

Evaluation of preplant, preemergence, and postemergence herbicides for weed management in imidazolinone-resistant canola at Kennedy, MN in 1998. Lueschen, William E., Ervin A. Oelke, Erik J. Levorson, David G. LaGare and Karen B. Andol. The objective of this study was to evaluate canola injury and weed control with preplant incorporated, preemergence, postemergence, and sequential herbicide applications in canola. This trial was conducted near Kennedy, MN on the Dan Lundberg farm on a Northcoat clay soil with 3.5% organic matter, pH 8.0 and soil test P and K levels of 8 and 300+ ppm, respectively. The study was designed as a randomized complete block experiment with four replications and a plot size of 12 by 25 ft. Data were collected on the center 6 ft of each plot and yields were obtained from a 6 by 19.5 ft area. Wheat was the previous crop and the site was chisel plowed twice in the fall following wheat harvest and field cultivated once in the spring prior to fertilizing the site with 100 lb/A N, 20 lb/A P<sub>2</sub>O<sub>5</sub> and 20 lb/A S. The preplant twice incorporated (PPI 2X) treatments were applied on April 28 and the entire site was tilled once with a field cultivator set to till 3 to 4 inches deep. The preplant once incorporated (PPI 1X) treatments were applied on April 29 and the entire site was tilled once with a field cultivator set to till 3 inches deep. On April 29 Pioneer Brand '45A71' imidazolinone-resistant canola was planted at a seeding rate of 12 viable seeds/ft<sup>2</sup> in rows spaced 6 inches apart; the seed had been previously treated with imidacloprid and benomyl for control of flea beetles and seedling fungus diseases, respectively. The preemergence (PRE) treatments were applied immediately after planting. After planting the canola, a single row of barley, wheat and oat was planted across the end of each plot, perpendicular to the canola row direction, to allow us to evaluate control of these species without influencing canola yield. These strips were cut off while end trimming plots prior to harvest. All treatments were applied with a tractor-mounted sprayer equipped with 8002 flat-fan nozzle tips spaced 15 inches apart on the boom. The compressed-air sprayer was calibrated to deliver 20 gpa at 30 psi boom pressure. Application dates, environmental conditions, plant sizes and rainfall are listed below:

Date	April 28	April 29	April 29	June 3	June 10
Application	PPI 2X	PPI 1X	PRE	POST I	POST II
Temperature (F)					
air	74	63	66	58	65
soil (4 in)	53	47	48	54	66
Soil moisture	dry	dry	dry	moist	moist
Sky	clear	clear	clear	p. cloudy	cloudy
Wind (mph:direction)	10:SW	5:S-SW	8:S-SW	10:NW	14:S-SE
Relative humidity (%)	17	38	42	39	63
Canola					
leaf no	---	---	---	3-4	8-9
height (in)	---	---	---	3-5	7-8

Green foxtail					
leaf no.	---	---	---	3-4	---
height (in)	---	---	---	2-3	---
infestation (plts/ft <sup>2</sup> )	---	---	---	<1	---
Yellow foxtail					
leaf no.	---	---	---	3-4	4-tiller
height (in)	---	---	---	2-3.5	2-4
infestation (plts/ft <sup>2</sup> )	---	---	---	1	1
Wild oat					
leaf no.	---	---	---	tillering	tillering
height (in)	---	---	---	5-6	7-8
infestation (plts/ft <sup>2</sup> )	---	---	---	1	1
Redroot pigweed					
leaf no.	---	---	---	4	6
height (in)	---	---	---	2-3	2-3
infestation (plts/ft <sup>2</sup> )	---	---	---	<1	<1
Rainfall after application (in)					
1st week	0.01	0.09	0.09	0.00	0.46
2nd week	0.57	0.49	0.49	0.46	2.05
3rd week	1.60	1.60	1.60	2.05	2.55

Canola injury on the weedy check and hand-weeded check were the result of uneven emergence due to dry soil conditions after planting. Both ethalfluralin at 0.95 lb/A and pendimethalin at 1.24 lb/A gave similar levels of canola injury and stand reduction. Trifluralin at 0.75 lb/A gave less injury and stand reduction than either ethalfluralin or pendimethalin. Trifluralin at 1.0 lb/A gave canola injury similar to the ethalfluralin and pendimethalin treated plots but stand reduction was less for the 1.0 lb/A of trifluralin. Acetochlor applied either PPI 1X or PRE at 2.4 lb/A resulted in more canola injury than either metolachlor or dimethenamid. Greater stand reduction was observed with both acetochlor and dimethenamid applied PPI 1X compared to the PRE treatment. Carfentrazone at 0.004 and 0.008 lb/A gave about 50% and 70% canola injury, respectively, at the first two evaluation dates and these treatments caused significant early stand loss. However, the canola recovered remarkably well from this early injury and flowered within 1 or 2 days of the other treatments. The mixed population of green and yellow foxtail was very light, probably due to dry conditions after planting. Very few weeds were emerged when the first injury ratings were taken on June 9. All treatments gave adequate foxtail control from a weed competitiveness standpoint. Lower control ratings for foxtail were observed on June 30 for sethoxydim + carfentrazone treatments. This probably occurred because of the injury to canola from these treatments. Redroot pigweed control was excellent for all treatments except the sethoxydim + carfentrazone. No difference in control of barley, wheat and oat was observed for any of the treatments. The only treatments that gave greater than 85% control of each of the small grain species were treatments that included one of the following herbicides: imazamox, quizalofop,

nicosulfuron or sethoxydim. Carfentrazone severely antagonized the activity of sethoxydim on the small grains, reducing control to only 30% to 40%. Imazamox applied POST II following trifluralin PPI 2X gave 6% to 22% less control of the small grains than the same treatments applied POST I. Yield differences among the treatments were small. It was surprising that the sethoxydim + carfentrazone treatments yielded well in spite of the severe early injury. This indicates that canola is resilient and can recover from serious early season injury, at least where weed densities are low. [MN Agric. Exp. Stn., Paper No. 98-1-13-0095, Misc. Journ. Series, University of Minnesota, St. Paul, MN]

Table. Evaluation of preplant, preemergence, and postemergence herbicides for weed management in imidazolinone-resistant canola at Kennedy, MN in 1998 (Lueschen, Oelke, Levorson, LeGare and Andol).

Herbicide treatment <sup>a</sup>	Rate ----- (lb/A or %) -----	Injury		Std. Reduction		Foxtail <sup>b</sup>		Rrpw		Barley		Wheat		Oat		Yield ----- (lb/A) -----
		6/9	6/16	6/30	6/9	6/16	6/30	6/16	6/30	6/16	6/30	6/16	6/30	6/16	6/30	
<b>PPI_2X</b>																
Ethalfuralin	0.95	21	15	4	28	20	4	93	96	99	96	60	60	60	60	1633
Pendimethalin	1.24	20	14	3	23	18	9	96	94	98	95	39	39	39	39	1572
Trifluralin	0.75	14	7	5	12	7	3	98	95	99	95	35	35	35	35	1523
Trifluralin	1	19	10	6	10	5	4	97	96	99	96	38	38	38	38	1587
<b>PPI_2X Trif 0.75/POST I</b>																
Clpyralid	0.125	20	17	7	12	12	3	96	96	99	82	35	35	35	35	1608
Dicamba	0.063	19	18	15	6	9	4	96	95	99	95	30	30	30	30	1305
Endothall	0.375	16	11	6	18	5	4	98	95	99	95	65	65	65	65	1578
Endothall	0.56	13	5	4	6	4	3	95	95	99	95	75	75	75	75	1586
Endothall	0.75	20	10	5	8	9	2	95	91	99	95	58	58	58	58	1498
Ethametsulfuron+COC	0.019+1.0%	14	8	4	9	5	2	97	94	98	95	56	56	56	56	1581
Thifensulfuron+COC	0.023+1.0%	19	13	6	14	12	3	98	96	99	96	57	57	57	57	1693
Imazamox+COC+28%N	0.016+1.25%+1.25%	17	7	5	10	9	4	98	95	99	95	93	93	93	93	1730
Imazamox+COC+28%N	0.032+1.25%+1.25%	15	8	4	7	4	3	95	96	98	96	95	95	95	95	1617
<b>PPI_2X Trif 0.75/POST II</b>																
Endothall	0.56	15	21	5	13	21	3	96	94	99	95	55	55	55	55	1632
Imazamox+COC+28%N	0.016+1.25%+1.25%	14	5	4	7	5	3	91	93	99	96	87	87	87	87	1697
Imazamox+COC+28%N	0.032+1.25%+1.25%	19	12	4	13	10	3	86	91	94	96	73	73	73	73	1625
<b>PPI_IX</b>																
Metolachlor	1.5	18	9	4	10	6	3	92	90	94	74	14	14	14	14	1487
Dimethenamid	1.5	23	13	8	25	16	8	89	95	89	95	40	40	40	40	1553
Acetochlor	2.4	26	26	15	43	40	26	93	95	98	97	39	39	39	39	1582
<b>Preemergence</b>																
Metolachlor	1.5	15	8	7	8	6	4	89	89	94	93	15	15	15	15	1495
Dimethenamid	1.5	12	6	4	6	6	2	93	94	99	95	13	13	13	13	1572
Acetochlor	2.4	24	17	9	26	16	9	91	94	98	96	15	15	15	15	1580
<b>POST I</b>																
Quizalofop+COC	0.055+1.0%	12	8	5	5	6	2	87	95	86	91	96	96	96	96	1578
Nicosulfuron+COC	0.031+1.0%	12	4	4	6	3	2	82	90	91	95	91	91	91	91	1659
Endothall	0.56	15	10	5	11	9	3	73	86	93	89	28	28	28	28	1603
Sethoxydim+COC	0.2+1.25%	13	7	3	3	3	2	89	96	91	84	96	96	96	96	1626
Quizalofop+thif+COC	0.055+0.023+1.0%	14	15	5	5	4	3	92	96	96	96	96	96	96	96	1606
Quizalofop+emsu+COC	0.055+0.019+1.0%	13	9	9	4	5	3	90	95	89	86	96	96	96	96	1730
Quizalofop+clpy+COC	0.055+0.125+1.0%	13	10	8	2	7	4	91	95	83	96	95	95	95	95	1639
Nicosulfuron+thif+COC	0.016+0.004+1.0%	16	11	9	9	9	5	37	90	94	94	90	90	90	90	1483
Nicosulfuron+thif+COC	0.031+0.004+1.0%	16	12	6	3	8	2	89	95	98	91	95	95	95	95	1669
Imazamox+COC+28%N	0.016+1.25%+1.25%	12	7	5	5	4	3	81	97	99	97	95	95	95	95	1645
Imazamox+COC+28%N	0.032+1.25%+1.25%	14	10	8	2	4	4	87	93	98	95	93	93	93	93	1585

Sethoxydim+cafe+NIS	0.2+0.004+0.25%	48	54	28	20	21	11	85	80	96	95	34	34	34	1365
Sethoxydim+cafe+NIS	0.2+0.008+0.25%	73	71	43	44	34	19	86	84	94	84	40	40	40	1583
Sethoxydim+endo+NIS	0.2+0.375+0.25%	13	10	10	4	6	3	86	93	72	85	51	51	51	1301
Quinchlorac+MSO	0.125+1.25%	11	8	10	3	5	3	94	93	91	95	25	25	25	1843
Quinchlorac+MSO	0.25+1.25%	14	12	14	4	6	7	91	90	99	94	29	29	29	1453
<u>POST I/POST II</u>															
Sethoxydim+COC/endo	0.2+1.25%/0.375	13	8	5	5	4	3	93	95	99	90	96	96	96	1618
Qufp+COC/thif+COC	0.055+1.0%/0.023+1.0%	12	8	4	5	4	3	95	95	92	95	95	95	95	1624
Qufp+COC/imazamox	0.055+1.0%/0.016	13	7	6	6	4	3	91	96	99	96	96	96	96	1527
+COC+28%N	+1.25%+1.25%														
<u>POST II</u>															
Imazamox+COC+28%N	0.032+1.25%+1.25%	13	8	9	3	7	4	86	81	91	95	76	76	76	1493
<u>Checks</u>															
Hand-weeded		16	11	7	4	6	5	99	99	99	99	96	96	96	1691
Trif/imazamox+COC	0.75/0.032+1.25%														
+28N	+1.25%														
Weedy Check		13	7	5	3	4	2	0	0	0	0	8	8	8	1564
LSD (0.10)		5	6	5	10	7	3	11	11	14	14	20	20	20	185

<sup>a</sup>Treatments: acetochlor+dichlormid=Surpass 6.4EC; clopyralid=Stinger 3SL; dicamba=Banvel 4EC; dimethenamid=Frontier 6EC; endosulfan=Herbicide273 3SL; ethalfluralin=Sonalan 3EC; ethametsulfuron=Muster 75DF; imazamox=Motive 1SC; metolachlor=Dual II Magnum 7.62EC; pendimethalin=Prowl 3.3EC; quizalofop=Assure II 0.88EC; sethoxydim=Poast 1.53EC; trifluralin=Treflan 4EC; thifensulfuron=DPX M-6316 75DF; nicosulfuron=DPX V-9360 75DF; cafe=carfentrazone=FMCS426 40DF; NIS=nonionic surfactant spray boosters from Cenex Land O'Lakes; COC=crop oil concentrate 17% Class Additive from Cenex Land O'Lakes; 28%N=aqueous solution of urea and ammonium nitrate.

<sup>b</sup>Mixed population of green and yellow foxtail.