Title: Weed Control in Oil Seed Crops

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Background: The single greatest impediment to increased oilseed crop production in Washington is the use of herbicides in other crops that injure oilseed crops. In particular, imazethapyr (marketed under the trade name Pursuit) has a 40 month rotation restriction for canola and other mustards, including camelina. Growers also complain of injury to winter wheat. Previous work on imazethapyr carryover focused on imazethapyr applications in pulse crops and then attempted to quantify yield losses in the following winter wheat crop. Hanson and Thill (2001) found that there was no injury to winter wheat when imazethapyr was applied the previous spring in a pulse crop. Largely as a result of this and other research, BASF, the company that markets Pursuit, has not made a label change. However, no attempt was made to quantify the imazethapyr soil residue present at the time of winter wheat planting, nor was any imazethapyr application made directly to wheat to observe injury. If the Pursuit label is changed to increase the rotation restrictions for winter wheat, or if the implications of imazethapyr residue is extended to growers, Pursuit use will likely decline significantly, increasing the acreage available for oil seed crop production.

Objectives: Determine the fate of soil-applied imazethapyr in eastern Washington soils and determine the relationship between concentration in the soil and yield loss to winter wheat with the goal of changing the use pattern of Pursuit in Washington.

Methods: Two studies will be conducted: 1) Field studies will be established to evaluate the effect of different rates of Pursuit on three different wheat lines. The varieties of wheat will be ‘ORCF 102’ (soft white, imidazolinone tolerant), ‘Brundage 96’ (soft white), and ‘Eddy’ (hard red). Imazethapyr will be incorporated in soil. Pursuit residues will be quantified using analytical techniques, and 2) imazethapyr will be applied in the spring at the normal application time and sampled periodically to determine the fate of the herbicide between application and planting of winter wheat.

In 2009, field trials were conducted in Moscow, ID, Pullman, WA, and Pendleton, OR, to determine the yield loss caused by increasing rates of imazethapyr. Imazethapyr was applied at 6 rates based on the 3.0 oz/A 1X rate: 3.0, 1.5, 0.3, 0.15, 0.03, and 0.015 oz/A. A nontreated control was included for comparison purposes. The imazethapyr was applied preplant incorporated to activate the herbicide prior to planting wheat. After application, wheat varieties Eddy, Tubbs06, and ORCF-102 were conventionally planted. Two ¼ m² samples were taken from each plot at 100% heading. Canopy height was measured at that time. Plots were harvested using a combine with a 5 foot header.

At planting and at intervals following planting, soil samples were taken from plots receiving 3.0 and 1.5 oz/A at 0, 1, 2, 3, and 4 wks after treatment. From then on, the plots were sampled
monthly. Four cores were taken from each plot and combined. The samples were analyzed for imazethapyr residue using a GC-MS. Limit of detection was 800 part per trillion.

**Duration:** 2008-2012

**Results:** Stand establishment was monitored throughout the fall and spring. No stand reduction or stunting was observed. The rate of imazethapyr necessary to cause a yield loss in winter wheat appears to be 0.3 oz/A (Figure 1). The magnitude of the yield loss in 2009 was greater than 20 bu/A for the two non-Clearfield varieties. ORCF-102, as a Clearfield variety, was not affected by imazethapyr at any rate.

The rate of imazethapyr degradation was affected by soil temperatures over the winter. The published half-life of imazethapyr is 60-90 d. A half-life of 106 to 150 d was observed in Pullman in the 2008-2009 season (Figure 2). This would indicate that a single application of imazethapyr is not sufficient to cause injury or yield loss when applied 4 months or more before winter wheat is planted. However, the rate of degradation may be different during the summer. The lack of moisture may render the imazethapyr residues unavailable for breakdown.

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**Figure 1.** Wheat yields in response to increasing doses of Pursuit applied PPI to varieties Brundage06, ORCF-102, and Tubbs06. Error bars are the standard error of the mean (n=6).
Impact/Potential Outcomes: The data is incomplete as there are more samples to process. However, based on this data, BASF is likely to increase the rotation interval for wheat planted after a Pursuit application to pulses. Even if BASF does not change the guidelines, an extension bulletin addressing the issue will be produced to guide producers on how to better manage herbicide residues for oilseed production in Washington.

Publications:

Future directions in the upcoming year: Pursuit residue analysis in support of Objective 2 must be completed, and the entire experiment repeated.