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# Canola Production in Michigan

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Canola is the major oilseed crop in Canada and Western Europe. It is a type of rapeseed that has become an important crop in parts of the United States. Ten to fourteen million acres of spring canola are produced annually in Canada, mostly in the prairie provinces of Manitoba, Saskatchewan and Alberta. Since 1980, there has been an increase in production in Ontario, and the upper Great Lakes area of the United States westward to the Pacific Northwest.

The term canola denotes edible rapeseed that is low in erucic acid (2 percent, or less) and glucosinolates (under 30 micromoles per gram of air-dried defatted meal). At six percent, canola has the lowest level of saturated fats of any edible oil. Because consumers demand both cholesterol-free and low saturated fats in their diets, U.S. canola imports have risen dramatically. Since the early 1990's, the U.S. has imported up to 400,000 tons of canola oil annually, mostly from Canada.

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Like soybeans, canola is an oilseed crop containing high levels of oil and protein. Canola typically has 40 to 44 percent oil and 23 percent protein, compared with soybeans which has 18 and 37 percent, respectively. When the oil is removed from canola, it leaves a high protein (37 percent) supplement which is fed to livestock. Nearly one-half of the canola meal produced in Canada is fed in the U.S., mostly in northern states.

## Types of Canola

Canola consists of two species in the mustard family, *Brassica napus* and *Brassica campestris.* Other closely related species, often grown in the garden, are cabbage, turnips, kale, broccoli and rutabagas. Both spring and fall planted canola varieties are available in both species. Virtually all of the canola grown in the U.S. is of the *napus* type and may be either spring or fall planted; both types are planted in Canada. The *campestris* type is a very short season crop for the farther north regions. Because of Michigan's mild winters moderated by the Great Lakes, winter canola can be produced in most southern counties. The mild, relatively cool summers also allow spring canola production in more northern areas. A comparison of spring and winter characteristics is given in Table 1.

Spring canola is best adapted throughout northern Michigan, including the Upper Peninsula. Plant fall seeded varieties where the crop can survive the winter, since yields are usually 30 to 35 percent higher than spring seeded canola. Based on experience in Michigan and Ontario, the area suitable for winter canola should be comparable to that where winter barley could be expected to survive (see map, Fig. 1). Although spring canola generally yields less than its winter counterparts, yields of 2,000 lbs per acre, or more, are possible.

**Table 1. Characteristics of the two types of canola.**

| Characteristic | Spring Canola | Winter Canola |
|---|---|---|
| Maturity | 100 to 110 days (Aug.-Sept. harvest) | 10-plus months (July harvest) |
| Height | 30 to 45 inches | 40 to 60 inches |
| Cold tolerance | tolerates light freeze | overwinters |
| Seed yield (lbs/acre) | 1,500 to 2,500 | 2,000 to 3,000 |
| Seeds/lb | 125,000 to 150,000 | 100,000 to 125,000 |
| Adapted to | northern Michigan and U.P. | southern Michigan and U.P. |

## Varieties, Seed Sources and Production Information

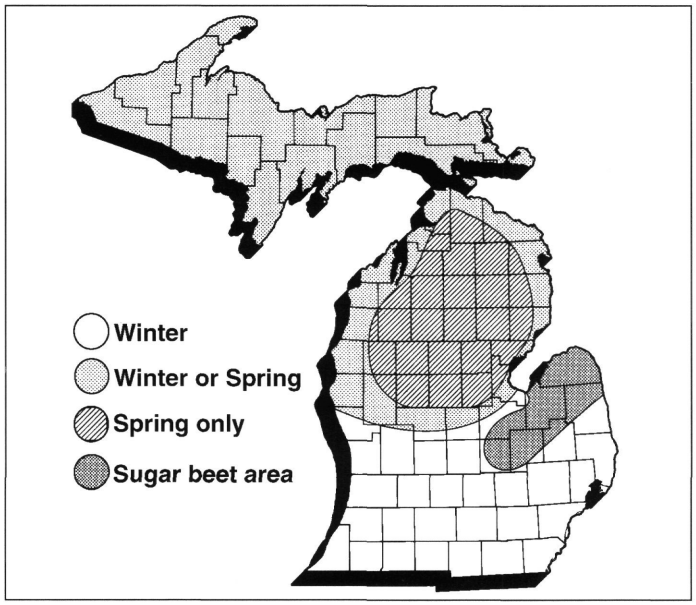
Many varieties of spring canola and relatively fewer winter varieties are available. Growers should first contact their local MSU Extension office for production information. Information can also be obtained from the following sources:

1. Great Lakes Canola Association (phone: 906-875-0603).
2. Department of Crop and Soil Sciences, Michigan State University (phone: 517-355-0217).
3. Canola Council of Canada (phone: 204-982-2100), or their Web page at http://www.canola-council.org

## Planting

Begin to plant spring varieties as soon as soil and weather conditions permit (soil temperature 45 to 50 degrees F). This normally occurs during late April in southern Michigan and mid-May in northern Michigan. Like spring barley, seed canola as early as possible for best yields; however, unlike barley it can be injured by a hard frost. Since it requires 95 to 100 days to reach maturity, plant early enough to reach maturity and dry down for harvesting prior to wet periods in late summer or fall.

**Figure 1. Adaptation of canola in Michigan.**




This bulletin provides a general coverage of canola production in Michigan. More complete and detailed information about canola production may be obtained by purchasing the Canola Growers Manual from the Canola Council of Canada, 301-433 Main Street, Winnipeg, Manitoba.

The authors gratefully acknowledge the information used from the Ontario Ministry of Agriculture and Food Factsheet "Spring Canola in Ontario" by R.A. Upfold, D.J. Hume and W.D. Beverdorf, October, 1984, in developing this information.

Plant winter varieties between August 10 to 25 in the Upper Peninsula and between August 20 ? September 10 in southern Michigan. It is important that enough fall growth occurs to allow canola to go into the winter with adequate root reserves. This generally equates to about the 6- to 8-leaf stage, or more accurately a crown size of ⅜- to ½-inch diameter. Excessive fall nitrogen or planting too early can cause crown extension and lead to reduced winter hardiness.

Seed both spring and winter canola at the rate of 5 to 7 lbs per acre. Follow the manufacturer's recommendations carefully in calibrating the drill and clean all drop tubes leading from the drill box to make certain they are free and clear. Otherwise, planting accuracy and precision will be affected.

Winter canola grows and overwinters best on well-drained or sandy loams. Root heaving in the spring can be a problem on heavy clays. Snow cover helps overwintering in northern areas.

## Seedbed Preparation

Treat fields with glyphosate or other suitable chemical to control perennial grasses. Do this in the fall prior to seeding in the spring. Treat winter canola in the fall or throughout the summer in preparation for fall seeding.

Prepare a good seedbed similar to that for small grains, then cultipack to ensure better seed-soil contact. Plant 5 to 7 lbs of seed per acre at a depth of ¼ to ½ inch. Use a standard grain drill with small seed capability or a Brillion seeder, or broadcast and follow with shallow harrowing and/or cultipacking.

## Fertilization

Canola responds well to nitrogen fertilizer, with optimum yields occurring around 125 lbs per acre, of actual N. Apply broadcast and incorporate at seeding time for spring canola along with the P, K and S needs as indicated by a soil test for small grains. For winter canola, use a starter nitrogen application of about 20 lbs per acre and topdress with about 125 lbs per acre in the spring prior to regrowth. Sulfur is recommended for northern Michigan at the elemental rate of 20 lbs per acre. This can be applied as either ammonium sulfate, potassium sulfate, potassium-magnesium sulfate (sul-po-mag) or slag.

## Herbicides

Trifluralin (Treflan, others) and sethoxydim (Poast) are currently the only herbicides registered in the United States for use in canola. Apply trifluralin preplant incorporated for control of annual grasses, redroot pigweed, and common lambsquarters. It is important to apply trifluralin according to label rates and directions because it can injure seedlings at higher rates, or if not incorporated properly. Sethoxydim is applied postemergence for control of annual grasses.

One potentially serious weed problem in canola is wild mustard. Trifluralin does not control this weed. If canola contains more than five percent mustard seed, it may be rejected for processing. It is best to plant canola in a field where wild mustard is not a problem. With proper field selection and good weed control practices prior to planting, trifluralin application should not be necessary for winter canola, since annual grasses are not expected to survive later than the hard freeze. However, trifluralin and sethoxydim are important for use in establishing spring canola.

## Insect Control[1]

Little work has been conducted on insects that may threaten canola production in Michigan. However, an extensive research base is available from other regions and from the experience of canola producers in the U.S. and Canada. In regions where canola production is well established, numerous insect pests may damage the crop. The following insects are the most likely threats to canola production in Michigan.

**Flea Beetles:** Flea beetles are perhaps the most common insect problem in establishing canola. Several species of this insect can damage canola seedlings, with serious damage most prevalent in spring seeded canola. Damage to fall planted canola is not as prevalent. Several species of *Phyllotreta* are most commonly associated with damage, with the crucifer flea beetle (*P. cruciferae*) the major species. The pale striped flea beetle (*Systena blanda*) may also damage canola. Flea beetles overwinter as adults and emerge in the spring to feed on cruciferous weeds. They move to canola seedlings as soon as they emerge. Feeding on the cotyledons of young seedlings can result in reduced vigor or stand loss. Moderate stand loss may not result in yield reduction due to compensatory growth of the canola plant, however, under heavy infestations complete stand loss can occur. Flea beetle damage is usually limited to the seedling establishment period and is not usually a problem thereafter.

Management of flea beetle damage relies almost exclusively on early detection through scouting. Closely observe fields of spring planted canola (every day or two) to determine if flea beetles are present and feeding on the emerging seedlings. Adult flea beetles are shiny black, or black with yellow stripes, approximately ⅛-inch in length and jump readily when disturbed. Foliar sprays can be applied if populations are high enough to

[1]For insect-related questions, contact Dr. Chris DiFonzo, Department of Entomology, Michigan State University (phone: 517-353-5328).

cause stand loss. Crop rotation has little effect on flea beetles since the adults can fly long distances. Planting spring seeded canola as early as possible may allow a plant to tolerate flea beetle damage better due to its increased size at time of attack.

**Root Maggots:** Both the cabbage maggot (*Delia radicum*) and the seedcorn maggot (*D. platura*) may damage canola. Adult flies lay eggs in the soil near the base of the plant. The small (1/16- to 1/4-inch) cream-colored larvae (maggots) which emerge may feed extensively on the root system and potentially girdle the taproot. Cool, wet conditions favor damage by root maggots since slow growth of the plants allows more time for damage. Root maggots are most common in low, wet areas of fields.

**Diamondback Moth and Cabbage Butterfly:** The larvae (caterpillars) of these lepidoptera cause damage to the foliage and sometimes the seed pods of canola. Diamondback moth (*Plutella xylostella*) adults lay eggs on canola or other wild brassicas. The larvae which develop make small mines in the foliage of the plant; when larger, they emerge to feed on the lower surfaces of leaves. Foliage feeding is of little consequence except under the most extreme cases. Large larvae can, however, reduce yields by feeding on the developing flowers and seed pods. They strip tissue from the pod wall which reduces seed fill and they may feed on mature pods. Diamondback moth larvae reach approximately ½-inch in length when full grown and thrash wildly when disturbed or drop quickly on a silk thread. They pupate on the plant in elongated silk cocoons before emerging again as adults. Diamondback moth damage is more prevalent under hot, dry conditions.

Cabbage butterflies (*Pieris rapae*) also lay eggs on canola foliage where the larvae feed, making holes in leaves. Although fairly large numbers can occasionally be found, they are generally not a serious problem. The light green larvae appear velvety and have a faint yellow stripe down their back. The larvae pupate on the plant in a case (*chrysalis*) that is attached via a single silk thread.

**Tarnished Plant Bugs:** Tarnished plant bugs, also called Lygus bugs (*Lygus lineolaris*), feed on canola leaves, flowers and pods by piercing them with their mouthparts. Leaf and flower feeding are inconsequential, even though some of these flowers may abort. Damage occurs when the insect feeds on developing seeds within pods. Both immature (nymphs) and adult tarnished plant bugs probe developing seeds through the pod wall, resulting in collapsed seed. Losses of 10 to 35 percent have been reported from Canada. Damage is considered to be greater on spring planted canola.

**Aphids**: Several species of aphids occasionally infest canola. These include the cabbage aphid (*Brevicoryne brassicae*), the turnip aphid (*Lipaphis erysimi*) and green peach aphid (*Myzus persicae*). The most serious damage occurs when colonies form on fall-planted canola seedlings. Heavy infestations can weaken plants and increase the chance for winterkill. A foliar insecticide may be warranted under these conditions.

**Cutworms and Armyworms:** The clover cutworm (*Discestra trifolii*), variegated cutworm (*Peridroma saucia*) and the true armyworm (*Pseudaletia unipuncta*) have occasionally damaged canola in the Midwest. Clover cutworms feed at the base of plants, causing cutting, or destroy the tip of the plant causing increased branching. Variegated cutworms and armyworms feed on pods. Armyworm infestations usually develop in areas with a dense grass weed problem or adjacent to a grassy ditch or small grain field.

**Other Insects Associated with Canola:** Canola attracts a wide variety of insects, particularly when in bloom. Honeybees, soldier beetles and wireworm adults are but a few of the insects attracted to feed on the pollen and nectar available at this time. Carefully identify insects to determine if they actually are damaging the plant or merely visiting. Additional pests of canola, including the cabbage seedpod weevil, red turnip beetle and false chinch bug, may appear in Michigan as the number of acres produced increases. Unknown insects which are thought to be damaging canola should be brought to the attention of your local MSU Extension agent.

## Disease Control

White mold (*sclerotinia*) can be a serious disease after flowering in seasons with cool, moist growing conditions. Infection occurs when dropped petals contact the stem, and spores germinate on the dead petals. Bleached stem lesions occur around the initial infection, then white mold and black fungal bodies grow inside and outside the stem. Sudden wilting and premature death of individual plants are usually the first noticeable symptoms. Since white mold is a problem in several other Michigan crops, its occurrence must be carefully monitored. Avoid planting canola following such crops as soybeans and dry edible beans.

Blackleg (*Leptosphaeria maculans*) is one of the most important diseases of crucifers (mustard crops). This can be devastating in canola and can spread on the seed. To avoid the potential spread of the disease in Michigan use only certified seed with a phytosanitary clearance and treated with a fungicide specific to blackleg control (e.g. Benlate).

Canola is susceptible to a virus disease called turnip mosaic yellows (or virus yellows) which can also occur in sugar beets. This virus can be spread by aphids from neighboring sugar beet fields. Although aphids are killed by cold winter temperatures in Michigan, do not plant canola in established sugar beet areas since overwintering aphids may move out of canola into sugar beets.

Many potential disease problems can be avoided if canola is planted only one time in a four-year rotation.

## Harvesting

Canola can be easily harvested with any combine used for small grains. Most current combine manuals include instructions for canola or rapeseed. Cylinder speed should be about 450 to 600 rpm, with wide concave clearance such as ¾ inch. Running the combine full with partial wind and sieve openings allows more rapid travel. Good combine setup will allow some pod-ends to come into the bin. A very clean sample likely means some good seed is being blown out the back of the combine. Plug minor leaks on the combine with silicone sealant or duct tape. Due to the heavy amount of material run through the combine, belts must be kept tight for best performance.

Although spring canola can be direct-combined, better results are achieved by cutting and swathing after the crop reaches physiological maturity. Allow the crop to dry in the windrow (swath) and combine at about 9 to 10 percent moisture. This corresponds to when about 30 to 40 percent seed color change on the main stem (only) has occurred. The swath should be no more than seven feet in width to ensure that adequate curing occurs. This will minimize the amount of green material that might otherwise clog the combine.

Since winter canola normally matures more evenly and is more uniform in moisture, it can usually be direct-harvested satisfactorily. In either case, a quick and accurate method of determining moisture content is critical. Moisture meters are readily available from equipment suppliers for the seed industry, e.g., Seedboro Equipment Company (phone: 1-800-284-5779).

## Marketing

In addition to a few local markets, canola can be transported to Harvest States in Duluth, Minn. (phone: 651-306-6590) or to markets in Windsor, Ontario (ADM — phone: 1-800-265-3619), if arrangements for delivery are made in advance. This can be done very easily, however, the following documentation is needed for delivery into Canada:

1. A notarized certificate of origin (copies may be obtained by fax or mail from processors above).
2. Form 7525V - Shippers Export Declaration (a U.S. form available from an elevator, some U.S. Post Offices and libraries).
3. Canada Customs Invoice (copies may be obtained by fax or mail from processors above).

Prices are based on either the Chicago or Winnipeg canola market. Since canola is an oilseed, its price is heavily influenced by the soybean market. Prices per metric ton (2,204 U.S. lbs) are quoted on the basis of Grade 1 canola, and discounts are assessed for low quality factors (Table 2).

Table 2. Example of quality discounts, ADM Agri-Industries.

| Item | Discount |
|---|---|
| Dockage | unload weight, less % dockage |
| Moisture: tough damp shrink | 10.1 to 12.5% max: $12/ton<br>over 12.5%: $20/ton<br>down to 10.0%: clean weight less<br>unload %: 10.0%<br>100: 10.0% |
| Glucosinolates | 3+ to 4 max: $25/ton<br>4+ to 5 max: $100/ton<br>subject to rejection at crushers (rejection per visual color readings on litmus paper) |
| Grade:<br>No. 1<br>No. 2<br>No. 3 | <br>no discount<br>$20/ton<br>$75/ton |
| Other grade factors: heated-brown seed; distinctly green seed. | |

## Profitability of Canola vs. Other Michigan Field Crops

Canola profitability is comparable to other Michigan crops (Table 3) based on current prices and costs of inputs. These comparisons are based on estimated budgets for Michigan crops according to Agricultural Economics Report No. 496 from the MSU Department of Agricultural Economics. Estimates are based on projections from experience in Ontario and MSU research/demonstration trials.

## Recommended Production Practices for Spring Canola (Northern Michigan)

1. Prepare field and fertilize as for oats. Fertilize according to soil test, including phosphorus, potassium and sulfur. Include 125 lbs nitrogen per acre.
2. Preplant incorporate 1 to 1.5 pints of trifluralin per acre. Avoid any overlapping due to application pattern.
3. Plant as early in the spring as soil and weather conditions permit.
4. Plant 5 to 7 lbs per acre with grain drill (use small seed box).
5. Control insects (flea beetle) if, and as, needed.
6. Harvest by direct combining at 9 to 10 percent seed moisture or swath at 30 to 40 percent seed color change on main stem (mid August).

## Recommended Practices for Winter Canola Production (Southern Michigan)

1. Select field free of perennial broadleaf weeds and spray with Roundup as needed to control perennial grasses.
2. Prepare field as for winter wheat and apply P and K according to soil test recommendations, plus 25 lbs actual nitrogen per acre.
3. Cultipack as necessary to attain a firm seedbed.
4. Plant 5 to 7 lbs per acre August 25 to September 10 with grain drill (use small seed box).
5. The following March, topdress the field with nitrogen at the rate of 125 lbs of actual N per acre.
6. Harvest by direct combining at 9 to 10 percent seed moisture.

**Table 3. Expense-profit (per acre) comparisons of canola vs. other Michigan field crops[1].**

| Input | Spring canola | Winter canola | Wheat | Corn | Navy bean | Soybeans |
|---|---|---|---|---|---|---|
| Seed | 15.00 | 15.00 | 15.00 | 23.75 | 20.00 | 10.00 |
| Nitrogen | 27.50 | 27.50 | 22.00 | 19.60 | 6.60 | 3.20 |
| Phosphate | 16.00 | 16.00 | 16.00 | 6.00 | 0.00 | 0.00 |
| Potassium | 18.00 | 18.00 | 18.00 | 13.20 | 2.40 | 4.80 |
| Herbicides | 16.00 | 11.00 | 1.00 | 14.70 | 14.70 | 17.90 |
| Insecticides | 0.00 | 0.00 | 0.00 | 2.20 | 0.00 | 0.00 |
| Selected variable costs (SVC) ($) | 92.50 | 87.00 | 72.00 | 79.45 | 43.70 | 35.90 |
| Yield/unit | 2,000 lb | 2,500 lb | 65 bu | 110 bu | 12 CWT | 40 bu |
| Price/unit[1] | 0.12 | 0.12 | 3.02 | 2.00 | 20.00 | 5.00 |
| Gross revenue ($) | 240.00 | 300.00 | 196.30 | 220.00 | 240.00 | 200.00 |
| Return above SVC ($) | 147.50 | 212.50 | 124.30 | 140.55 | 196.30 | 164.20 |

Production costs reflect cost example for agricultural inputs and are subject to change. Yield estimates for canola are based on MSU research and Extension tests.

While additional costs may be incurred in producing these crops, these figures are used as a basis for comparing different crops. Estimates in all cases are for costs expected to produce higher yield levels.

[1]Check current prices.