EFFECT OF PLANTING DATE ON RESPONSE OF
IMIDAZOLINONE-TOLERANT WHEAT
TO IMAZAMOX AND OTHER
HERBICIDES

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INTRODUCTION

The development of imidazolinone-tolerant wheat has given Oklahoma wheat growers another option for weed control by allowing them to apply imazamox to control their weeds during the wheat growing season. Until the release of imidazolinone-tolerant wheat, selective control for jointed goatgrass was unavailable because imazamox is currently the only herbicide labeled for jointed goatgrass control in wheat (3, 27).

Imidazolinone-tolerant wheat contains a gene developed through mutagenesis that confers resistance to imazamox (8, 26, 27). Wheat varieties with this gene are accepted by the international wheat export market because they are not considered to be genetically modified organisms (GMO) since the process used to develop the gene does not include transfer of foreign DNA (26, 27).

The hard red winter wheat variety ‘TAM 110’ is a parent of the imidazolinone-tolerant wheat varieties ‘AP502CL’ and ‘Above’ and consequently, they have some of the same genetic limitations as ‘TAM 110’, such as susceptibility to leaf rust, stripe rust, soil borne mosaic virus, and to aluminum toxicity in low pH soils. ‘AP502CL’ and ‘Above’ are not recommended for planting in central or eastern Oklahoma without proper fungicide applications to control leaf rust and stripe rust. They are also not recommended for planting on soils with a pH below 5.5, or in areas with a history of soil borne mosaic virus (21).

The corporate owner of the genetics developed a stewardship program for imidazolinone-tolerant wheat to ensure that it is used correctly and its utility is prolonged (27). The program specifies that (1) farmers must acquire certified seed every year from an approved seed dealer, (2) saving harvested seed from previous years is prohibited, and (3) farmers are also prohibited from planting imidazolinone-tolerant wheat for more than two consecutive years (27).

Sulfonylurea herbicides are commonly used in Oklahoma for weed control in winter wheat. When applied correctly, the sulfonylurea herbicides labeled for use on wheat typically cause little if any visible injury to conventional wheat However, stunting has been reported. The metabolism of sulfonylurea herbicides in plants is temperature dependant (add reference that says this). Visible injury was observed in Oklahoma when sulfonylurea herbicides were applied in spring when the minimum average temperature one week after application was below -6°C (10).

Chlorsulfuron + metsulfuron-methyl (5:1), a combination of sulfonylurea herbicides, can be used to control grass and broadleaf weeds in wheat, barley, and fallow land. It can be applied to winter wheat before planting or postemergence at 11 to 21 g ai/ha or preemergence at 11 to 26 g ai/ha (9). The risk of wheat injury and grain yield loss caused by chlorsulfuron can increase when it is applied in the spring to tillered wheat. In Akron, CO, chlorsulfuron applied at 26 g ai/ha in late April to tillered winter wheat reduced grain yields by 14 to 15% and in central Oklahoma, chlorsulfuron applied at 53 g ai/ha in late January to November-planted wheat reduced yields by 23% (1, 10). In

Chugwater, Wyoming, chlorsulfuron applied at 38 g ai/ha in mid October to 3 leaf wheat reduced plant height by 6 to 7% (20). Chlorsulfuron at 22 g ai/ha + metsulfuron-methyl at 4 g ai/ha applied preemergence to September-planted wheat decreased wheat forage production by 18% in central Oklahoma (18). In Virginia, chlorsulfuron at 22 g ai/ha + metsulfuron-methyl at 4 g ai/ha applied postemergence in February to late November planted wheat and November to mid October planted wheat caused 8% visual injury 4 weeks after application (2). In Georgia, chlorsulfuron at 22 g ai/ha + metsulfuron-methyl at 4 g ai/ha applied preemergence in November caused 28% visual injury 54 days after planting (13).

Imazamox, an imidazolinone herbicide, can be used to control grass and broadleaf weeds in imidazolinone-tolerant wheat, imidazolinone-tolerant canola, and imidazolinone-tolerant sunflower. Imazamox can be applied postemergence to imidazolinone-tolerant winter wheat at 35 to 53 g ai/ha (4). Imazamox will cause severe injury to conventional wheat varieties and field experiments have also demonstrated that it can also injure and reduce grain yields of imidazolinone-tolerant wheat varieties (3, 11, 24). Imazamox applied at 35, 44, and 53 g ai/ha in the fall to 3 to 4 leaf imidazolinone-tolerant wheat and in the spring to 2 to 4 tiller imidazolinone-tolerant wheat caused little to no visual injury in North Carolina, however, wheat could not be taken to yield as the testing agreement called for it to be destroyed prior to grain maturity (7). In Kalispell, Montana and Corvallis, Oregon, imazamox was applied in the fall and spring at 9, 18, 26, 36, 45, and 54 g ai/ha to imidazolinone-tolerant wheat. Fall treatments were applied to wheat with 1 to 4 leaves and spring treatments were applied to wheat with 4 leaves to 4 tillers. Wheat injury in Montana never exceeded 10%, however, in Oregon, the 54 g ai/ha treatment applied in the fall caused 33% visual injury (24). In Hays, Kansas, and Sidney, Nebraska, imazamox was applied in early fall, late fall, and early spring at 35, 45, and 53 g ai/ha. When averaged over rate, the early spring imazamox treatments applied to October planted imidazolinone-tolerant wheat caused 13 to 34% visual injury at Kansas. In Nebraska, the early fall and late spring treatments applied to September planted imidazolinone-tolerant wheat caused 17% and 12% visual injury, respectively. When imazamox application was delayed until late spring in Kansas, wheat was 7 to 12 cm shorter than earlier treatments. Visual wheat injury increased as imazamox rates increased. Grain yield decreased when application timing was delayed from early fall to late spring (11). In Washington, imazamox applied at 71 g ai/ha in the spring to October planted imidazolinone-tolerant wheat caused 20% visual injury (3).

Mesosulfuron-methyl, a sulfonylurea herbicide used to control annual grass and broadleaf weeds in winter wheat, can be applied to winter wheat postemergence at 15 g ai/ha (5). In north-central Oklahoma, mesosulfuron-methyl applied at 18 g ai/ha in early March caused 43% foliar burn 10 days after treatment, however, wheat yield was increased compared to the untreated check (16).

Propoxycarbazone-sodium, a sulfonylaminocarbonyl triazolinone herbicide used to control grass and broadleaf weeds in wheat, can be applied postemergence to winter wheat at 30 and 45 g ai/ha (6). In Manhattan, Kansas, propoxycarbazone-sodium applied at 45 g ai/ha in the spring to 3 to 8 tiller wheat caused 11% visual injury (12). In central Oklahoma, propoxycarbazone-sodium applied at 35 and 45 g ai/ha postemergence in the fall to October planted wheat caused slight chlorosis and increased wheat grain yields when compared to the untreated check (15). In north-central Oklahoma, propoxycarbazone-sodium applied at 45 g ai/ha in early March injured winter wheat by 18% 10 days after treatment and increased wheat grain yield when compared to the untreated check (16).

Sulfosulfuron, a sulfonylurea herbicide used for grass and broadleaf weed control in winter wheat, can be applied pre- or postemergence at 35 g ai/ha per cropping season (23). In north-central Oklahoma, sulfosulfuron applied at 35, 70, and 140 g ai/ha in December to wheat with 2 to 4 leaves reduced grain yield by 6, 11, and 24%, respectively (17). Sulfosulfuron at 35 g ai/ha applied to wheat in the fall prior to substantial tillering caused minor wheat injury, however, wheat treated with sulfosulfuron had higher grain yields when compared to the untreated check (14). Sulfosulfuron applied at 26 and 35 g ai/ha postemergence in the fall caused slight chlorosis to October planted wheat and increased wheat grain yields when compared to the untreated check (15). In north-central Oklahoma, sulfosulfuron applied at 35 g ai/ha in early March injured wheat by 14% 10 days after treatment and increased wheat grain yield when compared to the untreated check (16). In Virginia, sulfosulfuron at 35 g ai/ha applied postemergence in February to November planted wheat and in November to October planted wheat caused 8% visual injury 4 weeks after application (2).

Triasulfuron, a sulfonylurea herbicide, can be used to control grass and broadleaf weeds in wheat, barley, pastures, rangeland, and conservation reserve programs. It can be applied preplant surface, preplant shallow incorporated, preemergence, or postemergence at 15, 18, or 25 g ai/ha (25). In central Oklahoma, triasulfuron applied preemergence in September at 23 g ai/ha reduced total wheat forage production by 10% (18).

In central Oklahoma, where the experiments were conducted, the ideal planting date for winter wheat used for gain only ranges from October 1 to October 20 (20). However, planting is occasionally delayed to reduce interference from winter annual grass species. Delaying wheat planting until cheat germinates, then destroying it with tillage or herbicides will not completely control cheat, but can reduce cheat density and competitive ability (22).

The objective of this research was to determine the effect of planting date on the response of imidazolinone-tolerant wheat to imazamox and other selected herbicides.

MATERIALS AND METHODS

Four field experiments were conducted during the 2003 and 2004 winter wheat growing seasons to determine the effect of planting date on the response of imidazolinone tolerant wheat to imazamox and/or other herbicides. The experimental design each year was a randomized complete block with a factorial arrangement of treatments. Experiment sites with minimal weed pressure were selected to minimize the influence of weed competition on wheat grain yields. Conventional tillage was used to prepare the seedbed at each site.

All plots were seeded with ‘AP 502 CL’ imidazolinone-tolerant wheat at 100 kg/ha using a double disc grain drill with a row spacing of 19 cm. Plot size in 2003 was 1.5 by 7.6 m and in 2004 was 1.5 by 6.1 m. All herbicide treatments were broadcast postemergence in 187 L/ha water carrier using a CO_2 pressurized backpack sprayer equipped with flat fan nozzles spaced 51 cm apart. Chlorsulfuron + metsulfuron-methyl (5:1) was applied at 11 g ai/ha with non-ionic surfactant (NIS) at 0.25% v/v; imazamox was applied at 35 g ai/ha with NIS at 0.25% v/v and 28% urea ammonium nitrate (UAN) at 1.25% v/v; mesosulfuron-methyl was applied at 15 g ai/ha with NIS at 0.5% v/v; propoxycarbazone-sodium was applied at 30 g ai/ha with NIS at 0.25% v/v; sulfosulfuron was applied at 35 g ai/ha with NIS at 0.25% v/v; and triasulfuron was applied at 15 g ai/ha with NIS at 0.25% v/v.

An unsprayed check was included at each site. Wheat growth stage at herbicide application was determined by examining ten randomly selected plants from each planting date. Herbicide application date, wheat growth stage at application, minimum, maximum, and mean temperatures one week before and after treatment, and first post-application rainfall are listed in Table 1.

Wheat chlorosis and stunting were visually estimated using a scale of 0 to 100% where 0% = no injury and 100% = plant death.

A small plot combine was used to harvest 9.8 m^2 from each plot in 2003 and 8.4 m^2 in 2004. The harvested samples were re-cleaned to remove chaff and straw. Material removed after the samples were re-cleaned was considered dockage and consisted primarily of chaff, straw, and shriveled wheat. Wheat volume weight, moisture content, and grain yield adjusted to 12% moisture, were determined after cleaning. Wheat grain yield data from the 2003 Perkins site was grouped by planting date and analyzed as percent of the untreated check. All data were subjected to analyses of variance using the Agriculture Research Manager program (ARM).

2003 Perkins. An experiment with four replicates was initiated in the fall of 2003 at the Agronomy Research Station near Perkins, Ok on a Teller loam (fine-loamy, mixed, thermic Udic Argiustolls). The plots in the first planting date were tilled with an S-tine field cultivator and the remaining plots were tilled with a spring-tooth harrow on their respective planting dates. Wheat was seeded October 3, October 17, October 30, November 11, and December 1. All herbicide treatments were applied January 21, 2004 and included chlorsulfuron + metsulfuron-methyl (5:1), imazamox, mesosulfuron-methyl, propoxycarbazone-sodium, sulfosulfuron, and triasulfuron at the rates mentioned above. Crop injury was visually estimated 5, 7, 14, 21, 27, and 51 DAT. Plots were harvested June 7, 2004.

2003 Stillwater. An experiment with three replications was initiated in the fall of 2003 at the Agronomy Research Station in Stillwater, OK, on a Kirkland silt loam (fine, mixed, thermic, Pachic Paleustolls). Plots seeded at the first planting date were tilled with an S-tine field cultivator immediately prior to seeding. The remaining plots were tilled with a spring-tooth harrow immediately before seeding on December 22. Imazamox was applied February 17, 2004. Crop injury was visually estimated 3, 7, 14, 21, 28, and 37 DAT. Plots were harvested June 14, 2004.

2004 Lake Carl Blackwell. An experiment with three replicates was initiated in the fall of 2004 at the Agronomy Research Station near Lake Carl Blackwe on a Port loam (fine, mixed, thermic, Pachic Argiustolls). Plots were tilled with sweeps on their respective planting dates. Wheat was seeded October 18 and December 14. Imazamox, mesosulfuron-methyl, propoxycarbazone-sodium, and triasulfuron were applied February 22, 2005. Propiconazole (11.7%) + azoxystrobin (7%) was applied to the entire site at 203 g ai/ha on April 18, 2005 to control leaf rust, Puccinia recondita. Crop injury was visually estimated 3, 7, 14, 21, and 31 DAT. Plots were harvested June 9, 2005.

2004 Stillwater. An experiment with three replications was initiated in the fall of 2004 at the Agronomy Research Station in Stillwater, OK on a Kirkland silt loam (fine, mixed, thermic, Pachic Paleustolls). Plots were tilled with sweeps on their respective planting dates. Wheat was seeded October 18 and November 28. Imazamox was applied February 25, 2005. Propiconazole (11.7%) + azoxystrobin (7%) was applied to the entire site at 203 g ai/ha on April 18, 2005 to control leaf rust, Puccinia recondita. Crop injury was visually estimated 3, 6, 14, 21, and 28 DAT. Plots were harvested June 9, 2005.

RESULTS AND DISCUSSION

Visual crop injury was not observed at any site. Thus, no data for visual crop injury ratings are reported herein. Because location by planting date interactions were found data are presented by location.

2003 Perkins. A weak (P = 0.09) planting date by herbicide treatment interaction in wheat grain yield data indicated that wheat planted on November 11 and treated with chlorsulfuron + metsulfuron-methyl (5:1), imazamox, propoxycarbazone-sodium, and sulfosulfuron yielded less grain than wheat planted the same day and treated with mesosulfuron-methyl or triasulfuron (Table 2). Mesosulfuron-methyl was the only herbicide applied to wheat planted on December 1 that did not significantly lower grain yields.

When wheat grain yield data were averaged over planting date, a herbicide treatment effect indicated that all herbicide treatments except imazamox reduced grain yield (Table 3). The sulfosulfuron treatment reduced yield by 15%, propoxycarbazone-sodium and chlorsulfuron + metsulfuron-methyl (5:1) by 14%, mesosulfuron-methyl by 12%, and triasulfuron by 10%.

When wheat grain yield data were averaged over herbicide treatments, a linear relationship was found between wheat planting date and wheat grain yield ($y = 3613.1 - 48.1x$, $R^2 = 0.89$) (Figure 1). Wheat grain yields decreased by 29% when planting was delayed from October 3 to October 30 and by 66% when planting was delayed from October 3 to November 11. Wheat planted on December 1 yielded 89% less than wheat planted on October 3.

A planting date by herbicide treatment interaction in wheat grain moisture content revealed an effect of herbicide treatment on wheat grain maturity (Table 4). Chlorsulfuron + metsulfuron-methyl (5:1), imazamox, sulfosulfuron, and triasulfuron accelerated the maturity of wheat seeded November 11 as evidenced by the lower (2.1% on average) grain moisture at harvest. Chlorsulfuron + metsulfuron-methyl (5:1), imazamox, sulfosulfuron, and triasulfuron accelerated the maturity of wheat seeded December 1 while propoxycarbazone-sodium delayed it.

Averaged over herbicide treatments, a planting date effect on dockage was observed (Table 5). Dockage increased from 1 to 8% when planting was delayed from October 30 to December 1.

When wheat volume weight was averaged over herbicide treatment, a linear relationship was found between wheat planting date and wheat volume weight ($y = 80.9 – 0.25x$, $R^2 = 0.76$) (Figure 2). Wheat volume weight decreased by 11% when planting was delayed from October 17 to November 11 and by 19% when delayed until December 1.

2003 Stillwater. Data collected from this site did not indicate the occurrence of planting date by herbicide treatment interactions. When planting was delayed from October 28 to December 22 wheat grain yields decreased by 57%, wheat volume weight decreased by 9%, and dockage increased from 1 to 3% (Table 6).

2004 Lake Carl Blackwell. Data collected from this site did not indicate the occurrence of planting date by herbicide treatment interactions. When planting was delayed from October 18 to December 14, wheat grain yields decreased by 18%, wheat grain moisture content increased from 15.2 to 16%, and dockage increased from 3 to 4% (Table 6).

2004 Stillwater. Data collected from this site did not indicate the occurrence of planting date by herbicide treatment interactions. Wheat planted on November 28 yielded 55% less than wheat planted on October 18 (Table 6).

Data collected from these experiments indicate that planting date can affect the response of wheat to imazamox, chlorsulfuron + metsulfuron-methyl (5:1), sulfosulfuron, triasulfuron, and propoxycarbazone-sodium. Since the metabolism of sulfonylurea herbicides in plants is weather dependant, yield losses that occurred at Perkins in 2003 may be attributed to cold temperatures one week after application (WAT). The minimum temperature one WAT was -12°c. Ferreira et al. also reported visable wheat injury from sulfonylurea herbicides when the minimum temperature was -6°c in contrast to a lack of injury when the minimum termperature was 0° C (10).

Delayed planting resulted in reductions in wheat grain yield and wheat volume weight, delayed grain maturity, and increased dockage. Farmers who use delayed planting as a method of cultural control for winter annual grasses should consider the risks of reduced yield associated with delayed planting date and the application of the above mentioned herbicides.

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Table 1. Experiment site and year, application date, planting date and wheat growth stages at application, average temperature one week before and one week after application, and days from application to first rainfall of at least 1 cm.

		Wheat size at application		Temperature						First post-application rainfall	
				1 WBT[a]			1 WAT[a]				
Site and year	Herbicide application date	Planting date	growth stage	Min	Max	Mean	Min	Max	Mean	DAT[a]	Quantity
				°C							cm
Perkins 03	01-21-04	10-03-03	3 - 4 tillers	-8	17	4.4	-12	17	3.0	3	1.1
		10-17-03	2 - 4 tillers								
		10-30-03	2 - 3 tillers								
		11-11-03	1 - 2 tillers								
		12-01-03	2 - 3 leaves								
Stillwater 03	02-17-04	10-28-03	5 - 6 tillers	-10	14	0.4	-3	22	9.6	12	1.2
		12-22-03	2 - 3 leaves								
Lake Carl Blackwell 04	02-22-05	10-18-04	2 - 4 tillers	-2	24	8.8	-5	16	5.7	1	1.1
		12-14-04	3 - 4 leaves								
Stillwater 04	02-25-05	10-18-04	2 - 4 tillers	-4	24	8.2	-5	22	8.0	24	1.1
		11-28-04	3 leaves - 1 tiller								

[a]1 WBT = one week before treatment, WAT = one week after treatment, DAT = Days after treatment.

Table 2. Interaction of planting date and herbicide treatment on wheat grain yield at Perkins in 2003.

Herbicide treatment[a]	Rate	October 3	October 17	October 30	November 11	December 1
	g ai/ha	% of untreated[b]				
Chlorsulfuron+ metsulfuron-methyl	9.2 + 1.8	102	91	94	51	67
Imazamox	35	103	98	100	67	58
Mesosulfuron-methyl	15	91	97	83	87	80
Propoxycarbazone-sodium	30	102	102	79	60	50
Sulfosulfuron	35	100	93	89	58	53
Triasulfuron	15	94	100	89	79	67
LSD (0.10)		22				
CV%		22				

[a]Herbicide treatments were applied on January 21, 2004.

[b]Untreated checks were seeded at each planting date.

Table 3. Effect of herbicide treatment, averaged over planting date, on wheat grain yield, grain volume weight, and dockage at Perkins in 2003.

Herbicide treatment	Rate	Yield	Volume weight	Dockage
	g ai/ha	kg/ha	kg/hl	%
Untreated	——	2050	72	3
Chlorsulfuron+ metsulfuron-methyl	9.2 + 1.8	1775	72	2
Imazamox	35	1898	71	2
Mesosulfuron-methyl	15	1804	70	4
Propoxycarbazone-sodium	30	1779	71	5
Sulfosulfuron	35	1747	72	2
Triasulfuron	15	1843	71	3
LSD (0.05)		164	NS[b]	NS
CV%		14	3	94

[a]Herbicide treatments were applied on January 21, 2004.

[b]NS = no significant difference between means within a column at P = 0.05.

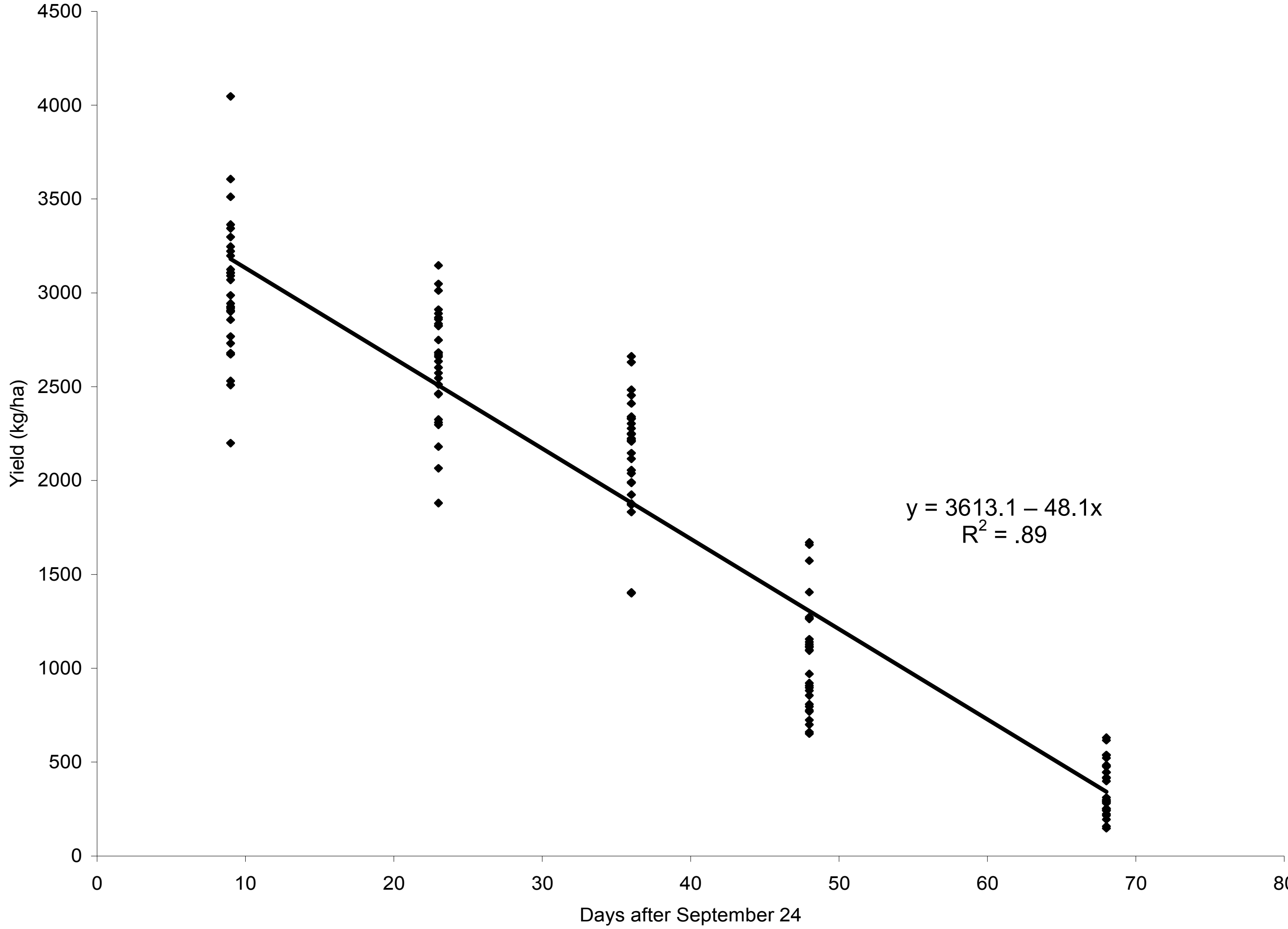

Figure 1. Effect of planting date on wheat grain yield.

Table 4. Interaction of planting date and herbicide treatment on wheat grain moisture content at Perkins in 2003.

Herbicide treatment	Rate	Planting date				
		October 3	October 17	October 30	November 11	December 1
	g ai/ha	%				
Untreated		15.0	14.6	14.8	16.1	16.6
Chlorsulfuron+ metsulfuron-methyl	9.2 + 1.8	14.7	14.5	14.6	14.1	15.4
Imazamox	35	14.8	14.8	14.8	13.9	15.0
Mesosulfuron-methyl	15	14.6	14.5	14.6	15.8	16.7
Propoxycarbazone-sodium	30	14.7	14.7	14.9	16.1	18.2
Sulfosulfuron	35	14.7	14.6	14.8	14.0	15.2
Triasulfuron	15	14.7	14.6	14.7	14.1	14.5
LSD (0.05)		1.08				
CV%		5.00				

[a]Herbicide treatments were applied on January 21, 2004.

Table 5. Planting date effect on wheat grain yield, grain volume weight, and dockage, averaged over herbicide treatment at Perkins in 2003.

Planting date	Growth stage at application	Yield	Volume weight	Dockage
		kg/ha	kg/hl	%
10-03-03	3 - 4 tillers	3030	76	1
10-17-03	2 - 4 tillers	2625	76	1
10-30-03	2 - 3 tillers	2152	74	1
11-11-03	1 - 2 tillers	1045	68	4
12-01-03	2 - 3 leaves	360	62	8
LSD (0.05)		138	1	1
CV%		14	3	94

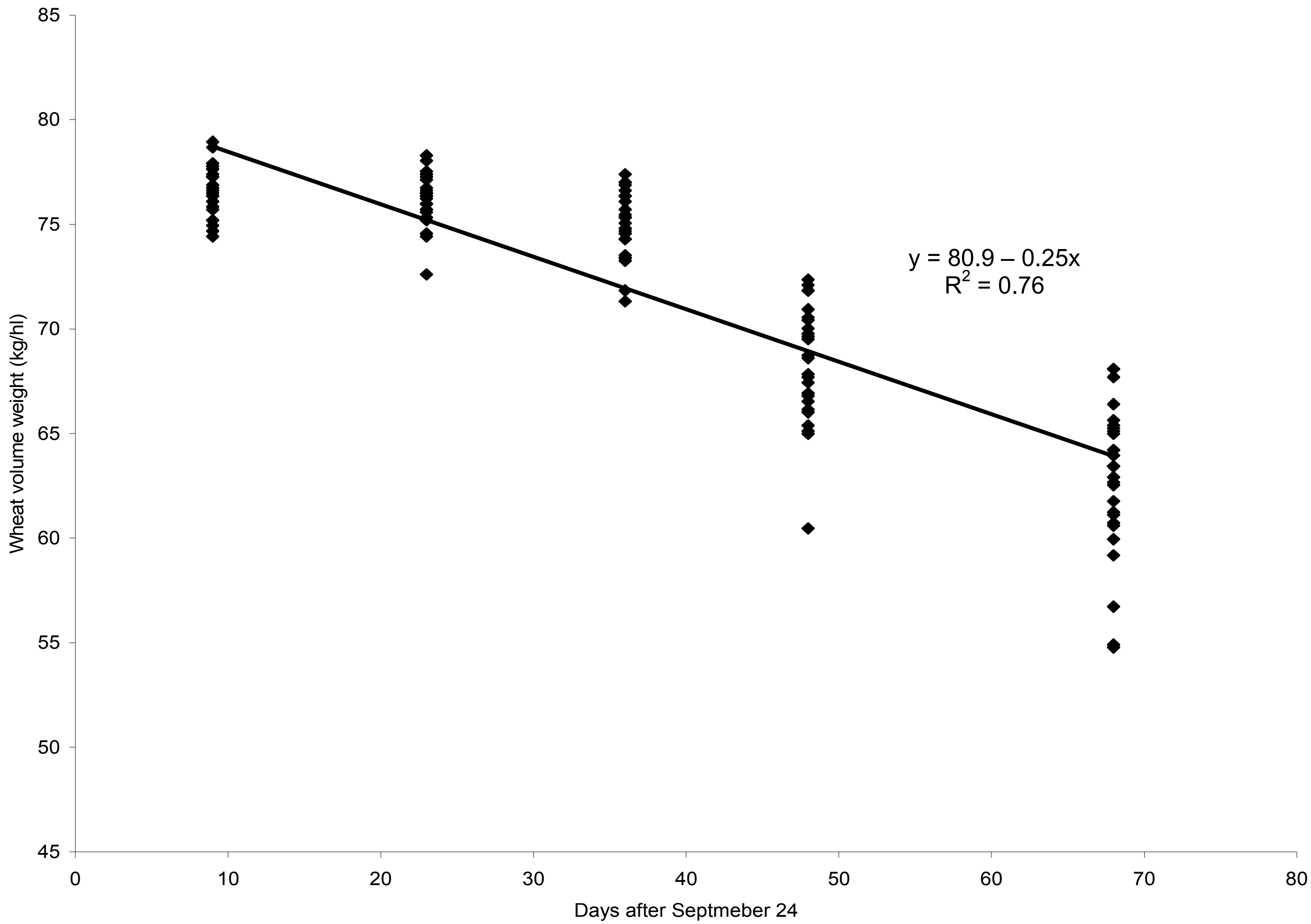

Figure 2. Effect of planting date on wheat volume weight.

Table 6. Planting date effect on wheat grain yield, grain volume weight, grain moisture content, and dockage, averaged over herbicide treatment at three sites.

Site and year	Planting date	Growth stage at application	Yield	Volume weight	Moisture	Dockage
			kg/ha	kg/hl	——— %	———
Stillwater 03	10-28-03	5 - 6 tillers	3225	72	11	1
	12-22-03	2 - 3 leaves	1384	66	10	3
LSD (0.05)			244	2	NS[a]	1
CV%			8	2	2	31
Lake Carl Blackwell 04	10-18-04	2 - 4 tillers	2866	73	15.2	3
	12-14-04	3 - 4 leaves	2369	73	16.0	4
LSD (0.05)			323	NS	0.4	1
CV%			16	2	3	37
Stillwater 04	10-18-04	2 - 4 tillers	2393	78	13	3
	11-28-04	3 leaves - 1 tiller	1085	76	14	5
LSD (0.05)			522	NS	NS	NS
CV%			21	3	9	67

[a]NS = no significant difference between means within a column at P = 0.05.

Table 7. Herbicide treatment effect on wheat grain yield, grain volume weight, grain moisture content, and dockage averaged over planting date at three sites.

Site and year	Application date	Herbicide treatment	Rate	Yield 1st date	Yield 2nd date	Yield Mean	Volume weight	Moisture	Dockage
			g ai/ha	kg/ha	kg/ha	kg/ha	kg/hl	%	%
Stillwater 03	2-17-04	Imazamox	35	3230	1334	2282	69	10	2
		Untreated check	—	3220	1434	2327	69	11	2
		LSD (0.05)		NS[a]	NS	NS	NS	NS	NS
		CV%		8	8	8	2	2	31
Lake Carl Blackwell 04	2-22-05	Imazamox	35	3215	2475	2845	73	15	3
		Mesosulfuron-methyl	15	2969	2081	2525	74	15	3
		Propoxycarbazone-sodium	30	3020	2736	2878	73	15	4
		Triasulfuron	15	2660	1910	2285	73	15	3
		Untreated check	—	2466	2646	2556	73	15	4
		LSD (0.05)		NS	NS	NS	NS	NS	NS
		CV%		16	16	16	2	3	37

Table 7. Continued.

Stillwater 04	2-25-05	Imazamox	35	2542	903	1722	78	13	4
		Untreated check	——	2245	1267	1756	76	13	4
		LSD (0.05)		NS	NS	NS	NS	NS	NS
		CV%		21	21	21	3	9	67

[a]NS = no significant difference between means within a column at P = 0.05.

Name: Amber D. Roberson Date of Degree: May 2006

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: EFFECT OF PLANTING DATE ON RESPONSE OF IMIDAZOLINONE-TOLERANT WHEAT TO IMAZAMOX AND OTHER HERBICES

Pages in Study: 27 Candidate for the Degree of Master of Science

Major Field: Plant and Soil Sciences

Scope and Method of Study: The objective of this research was to determine the effect of planting date on the response of imidazolinone tolerant wheat to imazamox and other herbicides. Four replicated field experiments were conducted during the 2003 and 2004 winter wheat growing seasons. Planting dates at the 2003 Perkins site were between October 3 and December 1. Chlorsulfuron + metsulfuron-methyl (5:1) at 11 g ai/ha, imazamox at 35 g ai/ha, mesosulfuron-methyl at 15 g ai/ha, propoxycarbazone-sodium 30 g ai/ha, sulfosulfuron at 35 g ai/ha, and triasulfuron at 15 g ai/ha were evaluated. Planting dates at the 2003 Stillwater site were October 28 and December 22. Imazamox at 35 g ai/ha was evaluated. Planting dates at the 2004 Lake Carl Blackwell site were October 18 and December 14. Imazamox at 35 g ai/ha, mesosulfuron-methyl at 15 g ai/ha, propoxycarbazone-sodium at 30 g ai/ha, and triasulfuron at 15 g ai/ha were evaluated. Planting dates at the 2004 Stillwater site were October 18 and November 28. Imazamox at 35 g ai/ha was evaluated. Crop injury was visually estimated. Moisture content, wheat volume weight, and grain yield were determined. Data was statistically analyzed.

Findings and Conclusions: Visual crop injury was not observed. Wheat grain yield declined with later planting date. At the 2003 Perkins site, all herbicide treatments except imazamox reduced wheat grain yield. At P = (0.09), yield data indicated that chlorsulfuron + metsulfuron-methyl (5:1), imazamox, propoxycarbazone-sodium, and sulfosulfuron reduced grain yield when applied to wheat planted on November 11. All herbicides except mesosulfuron-methyl reduced grain yields when applied to wheat planted on December 1. Moisture data indicated chlorsulfuron + metsulfuron-methyl (5:1), imazamox, sulfosulfuron, and triasulfuron accelerated maturity of wheat seeded November 11 and December 1. Propoxycarbazone-sodium delayed maturity of wheat seeded December 1.

Advisor's Approval: Thomas F. Peeper

VITA

Amber Dawn Roberson

Candidate for the Degree of

Master of Science

Thesis: EFFECT OF PLANTING DATE ON RESPONSE OF IMIDAZOLINONE-TOLERANT WHEAT TO IMAZAMOX AND OTHER HERBICIDES

Major Field: Plant and Soil Sciences

Biographical:

Personal Data: Born in Stillwater, Oklahoma, On May 28, 1980, the daughter of Lonnie and Ernestine Cargill. Married to William Tyler Roberson on May 24, 2003.

Education: Graduated from Drumright High School, Drumright, OK in May 1998; received Associate in Science degree in Agronomy from Eastern Oklahoma State College, Wilburton, Oklahoma in May 2000; received Bachelor of Science degree in Plant and Soil Science from Oklahoma State University, Stillwater, Oklahoma in May 2003. Completed the requirements for the Master of Science degree with a major in Plant and Soil Sciences in May 2006.

Experience: Raised on family farm near Drumright, Oklahoma; employed by Rhone-Poulenc as a field research summer intern in May 1999; employed by Aventis CropScience as a field research summer intern, May 2000; employed by Monsanto as a field research 6 month intern, May 2001 and as a summer intern, May 2002; employed by Oklahoma State University, Department of Plant and Soil sciences, as an undergraduate research assistant, August 2003 to May 2003; employed by Oklahoma State University, Department of Plant and Soil sciences, as a Graduate Research Assistant, May 2003 to present.

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