

Effects of time and rate of application of glyphosate on glyphosate-resistant canola at Kennedy, MN in 1998. Lueschen, William E., Ervin A. Oelke, Erik J. Levorson, David G. LaGare and Karen B. Andol. The initial objective of this study was to evaluate the effects of time and rate of glyphosate application on weed management and crop safety in glyphosate-resistant canola. However, weeds did not emerge in this trial, with the exception of a few scattered wild oat and volunteer wheat plants, so the treatments were applied according to protocol to evaluate tolerance of glyphosate-resistant canola to time and rate of glyphosate application. This trial was conducted near Kennedy, MN on the Tim and Rob Rynning farm on an Augsburg very fine sandy loam soil with 4.2% organic matter, 7.5 pH and soil test P and K levels of 24 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 was 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 in the fall prior to establishing this study. The soil surface had approximately 50% wheat straw residue cover at the time of planting and dry conditions prevailed throughout April and for nearly two weeks following planting. These conditions were likely the cause of lack of weed emergence. Just prior to planting the site was fertilized with 90 lb/A N, 30 lb/A P<sub>2</sub>O<sub>5</sub> and 15 lb/A S. The site was tilled once with a field cultivator to incorporate the fertilizer and level the soil surface. The preplant incorporated (PPI) treatments were applied on April 28 and incorporated twice with a field cultivator set to till 3-4 inches deep. On April 28 'Hyola 401RR', glyphosate-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. All treatments were applied with a tractor-mounted sprayer equipped with 8002 flat-fan nozzle tips spaced 15 inches apart on the boom. The sprayer was calibrated to deliver 10 gpa at 30 psi boom pressure. Application dates, environmental conditions, plant sizes and rainfall are listed below:

Date	April 28	May 19	May 29	June 3	June 10
Application	PPI	POST I	POST II	POST III	POST IV
Temperature (F)					
air	70	55	64	64	66
soil (4 in)	54	63	63	62	69
Soil moisture	dry	moist	moist	moist	moist
Sky	clear	clear	clear	p.cloudy	cloudy
Wind (mph:direction)	12:SW	2:SE	3:NE	10:NW	4:SE
Relative humidity (%)	23	56	36	35	59
Canola					
leaf no.	---	cotyl-2	3-5	4-6	8-9
height (in)	---	1-2	3-4	5-6	7-8

Rainfall after application (in)

1 <sup>st</sup> week	0.01	0.00	0.12	0.00	0.46
2 <sup>nd</sup> week	0.57	0.92	0.20	0.46	2.05
3 <sup>rd</sup> week	1.60	0.00	1.62	2.05	2.55

Canola injury ratings taken on June 9 and June 16 represented uneven growth, most of which was caused by the dry soil conditions and uneven canola emergence. We did observe some slight chlorosis in most of the glyphosate treated plots. This chlorosis was observed on isolated plants that accounted for no more than 1 or 2% of the plants in a plot, which likely was the result seed mixture or genetic impurities. Endothall at 0.38 lb/A applied POST I following trifluralin PPI caused some mild leaf necrosis, which disappeared within three weeks of application. Canola stands were visually evaluated on June 6 and 16 and no meaningful differences were observed among the treatments. Volunteer wheat control was greater than 90% for all treatments except for trifluralin PPI, glyphosate at 0.38 lb/A applied at POST I, or quizalofop + clopyralid + surfactant applied POST I. Glyphosate applied at 0.38 lb/A POST II gave 99 to 100% control of volunteer wheat. Time of emergence of the volunteer wheat is believed to be the biggest factor contributing to this observation. No canola yield differences were observed among any of the treatments, except for 0.75 lb/A of glyphosate applied at POST IV which reduced yield by 286 lb/A compared to the hand-weeded check. [MN Agric. Exp. Stn., Paper No. 98-1-13-0094, Misc. Journ. Series, University of Minnesota, St. Paul, MN]

Table. Effects of time and rate of application of glyphosate on glyphosate-resistant canola at Kennedy, MN in 1998 (Lueschen, Oelke, Levorson, LeGare, and Andol).

Herbicide treatment <sup>a</sup>	Canola										
	Rate		Injury		Std Red <sup>b</sup>		Flowering		Vol. Wheat <sup>c</sup>		
	-----(lb/A or %)--		6/9	6/16	6/9	6/16	6/16	6/16	6/9	6/16	Yield
<u>PPI 2X</u>											
Trifluralin	0.75	12	7	9	11	21	38	70	79	2353	
<u>PPI 2X/POST I</u>											
Trifluralin/endothall	0.75/0.56	20	16	13	18	12	37	95	99	2186	
Trifluralin/glyphosate	0.75/0.38	15	9	13	13	16	37	100	99	2351	
<u>PPI 2X/POST II</u>											
Trifluralin/glyphosate	0.75/0.38	16	11	11	13	13	38	100	99	2233	
<u>POST I</u>											
Glyphosate	0.38	11	6	8	8	22	38	75	79	2337	
Glyphosate	0.56	12	10	10	10	18	37	100	99	2279	
Glyphosate	0.75	12	13	11	14	18	38	100	99	2243	
<u>POST I/POST III</u>											
Glyphosate/glyphosate	0.38/0.38	11	13	10	13	16	37	100	99	2185	
<u>POST II</u>											
Quizalofop+clopyralid+SURF	0.055+0.125+0.25%	12	8	9	10	20	37	50	57	2372	
Glyphosate	0.38	15	8	11	13	24	37	100	99	2371	
Glyphosate	0.56	15	10	8	13	14	38	100	99	2252	
Glyphosate	0.75	14	14	10	14	13	38	100	87	2310	
<u>POST III</u>											
Glyphosate	0.38	17	11	10	14	16	37	99	99	2254	
Glyphosate	0.56	13	12	5	12	23	38	94	99	2227	
Glyphosate	0.75	11	12	20	11	18	38	93	99	2158	
<u>POST IV</u>											
Glyphosate	0.75	12	11	9	11	18	38	- <sup>d</sup>	55	2031	
<u>Checks</u>											
Hand-weeded		10	9	9	9	15	37	100	99	2317	
Trifluralin/glyphosate	0.75/0.38	9	5	6	8	24	37	25	21	2275	
Weedy		4	4	7	4	6	1	29	24	155	
LSD (0.10)											

<sup>a</sup>Clopyralid=Stinger 3SL; endothall=Herbicide 273 3SC; glyphosate=Roundup Ultra 3AS; quizalofop=Assure II 0.88EC; trifluralin=Treflan 4EC; and SURF=nonionic surfactant Cennex Land O'Lakes Preference.

<sup>b</sup>Std Red=Stand Reduction

<sup>c</sup>Vol. wheat=Volunteer wheat.

<sup>d</sup>Not applied yet.