

PROGRESS REPORT

PROJECT NO: BJKD97

TITLE: Effect of varying soil residues of Pursuit® (imazethapyr) herbicide on the performance of Clearwater spring canola and Gem spring rapeseed.

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ACCOMPLISHMENTS:

To address the problem of weeds infesting canola fields, researchers have developed herbicide resistant canola cultivars. Herbicide resistant crops provide means to effectively control weed populations, permitting higher yields while maintaining high product quality. Herbicide resistant canola may be of particular interest in several situations including direct seed fields where bedstraw is a major problem.

Canola cultivars are available that are resistant to different types of herbicides, including: imazamox, glyphosate, and glufosinate. Glyphosate and glufosinate resistance were developed using recombinant DNA techniques, and cultivars with these traits are considered to be genetically modified organisms (GMOs). However, imazamox resistance resulted from a natural mutation and cultivars are developed via conventional breeding techniques. Imazamox (Beyond® herbicide) resistant cultivars are also resistant to other imidazolinone class herbicides such as imazethapyr (Pursuit® herbicide). Imazamox resistant canola cultivars have been available in the USA and Canada for a number of years, and a few resistant breeding lines have been tested in the Pacific Northwest Canola Variety Trials. These cultivars are marketed as Clearfield® canola. The University of Idaho Canola, Rapeseed and Mustard Breeding Group are about to release their first spring canola and spring rapeseed cultivars, 'Clearwater' and 'Gem' respectively, that are resistant to imidazolinone class herbicides.

In the high rainfall area of the Inland Northwest, legumes are often included in dryland crop rotations with wheat and barley. Pursuit herbicide is commonly used in legume production, and its long half life in soil restricts the inclusion of sensitive crops like canola in rotations where it is used. Current label restrictions require a 40 month interval followed by a season long infield soil bioassay before planting a canola crop. This requires a minimum of five years between applying Pursuit and planting a canola crop if the bioassay is successful. Clearfield canola cultivars are exempt from this requirement and may be planted one year after the Pursuit application according to label instructions.

This project examines the effect of Pursuit herbicide soil residues on the imidazolinone resistant cultivars Clearwater and Gem. The opportunity to include Clearfield canola and rapeseed cultivars in crop rotations with legumes will increase grower options for crop choice and lengthen crop rotations; although we do not recommend that both Pursuit and Beyond herbicides be used in the same crop rotation.

In the spring of 2004, field trials were established at Moscow and Genesee, Idaho. Four Pursuit herbicide dose rates, 0X, 0.5X, 1X, and 2X were used, and the herbicide treatments were applied to cultivated soils and incorporated per label instructions prior to seeding. Plots of Clearwater spring canola and Gem spring rapeseed were planted at right angles to the herbicide treatments, resulting in a split block (strip plot)

design with each cultivar-treatment combination replicated four times at each location. Individual plot size was 10 feet x 20. Weed populations in the trials were low, and no additional herbicides were applied. Trials were fertilized according to local practice.

Data was taken throughout the growing season at both sites. Stand counts were made on one-meter sections of two rows in each plot, and visible herbicide damage, if any, was scored on a scale of one to nine with a score of one assigned to dead plots and a score of nine assigned to plots showing no damage. The date of 50% bloom and plant height at maturity was recorded. Seed was harvested with a small plot combine and weighed to determine yield. Oil content was estimated using a Nuclear Magnetic Resonance Analyzer (NMR) on a subsample of seed from each plot harvested.

Pursuit level had no effect on stand in either cultivar, and stands of Clearwater and Gem were similar (Table 1). No differences in damage score between treatments were observed in either cultivar (not shown). Days to flowering was not affected by Pursuit level. Gem flowered approximately two days earlier than Clearwater, but flowering time of neither cultivar was affected by the herbicide treatment. An interesting interaction occurred between the cultivars in regards to plant height. At Genesee, Gem was approximately 6 inches shorter than Clearwater, but at Moscow the height difference was less than 1 inch. In spite of this, the herbicide treatment had no statistically significant effect on plant height.

The mean seed yields of Clearwater and Gem were very similar, 2034 and 1976 respectively when averaged across both locations. Mean yields for the two locations were also similar; the yield was 2056 lbs. per acre at Moscow and 1956 lbs. per acre at Genesee. Some variation in yield was observed among the herbicide treatments, but that variation was not related to the rate of herbicide applied and was not statistically significant (Table 1). Oil content values showed some variation across treatment levels as well, but again this variation was not statistically significant.

Table 1. Mean stand counts, days to flower, plant height, yield, and oil content of Clearwater (C'water) spring canola and Gem spring rapeseed on ground with four rates of Pursuit herbicide applied and incorporated prior to planting.

Pursuit Level	Stand Count		Days to Flower		Plant Height		Yield		Oil Content	
	C'water - Gem		C'water - Gem		C'water - Gem		C'water - Gem		C'water - Gem	
	-- plants foot ⁻¹ --		--- DAP ---		--- in ---		-- lbs. acre ⁻¹ --		--- % ---	
0.0 X	9.4	10.3	57.0	55.7	57.3	53.0	1814	2088	35.4	36.8
0.5 X	9.8	9.6	57.3	55.5	57.1	53.9	2055	1930	35.7	36.2
1.0 X	10.5	9.2	57.0	55.7	55.2	51.2	2085	1830	34.7	34.7
2.0 X	8.6	9.8	57.4	55.6	55.2	52.6	2183	2062	35.0	35.7

PROJECTIONS:

The first year of data from this experiment indicates that relatively high levels Pursuit herbicide residue in soil does not have a negative effect on the performance of Clearwater spring canola or Gem spring rapeseed. Availability of adapted canola and rapeseed cultivars with imidazolinone resistance will give growers greater flexibility by allowing them to include both a legume and *Brassica* crop in rotation with small grain cereals with continuing to use a favored herbicide in the legume crop. These non-GMO herbicide resistant *Brassica* crops also will offer area growers an additional tool to control weeds.

Current plans call for Clearwater, Gem and a susceptible cultivar to be planted on the same study sites in 2005 to examine the effect of year old Pursuit residues on these cultivars. Since herbicide-plant interactions can vary with weather and climatic conditions, the entire study should be repeated to confirm these results.

PUBLICATIONS:

Effect of varying soil residues of Pursuit® (imazethapyr) herbicide on the performance of Clearwater spring canola and Gem spring rapeseed. 2005. Jack Brown and Jim B. Davis. University of Idaho. <http://www.ag.uidaho.edu/brassica/>.