

Two pass systems including applications of early preplant and preemergence followed by postemergence for weed control in no-tillage corn production, Ames, IA, 2004. Owen, Micheal D.K., James F. Lux, and Damian D. Franzenburg. The purpose of this study was to evaluate two pass systems for weed control in no-tillage corn production. Early preplant and preemergence applications followed by postemergence applications were evaluated for crop phytotoxicity and weed efficacy. Potential tank-mix partners and rates in combination with postemergence applied foramsulfuron or foramsulfuron & iodosulfuron were evaluated. The soil was a Canisteo, Nicollet clay loam with a pH 7.6 and 5% organic matter. The experimental design was a randomized complete block with three replications and plots were 10 by 25 ft. The 2003 crop was soybean. Fertilization included 127 lb/A actual N applied as urea. Crop residue on the soil surface was 57% at planting. "Pioneer hybrid 33R79" corn was planted 1.5 inches deep on May 3, at 30,200 seeds/A in 30-inch rows. Early preplant (EPP1) and EPP2 treatments were applied on April 2 and April 16, respectively, at 20 gpa and 30 psi using flat fan nozzles. Conditions on April 2 were: air temperature 20 C, soil temperature at the 4-inch depth 5 C, 3 mph wind, 0% cloud cover, 27% relative humidity. Conditions on April 16 were: air temperature 28 C, soil temperature at the 4-inch depth 14 C, 12 mph wind, 20% cloud cover, 46% relative humidity. Preemergence (PRE) and mid-postemergence (MPOST) treatments were applied on May 3 and June 8, respectively, at 20 gpa and 30 psi using flat fan nozzles. Conditions on May 3 were: air temperature 13 C, soil temperature at the 4-inch depth 11 C, 11 mph wind, 20% cloud cover, 74% relative humidity. Weed species, average size, and number per ft² in the areas to be treated included: giant foxtail one to three leaves, 0.5 inches tall, zero to two plants; woolly cupgrass one to 4 leaves, 0.5 to 1 inch tall, zero to one plant; velvetleaf cotyledon, 0.25 inch tall, zero to one plant; common lambsquarters numerous leaves, 0.5 to 3 inches tall, zero to one plant. Conditions on June 8 were: air temperature 30 C, soil temperature at the 4-inch depth 26 C, 6 mph wind, 100% cloud cover, 74% relative humidity. Weed species, average size, and number per ft² in the areas to be treated included: giant foxtail one to four leaves, two tillers, 0.5 to 3 inches tall, zero to two plants; woolly cupgrass one to 4 leaves, four tillers, 0.5 to 6 inches tall, zero to one plant; velvetleaf cotyledon to six leaves, 0.5 to 5 inches tall, zero to two plants; common waterhemp numerous leaves, 0.5 to 5 inches tall, zero to three plants; common lambsquarters numerous leaves, 0.5 to 3 inches tall, zero to one plant. April rainfall included: 0.35, 0.56, 0.65, 0.19 and 0.13 inches on April 18, 20, 24, 25, and 30, respectively. Total rainfall for April was 1.89 inches. May rainfall included: 0.41, 0.03, 0.16, 0.43, 0.12, 0.44, 3.18, 0.21, 1.19, 0.12, 0.45, 0.35, and 0.03 inches on May 8, 9, 12, 13, 14, 17, 22, 23, 24, 28, 29, 30, and 31, respectively. Total rainfall for May was 7.12 inches. June rainfall included: 0.01, 0.25, 0.27, 0.41, 0.33, 0.7, 0.92, 0.21, 0.05, and 0.01 inches on June 6, 10, 11, 12, 14, 16, 21, 24, 27, and 28, respectively. Total rainfall for June was 3.16 inches. July rainfall included: 1.51 inches and 0.18 inches from July 1 through 15 and 16 through 31, respectively. Total rainfall for July was 1.69 inches. Rainfall total for August was 4.54 inches.

No corn injury was observed on May 18 following EPP1, EPP2, and PRE applications. Treatments afforded 90% and higher giant foxtail control when observed on May 18; 46, 32, and 15 days after application, respectively. Woolly cupgrass control ranged from 63 to 92%, and in general, PRE treatments provided the best control. Velvetleaf, common waterhemp, and common lambsquarters control was good to excellent on May 18 with all application timings. EPP1 applied s-metolachlor & benoxacor, however, did not control velvetleaf. No corn injury was observed on June 3. Overall, treatments provided 77 to 92% giant foxtail control on June 3 with PRE treatments achieving 88% control and higher. EPP1 and EPP2 treatments failed to control woolly cupgrass; PRE treatments provided fair control. Velvetleaf control was variable on June 3 with few treatments providing acceptable control. PRE treatments provided 93% and higher common waterhemp control. Common lambsquarters control was good to excellent with all treatment timings on June 3.

MPOST treatments of foramsulfuron and foramsulfuron & iodosulfuron resulted in corn injury when observed June 16, 8 days application. Treatments that included glufosinate did not result in corn injury. Observations on June 25 demonstrated that MPOST applications involving glufosinate resulted in 99% control of giant foxtail and woolly cupgrass. Giant foxtail control improved with treatments involving MPOST foramsulfuron and foramsulfuron & iodosulfuron as well, with control ranging from 83 to 95%. Foramsulfuron and foramsulfuron & iodosulfuron treatments improved woolly cupgrass control when observed on June 25, and the best control occurred where PRE treatments preceded MPOST. MPOST treatments that included mesotrione and/or atrazine resulted in excellent velvetleaf, common waterhemp and common lambsquarters control on June 25. Weed control observations on July 28 reflected trends demonstrated on June 25. (Dept. of Agronomy, Iowa State University, Ames).

Table 1. Two pass systems including applications of early preplant and preemergence followed by postemergence for weed control in no-tillage corn production, Ames, IA, 2004 (Owen, Lux, and Franzenburg).

Treatment	Rate (lb/A)	Appl. time	Corn ^a stand	Injury	SETFA	ERBVI	ABUTH	AMATA	CHEAL
				5/18/04 -- (%) --	5/18/04 -----	5/18/04 (weed control)	5/18/04 -----	5/18/04 -----	5/18/04 -----
Untreated	-	-	22	0	0	0	0	0	0
Isoxaflutole+atrazine+glyphosate ^b / foramsulfuron+mesotrione+ atrazine+MSO ^c +AMS ^d	0.0625+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	EPP1/ MPOST	30	0	90	78	96	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.0625+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	EPP1/ MPOST	32	0	92	77	98	98	99
Isoxaflutole+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.0625+0.5+0.77/ 0.42+1.0+3.0	EPP1/ MPOST	30	0	92	83	96	99	99
S-metolachlor+glyphosate/ mesotrione+atrazine+ COC ^e +AMS	1.59+0.77/ 0.094+0.25+ 1.0+1.5	EPP1/ MPOST	32	0	93	63	50	99	88
Isoxaflutole+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.047+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	EPP2/ MPOST	31	0	90	75	93	98	98
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.047+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	EPP2/ MPOST	32	0	92	73	99	99	99
Isoxaflutole+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.047+0.5+0.77/ 0.42+1.0+3.0	EPP2/ MPOST	30	0	93	78	93	98	98
Isoxaflutole+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.047+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	PRE/ MPOST	30	0	93	87	98	99	98
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.047+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	PRE/ MPOST	31	0	95	83	96	99	99
Flufenacet+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.375+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	PRE/ MPOST	30	0	93	85	92	99	96
Flufenacet+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.375+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	PRE/ MPOST	32	0	93	92	93	99	98
Flufenacet+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.375+0.5+0.77/ 0.42+1.0+3.0	PRE/ MPOST	31	0	95	88	88	99	92
Atrazine&s-metolachlor&benoxacor+ glyphosate/ nicosulfuron&rimsulfuron+ mesotrione+atrazine+ COC+AMS	0.59&0.77+ 0.77/ 0.023&0.012+ 0.0625+0.25+ 1.0+1.5	PRE/ MPOST	30	0	95	85	90	99	98
LSD (P=0.05)			3	0	5	17	12	2	4

^a Corn stand per 17.42 row feet on July 29.

^b Glyphosate rate in lb ae/A.

^c MSO = Meth Oil, a methylated seed oil plus surfactant from UAP-Loveland Industries. Rate in pt/A.

^d AMS = ammonium sulfate. Rate in lb/A.

^e COC = Herbimax, and oil-surfactant adjuvant from UAP-Loveland Industries. Rate in qt/A.

Table 2. Two pass systems including applications of early preplant and preemergence followed by postemergence for weed control in no-tillage corn production, Ames, IA, 2004 (Owen, Lux, and Franzenburg).

Treatment	Rate (lb/A)	Appl. time	Injury 6/3/04 -- (%) --	SETFA	ERBVI	ABUTH	AMATA	CHEAL
				6/3/04	6/3/04	6/3/04	6/3/04	6/3/04
Untreated	-	-	0	0	0	0	0	0
Isoxaflutole+atrazine+glyphosate ^a / foramsulfuron+mesotrione+ atrazine+MSO ^b +AMS ^c	0.0625+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	EPP1/ MPOST	0	78	60	70	77	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.0625+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	EPP1/ MPOST	0	78	57	75	77	99
Isoxaflutole+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.0625+0.5+0.77/ 0.42+1.0+3.0	EPP1/ MPOST	0	78	65	73	82	99
S-metolachlor+glyphosate/ mesotrione+atrazine+ COC ^d +AMS	1.59+0.77/ 0.094+0.25+ 1.0+1.5	EPP1/ MPOST	0	87	50	38	92	88
Isoxaflutole+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.047+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	EPP2/ MPOST	0	77	57	70	87	98
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.047+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	EPP2/ MPOST	0	78	55	80	83	99
Isoxaflutole+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.047+0.5+0.77/ 0.42+1.0+3.0	EPP2/ MPOST	0	83	60	68	78	98
Isoxaflutole+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.047+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	PRE/ MPOST	0	90	82	82	96	98
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.047+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	PRE/ MPOST	0	88	82	88	95	99
Flufenacet+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.375+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	PRE/ MPOST	0	90	78	77	96	98
Flufenacet+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.375+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	PRE/ MPOST	0	90	85	83	93	96
Flufenacet+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.375+0.5+0.77/ 0.42+1.0+3.0	PRE/ MPOST	0	92	82	73	95	93
Atrazine&s-metolachlor&benoxacor+ glyphosate/ nicosulfuron&rimsulfuron+ mesotrione+atrazine+ COC+AMS	0.59&0.77+ 0.77/ 0.023&0.012+ 0.0625+0.25+ 1.0+1.5	PRE/ MPOST	0	90	73	75	93	96
LSD (P=0.05)			0	8	15	27	7	3

^a Glyphosate rate in lb ae/A.

^b MSO = Meth Oil, a methylated seed oil plus surfactant from UAP-Loveland Industries. Rate in pt/A.

^c AMS = ammonium sulfate. Rate in lb/A.

^d COC = Herbimax, and oil-surfactant adjuvant from UAP-Loveland Industries. Rate in qt/A.

Table 3. Two pass systems including applications of early preplant and preemergence followed by postemergence for weed control in no-tillage corn production, Ames, IA, 2004 (Owen, Lux, and Franzenburg).

Treatment	Rate (lb/A)	Appl. time	Injury		SETFA	ERBVI	ABUTH	AMATA	CHEAL
			6/16/04	6/25/04	6/25/04	6/25/04	6/25/04	6/25/04	6/25/04
			----- (%) -----		----- (weed control) -----				
Untreated	-	-	0	0	0	0	0	0	0
Isoxaflutole+atrazine+glyphosate ^a / foramsulfuron+mesotrione+ atrazine+MSO ^b +AMS ^c	0.0625+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	EPP1/ MPOST	10	2	88	70	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.0625+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	EPP1/ MPOST	10	2	90	73	99	99	99
Isoxaflutole+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.0625+0.5+0.77/ 0.42+1.0+3.0	EPP1/ MPOST	0	0	99	99	99	99	99
S-metolachlor+glyphosate/ mesotrione+atrazine+ COC ^d +AMS	1.59+0.77/ 0.094+0.25+ 1.0+1.5	EPP1/ MPOST	2	3	87	53	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.047+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	EPP2/ MPOST	10	5	83	58	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.047+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	EPP2/ MPOST	10	3	85	67	99	99	99
Isoxaflutole+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.047+0.5+0.77/ 0.42+1.0+3.0	EPP2/ MPOST	0	0	99	99	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.047+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	PRE/ MPOST	7	0	95	92	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.047+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	PRE/ MPOST	10	2	92	88	99	99	99
Flufenacet+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.375+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	PRE/ MPOST	10	5	92	82	99	99	99
Flufenacet+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.375+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	PRE/ MPOST	8	2	93	88	99	99	99
Flufenacet+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.375+0.5+0.77/ 0.42+1.0+3.0	PRE/ MPOST	0	2	99	99	99	99	99
Atrazine&s-metolachlor&benoxacor+ glyphosate/ nicosulfuron&rimsulfuron+ mesotrione+atrazine+ COC+AMS	0.59&0.77+ 0.77/ 0.023&0.012+ 0.0625+0.25+ 1.0+1.5	PRE/ MPOST	10	2	90	87	99	99	99
LSD (P=0.05)			2	4	4	12	0	0	0

^a Glyphosate rate in lb ae/A.^b MSO = Meth Oil, a methylated seed oil plus surfactant from UAP-Loveland Industries. Rate in pt/A.^c AMS = ammonium sulfate. Rate in lb/A.^d COC = Herbimax, and oil-surfactant adjuvant from UAP-Loveland Industries. Rate in qt/A.

Table 4. Two pass systems including applications of early preplant and preemergence followed by postemergence for weed control in no-tillage corn production, Ames, IA, 2004 (Owen, Lux, and Franzenburg).

Treatment	Rate (lb/A)	Appl. time	SETFA	ERBVI	ABUTH	AMATA	CHEAL
			7/28/04	7/28/04	7/28/04	7/28/04	7/28/04
Untreated	-	-	0	0	0	0	0
Isoxaflutole+atrazine+glyphosate ^a / foramsulfuron+mesotrione+ atrazine+MSO ^b +AMS ^c	0.0625+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	EPP1/ MPOST	93	68	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.0625+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	EPP1/ MPOST	93	72	99	99	99
Isoxaflutole+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.0625+0.5+0.77/ 0.42+1.0+3.0	EPP1/ MPOST	96	96	99	99	99
S-metolachlor+glyphosate/ mesotrione+atrazine+ COC ^d +AMS	1.59+0.77/ 0.094+0.25+ 1.0+1.5	EPP1/ MPOST	90	60	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.047+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	EPP2/ MPOST	92	60	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.047+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	EPP2/ MPOST	93	63	99	99	99
Isoxaflutole+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.047+0.5+0.77/ 0.42+1.0+3.0	EPP2/ MPOST	99	95	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.047+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	PRE/ MPOST	96	92	99	99	99
Isoxaflutole+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.047+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	PRE/ MPOST	92	88	99	99	99
Flufenacet+atrazine+glyphosate/ foramsulfuron+mesotrione+ atrazine+MSO+AMS	0.375+0.5+0.77/ 0.0328+0.0625+ 0.25+1.5+1.5	PRE/ MPOST	95	80	99	99	99
Flufenacet+atrazine+glyphosate/ foramsulfuron&iodosulfuron+ mesotrione+atrazine+ MSO+AMS	0.375+0.5+0.77/ 0.028&0.002+ 0.0625+0.25+ 1.5+1.5	PRE/ MPOST	95	87	99	99	99
Flufenacet+atrazine+glyphosate/ glufosinate+atrazine+AMS	0.375+0.5+0.77/ 0.42+1.0+3.0	PRE/ MPOST	99	96	99	99	99
Atrazine&s-metolachlor&benoxacor+ glyphosate/ nicosulfuron&rimsulfuron+ mesotrione+atrazine+ COC+AMS	0.59&0.77+ 0.77/ 0.023&0.012+ 0.0625+0.25+ 1.0+1.5	PRE/ MPOST	95	85	99	99	99
LSD (P=0.05)			3	16	0	0	0

^a Glyphosate rate in lb ae/A.

^b MSO = Meth Oil, a methylated seed oil plus surfactant from UAP-Loveland Industries. Rate in pt/A.

^c AMS = ammonium sulfate. Rate in lb/A.

^d COC = Herbimax, and oil-surfactant adjuvant from UAP-Loveland Industries. Rate in qt/A.