CAMELINA BREEDING

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WASHINGTON OILSEED CROPPING SYSTEMS
Part of the Washington State Biofuels Initiative

Project Objectives

1. Have selected the high performing HT line selected and working on variety release.
2. Licensing HT low erucic acid line. Advance trait to make better variety.
3. Evaluate 32 advanced lines for second generation HT cultivar release with higher yield?
4. Evaluate 78 large seeded lines for yield, oil content, seed size.
5. Perform genetic analysis of oil content vrs seed size mapping populations (~600 lines; Wilson Craine grad student).

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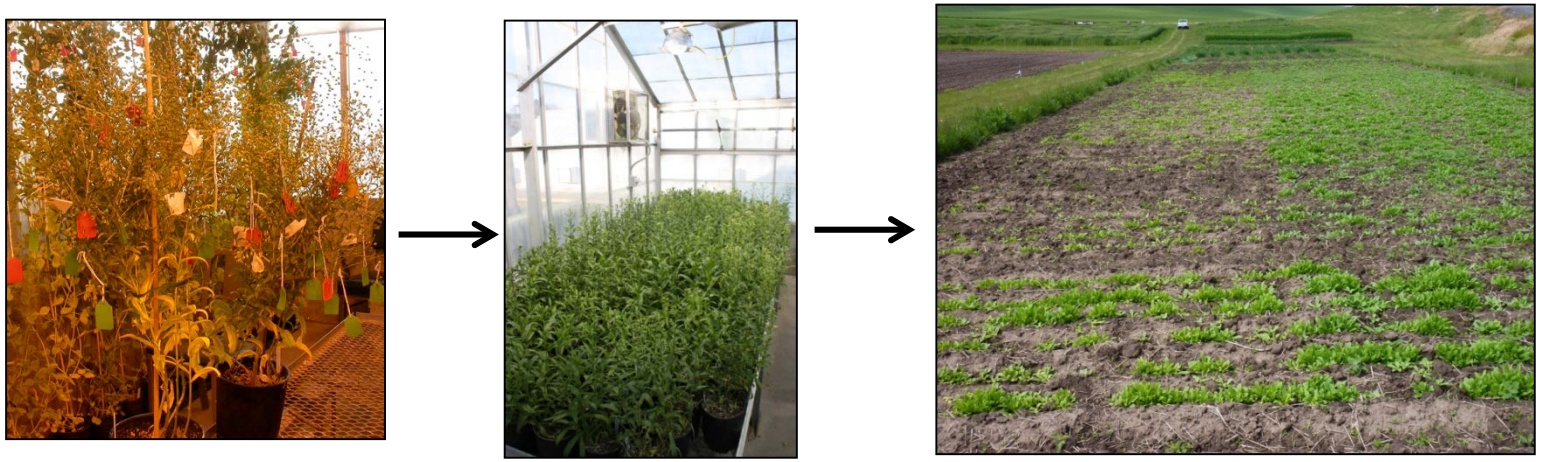
Project Methods

- Genetic background of HT mutation improved first by crossing to Calena and selecting advanced lines.
- Low erucic acid mutation identified by Chaofu Lu, Montana State.
- Large seeded lines advanced by cycles of selection and intermating.
- New breeding populations made by crossing advanced lines HT lines to other germplasm.



Crossing F_1s Early generation plots or rows

HT cultivar performance averages

	2014 Wilke		2015 Pullman		2016 Pullman	
	Yield	Oil	Yield	Oil	Yield	Oil
HT427	304	33.1%	349	34.1%	506	35.1%
HT494	280	33.6%	335	35.1%	608	34.5%
HT554	**318**	**33.7%**	**364**	**34.8%**	**723**	**35.3%**
HT556	293	33.0%	384	33.6%	602	34.4%
Blaine Creek	191	31.2%	289	34.6%	447	35.3%
Calina	362	34.5%	311	35.2%	719	36.0%
Suneson	255	32.3%	320	36.0%	469	35.2%
Midas	-	-	299	33.7%	460	34.8%
Acc-19	347	34.1%	378	35.3%	453	35.3%
Acc-31	380	33.7%	308	34.8%	548	35.0%

Low Erucic Camelina Lines

Fatty Acid		50-26-1	50-26-18	50-26-26	Calina	Blaine Cr.	Midas	Suneson
Palmitic Acid	16:0	6.0	5.9	6.1	5.5	5.4	5.5	5.4
Stearic Acid	18:0	3.6	3.4	3.7	2.6	2.5	2.3	2.7
Oleic Acid	18:1	27.5	23.3	25.1	19.9	19.9	18.8	20.0
Linoleic Acid	18:2	23.9	23.4	23.5	20.6	20.3	20.4	22.6
Linolenic Acid	18:3	28.1	33.6	30.8	26.0	28.4	29.7	25.0
Eicosenoic Acid	20:1	7.2	6.7	6.9	14.8	14.4	13.5	14.6
Erucic Acid	22:1	0.40	0.45	0.40	3.40	2.90	2.90	2.70

Additional backcrosses to elite HT lines made and are being advanced this spring.

Genetic mapping populations completed & grown in one or two environments

Populations for genetic analysis: Seed size inversely related to oil content?

- SO-1 x SO-2 (high x low oil) — 254 advanced lines
- SO-3 x SO-4 (big x small seed) — 334 advanced lines

Graduate student recruited: Wilson Craine (PhD, CSS)

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Potential additional Camelina funding

- CaRBON Camelina Renuable Bioproduct and Oil Network. Cropping systems, Engineering, Bioproducts, focus on increased profitability. UNL lead; Reverse site visit March 13. $15M

- ECO-PML Engineering Crops for Optimal Productivity on Marginal Lands WSU lead. Still in writing phase

Outcomes

- Better PNW camelina varieties with lower risk to growers
- New market expansion with low erucic lines
- Better understanding of traits & crop development limitations

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