WSU-HT1, a Group Two Herbicide Tolerant Camelina Cultivar

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One of the limitations of camelina as an oilseed rotation crop in the PNW is the paucity of herbicides labeled for the crop and its sensitivity to residual amounts of herbicides commonly used in wheat production. Specifically, Group 2 herbicides that inhibit acetolactate synthase (ALS), like sulfonylureas and imidazolinones, are particular problems because of their long residual activities. Imidazolinones include Beyond®, a herbicide popularly used in Clearfield wheat varieties. A breeding project was initiated to develop a camelina variety adapted to dryland region of the PNW that is resistant/ tolerant to group 2 herbicides. Mutagenized camelina seed was sown at a very high density, allowed to germinate and establish, and then treated with Beyond herbicide. Several mutants were identified with partial resistance to the herbicides. One line in particular carried a mutation that provided partial resistance to both imidazolinones and sulfonylureas. Crosses between this line and other camelina varieties were made to create a breeding population from which WSU-HT1 was selected.

These breeding lines carrying the mutant gene showed no herbicide injury and high yields when planted into soils where the herbicide Beyond was applied at four times the recommended rate the previous season. WSU-HT1 had the highest yield and oil content of the breeding lines and is being released for commercial production. Yield and oil content are competitive with, or better than, other varieties that have been grown commercially in the region.

Table 1. Performance of WSU-HT1 and other cultivars

Variety	2014		2015		2016	
	Yield[1]	% Oil	Yield	% Oil	Yield	% Oil
WSU-HT1	858 ab	33.7 ab	983 a	34.8 a	1951 a	35.3 a
Blaine Cr.	597 b	31.2 b	780 a	34.6 a	1207 c	35.3 a
Calena	980 a	34.5 a	840 a	35.2 a	1943 ab	36.0 a
Suneson	690 ab	32.3 ab	864 a	36.0 a	1266 bc	35.2 a
Midas	n.t	n.t	806 a	33.7 a	1242 c	34.8 a

[1]lbs/acre

Other traits targeted for improvement:

Another problem with camelina production has been the lack of suitable markets and corresponding low prices. A recent decision by the FDA provides GRAS status to camelina oil as a food ingredient if erucic acid is less than 2% of the oil content. While current varieties exceed this limit, we have developed lines with less than 0.5% erucic acid. Although these lines currently do not perform well agronomically, we have crossed them to lines like WSU-HT1 to improve their performance. If successful, these breeding lines will greatly expand the current marketability of camelina, thereby increasing farmer profitability. Past efforts to encourage commercial camelina production with only the promise of future fuel markets have failed. In contrast, the canola food oil and feed meal markets have ensured markets for canola producers, even during times of wavering canola biofuel markets and prices. This food + fuel history of canola integration into the PNW should provide a model pathway for successful camelina integration.