

Camelina is a Potential Oilseed Crop for Washington

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Introduction

Camelina, *Camelina sativa* L, is a member of the mustard family that has also been called the popular names 'False-flax' and 'Gold-of-Pleasure'. Camelina is an ancient crop. Seeds and seed capsules of Camelina have been found in European Bronze Age excavations (1500 BCE). Camelina was a widely grown crop in Europe into the early 1940's when rapeseed and canola replaced it due to preferred oil profiles and higher yield potential under European intensive management practices.

Camelina seed contain 30-40% oil and the oil fatty acid profile is similar to flax oil. They are high in Omega-3 fatty acids. Camelina oil has historically been consumed and the meal has higher protein than canola meal. Camelina can be use as a biofuel feed stock. Camelina meal can be used as a high quality animal feed that will increase Omega-3 fatty acid levels in animal products. Currently meal is approved for broiler chickens and beef. Camelina seeds contain high levels of gamma tocopherol (Vitamin E) an anti-oxidant that stabilizes the oil and residual oil in meal.

Camelina crop production practices are being developed for seeding methods, fertilizer rates, and cultivar adaptation under Washington conditions to support commercial production. Camelina appears to be adapted to many Washington locations better than other oilseed crops. Other crop production issues include weed control, there is currently only a post-emergence grass herbicide labeled, and sensitivity of residual herbicides that limits rotation flexibility.



Camelina in Rosette Stage Camelina after bolting

Materials and Methods

- Camelina studies were conducted in Washington and Northern Idaho. The Pullman, WA, Moscow, and Greencreek, ID sites are high rainfall (20-24") but the Dusty and LaCrosse, WA sites are intermediate for rainfall (15-18").
- Randomized complete block experimental designs were used with four replications.
- Trials that were seeded used small plot drill having seven double disk openers with 6-7" spacing and packer wheels.
- Except in cultivar trials, the cultivar 'Calena' was grown.
- When dried and mature, seed was harvested with a small plot combine containing a 'canola' screen or a fine slotted screen set at a low winnowing airflow.

2010 Pullman Crop Comparison Study



Camelina Cultivar Evaluations, 2007

Cultivar	Moscow 2007	Dusty 2007	Greencreek 2007	Moscow 2008	LaCrosse 2008	Pullman 2008	Pullman Fall, 2009	Pullman Spring, 2009	Dusty Fall, 2009	Pullman Spring, 2010
----- Seed Yield lb acre ⁻¹ -----										
Blaine Creek	2010	1435	970	1155	1695	1780	2980	2810	1720	2580
Calena	2085	1780	1105	1290	2015	1565	3780	3090	1930	2820
Celine	---	---	---	1280	1765	1640	3620	3380	2020	2780
Columbia	2175	1460	1290	1225	1550	1515	3280	3060	1760	2700
Ligena	2045	1540	1175	1230	1740	1555	---	3020	---	2580
Average	2085	1490	1130	1235	1755	1610	3420	3070	1860	2690
LSD, 0.05	125	480	175	150	na	na	330	450	220	310

Camelina Seed Yield Response to Nitrogen Fertilizer

Applied N rate	Moscow 2007	Green-Creek 2007	Moscow 2008	Moscow 2009	Pullman 2010
----- lb acre ⁻¹ -----					
0	2020	760	630	1640	880
20	2115	920	670	1820	1220
40	2080	940	790	2020	1700
60	2150	1090	840	2280	1920
80	2150	1210	840	2590	2190
100	2025	1350	910	2620	2380
Average	2090	1045	780	2160	1715
LSD, 0.05	ns	200	100	170	130
Residual N:	185	90	85	70	41

Camelina Compared to Other Spring Crops

Spring Crop	Moscow 2005*	Moscow 2006*	Moscow 2008	Pullman 2009	Pullman 2010
----- lb acre ⁻¹ -----					
Camelina	2300	2250	1890	2580	1710
Canola	1650	970	700	1610	670
Yellow Mustard		720	1390	1640	690
Oriental Mustard		1420	910	2290	700
Wheat			3750	3920	1700
Barley			4620	5490	3520
Dry Pea			1890	250	840
Lentil			1080	740	480

* Comparison between adjacent trials, other comparisons are replicated

Camelina Seeding Evaluation at Moscow, 2007

----- Seeding -----		Seed Yield	Grain Density	Plant Height
Date	Method	lb acre ⁻¹	lb bu. ⁻¹	inches
19 March	Drill	2170	51.8	35
19 March	Broadcast	2125	51.7	33
5 April	Drill	2065	50.9	37
5 April	Broadcast	1985	50.1	36
19 April	Drill	1650	50.9	34
19 April	Broadcast	1385	51.1	32
Average		1870	51.2	33
LSD, 0.05		260	0.5	2



Results

Cultivar Trials

- Camelina average seed yield ranged from 1130 to 3420 pounds per acre and was 2035 lb acre⁻¹ across locations.
- The two highest yielding cultivars were Calena and Celine.
- Seed weights (not reported) varied more among varieties than between sites, and Ligena had the highest average 500 seed weight of 0.69 grams.
- Grain density of cleaned grain varied little across sites and less than 5% among varieties within a site..
- Plant height was directly related to yield among sites, but not among varieties.

N fertilizer Trials

- Camelina respond to N fertilizer more as soil residual N decreased, but response was limited in some cases by low yield potential.
- For most agronomic management situations, Camelina responds well to fertilizer nitrogen application and needs 5-7 lb per 100 lb of seed production, unless other management limits yield potential.

Seeding Trials

- Seed yield decreased rapidly as seeding date progressed, early spring seeding produces the best results.
- Drilling was the best seeding method especially at later seeding when there was less surface moisture.

Crop Comparisons

- Camelina will yield more and is more consistent in yield than other mustard and canola crops.
- Economic analysis shows Camelina will produce good returns if priced similar to canola and should be a good rotation crop to wheat.

Conclusions

- Camelina appears to be adapted to Eastern Washington and other areas of the Palouse.
- Camelina should require fewer inputs than many other crops due to:
 - Low seeding rates and low seed costs
 - Little or no pest control needs, e.g. flea beetles, aphid, cabbage seed pod weevil were not observed to attack Camelina, unlike canola and mustards
 - Efficient use of water and nutrients.
- Seeding Camelina early in the spring produces the highest yields and grain density and it is resistant to cold and frost.
- Surface seeding can be successful when there is high moisture present, but if that is in doubt, then placing the seed beneath the soil is beneficial.
- Camelina responds well to nitrogen application was soil is deficient.
- A harvest index assessment of Camelina showed a 33% grain/biomass ratio, much higher than Canola.

Camelina Field and Plots near Dusty, Washington

