OKLAHOMA COOPERATIVE EXTENSION SERVICE

Producing Winter Hardy Canola in Oklahoma

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Canola (*Brassica napus*) is a broadleaf crop primarily grown for its edible oil and meal qualities (Figure 1). The term canola was trademarked by the Western Canadian Oilseed Crushers Association in 1978. Canola was derived from a rapeseed plant using traditional plant breeding methods to lower the content of erucic acid in the seed oil and glucosinolates in the meal. These changes improved canola's usefulness as healthy cooking oil for humans and protein supplement for livestock feed. Canola seeds have approximately 40% oil and contains two poly-unsaturated fatty acids that are essential in our diets and helps prevent heart disease and arthritis. Canola oil contains 6% saturated fat, the lowest level of any commercially available vegetable oil. Canola meal (Figure 2) is sold as mash or pellets that contain approximately 34% protein. The United States imports the equivalent of 2 million acres of production each year, so a domestic market for the oil and meal already exists.

In recent years, cooperative research efforts funded by federal and state agencies have developed winter-tolerant varieties. These new winter-tolerant varieties offer promise as a rotational crop with winter wheat. The varieties Wichita, Abilene, and Sumner were released in 1997, 2002, and 2003, respectively. All of these are conventional canola varieties while Sumner is also sulfonylurea tolerant. Glyphosate-tolerant canola varieties will be available in the near future.

Figure 1. Winter Canola.

Figure 2. Canola meal in pellets.

Growing winter canola is much like growing winter wheat. Winter canola and winter wheat are planted and harvested about the same time. Canola can be produced with small grains equipment, limiting the need for additional machinery. Production costs of canola are similar to those for winter wheat. Canola yields a little less than wheat and has a lower test weight (e.g. 50 lbs/bu), but has a higher market price. The low investment costs and increasing consumer demand for canola oil makes it a potentially good alternative rotational crop for Oklahoma wheat growers. USDA programs consider canola an "other oilseed" for loan deficiency payments (LDP) and other FSA administered programs. County LDP rates are available at http://www.fsa.usda.gov/dafp/psd/ldp/pstatecldp.htm

Potential Benefits of Growing Winter Canola in Oklahoma

- A crop rotation of winter canola and winter wheat may be an economically viable alternative to continuous winter wheat.
- Rotating winter canola with winter wheat should improve the marketability of the wheat because of improved consistency and quality after a canola rotation.

- Management of mixed infestations of problem weeds in wheat, such as cheat, ryegrass, jointed goatgrass, rescuegrass, wild oats, and feral rye, will be easier in canola since Assure II, Poast Plus, Select, or glyphosate (only for use in Roundup Ready canola) are all labeled for use on canola and they will control all of these weeds.
- Canola production would give wheat growers the opportunity to produce a commodity that is tied to a market other than the grain market. Canola would be tied closer to the oil-seed market. This gives farmers the opportunity to spread out their economic risk.
- Including canola into the cropping rotation will interfere with wheat disease and insect cycles and decrease these problems in the following wheat crop.
- Crop rotations have long been considered important for sustainable crop production. Recent research by Dr. Gene Krenzer showed a 4-year average wheat yield increase of 7.8 bushels/acre when wheat was rotated with winter field peas. However, unlike winter canola, the peas are not considered a profitable crop on their own.

Crop rotation has the potential to be a major part of the long-term weed management strategy, essential for Oklahoma to be a reliable supplier of high quality wheat.

Site Location for Planting Winter Canola

Canola grows best in medium-textured, well-drained soils, but it will grow over a wide range of soil textures. A soil pH between 6.0 and 7.0 is optimal, and yields may be significantly reduced when the soil pH is below 5.5. Canola does not tolerate water-logged conditions and should not be grown in fields prone to standing water, flooding, or poor drainage.

Germinating canola seedlings are very susceptible to many herbicides commonly used in other crops currently grown in Oklahoma. Rotation restrictions of these products are found on the product label and should be followed. Table 1 lists common herbicides used in wheat, corn, sorghum, and soybean crops and the waiting period after their application before canola can be seeded.

Table 1.

- Ally – 10 months if pH < 6.5, 18 months if pH > 6.5
- Glean – 18 months
- Finesse – Label not specific (14 to 18 months)
- Amber – No sooner than 4 months – do a bioassay
- Maverick – Not listed (10 to 14 months)
- Harmony Extra – 60 days
- Express – 60 days
- Olympus – Field bioassay required
- Osprey – 10 months
- Atrazine – Second fall following application
- Dual/Frontier – 18 months
- Beyond/Raptor – 18 months

Variety Selection

The most important factor in considering a variety for the Great Plains is winter survival (Figure 3). Unless a variety is proven to withstand winter conditions in your area, it should not be planted. Other factors that need to be considered when selecting a variety include oil quality, seed yield, seed oil content, lodging, shattering, maturity, and disease resistance. The varieties Wichita, Abilene, and Sumner were developed by Kansas State University and have been tested and released for production in the Great Plains.

Figure 3. Differences in winter survival between varieties can be dramatic. A winter-hardy variety is on the left, while a variety prone to freezing out is planted on the right.

Wichita (Figure 4) was the first winter-hardy canola variety released for production in the Great Plains. This variety can grow 45 to 72 inches tall and has an average seed oil content of 37%, Abilene, released in 2002, ripens 1 to 2

Figure 4. Wichita, a canola variety released by Kansas State University in 1997, is well suited for Oklahoma.

days later than Wichita, but is comparable to Wichita in height, oil content, and shattering and lodging resistance. Sumner, released in 2003, is tolerant to carryover SU herbicides, such as Finesse, Maverick, Glean, Amber, and Ally. Flowering and harvesting of Summer are earlier than Abilene or Wichita. It tends to have higher winter survival than Wichita, but it may yield 10% less than Wichita. Sumner tolerates heat stress well and has excellent cold tolerance.

Canola Growth and Development

Growers who understand how a canola plant grows can make more effective management decisions. Unlike wheat, whose growing point is protected beneath the soil during early development, the growing point of canola is above the soil. The exposed growing point makes canola seedlings more susceptible to foliage feeding insects and freeze damage; however, canola plants with three to four leaves are very tolerant to freezing weather. Seedlings in deep furrows are a potential problem during heavy rain, since they will not survive flooded conditions.

A seedling develops its first true leaves within 4 to 8 days after emergence and begins to establish a rosette with larger leaves at the base and smaller, newer leaves at the center. Canola overwinters in the rosette growth stage until early spring. Rising temperatures and lengthening days initiate bud formation. A cluster of flower buds becomes visible at the center of the rosette and rises as the stem rapidly bolts or lengthens. Upper leaves are the major sites of photosynthesis to provide nutrients for the growth of stems and buds. Rapid development and growth of a large leaf area strongly and directly influence pod set, seed development, and potential yield. Flowering begins with the opening of the lowest bud on the main stem and continues upward. Under favorable growing conditions, flowering of the main stem continues for 2 or 3 weeks, and full plant height is reached by peak flowering (Figure 5). When unfavorable growing conditions cause abortion of flowers or pods the plant can recover rapidly by developing buds that otherwise would have been aborted. The plant will maintain only the pods it can support under existing environmental conditions.

Figure 5. Flowering of canola progresses from the base of the inflorescence upward.

Maturation begins as the last flowers fade from the main stem. At this stage, the stem and pod walls are the major sources of nutrients for seed growth. Leaves, stems, and pod surfaces should be kept free from diseases and insects. Seed filling is followed by a ripening stage characterized by plant color changes. The stems and pods turn yellow and progressively become brittle as they dry out. The seed coat turns from green to brown, and seed moisture is lost rapidly. After all seeds in all pods have changed color, the plant slowly dies. Mature pods are split easily along the center membrane, and the seed can be lost by shattering. At harvest, average seed moisture should be 8 to 10%, and the main stem of the plant will remain green.

Canola Production

Planting and Seedbed Preparation

Small grains equipment is used to plant canola, but soil conditions are more critical for its establishment than for small grains. Lack of shallow soil moisture at planting time, soil compaction, crusting, and water-logging can prevent canola establishment. The seedbed should be fairly level and firm. You should sink no deeper than the heel of your work boot. Excellent results have also been observed planting into no-till wheat stubble.

Seeding Date

Seeding date is important to establishing a crop that has sufficient growth for good winter hardiness. As a general rule, canola should be planted six weeks before the first killing frost date for the area (less than 25°F). These planting dates are shown in Figure 6.

Planting very early often results in large plants that use excessive amounts of water and nutrients during fall growth. These added stress factors often decrease winter survival.

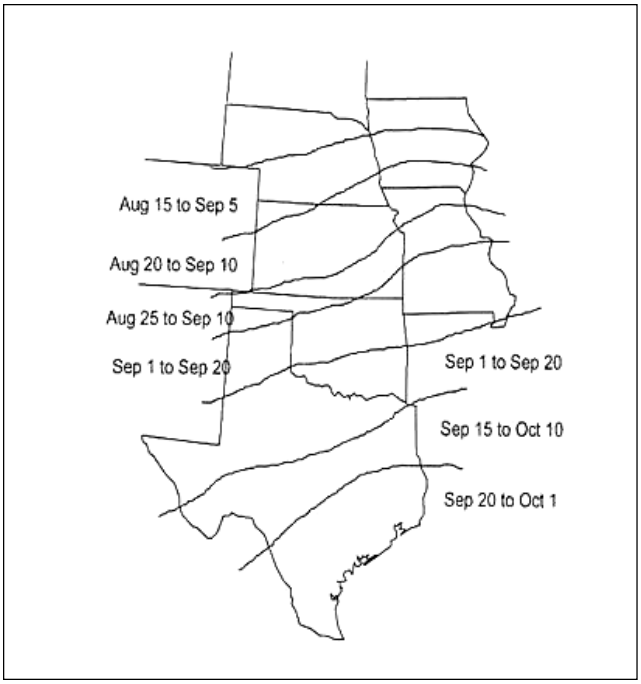

Figure 6. Approximate planting dates for canola across the Great Plains.

Late planting results in small plants that have not stored sufficient reserves to maximize winter survival.

Seeding Rate and Stand Establishment

Canola can adapt to a wide range of plant populations. Similar yields are obtained for seeding rates from 4 to 10 pounds per acre. A harvest population of 6 to 10 plants per square foot is ideal. It is important to evaluate a damaged crop in the spring before destroying it. A spring stand of only one or two plants per square foot can compensate for wider spacing between plants by increased branching. Average seeding rates for Oklahoma with good seedbed preparation should range from 4 1/2 to 6 pounds per acre for grain and 6 to 10 pounds in a dual purpose crop.

Very limited data exists for using canola as a forage crop. For this reason, OSU cannot yet provide research-based recommendations for using canola as a dual purpose crop. If a grain crop is desired, no more than half of the fall foliage should be removed by grazing. Grazing should be terminated before January 1 because cattle can quickly overgraze canola.

Seeding Depth and Row Spacing

Canola seeds are very small, and careful placement is required. Planting equipment must have good depth control without leaving large furrows. Best germination and emergence occur at seeding depths of 1/2 to 1 inch under conditions of adequate soil moisture. The row spacing found on most commercial grain drills is acceptable for canola.

Fertility and Fertilizer Application

Soil pH and fertility levels are important for a successful canola crop. A representative soil sample is recommended for assessing any lime and fertilizer needs. Refer to OSU Production Technology publication (PT 2004-6) for information on Fertilizer and Lime Recommendations for canola.

Weed Management

After establishment, winter canola can suppress and outcompete most annual weeds when good management practices are followed. Most spring weeds are problems only when canola stands are poor and areas of the field are left open. The vigorous growth habit of canola aids in competing against weeds. Canola is very sensitive to SU herbicides typically used in wheat production; therefore, sprayers used in wheat must be thoroughly cleaned and rinsed. This includes tank, main system screen, spray tips, and tip screens. Herbicides currently labeled for weed control in canola include Treflan, Sonalan, Stinger, Poast, Select, Assure II, and Roundup Ultra Max II on RR canola varieties. Please refer to each label for specific use directions, precautions, and sprayer cleanup.

Diseases

Diseases can attack canola at any stage of development. They can be soil borne, seed borne, or airborne. Only a few major diseases are likely to be of concern in Oklahoma. These include blackleg (*Leptosphaeria maculans*), Sclerotinia stem rot (*Sclerotiorum sclerotiorum*), powdery mildew (*Erysiphe cruciferarum*), Alternaria black spot (*Alternaria* spp.), and aster yellows. Currently labeled fungicides include Abound, Curalan, Ronilan, Quadris, Endura, M-Pede, and Trilogy.

Insect Pests

Several insect species can damage winter canola, but not all of them are problems in Oklahoma. Because extensive production of canola has not occurred in Oklahoma, information on insect pests is limited. Insects that are known to attack canola are flea beetles (*Phyllotreta* spp.), cabbage seedpod weevils (*Ceutorhynchus obstrictus*), cabbage worms (*Pieris* spp.), various cutworms, various armyworms, alfalfa looper (*Autographa californica*), diamondback moth larvae (*Plutella xylostella*), aphids (*Brevicoryne* spp.), lygus bugs (*Lygus* spp.), and root maggots (*Delia* spp.). Labeled insecticides include Helix (seed treatment), Capture, Warrior T, Confirm, methyl parathion, ethyl parathion, Crymax, Deliver, Dipel, Lepinox, XenTari, and Ecozin.

Harvest

Canola can be either swathed and then combined or combined directly. Swathing is generally not recommended for winter canola. When harvesting canola, any holes in the combine or trucks should be plugged with tape or caulk to ensure that the seed is not lost. Canola that is ready should be harvested immediately. Damage from pod shattering caused by high wind, hail, and even birds can be devastating.

Direct Combining

Canola is an indeterminate crop and has a small amount of immature seeds at harvest. Canola should be harvested when the average seed moisture is 8 to 10% and no green seeds are visible. Initial combine settings should be in accordance with the operator's manual instructions for canola (rapeseed). Canola should be cut just below the seed pods to avoid excess trash going through the combine and slowing harvest. The reel should be placed as high and far back over the table as possible. The reel speed should be the same as the ground speed.

Storage

Planning the storage of canola requires consideration of moisture, temperature, and soundness of the storage container. Seed moisture should be 8 to 9%, and drying temperature should not exceed 110°F. Relative humidity should be kept below 65% and the storage temperature at 50°F or lower. Every reduction of 10°F below 77°F and 1% seed moisture below 9% will double the storage life of canola. Temperature should be maintained with aeration fans. If low temperature and humidity are maintained and seed is cleaned adequately, growth of mold should be prevented and storage life extended. Round metal bins that are weatherproof and sealed from rodents and birds are best for storage.

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