

Guide for Producing Dryland Camelina in Eastern Colorado

Fact Sheet No. 0.709

Crop Series | **Production**



J.N. Enjalbert and J.J. Johnson*

Camelina is an annual crop with small seed that has been cultivated in Europe for more than a thousand years. Eastern Colorado's wheat-based, cropping system covers more than 4 million acres and spring-planted camelina would fit well into a dryland crop rotation. Camelina is a short, relatively shallow-rooted, short-season, crop requiring 85 to 100 days from emergence to maturity. The seed contains approximately 30–35% oil and can produce 40 or more gallons per acre of clean vegetable oil and potentially 900 lb/ac of high-protein animal meal.

Potential benefits of growing dryland spring camelina in eastern Colorado

- Camelina production requires the same equipment as wheat.
- Typical seeding rates are 5 to 7 lb/ac and seed cost is approximately \$2/lb.
- Camelina requires little fertilization. See Fertilization below.
- Unlike spring canola and Indian brown mustard, camelina is tolerant of flea beetles and other insects.
- Camelina has been relatively disease-free in eastern Colorado.
- Camelina branches easily, fills in blank spaces, and is more drought and heat-tolerant than other brassica crops.
- Until its pods ripen, camelina is less susceptible to hail damage than most other crops grown in eastern Colorado.
- Camelina can be direct-harvested given its pods mature quite uniformly on the plant.

- Camelina meal contains approximately 40% protein, is high in Omega-3 fatty acid content, and low in erucic acid content and glucosinolates.

Potential problems for growing dryland spring camelina in eastern Colorado

- The primary production challenges are stand establishment and weed control.
- An effective weed control method is to plant camelina in late winter/early spring into a clean field. Camelina can be planted from the end of February to the first week of April in eastern Colorado.
- Camelina is sensitive to damage from sulfonylurea (SU) herbicide residuals such as Ally, Amber, and triazine herbicides.
- Shallow ($\frac{1}{4}$ in.) planting is critical to good stand establishment and good seed-to-soil contact.
- Weed control in open areas is more of a threat than lower yields due to poor stands.
- Camelina seed yields have been variable in eastern Colorado, ranging from 300 to 1600 lb/ac in experimental plots. Crop yields vary but camelina yields have been more variable than what we have observed in many other crops in eastern Colorado and the reasons for this yield variation of camelina have not been identified.
- Reliable markets for camelina need to be developed.

Quick Facts

- Eastern Colorado's wheat-based, cropping system covers more than 4 million acres and spring-planted camelina would fit well into a dryland crop rotation.
- Unlike spring canola and Indian brown mustard, camelina is tolerant of flea beetles and other insects.
- Camelina can be grown under tilled or no-till dryland conditions. Excessive crop residue can reduce emergence so seeding rates might need to be increased.

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*J.N. Enjalbert, Colorado State University graduate student, department of soil and crop sciences; J.J. Johnson, Colorado State University Extension specialist, crop production. 7/11

Table 1: Residual sulfonylurea herbicide damage to camelina.

Herbicide (active ingredient)	Weeds controlled	Labeled Crop	Residuals for camelina
Ally/ Escort (Metsulfuron)	Broadleaf weeds	Wheat/Barley and CRP land	>24 months
Amber (Triasulfuron)	Broadleaf weeds	Winter and spring wheat	>24 months
Express (Tribenuron)	Annual broadleaf weeds	Wheat/Barley	>24 months
Atrazine (triazine)	Broadleaf weeds	Corn/Fallow	>18 months

Rotation

Following summer crops (corn, sunflower, sorghum, or proso millet), camelina can be planted early. Harvested from mid-to-late July, the soil can store moisture from late July to mid-September before planting winter wheat. When moisture allows, it's possible to harvest three crops in three years instead of two crops in three years. Camelina would replace fallow, provide an energy crop, and not compete with a critical food crop. Insufficient precipitation after camelina harvest and before wheat planting could reduce subsequent wheat yields. Camelina crop residue decomposes readily and is not expected to be a problem for tilled or no-till wheat planting.

Field selection

Some residual (carry over in the soil) herbicides from preceding crops are important to avoid. Camelina is damaged by the residual sulfonylurea (SU) herbicides in Table 1.

In areas with a soil pH higher than 7.0 and with prolonged periods of low soil temperature and low annual rainfall, the SU herbicides can remain active in the soil for 2-4 years or more and they can injure non-tolerant rotational crops such as camelina.

Camelina can be grown under tilled or no-till dryland conditions as long as there is no residual SU or triazine herbicides remaining in the soil, that good seed-to-moist soil contact must be obtained at planting, and an effective weed control in camelina can be difficult due to lack of registered products. Excessive crop residue can reduce emergence so seeding rates might need to be increased.

Variety selection

Camelina variety selection is highly dependent on seed availability. This spring

(2011), the only regionally available camelina variety is *Pronghorn*. It is an early-maturing variety bred and released by Charlie Rife (High Plains Crop Development, LLC) in Torrington, WY. Colorado State University has conducted camelina variety trials for multiple years at Akron, Iliff, and Fort Collins under dryland and irrigated conditions. Camelina varieties *Ligena*, *Celine*, *Cheyenne*, and *Blaine Creek* have performed well but seed of these varieties would have to be found from outside the region.

Pronghorn – Early maturity, will be in Colorado yield trials for first time in 2011.

Cheyenne – Medium to late maturity, stable yield and 32.4% oil content in CSU trials (Johnson and Enjalbert, 2011).

Ligena – European variety, late maturity, tall, high yielding, and 31.8% oil content in CSU trials.

Celine – European variety, medium maturity, highest yielding variety, 32.4% oil content in CSU trials.

Blaine Creek – Medium maturity, average yield, and 32.3% oil content in CSU trials.

Planting considerations

Camelina is cold-tolerant and can be planted from late February to mid-April in eastern Colorado without too much risk of experiencing freeze damage. Early planting can help to control weeds. Planting into moisture is critical. Camelina seed will germinate and emerge at soil temperatures at or above 36°F. Early planting leads to early emergence, flowering, and maturity which improves the chances of escaping high temperatures during pollination. Planting after April 15 in eastern Colorado may subject the crop to high temperatures during flowering, which will likely reduce yields. Planting early, in cool temperatures, reduces the risk of drying out the soil surface and reducing emergence. Plant camelina ¼-inch deep and use the press-

wheels on the planter to ensure good seed-to-soil contact. Camelina can be planted with a wheat drill, or broadcast and then pressed into moist soil. Seed can also be broadcast with fertilizer. Some producers may prefer to plant camelina seed with an alfalfa seed attachment on the wheat drill or plant with an alfalfa seeder. Camelina should be planted at 5–7 lb/ac. There are about 500,000 camelina seed/lb. Seeding rate should be increased to 7 lb/ac if soil moisture is not optimal, if the field has a history of crusting, or if there is excessive crop residue.

Weed control

The best weed control approach is to plant early into a field that was relatively weed-free. Early planting and good stand establishment, allows camelina to compete well with weeds so herbicide applications may not be necessary. Emerged weeds can be controlled with glyphosate applied immediately before planting camelina. Currently, Poast® (a BASF post-emergence grass control product) is the only herbicide labeled for camelina and is a grass herbicide. Therefore, no broadleaf weed control is available in crop.

Camelina breeding programs, varieties, and contact information

High Plains Crop Development, LLC.

Varieties: *Cheyenne* and *Pronghorn*.

Breeder: Charlie Rife. Location:

Torrington WY. Phone: (307) 575-4580.

Price: 2\$/lb

Montana State University. Varieties:

Blaine Creek, *Sunesson* and *Celine*.

Breeder: Biobased Products Institute.

Site: www.montana.edu/biobased/

Sustainable Oils (Target Growth, Inc.).

Varieties: SO-10, SO-20 and SO-30.

Contact: Mike Waring. Phone: (406)

788-2433. E-mail: Mike.Waring@susoils.com

Site: www.susoil.com

Great Plains Oil. Variety: *Yellow*

Stone. Contact: Great Plains Oil

& Exploration, LLC. 1 Enfield

Street, Cincinnati, OH 45218.

Site: www.camelinacompany.com

Fertilization

Soil sampling is always recommended. Soil nitrogen and organic matter content and expected yield determine how much nitrogen should be applied. Assuming a common residual nitrogen level in a dryland wheat-based cropping system and a camelina seed yield target of 1200 lb/ac, 20-40 lb N/ac may need to be incorporated prior to planting. Camelina has not been shown to respond to phosphorus, potassium, or sulfur applications at current yields in our cropping systems.

Harvest considerations

- **Timing:** Camelina should be harvested when the pods turn yellow brown. The lower stems can still be light green but the upper stems should be yellow. Optimum seed moisture for storing camelina is 8%. Seed moisture contents higher than 8.5% may increase the rise of spoilage.
- **Direct harvest or swathing:** Pod shattering is less with camelina than in canola. Camelina is typically direct harvested. However, it can be swathed to limit possible pod shattering. Oilseeds can be harvested at night to limit shattering.
- **Combine settings:** Set combine settings initially for canola and adjust accordingly. When direct combining camelina the header height should be set as high as possible and open the concave to avoid plugging the combine with moist stems. Producers have reported that a 9/64 in. screen installed over the lower sieves produces good separation of the seed from pod and stem pieces. Due to the small seed size, reduce the airflow to minimize seed loss. Transportation and storage equipment as well as the combine should be checked for leaks and sealed with tape or caulking as necessary.
- **Residue management:** Camelina residue contains high levels of glucosinolates, which can be a nematicide and be beneficial to a subsequent wheat crop.

Marketing camelina

A reliable market for camelina should be identified prior to planting. This fact sheet targets on-farm production of camelina as a petroleum fuel substitute and on-farm use of camelina meal. Mechanically extracted camelina meal contains approximately 13% fat and 40% protein, making it similar to other oilseed meals. The quantities of glucosinolates and other anti-nutritional factors are relatively low in camelina meal. (Böhme, and Flachowsky, 2005). The Food and Drug Administration (FDA) has approved camelina meal use in cattle feed at a level of 10% of the total ration. High Omega 3 content in camelina meal indicates that it might be more beneficial than other oilseed meals for human and livestock health.

Additional resources

- Lafferty, R., C. Rife, G. Foster. 2009. Spring Camelina Production Guide for the Central High Plains. Blue Sun Energy. www.extsoilcrop.colostate.edu/CropVar/oilseeds.html
- McVay K.A, P.F. Lamb. 2008. Camelina Production in Montana. Montana State University Extension. Southern Agricultural Research Center. www.extsoilcrop.colostate.edu/CropVar/oilseeds.html
- Johnson J., J-N. Enjalbert. 2011. Camelina agronomy and variety trial results 2006-2010. Colorado State University Crops Testing. www.extsoilcrop.colostate.edu/CropVar/oilseeds.html
- BASF, 2010. Poast® supplemental label for camelina: <http://agr.mt.gov/camelina/>
- Food and Drug Administration, 2010. Currently Allowed Practices for the Use of Camelina sativa meal as a Commercial Feed. <http://agr.mt.gov/camelina/>
- H. Böhme, and G. Flachowsky. 2005. On the suitability of camelina press cake as feedstuff for pigs, ruminants and poultry. *Landbauforschung Völkenrode*, 2005 (Vol. 55) (No. 3) 157-162.

Colorado crushing facilities

Rocky Ford. Big Squeeze. Managers/owners: Hal Holder and Joel Lundquist. Phone: (719) 241-1128. Contact: Dr. Perry E. Cabot, Extension water resources specialist. Phone: (719) 549-2045.

Burlington (Stratton). Chuck Clapper. Phone: (719) 349-2183.

San Luis Valley (Costilla County). Ben Doon. Phone: (719) 672-0320. E-mail: doon@amigo.net.