Effects of planting date, seeding rate, canola variety and weed management strategy on weed control in canola at Roseau, MN in 1998. Lueschen, William E., Ervin A. Oelke, Erik J. Levorson, Dave G. LeGare and Karen B. Andol. The objective of this study was to evaluate the effects of two planting dates, three seeding rates, three canola varieties and four weed management strategies on competitiveness of canola with weeds. This study was conducted near Roseau, MN on the Mike Baumgartner farm. The soil type was a Borup very fine sandy loam with 2.1% organic matter, pH 7.8 and soil test P and K levels of 60 and 167 lb/A, respectively. This study was designed as a randomized complete block experiment with a split-split plot arrangement of treatments, four replications and a plot size of 6 by 30 ft. Because of flooding in one part of the site one replication was dropped and data was collected on three replications. Data and yield were obtained from a 6 by 20 ft area. Main plots were two planting dates, May 1 and May 27, subplots were four herbicide treatment regimes and the sub-subplots were a combination of three canola varieties and three seeding rates (6, 12 and 18 viable seeds/ft^2) planted in rows spaced 6 inches apart. The three canola varieties were selected based on rate of canopy closure from data obtained in 1996. The three varieties were: 'Hyola 401', 'Sponsor' and OAC 'Summit' which were characterized as having rapid, medium and slow rates of canopy closure, respectively. All canola seed was prepackaged for the appropriate seeding rate and treated with imidacloprid and benomyl. The postemergence treatments were applied very late for the second planting date due to wet field conditions. All herbicide treatments were applied with a tractor-mounted, compressed-air sprayer calibrated to deliver a spray volume of 20 gpa using 30 psi boom pressure. The spray boom was equipped with 8002 flat-fan nozzle tips spaced 15 inches apart. Canola and weed biomass samples were harvested from a 2 by 4 ft area near the end of each plot after end trimming to eliminate border effects. Canola and weed biomass was hand-separated and dried in a forced air oven before weighing. Biomass samples for planting dates I and II were taken on July 15 and August 13, respectively. Information on treatment dates, environmental conditions, plant sizes and rainfall are listed below:

	Planting Date I		Planting Date II	
Application	PPI	POST	PPI	POST
Date	May 1	May 27	May 27	July 6
Temperature (F)				
air	55	75	75	72
soil (4 inch)	55	68	68	70
Relative humidity (%)	58	50	50	62
Sky	p.cloudy	clear	clear	cloudy
Wind (mph:direction)	10:N-NE	13:SW	13:SW	5-7:SE
Canola				
leaf no	---	3-4	---	15
height (in)	---	3-4	---	18

Green foxtail				
leaf no	---	---	---	6-8
height (in)	---	---	---	6-7
infestation (plants/ft^2)	---	---	---	1
Wild oat				
leaf no	---	2-3	---	tiller
height (in)	---	4-6	---	4-5
infestation (plants/ft^2)	---	5-30	---	3
Wild buckwheat				
leaf no	---	3	---	20
height (in)	---	2	---	5-8
infestation (plants/ft^2)	---	3	---	2
White cockle				
leaf no	---	2-6	---	6-13
height (in)	---	0.5-1.5	---	4-22
infestation (plants/ft^2)	---	1	---	2
Pennsylvania smartweed				
leaf no	---	3	---	10-17
height (in)	---	1	---	7-15
infestation (plants/ft^2)	---	1	---	2
Rainfall following application (in)				
1st week	0.11	0.83	0.83	1.02
2nd week	1.16	0.00	0.00	0.19
3rd week	1.94	0.62	0.62	0.12

Canola injury was not observed with any of the herbicide treatments. Canola stand counts for the first planting were more than twice as high as those observed for the second planting date. This occurred because very dry soil conditions existed when the second date was planted and therefore, the seed was planted deeper. An intense thunderstorm with heavy rainfall occurred two days after planting that caused severe soil crusting and poor emergence of canola resulted. Therefore, it is difficult to compare the results between the two planting dates. The plant counts taken on June 17 showed a higher plant population than was observed late in the season. This difference was greatest for the highest seeding rates with about 40% stand loss at the highest seeding rate for the spring vs fall counts. There was very little difference in spring vs fall stand counts for the lowest seeding rate. Plant counts with Sponsor were only one-fourth to one-third of those observed with the other two varieties. This occurred even though we adjusted seeding rates based on seed germination tests. Very low levels of weed biomass were observed at the pod filling stage of canola for the first planting date. The weedy check, averaged across varieties and seeding rates, had only 764 lb/A of weeds which was higher than any of the herbicide treated plots. The lowest weed biomass for the first planting date was observed with the sequential treatment of trifluralin PPI followed by endothall postemergence. Weed biomass for the first planting date was not affected by variety or seeding rate. The

second planting date had much higher weed biomass levels than the first planting date, probably due to poor canola stand establishment for the second planting date. Sponsor had the highest level of weed biomass, especially for the second planting date, of the three varieties. This was probably due to the poor stands observed with this variety. Seeding rate did not have a consistent effect on weed biomass, although the highest seeding rate did have the lowest weed biomass when averaged over varieties and herbicide treatment. Canola biomass was affected by herbicide treatment; the weedy check had the lowest biomass. With the exception of Summit, canola biomass increased as seeding rate increased. Canola seed yields were approximately one-third lower for the second planting date compared to the first. There were only small yield differences among the herbicide treatments. The most consistent yield response to increased plant population was observed with Sponsor, a nearly linear increase in yield as seeding rate increased was observed. This observation was likely the result of poor plant stands with this variety compared to our target populations. [MN Agric. Exp. Stn., Paper No. 98-1-13-0092, Misc. Journ. Series, University of Minnesota, St. Paul, MN]

Table. Effects of planting date, seeding rate, canola variety and weed management strategy on weed control in canola in Roseau, MN in 1998 (Lueschen, Oelke, Levorson, LeGare and Andol).

Herbicide				Stand Counts				Biomass									
				5/20	6/17	8/25	9/14	Canola		Weeds		10% Flow		Maturity[c]		Yield	
treatment[a]	Rate	Variety	Seed Rate	PDI[b]	PDII[b]	PDI	PDII	PDI	PDII	PDI	PDII	PDI	PDII	PDI	PDII	PDI	PDII
			(seeds/ft^2)	----(plts/10 ft^2)----				-------(lb/A)-------				--------(DAP)--------				--(lb/A)--	
Trifluralin	0.5	Hyola 401	6	45	21	43	15	8516	5696	18	328	49	43	100	98	2186	2253
		Hyola 401	12	109	33	80	20	7124	8532	0	2016	49	43	100	95	2583	2408
		Hyola 401	18	157	61	112	47	7124	8948	48	24	49	43	102	94	2340	2183
		Sponsor	6	33	6	27	7	6928	6012	288	1228	53	45	105	100	2007	1177
		Sponsor	12	56	15	55	13	8228	6188	0	462	53	44	107	97	2254	1452
		Sponsor	18	113	23	81	15	7396	8236	72	488	53	44	106	96	2384	1668
		Summit	6	50	14	44	9	7592	8064	0	666	52	45	108	101	1815	961
		Summit	12	107	34	72	25	7108	9488	0	428	52	44	109	99	1596	1714
		Summit	18	160	53	113	32	8100	9512	576	306	52	44	107	96	1753	2003
Endothall	0.375	Hyola 401	6	56	17	43	16	8048	8332	486	600	49	44	101	98	2259	1624
		Hyola 401	12	101	26	62	22	8744	8000	0	126	49	44	101	97	2391	1968
		Hyola 401	18	188	77	109	50	8008	10260	84	114	49	43	106	93	1851	2527
		Sponsor	6	35	4	34	8	6332	7304	636	660	53	45	106	100	1907	1065
		Sponsor	12	61	17	57	11	7568	5528	102	3404	53	45	106	98	2268	1215
		Sponsor	18	104	21	94	17	8264	8396	36	456	53	45	106	96	2288	1411
		Summit	6	55	20	48	18	7704	10236	84	240	52	45	108	99	1844	1422
		Summit	12	116	36	75	15	9216	7448	12	532	52	45	108	98	1303	1448
		Summit	18	184	48	149	27	6784	8508	360	48	52	44	108	98	1391	1870
Trifluralin/ endothall	1/0.75	Hyola 401	6	52	15	49	15	8172	7656	60	300	49	44	100	96	2710	1865
		Hyola 401	12	81	30	80	23	6520	10280	0	300	49	45	101	96	2685	2126
		Hyola 401	18	203	42	117	34	8344	8648	0	180	49	43	104	94	2232	2623
		Sponsor	6	28	5	27	5	5944	3968	24	1424	53	45	107	101	2249	877
		Sponsor	12	78	10	62	8	8128	6736	0	104	53	45	107	97	2054	1243
		Sponsor	18	112	23	85	15	7148	7932	0	12	52	44	103	96	2413	1471
		Summit	6	58	10	41	9	7232	7512	0	0	52	45	106	101	1887	1228
		Summit	12	82	25	71	17	7836	5452	0	780	52	45	107	99	1695	1329
		Summit	18	207	52	132	43	6544	7668	0	582	52	43	107	95	1579	2062
Weedy Check		Hyola 401	6	49	12	53	16	7320	5068	36	2016	49	44	100	98	2469	1258
		Hyola 401	12	100	24	84	28	8024	6496	180	1244	49	43	100	95	2346	2054
		Hyola 401	18	153	51	123	48	7256	7088	42	528	49	43	101	93	2533	2004
		Sponsor	6	37	9	43	9	6524	2204	44	2252	53	45	105	99	2251	971
		Sponsor	12	56	10	60	8	6536	3280	954	1816	53	45	105	97	2349	978
		Sponsor	18	130	20	89	13	7588	5748	64	1148	53	44	105	98	2518	1429
		Summit	6	47	13	46	15	7420	5256	136	840	52	44	105	98	2323	799
		Summit	12	114	25	104	27	7968	6904	78	816	51	45	104	98	2118	1220
		Summit	18	181	42	149	21	7064	5440	24	1536	52	44	108	98	1695	1295

A.	Planting date means:							
	Date I	97	75	6913	123	51	105	2126
	Date II	26	20	6467	778	44	97	1589
B.	Herbicide means:							
	Trifluralin 0.5	60	45	7117	386	48	101	1930
	Endothall 0.375	65	48	7325	443	48	102	1781
	Trifluralin/endothall 1/0.75	62	46	6610	209	48	101	1907
	Weedy check	60	52	5707	764	48	100	1812
	LSD (0.10)	5	4	679	187	0.2	1	155
C.	Variety x seeding rate means:							
	Hyola 401 6 seeds/ft2	33	31	6638	481	47	99	2078
	Hyola 401 12 seeds/ft2	63	50	7393	483	46	98	2320
	Hyola 401 18 seeds/ft2	116	80	7635	128	46	98	2287
	Sponsor 6 seeds/ft2	20	20	4941	820	49	103	1563
	Sponsor 12 seeds/ft2	38	34	5814	855	49	102	1727
	Sponsor 18 seeds/ft2	68	51	7018	285	48	101	1948
	OAC Summit 6 seeds/ft2	33	29	6918	246	48	103	1535
	OAC Summit 12 seeds/ft2	68	51	6969	331	48	103	1553
	OAC Summit 18 seeds/ft2	116	83	6881	429	48	102	1706
	LSD (0.10)	6	4	528	201	0.2	1	111
Prob (>F):								
	Main effects: A	0.001	0.001	0.260	0.010	0.001	0.001	0.020
	Main effects: B	0.230	0.060	0.003	0.001	0.020	0.020	0.300
	Main effects: C	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Interactions: AB	0.100	0.090	0.010	0.007	0.040	0.140	0.080
	Interactions: AC	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Interactions: BC	0.004	0.060	0.030	0.001	0.140	0.001	0.060

[a]Trifluralin=Treflan 4EC and endothall=Herbicide 273 3SL.

[b]PD=planting date; PDI=May 1, PDII=May27.

[c]Maturity=days after planting when 90% of the pods are brown.