Canola Production

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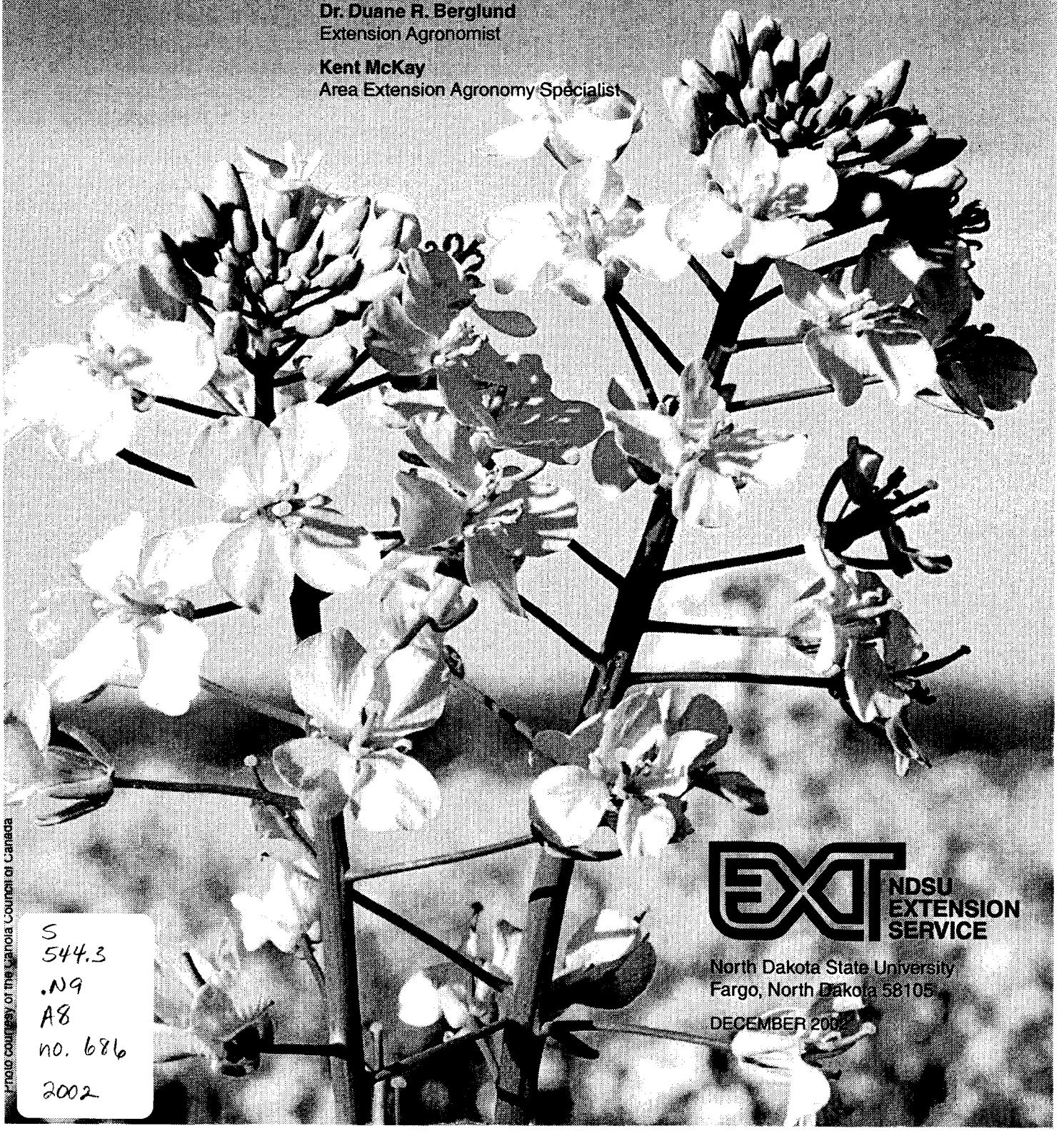

Photo courtesy of the Canola Council of Canada

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Canola has become a popular oilseed crop for North Dakota. North Dakota leads the U. S. in canola production with approximately 88 percent of domestic production. Canola is a specific edible type of rapeseed, developed in the 1970s, which contains about 40 percent oil. The term **"canola"** is a registered name by the Western Canadian Oilseed Crushers Association. Canola varieties must have an erucic acid content of less than 2 percent and also have less than 30 micromoles of glucosinolates per gram of seed. Canadian and U.S. farmers mostly grow low erucic acid and low glucosinolate varieties. High erucic acid oil rapeseed is grown and used for industrial lubricants. This type of rapeseed is mostly grown in Europe, although there is some production in Canada and the U.S.

In January 1985, the U.S. Food and Drug Administration granted canola oil GRAS (Generally Recognized as Safe) status for use in human foods. This has led to greatly increased sales and demand in the United States with only part of the demand being met by U.S. production. Canola oil has achieved worldwide commodity status and is extensively used in Japan, Canada and Europe.

Adaptation

Canola *(Brassica napus L.)* varieties have been developed as both spring and winter annuals. The spring type is best adapted to North Dakota conditions. The winter types have not survived in trials in North Dakota, northwestern Minnesota or in the prairie provinces of Canada. Canola can be grown on most soil types. It is best suited to clay-loam soils that do not crust. If grown on soil with poor internal drainage, good surface drainage is essential, as it cannot tolerate standing water or water logged soils. Canola is less tolerant to drought than small grain crops. It could be considered as a crop to plant on fallow if moisture recharge on recrop land is limited.

Rotations

Canola best follows cereal grains or fallow in rotation. A preferred crop rotation would have canola planted at least two cropping years between plantings. However, if planting canola after one cropping year, it is strongly recommended growing a variety that is moderately resistant or resistant to blackleg. Canola is susceptible to sclerotinia stem rot. Infection risk increases if canola is planted close in rotation with other highly susceptible crops like sunflower, dry edible beans, or crambe. At least two years should separate canola and sugarbeet plantings. If planting canola within three years of susceptible crops, a fungicide application may be needed. Less susceptible crops that could be planted sucessfully in a close rotation with canola are rowed soybeans, flax ,semi-leafless field pea or lentil. In years when ideal environmental conditions favor air-borne spore movement, all canola plantings without fungicide applied, regardless of rotation intervals, may have economic losses due to sclerotinia.

Canola is certain to shatter seeds, and volunteer plants are a probability the next season. Cereals should follow canola to allow the use of certain broadleaf phenoxy herbicides for control. Production of canola and tame mustard on the same farm should be avoided. Admixtures of the two crops reduces the market value of both. In addition, conventional canola should not be planted on fields with heavy infestations of wild mustard. Roundup Ready, Liberty Resistant and Clearfield canola could all be planted on heavily infested wild mustard fields.

The persistence of herbicide residue remaining from application to prior growing crops and weeds can injure new canola seedings. These include but are not limited to sulfonylurea, imidazolinone and triazine classes of herbicides. Always refer to the herbicide label information pertaining to crop rotation restrictions following their use. North Dakota Weed Control Guide, Circular W-253, includes information on rotation restrictions for certain crops, including canola following herbicide applications.

Varieties

There are two types of canola varieties, the Argentine type of the species *Brassica napus* and the Polish type of the species *Brassica rapa*. Argentine varieties have a higher yield potential and are also taller and have a higher oil content than Polish varieties. Argentine varieties require about 95 days to reach maturity, while Polish varieties need approximately 80 days to reach maturity. Variety trial results are available from NDSU research centers. See NDSU Extension Circular A-1124 for the most recent variety yield results.

Seed Preparation and Planting

Canola is very susceptible to soil crusting. The seedbed must be firm in order to seed canola. Seed and soil moisture contact is critical for rapid emergence, so seeding canola into dry soil is not recommended. Seedlings are easily damaged by drifting soil, so the seedbed should be prepared in such a manner to avoid wind erosion. Harrowing canola seedlings is not recommended.

Canola can be planted with a variety of seeding equipment. The optimum depth to seed canola is between a ½ to 1 inch. Seeding depth should not exceed 1 inch. Canola is typically seeded in 6 or 7 inch rows with a grain drill or air seeder if uniform depth control can be obtained.

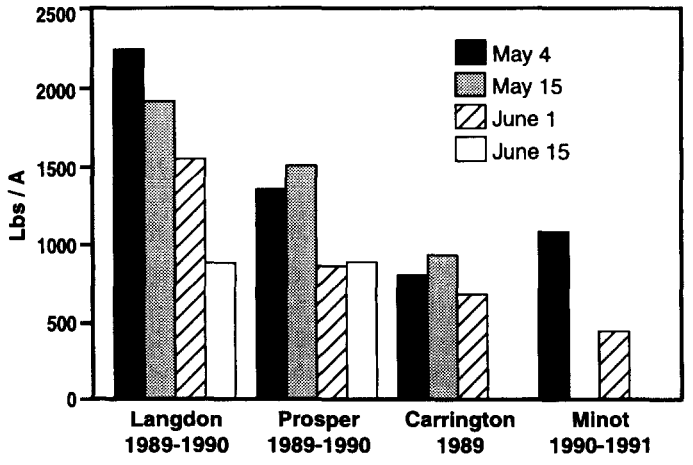
Planting and Seeding

Dates

Canola should be planted in April to early May to achieve the highest yields. Planting dates delayed beyond May 15 will result in yield reductions (Figure 1). Significant yield reduction can be expected if seeding is delayed into June. Canola is very susceptible to heat and drought stress during flowering. Planting in early May will reduce the risk of heat and drought stress on the crop. Canola seedlings are frost tolerant and can tolerate temperatures as low as 24 degrees Fahrenheit.

Dormant seeding. Dormant seeding of canola can be defined as seeding canola in cold, nearly frozen soil which will inhibit germination that fall. The objective is that the seed remains dormant after planting until early spring. As conditions become favorable in the spring, the canola germinates and emerges. Determining when to seed is difficult, since growers can't go by a specific calendar date. The soil needs to be cold, if not frozen (Below or near 32 degrees Fahrenheit in the top 2 inches). If soil temperatures warm to 38 F or higher, the seed will germinate and will be killed once the soil freezes. In the past, growers have found it difficult to dormant seed canola as the soil temperatures approached freezing, but before the first snow.

Figure 1. Canola planting date (variety: Westar).



Rates

Seeding rates of 5 to 8 pounds per acre for Argentine varieties and 5 to 7 pounds per acre for Polish varieties are recommended. A common rule of thumb for seeding canola is 5 pounds per acre. **There is a major difference between seeds per pound among canola varieties.** It is very important to adjust for these differences to avoid a stand being established that is too thick or too thin.

It is very important that a grower know the number of seeds per pound of the variety and establish a seeding rate by plant population. As a general rule for the Argentine canola, hybrids will contain approximately 75,000 to 85,000 seeds per pound, whereas open pollinated varieties will contain a range of 135,000 to 160,000 seeds per pound. For the Polish varieties, seed count will usually be greater than 200,000 seeds per pound. An optimum plant population is 16 plants per square foot or 600,000 plants per acre. A good stand is 10 to 12 plants per acre and a minimum stand is four plants per square foot. However, with herbicide tolerant canola, stands can be as low as two plants per square foot providing they are all uniformly spaced.

Fertilizer

Canola is similar to small grains in its response to fertilizer and levels of soil fertility. Nitrogen and sulfur are the key elements for high canola yields. Nitrogen and potash materials should not be placed in direct contact with the seeds but should be broadcast or applied in a band at least 2 inches away from the seed.

A soil test is recommended for proper assessment of nutrient need. See NDSU Extension Circular SF-1122, Fertilizing Mustard and Canola, for additional information.

Canola is a high user of sulfur. A 2000 lb/A canola crop contains about 12 lb/A sulfur in the straw and 15 lb/A sulfur in the seed. A 40 bu/A wheat crop, on the other hand, contains only 5 lb/A sulfur in the seed and 7 lb/A in the straw. The consequences of low soil S levels are very serious in canola production. Low sulfur can make the difference between having a crop and not having a crop. Responses to sulfur fertilization have been demonstrated in North Dakota. A composite soil test for sulfur may not represent sulfur fertility variation across the field. The current S soil test tends to overestimate available sulfate-S and field variability is huge. Therefore, at medium to low sulfur soil test levels, 20-30 lb/A of S is recommended. At high soil sulfur levels, 10-15 lb/A is still recommended.

Canola takes up sulfate-S. The form of sulfur fertilizer may be ammonium sulfate (21-0-0-24S) or a blend of ammonium sulfate and degradable elemental sulfur (0-0-0-90S). A blend is recommended because in sandy soils sulfate may leach during early season rains, while the elemental sulfur may degrade during a moist season to supply needed S later in the year.

It is best to provide adequate sulfur before or at planting. However, if deficiencies are identified early in the season before significant flowering, yield responses are still possible by applying a rescue treatment of ammonium thiosulfate (12-0-0-26S) or ammonium sulfate. The earlier a treatment is made, the greater the yield response. Little sulfur is absorbed by leaves. A rescue treatment needs rainfall to move the soluble sulfate to the roots.

Weed Control

Young canola seedlings are very sensitive to early weed competition. An effective weed control program should include cultural, mechanical and chemical methods. Once established, canola is a good competitor with most weeds. Wild mustard is a serious seed contaminant in canola and can cause price discounts or rejection in the market. Special attention should be given to controlling (prior to planting) or avoiding this weed in canola fields. Follow cultural practices to assure a dense, vigorous developing crop that will compete well with weeds. Pay attention to seeding dates, rates, and depth of seed placement. Perennial weeds should be controlled the year prior to seeding canola. Since canola is a shallow-seeded crop, the use of a rotary hoe or springtooth harrow for weed control is discouraged. These tillage tools can injure and destroy the canola seedlings, greatly reducing stands. Trifluralin (several brands) and Sonalan (ethalfluralin) are the only preplant soil incorporated herbicides presently labeled for control of weeds in canola. Use the lower rates on sandy, coarse textured, low organic matter soils of these two herbicides.

Trifluralin and Sonalan must always be preplant incorporated in the soil prior to planting. Both will control annual grasses and some broadleaf weeds such as pigweed, common lambsquarters and kochia. Wild mustard will not be controlled.

Sethoxydim (Poast), quizalofop (Assure II), and clethodim (Select) are all labeled for post-emergence grass control in canola. See the label for rates according to grass weed specie and size. For best control, grasses should be actively growing and crop oil adjuvants must be added.

Tank-mixing either Assure II, Poast or Select with a broadleaf herbicide is highly discouraged because reduced grass weed control may result.

Thoroughly clean and rinse any herbicide residue which may be harmful to canola prior to filling the spray tank. Sulfonylurea herbicide residue on phenoxy herbicide in trace amounts can be very injurious to canola.

Canola is extremely sensitive to drift from most broadleaf herbicides such as 2,4-D, MCPA, dicamba, glyphosate, and certain sulfonylurea herbicides. Precautions must be taken to avoid the drift of these herbicides to canola fields.

Herbicide Resistant Canolas

■ **CLEARFIELD (Imidazolinone) Resistant Canola**

Beyond (imazamox) is registered for use in Clearfield canola. Beyond at a 4 fl oz/A applied POST to Imi- tolerant canola from emergence until prior to bloom controls most annual grass and broadleaf weeds. Apply with NIS at 0.25 percent v/v alone or with UAN liquid fertilizer at 1 to 2 qt/A. Beyond will not control ALS resistant weeds. Clearfield canola can be planted on land previously treated with Assert or Pursuit and may reduce or eliminate injury from long residual SU herbicides. See label or information on Beyond for use, weed control, carryover, crop rotation restrictions and other information.

■ **LIBERTY (Glufosinate) Resistant Canola**

Liberty (glufosinate) at 34 fl oz/A applied POST to Liberty tolerant canola from cotyledon to bolting stage controls most annual broadleaf weeds, controls or suppresses grasses, and may suppress perennial weeds. Always apply with AMS at 2 to 4 lb/A. Liberty is a non-selective, non-residual, contact type herbicide with limited translocation and should be applied to small weeds. Refer to label for weeds controlled, application information and timing, tank-mix options, and other restrictions. Liberty has a unique mode of action and may be used as another tool in weed resistance management.

■ **ROUNDUP (Glyphosate) Resistant Canola**

Glyphosate applied at a maximum of 1 pt/A with no more than two applications to glyphosate resistant canola from emergence to bolting controls most annual and perennial weeds. Apply with AMS. Application timing may not be appropriate for effective perennial weed control. Glyphosate is a non-selective, non-residual, systemic herbicide. Full labeled rates are required for broadleaf weed control. Glyphosate will control weeds resistant to other herbicides. Refer to label for weeds controlled, application information and timing, tank-mix options, and other restrictions.

Diseases

Plant diseases can be a serious problem in canola production. Rotations must be planned carefully to keep disease incidence and levels low. The two diseases of major importance are Sclerotinia wilt and blackleg. Diseases of canola less often reported are white rust or staghead, downy mildew, alternaria blackspot, and aster yellows.

There are two strains of the **blackleg disease**, a mild strain and a virulent (severe) strain. The virulent strain produces deep-stem girdling cankers near the soil line. These cankers reduce plant vigor and may cause lodging. The virulent strain of blackleg was first found in North Dakota during the 1991 growing season in 23 canola fields. The blackleg fungus is spread by rain-splashed spores, wind-borne spores, and by infected seed. Varieties are now available that have good tolerance or resistance to this disease. As new varieties and hybrids are introduced, more will be totally resistant to this disease. Generally, the Argentine varieties are more tolerant, while the Polish varieties are more susceptible to blackleg.

In areas where the virulent strain of blackleg is present, crop rotation and selection of resistant varieties is important to blackleg management. Blackleg is not a problem in mustards (yellow, brown, and oriental), which are highly resistant. See NDSU Extension Circular PP-1024, Blackleg of Canola, for more information.

Sclerotinia stem rot or **white mold** is a canola disease that can be very destructive during periods of wet weather. The sclerotinia fungus survives up to five or six years in the soil in the form of hard black fungus bodies called sclerotia. Whenever there is wet weather for a week or two, with moist soil, the sclerotia germinate to produce tiny mushroom-like bodies called apothecia. These apothecia are only 1/8 to 3/16 inch across yet they produce millions of airborne spores. Canola is primarily susceptible during all bloom stages and shortly after. The spores infect the cast dead canola blossoms during periods of wet weather.

Infections that start on the dead blossoms spread to adjacent tissues, resulting in dead branches or dead plants, causing the plants to lodge. The rotted stems usually have a bleached appearance. Sclerotinia infections can be serious on canola if cool wet weather occurs in the last two weeks of June and continues into early July when blossoming occurs.

A minimum of a three-year rotation is recommended for fields that have a history of heavy sclerotinia or white mold infestations. During this rotation it is necessary to avoid planting highly susceptible crops including crambe, sunflower, and dry beans.

The fungicides Quadris, Ronilan and Topsin M are all registered for use in the suppression and control of sclerotinia in canola. Other fungicides may be registered within the next several years. Information on fungicides currently registered is available from county extension offices, NDSU Research and Extension Centers, the Northern Canola Growers Association and the Minnesota Canola Council.

Effective suppression of Sclerotinia requires timely application of a fungicide. Quadris should be applied at 10-25 percent bloom, or three to seven days after initiation of bloom. There will be 10 to 18 flowers on the main stem of Argentine canola when it is at 10-25 percent bloom. Quadris should be applied before or as the first petals begin to fall. Late application of Quadris is less effective than timely application.

Ronilan or Topsin M should be applied at 20-50 percent bloom, or four to eight days after initiation of bloom. There will be 14 to 16 flowers on the main stem at 20 percent bloom. The 50 percent bloom stage is the time of maximum color development in the crop. At that stage there will be pods on the lower one third of the main stem. Once the crop is beyond 50 percent bloom, most fungicides are much less effective for Sclerotinia control.

Quadris should be applied at 6.2 to 15.4 fl oz/A. The 9.6 fl oz rate has been supported by the registrant and may provide adequate control if applied before any petals begin to fall.

Ronilan should be applied at 10.6 to 16 oz/A and Topsin M at 1-2 lb/A rate. Extensive data indicates that the 12 oz rate of Ronilan or the 1 pound rate of Topsin M provides excellent *Sclerotinia* suppression under severe disease pressure when applied early.

The decision to spray should be made only when: 1) Yield potential is above normal (at least 40 bushels or 2,000 lb/A) when canola prices are minimal, 2) Weather leading to early bloom has been wet (at least 1-2 inches of rain in the two weeks prior to early bloom), 3) More rain or high humidity is expected, and 4) *Sclerotinia* has been a problem in recent years in fields currently planted to canola or in other fields nearby. A fungicide is more likely to be needed if canola is on tight rotations (three years or less).

See NDSU Extension publications on the control of sclerotinia in canola: NDSU Extension Circular PP-1201 Sclerotinia Stem Rot of Canola – Biology and Management, and A-1208 Canola Flowering and Fungicide Application Timing.

Insects

Serious damage to canola plants can be caused from overwintering populations of flea beetles feeding on newly emerged seedlings during May through June. Adult beetles feed on the cotyledons and first true leaves, causing the typical shot-holed appearance. Severely damaged seedlings may die, and less seriously damaged plants may suffer a reduction in vigor and stamina. Hot, sunny weather is conducive to feeding activity; while cool, damp weather slows feeding and favors crop growth. Hot and dry weather may cause seedlings to wilt and die resulting in partial to complete crop loss. In some instances, the infestation of a field can occur as a creeping movement from plant to plant across a field; in other instances the entire field may become quickly and evenly infested. Serious damage usually does not occur once the crop advances beyond the seedling stage, since vigorously growing canola plants can outgrow the beetle defoliation. No major effects on plant vigor have been noted from the larval feeding on the plant roots.

Occasionally in August, large numbers of newly emerged adults will move onto semi-mature canola plants and devour the epidermis of the stems, leaves and pods, and may cause pod shattering and small seeds. In most years, the crop will be sufficiently advanced to escape serious damage.

Cultural methods can help reduce plant losses caused by flea beetles. A firm seedbed that is adequately fertilized will help plants outgrow beetle damage during the susceptible seedling stage in the spring.

A few flea beetles or scattered shot-holing in leaves of a seedling crop are not necessarily cause for alarm. However, if the flea beetles are numerous and feeding holes cause approximately 25 percent defoliation (economic threshold), immediate control is necessary. The key to flea beetle control is frequent monitoring during the susceptible seedling stages.

Gaucho, Gaucho Platinum, and Helix Xtra are registered seed treatments labeled for control of flea beetles in canola. All seed treatments must be mixed in commercial seed treaters and is not for use in hopper-box, slurry-box, or other seed treatment applications at or immediately before planting.

Currently, foliar insecticides registered under state label for flea beetle, diamondback moth, and Bertha armyworm control include: methyl parathion, ethyl-methyl parathion6-3, and Capture. Follow safe pesticide practices when spraying flowering Canola to protect honey bees. Check federal and state labels for use on specific canola pests.

Practices to Reduce Green Seed

There have been problems with green seed in North Dakota. Cool, wet and overcast weather during the growing season promotes green seed problems in all canola varieties, and these problems can be made worse by sulfur deficiency in some cases.

Temperature at maturity is an important factor in chlorophyll breakdown. Cool temperatures and light frosts in August and September slow the enzyme activity that breaks down chlorophyll. Frost from 32 to 33 F disrupt that system; more specifically, it can reverse it and restart the synthesis process. This is very sensitive in the seed development stage, and the window is very narrow. This can cause differences between adjacent fields that are only days apart in maturity or differ in uniformity of maturity. Even canola swathed four to six days before a frost will retain relatively high levels of chlorophyll. Two or more germination flushes and growth stages results in immature seed at swathing and green seed at harvest. Thin stand counts can result in plants with more branching and more variability in seed maturity and more likely to have immature seed at swathing. Late seeded canola may be impacted by all these situations.

Growers can make management decisions to reduce green seed problems in the future:

- Choose fields with better surface drainage and fertility.
- Seed as early as possible in the spring to allow for the maximum ripening time.
- Provide a firm seed bed to achieve correct depth of planting and good seed to soil contact for quick and even emergence.
- Swath at the recommended color stage for the weather conditions.
- Maintain adequate fertility levels for canola growth and ripening. Canola stressed from nutrient deficiency will not mature evenly.
- Take soil samples for a general indication of N, P, K and micronutrient levels.
- Sample plant tissue early during rosette stage to allow time for corrective micronutrient applications.
- Fields with high fertility levels can be expected to delay maturity in years with below normal growing degree days accumulation or heat units (cool years).

Harvesting and Threshing

Canola is ripe when plants turn a straw color and seeds become a dark brown. Because shattering is a potential problem, it is recommended that the crop be swathed when 20 to 30 percent of the seeds on the main stem have turned from green to brown. Producers will need to sample pods from various places in the field to determine average maturity. When the crop is ready to swath, seed should be firm and not break when rolled between the thumb and forefinger. Moisture at this stage is about 35 percent. When swathing, reel speed should be reduced by one-half to two-thirds of normal. Canola is easy to cut but makes a bulky, fluffy swath which can be scattered quite easily by the wind. Swathing should be done just below the lowest seed pods, leaving the stubble as high as possible. This will allow the windrow to settle into the stubble and reduce loss from wind movements. A roller pulled directly behind the swather is a standard practice to ensure the newly cut windrow stays in place. To reduce shattering, use a belt-type pick-up attachment. Combine cylinder speed for canola is reduced to about 50 to 75 percent of that for wheat. Avoid excessive cylinder speed as it breaks up the straw, overloading the sieves and putting foreign matter in with the clean seed. Canola straw and chaff should be spread behind the combine. See NDSU Extension Circular A-1171, Swathing and Harvesting Canola for more detail.

Storage and Drying

Storage and handling problems of canola are similar to those of flax. The seed is round, small, heavy and runs freely. Very tight truck boxes and storage bins are required. The seed can sweat for up to six weeks after harvest, so heating and spoilage can occur even at 9-10 percent moisture levels. Canola as low as 8½ percent moisture should be examined for heating at regular intervals. If harvested at high moisture, natural air drying or artificial drying can be used. To maintain seed quality, a drying temperature of 110 degrees F or less is maximum for commercial production. If a significant amount of foreign material (straw) is included with the seed, it may be advantageous to run it over a scalper before drying and binning.

Canola Products

Canola varieties produce meals having about 38 percent protein. The amino acid distribution is very complementary to soybean oil meal, and the two meals are often included in the same ration. Feeding trials have shown that animals perform better when fed a mixture of the two meals than when fed either alone. In Canada, canola meals are recommended for up to 10-20 percent of the ration for chickens, turkeys, ducks, geese, pigs, dairy and beef animals.

Edible rapeseed oil or Canola oil has been used in some countries for the past two decades and was approved for human consumption in the U.S. by the FDA in 1985. Canola oil is usually blended with other vegetable oils for the production of various solid and liquid cooking oils and salad dressings. Canola oil is high in oleic acid relative to other vegetable oils and has been competitive in price with other cooking oils.

Marketing

Most canola is not grown under contract. Currently the U. S. Farm program has a good support loan program for canola oilseed production.

U.S. Grain standards for grading canola and rapeseed were established February 28, 1992, by the U.S. Grain Inspection Service. (See Table 1.)

Factors of most importance in the determination of grades are admixtures and soundness. Grading admixtures include such factors as foreign material, common wild mustard seed, tame brown and yellow mustard seed, earth pellets, sclerotinia, ergot, and stones. Soundness refers to broken seed not assessed to dockage, seeds distinctly green after cracking, heat damage, and odor.

Table 1. USDA Grade and Grade Requirements for Canola

US Grades	1	2	3
Grading Factors maximum percent limits of:			
Damaged kernels			
Heat damaged	0.1	0.5	2.0
Distinctly green	2.0	6.0	20.0
Total	3.0	10.0	20.0
Conspicuous admixture*			
Ergot	0.05	0.05	0.05
Sclerotinia	0.05	0.10	0.15
Stones	0.05	0.05	0.05
Total	1.0	1.5	2.0
Inconspicuous admixture**	5.0	5.0	5.0
Grading Factors maximum count limits of:			
Other Material			
Animal filth	3	3	3
Glass	0	0	0
Unknown foreign substance	1	1	1

US Sample grade - Canola that:
- does not meet the requirements for US Nos. 1, 2 or 3, or
- has a musty, sour or commercially objectionable foreign odor, or
- is heating or otherwise of distinctly low quality.

*Conspicuous admixture is all matter other than canola that is readily distinguishable from canola and which remains in the sample after the removal of machine-separated dockage. It is not limited to ergot, sclerotinia and stones.

**Inconspicuous admixture. Any seed which is difficult to distinguish from canola. This includes, but is not limited to, common wild mustard *(Brassica kaber and B. juncea)*, domestic brown mustard *(Brassica juncea)*, yellow mustard *(B. hirta)*, and seed other than the mustard group.

Grower Considerations

1. **Don't grow Canola varieties without knowing where to deliver to a market.**
2. **Plant recommended varieties of good quality and good yield potential.**
3. **Plant early for more profitable yields.**
4. **Select weed free fields and control weeds prior to planting.**
5. **A firm seedbed preparation is critical, therefore take time to prepare a proper seedbed.**
6. **Manage canola to avoid green seed.**
7. **Monitor fields for flea beetles.**
8. **Swath at proper maturity. Swathing early reduces yield, delay allows excessive shattering.**
9. **Monitor seed in storage for heating and spoilage since canola requires more attention than cereal grains.**
10. **Don't put canola and other Sclerotinia (white mold) susceptible crops in the rotation closer than every three years.**
11. **Promote the use of canola oil to consumers.**
12. **Consider joining the Northern Canola Growers Association.**

Canola Resources

Northern Canola Growers Association
4007 State Street, Bismarck, ND 58503
Tele: 701-223-4124
Web address: www.northerncanola.com

U. S. Canola Association
600 Pennsylvania Ave. SE., Suite 320
Washington, DC 20003
Tele: 202-969-8113
Web address: www.uscanola.com

Canola Council of Canada
400 - 167 Lombard Ave., Winnipeg, MB R3B 0T6
Tele: 204-982-2100
Web address: www.canola-council.org/

Publications

Canola Council of Canada

Canola Growers Manual

NDSU Extension Service

A-1124	**Canola Variety Trials**
SF-1122	**Fertilizing Mustard and Canola**
W-253	**North Dakota Weed Control Guide**
PP-1024	**Blackleg of Canola**
PP-1201	**Sclerotinia Stem Rot of Canola**
A-1208	**Canola Flowering and Fungicide Application Timing**
A-1171	**Swathing and Harvesting of Canola**
E-1143	**North Dakota Field Crop Insect Management Guide**
PP-622	**North Dakota Field Crop Fungicide Guide**

For more information on this and other topics, see: www.ag.ndsu.nodak.edu

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