

Part 1. Oilseeds and Other Alternative Crops

Expanding Camelina Adaption and Marketability by Breeding



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Camelina has potential as a rotation crop in dryland farming areas of the Pacific Northwest. Several genetic traits have been identified that either make the crop more adaptable to our wheat-based cropping systems or expand its marketing potential. One problem with currently available varieties is the extreme sensitivity to sulfonylurea and imidazolinone herbicides, which prevents their use in crop rotations using these chemistries, especially in rotations with Clearfield wheat varieties. We used a mutagenesis approach to identify lines with reduced sensitivity to these herbicides. One line carried a mutation that provided resistance to residual levels of both types of herbicides (Walsh et al. 2012). Lines carrying the gene showed no herbicide injury when planted into soils where the herbicide Beyond was applied at four times the recommended rate the previous season. The mutation has been bred into a high yielding, high oil background and is being amplified for release in 2016.

A second breeding objective is a variety that will be more widely accepted for edible oil purposes. Although this market is already expanding, camelina oil has not been approved by the FDA partly due to the erucic acid content. Current camelina varieties have erucic acid contents of approximately 3% while canola and other oils are less than 1%. Our cooperator at Montana State University, Dr. Chaofu Lu, has identified a mutation causing low (~0.5%) erucic acid. This trait is being bred into our highest performing lines for release as a low-erucic, herbicide tolerant variety for cooking/salad oil.



Variation in seed size in different Camelina breeding lines.

A third focus of the breeding program is larger seed size for better emergence and stand establishment. Camelina's small seed requires a very shallow seed depth at planting which can make stand establishment difficult under dryland conditions. We have begun a recurrent selection program for large seeds after crossing our advanced lines to the largest seeded camelina germplasm available. The objective is to determine if it is possible to make larger seeded varieties that have similar or better yields and oil contents.

Walsh, D.T., E.M. Babiker, I.C. Burke, and S.H. Hulbert. 2012. Camelina Mutants Resistant to Acetolactate Synthase Inhibitor Herbicides. *Molecular Breeding*: Volume 30:1053-1063

Canola-Wheat Integration in the Inland Pacific Northwestern U.S.



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The inland Pacific Northwestern U.S. (iPNW) has a diversity of environments and soils, but lacks crop diversity, and is one of the few global wheat growing regions without significant oilseeds in rotation. Although major interest in regional energy crops and rotational diversification spurred feasibility research on iPNW canola food, feed and fuel production as