Effect of Imazamethabenz Carryover on Canola

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A greenhouse study was conducted to evaluate the effects of imazamethabenz carryover on canola emergence and growth up to the four-leaf stage. Soil was collected in May 1997 from six commercial fields treated with imazamethabenz in 1996 in Polk and Red Lake counties in Minnesota and from one soil that had not received an imazamethabenz application. Soil locations and soil test information are included in Table 1.

Plastic containers measuring 10" x 14" x 5" containing approximately 18 lbs. of soil from each site were fertilized at rates equivalent to 120 lb N, 20 lb P, 100 lb K and 30 lb S. Canola varieties 'Hyola 420' and '45A71' (imidazolinone tolerant variety) were each seeded at 0.5 in deep in separate rows. Each container held ten seeds of each variety. The experimental design was a split plot arrangement of a completely randomized design with four replications. Whole plots were the various soil locations and subplots consisted of the two canola varieties. Two additional treatments consisted of soil applications of imazamethabenz applied in 100 ml of water to the check soil and lightly incorporated prior to seeding at 0.47 lb ai/A and 0.047 lb ai/A which are the high labeled rates on wheat and 10% of the high labeled rate respectively

Stand counts, damage ratings and plant dry weights at the four-leaf stage were taken to determine herbicide phytotoxicity to canola. Visual damage ratings were on a scale from 0 to 5 as follows;

0 = no symptoms
1 = chlorosis
2 = chlorosis and stunting
3-5 = increasing levels of chlorosis, stunting, rosetting and leaf malformations

Results

The check soil amended with imazamethabenz at 0.47 lb/a and 0.047 lb/a provided a comparison of the varietal response to the herbicide and symptoms of injury. Phytotoxicity from imazamethabenz was present as chlorosis, leaf and plant malformations, and as a reduction in growth as compared to the check plants. The two canola varieties responded differently to imazamethabenz (Table 2). Canola variety ' 45A71' was completely tolerant to both imazamethabenz rates. There were no differences in plant stands or in visual injury ratings. A significant increase in the percent dry weight reduction (0.47 lb ai/A) compared to the check soil is unexplained except that the check soil was from an area with a high weed seed bank and competition from the new seedlings was constant. The variety Hyola 420 was severely injured from the high imazamethabenz rate, but was unaffected at the low rate. Dry weight reduction at 0.47 lb ai/A was 76% while there was a slight but nonsignificant increase of 15% in dry weight at the 0.047 lb ai/A rate. Plant stands were not affected by either herbicide rate.

Canola grown in soil from commercial fields treated with imazamethabenz in 1996 did not show visual symptoms of injury (except for slight amounts of chlorosis) or significant decreases in percent reduction in dry weight per plant compared to the check soil. (Table2). The percent reduction in dry weight per plant of '45A71' canola was negative on all treatments except one soil location. A negative value indicates greater plant weight compared to the check plants. These increases in plant weights are

believed to be due to inherent differences in soil productivity between the sites rather than effects from imazamethabenz.

The percent reduction in dry weights was not statistically different from the check soil with 'Hyola 420', but there is a trend to less growth when compared to '45A71'. It is possible the reductions in dry weights are slight growth retarding effects of the herbicide on this variety. Visual symptoms of injury were restricted to slight amounts of chlorosis.

Canola emergence between soil locations was variable. Significant differences in plant stands are not believed to be related to carryover of imazamethabenz but rather to very warm greenhouse conditions which caused some soils to become crusted which resulted in reduced emergence. Reduced emergence is probably not due to carryover of imazamethabenz because this herbicide applied at 0.47 lb ai/A did not reduce plant emergence in either variety of canola.

Table 1. Location, imazamethabenz rate applied in 1996 and soil test information from soils sampled in 1997

Location	Soil Sites	Description	pH	Texture	Imazamethabenz rate in **1996** (lbs ai/A)	Organic matter (%)
Red Lake Co.	1	SE¼ , Sec. 34, Louisville twp	7.0	clay	0.38	5.9
	2	SE¼, Sec. 34, Red Lake twp	7.0	sandy loam	0.38	3.7
	3	NW¼, Sec. 2, L. Pleasant twp	7.3	sandy loam	0.38	3.4
Polk County	4	SE¼, Sec.15, Brandvold twp	7.3	loam	0.47	4.4
	5	SE¼, Sec. 1, Fairfax twp	7.8	sandy loam	0.44	3.0
	6	SW¼, Sec.5, Kertsonville twp	7.2	clay loam	0.44	9.8
Check 1 soil	7	SW¼, Sec. 12, Lowell twp	7.9	clay	0	4.0
Check 2 soil amended in **1997** with 0.047 lb ai/A imazamethabenz	8	SW¼, Sec. 12, Lowell twp	7.9	clay	0	4.0
Check 3 soil amended in **1997** with 0.47 lb ai/A imazamethabenz	9	SW¼, Sec. 12, Lowell twp	7.9	clay	0	4.0

Table 2. Influence of imazamethabenz carryover on canola varieties '45A71' at each soil location.

LOCATION MEANS - VARIETY 45A71

	PLANT DRY WT. (g)	DRY WT REDUCT. (%)	HERB. INJURY (SCALE 1-5)	PLANT NUMBER
	MEAN	MEAN	MEAN	MEAN
Soil Site				
Kertsonville	0.398	-109.2	0.0	5.5
Lake Pleasant	0.388	-104.0	0.0	3.8
Red Lake	0.355	-86.9	0.0	6.5
Check (0.47 lb/A)	0.338	-77.7	0.3	6.5
Louisville	0.270	-42.1	0.0	5.5
Branvold	0.263	-38.2	0.0	5.3
Check (0.047 lb/A)	0.233	-22.4	0.3	7.0
Check	0.190	0.0	0.0	5.8
Fairfax	0.160	15.8	0.0	7.0
LSD=0.05	0.134	70.5	0.34	2.7
C.V. %	32	94	424	32

Table 3. Influence of imazamethabenz carryover on canola variety 'Hyola 420' at each soil location.

LOCATION MEANS - VARIETY HYOLA 420

	PLANT DRY WT. (g)	DRY WT REDUCT. (%)	HERB. INJURY (SCALE 1-5)	PLANT NUMBER
	MEAN	MEAN	MEAN	MEAN
SOIL SITE				
Red Lake	0.793	-44.8	0.3	2.8
Check (0.047 lb/A)	0.630	-15.1	0.8	5.8
Louisville	0.593	-8.2	0.3	7.3
Check	0.548	0.0	0.0	8.0
Kertsonville	0.450	17.8	0.0	7.8
Lake Pleasant	0.448	18.3	0.3	2.3
Branvold	0.445	18.8	0.3	4.5
Fairfax	0.330	39.8	0.3	8.5
Check 0.47 lb/A	0.130	76.3	5.0	5.3
LSD=0.05	0.330	60.5	0.71	2.7
C.V. %	47	365	63	32