment:	CO2 bicycle
Operating Pressure:	24
Nozzle Type:	Flat fan
Nozzle Size:	8002 VS
Ground Speed:	2.2
Carrier Rate:	20

Soil Description	
% Sand: 30	% OM: 3.8
% Silt: 50	pH: 7.7
% Clay: 20	
Soil Name: Grant silt loam	

Weed Stage At Each Application	
Weed 1:	Common bermudagrass
Stage Scale:	100% greenup
Weed 2:	Marestail
Stage Scale:	2-6 inch
Weed 3:	Kochia
Stage Scale:	0.25-2 inch
Weed 4:	
Stage Scale:	
Weed 5:	
Stage Scale:	

Results & Discussion: (refer to Table 9)

The treatments in this study were applied on May 25, 2005 at which point weeds were actively growing but soil conditions were dry. These dry conditions persisted for a couple weeks following applications which resulted in slight to moderate drought stress in untreated check plots. After this two to three week drought period rainfall and soil moisture was adequate throughout the remainder of this study as above average rain fell in late June, July, through August. These early climatic conditions may responsible for delayed weed control in early evaluations.

At 14 & 28 days-after-application (DAA) all treatments (except Escort) were producing moderate (40-55%) early growth suppression of marestail but very little necrosis/control. All evaluations after 28 DAA were taken under more ideal soil moisture conditions and as a result both marestail and kochia control increased, except Escort. All treatments with DE-750 produced good to excellent marestail control at 56 DAA which ranged from 85-92%. Vanquish produced moderate control of marestail (75%) while Escort still produced very poor marestail control. By 84 DAA marestail control was excellent for all treatments, excluding Escort. The same trends were noticed for kochia with all treatments, excluding Escort, producing only growth suppression early (14 & 28 DAA) which increased to actual control at 56 DAA. The impact of the early dry conditions did

desiccate some of the very small kochia seedlings and was evident in untreated areas. No common bermudagrass injury resulted from any of the treatments throughout the duration of this experiment.

While this data was collected during the summer of 2004 it was not available to ODOT because of a research confidentiality agreement between OSU and Dow AgroSciences. This data has recently been released and is being submitted to ODOT.

Table 9. Postemergence summer weed control with DE-750 (2004 study).

Date Treated: 5-24-04

Trial ID: 4-H-56-04 Study Dir.: Montgomery/Evans

Location: Garfield County

Weed Code				Marestail	Marestail	Marestail	Marestail	Kochia	Kochia	Kochia
Rating Data Type				control	control	control	control	control	control	control
Rating Unit				percent	percent	percent	percent	percent	percent	percent
Rating Date				6/6/2004	6/22/2004	7/20/2004	8/17/2004	6/6/2004	6/22/2004	7/20/2004
Trt-Eval Interval				14 DAT	28 DAT	56 DAT	84 DAT	14 DAT	28 DAT	56 DAT
Trt No.	Treatment Name	Product Rate	Product Rate Unit							
1	DE-750	4	fl oz/a	48 abc	47 ab	88 a	98 ab	45 b	33 b	95 a
	Vista	21	fl oz/a							
	Activator 90	0.25	% v/v							
2	DE-750	6	fl oz/a	54 a	48 ab	85 ab	97 ab	42 b	36 b	91 a
	Vista	21	fl oz/a							
	Activator 90	0.25	% v/v							
3	DE-750	4	fl oz/a	47 bcd	47 ab	90 a	96 ab	55 a	35 b	95 a
	Vista	32	fl oz/a							
	Activator 90	0.25	% v/v							
4	DE-750	6	fl oz/a	52 ab	55 a	92 a	100 a	43 b	40 b	95 a
	Vista	32	fl oz/a							
	Activator 90	0.25	% v/v							
5	DE-750	4	fl oz/a	48 abc	47 ab	91 a	98 ab	43 b	30 bc	95 a
	Garlon 3A	16	fl oz/a							
	Vista	10	fl oz/a							
	Activator 90	0.25	% v/v							
6	DE-750	6	fl oz/a	43 cd	53 a	88 a	98 ab	45 b	40 b	95 a
	Garlon 3A	16	fl oz/a							
	Vista	10	fl oz/a							
	Activator 90	0.25	% v/v							
7	Vanquish	16	fl oz/a	40 d	43 b	75 b	94 b	43 b	70 a	95 a
	Activator 90	0.25	% v/v							
8	Escort	0.5	oz wt/a	15 e	25 c	20 c	0 c	20 c	18 c	63 b
	Activator 90	0.25	% v/v							
9	Untreated check			0 f	0 d	0 d	0 c	0 d	0 d	0 c
LSD (P=.10)				6.9	9	10.8	5	8.9	13.9	26.8
Standard Deviation				4.8	6.3	7.5	3.5	6.2	9.7	18.7
CV				12.51	15.52	10.75	4.58	16.65	28.91	23.28
Replicate F				1.875	1.332	2.458	2.153	1.719	3.025	1.205
Replicate Prob(F)				0.1876	0.2935	0.1194	0.1506	0.2128	0.0788	0.327
Treatment F				44.018	23.078	63.989	461.096	21.765	11.062	8.705
Treatment Prob(F)				0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002

Means followed by same letter do not significantly differ (P=.10, LSD).