Oilseed Variety Development: A Key to Successful Crop Adaptation

Brassica varieties; choices & traits for integration into cereal-based cropping systems

- Canola and rapeseed
- Winter canola
- Spring canola

Camelina variety development for Pacific Northwest



Canola vs. Rapeseed varieties

Canola

- Low erucic acid (22:1)
- Low glucosinolate
- Generally accepted by biofuel processors
- Mostly Brassica
 napus, some B. rapa,
 B. juncea

Rapeseed

- High erucic acid
- Glucosinolates vary, may limit meal marketing
- Acceptability depends on processor and variety
- Mostly B. napus



Winter canola (or rapeseed) properties

- Generally higher yielding than spring varieties in PNW
- Good PNW-focused breeding program at UI
- Some companies offer good varieties for PNW
- Generally planted into fallow unless irrigated in PNW





Canola seedlings don't survive PNW winters

Cold hardy size is hard to achieve when dryland planting after wheat harvest



- Planted Sept 25
- First rain Oct. 3
- Frost Oct 26 (20°C)



- Good size for surviving winter
- Planted/Irrigated early September



Winter canola is typically planted into fallow

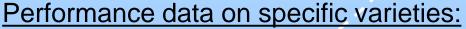


- Good stands can be difficult in mid-late summer
- Some varieties perform well in earlier plantings
- Seed cost are a consideration and varieties vary in cost
- Hybrids, and varieties with engineered traits generally cost more



Spring canola (or rapeseed) properties

- Generally not as high yielding as winter types but takes only one year to produce
- Usually grown in high-intermediate rainfall areas
- Good PNW-focused breeding program at UI
- Many companies offer good varieties for PNW
- Several traits for weed control



http://css.wsu.edu/biofuels/

http://www.webpages.uidaho.edu/jbrown/brassica/



Camelina yields well when planted after wheat

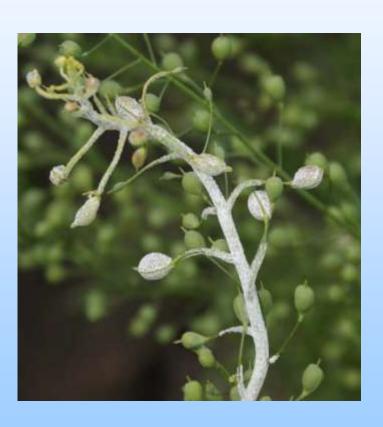
Camelina yields from 2008 to 2011 at PNW research sites*

	Annual	Number of trials	•	Average yield
Location	precipitation (in)	or years	(lbs/acre)	(lbs/acre)
Lind, WA	9.5	5	115-1030	600
Ralston, WA	11.0	2	760-1580	1230
Lacrosse, WA	15.5	4	1740-2000	1800
Pendleton, OR	16.5	5	1549-1756	1647
Moscow/Pullman	21.0	6	1610-3070	2300
Corvallis, OR	39.0	4	700-2200	1700

- A traditional low rainfall wheat fallow rotation provides three wheat crops in six years
- A wheat camelina fallow rotation would provide two wheat crops and two camelina crops in 6 years

Few pesticides required for camelina production in the PNW

Main disease encountered has been downy mildew, *Hyaloperonospora* camelinae



Approx. 5% incidence in camelina fields in Washington in 2010 - 2012

Seed transmitted pathogen

Partial control by seed treatments with Mefenoxam (Oomycete specific)

Control methods under investigation

Herbicide Resistance Traits can be Attractive to Growers

Winter canola

Roundup-Ready

Roundup-Ready, SU tolerant

Clearfield (IMI resistant)

Croplan

Croplan

High Plains Crop Dev.

Spring canola

Roundup-Ready

Liberty Link

Clearfield (IMI resistant)

Croplan, Monsanto, Cargill, Mycogen

Bayer

Mycogen Seeds

Camelina

None available



Herbicide use in cereal production is a problem for adapting Brassicas & camelina into wheat-based systems

- Brassica/Camelina sensitivity to residual amounts of ALS-inhibitor (IMI & SU) herbicides is a problem in adoption in PNW
- Many of these chemicals have very long residual activity in soil
- Good herbicides if not overused
- 300,000+ acres of CF wheat grown in Washington last year and sprayed with Beyond®. Acreage is growing!

ALS-inhibitor herbicides

Imidazolinones:

Beyond, Raptor, Pursuit...

Sulfonylureas:

Glean, Finesse, Osprey, Olympus Flex, Ally, Accent, Amber, Mavrick, Harmony...



Resistance arises to these chemicals at a low frequency



Selection of a camelina mutant that is resistant to Beyond®

- > 10 M seeds/acre rate
- Seed mutagenized (EMS)
- One mutant tolerant to IMIs and SUs



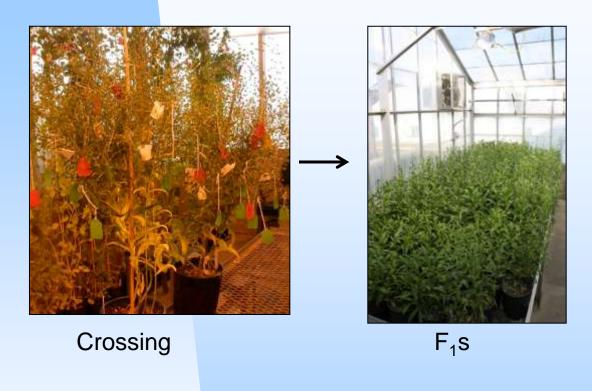
HT camelina following Clearfield wheat

	Beyond®	
Line	rate	Yield Kg/ha
Calena	0	1374
Cheyenne	0	1351
SM4-CC	0	1360
Calena	1x	1048
Cheyenne	1x	1142
SM4-CC	1x	1390
Calena	2x	474
Cheyenne	2x	606
SM4-CC	2x	1386
Calena	4x	31
Cheyenne	4x	33
SM4-CC	4x	1438



Herbicide injury in camelina plots

Private breeding efforts for camelina have been sporadic



- Crop very suitable to small breeding program
- Seed from one nice field grown plant can plant several small plots
- Main emphasis will be intermediate rainfall zone



Early generation plots in Pullman

Genetic variation is abundant for many useful traits

- Seedling vigor/competitiveness
- Seed size
- Earliness
- Oil content
- Height
- Shattering



Seed size variation



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Questions or Comments?

