



University of Idaho
College of Agriculture

Cooperative Extension System
Agricultural Experiment Station

Production Of Mustard in Northern Idaho

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Basic recommendations

- Obtain a firm contract and start with a limited acreage.
- Use cultural practices that ensure good stand establishment.
- Plant in early spring to avoid late-summer heat and moisture stress.
- Chemical control options for mustard are limited. Use cultural practices that minimize weed, insect and disease problems.

Additional crops are needed for crop rotations in northern Idaho. One crop that has potential is mustard seed for use as a condiment. Mustard (*Brassica* spp.), a relative of rapeseed, can be spring planted to avoid the rotation problems of winter rapeseed and has higher seed yield potential than current spring rapeseed varieties. Mustard in rotation with small grains should improve subsequent crop performance.

To grow mustard profitably in northern Idaho, obtain a good contract price, use appropriate production techniques and plan carefully. This publication defines production practices and risks of mustard production in northern Idaho.

Farm program considerations

The Food, Agriculture, Conservation and Trade Act of 1990 (Farm Bill) created a new category of lands that can be planted to a wide variety of crops. Normal flex and optional flex acres can be planted to mustard without loss of the producer's base acreage. Flex acres are considered part of a producer's planted acres. For crop years 1991-95 flex acres represent up to 25 percent of a producer's wheat and feed grain base acres.

Oilseeds such as mustard can also be planted on 0/92 acres without loss of the producer's base acreage. Producers who plant mustard on 0/92 acres must choose between receiving the deficiency payment or an oilseed marketing loan.



A popular Canadian crop, mustard shows promise as an alternative crop in northern Idaho. Mustard is managed much like rapeseed and is closely related.

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Rotation and field selection

When selecting a field for growing mustard, consider previous cropping, weed and disease potential and possible herbicide carryover. Mustard can be grown in rotation with cereal crops in most cases. Plant in fields with limited populations of broadleaf weeds. Avoid fields that may have residues of persistent herbicides such as dicamba (Banvel), picloram (Tordon) and chlor-sulfuron (Glean).

Avoid planting mustard for 1 year after production of field peas, buckwheat, clovers or alfalfa and for 3 years after production of rapeseed, sunflowers, field beans, lentils or mustard. This rotational period without broadleaf crops will minimize broadleaf weeds and diseases such as *Rhizoctonia* and *Fusarium* root rots, *Sclerotinia* stem rot and white mold, which can cause serious losses in mustard crops.

Volunteer rapeseed and mustard weed species can be avoided by selecting fields that are free of them. Because mustard will not tolerate waterlogging, avoid fields with poor drainage or a high water table. Physically separate fields to prevent mixing seed of different species (10 feet is adequate). No cross-pollination problems are currently known for the two species of mustard commonly grown.

Selection of mustard varieties

The two species of mustard most commonly grown in North America are brown or Oriental mustard (*Brassica juncea* [L.] Cross) and yellow or white mustard (*Brassica hirta* Moench). Generally, brown mustard requires cooler temperatures and more soil moisture than yellow mustard. Most commercial varieties of mustard

Table 1. Flowering date and seed yield of brown mustard and yellow mustard at Moscow, Idaho, during 1989 and 1990.

Variety	Flowering date		Seed yield		
	1989	1990	1989	1990	Average
	(50% bloom date)		----- (lb/acre) -----		
<i>B. juncea</i> : brown or Oriental mustard					
Forge	6/21	6/30	4,280	1,510	2,895
Common Brown	6/21	6/29	3,690	1,360	2,525
Cutlass	6/17	6/27	3,430	1,560	2,495
Lethbridge 22-A	6/19	6/26	3,280	1,280	2,280
Average	6/20	6/28	3,670	1,428	2,550
<i>B. hirta</i> : yellow/white mustard					
Ochre	6/17	6/22	3,245	1,755	2,500
Gisilba	6/18	6/22	3,105	1,595	2,350
Tilney	6/18	6/29	3,510	1,310	2,410
CW 89 TY	6/19	6/29	3,500	1,495	2,498
Average	6/18	6/25	3,340	1,540	2,440
LSD (P = 0.05) ¹	—	—	396	300	246

¹Mean differences within a column greater than this value are significantly different at the P = 0.05 level of probability by Fisher's protected least significant differences.

currently available have been selected in Canada where more than 500,000 acres of the crop are grown annually.

Work conducted by the University of Idaho in 1976 through 1979 showed that both species of mustard are adapted to northern Idaho. During 1989 and 1990, the University of Idaho conducted the Canadian cooperative mustard trials at Moscow, Idaho, to determine which varieties are best adapted to the Palouse region.

Canadian mustard trial

The 1989 and 1990 Canadian cooperative mustard variety trials included four commercial varieties each of *B. juncea* (L.) Cross and *B. hirta* Moench. These trials were planted on April 26, 1989, in a field that had produced a barley crop the previous year and on April 20, 1990, in a field that had been fallowed the previous year. These fields were fertilized with 68 and 80 lb/acre of nitrogen in 1989 and 1990, respectively.

Both species of mustard flowered in late June. Seed yield in 1989 ranged from 3,105 to 4,280 pounds per acre (Table 1). Under the dryer conditions of the 1990 trial, seed yield ranged from 1,280 to 1,755 pounds per acre (Table 1). Planting at an earlier date in 1990 would have avoided some of the drought stress, and seed yields would probably have been higher. When averaged across years and varieties, the brown mustard varieties produced higher seed yields (2,550 lb/acre) than the yellow mustard varieties (2,440 lb/acre).

These trials indicated that most of the varieties of the two mustard species currently grown in Canada are very well adapted to the northern Idaho climate. Proper planting and management of either species should allow commercial production of mustard in northern Idaho.

Stand establishment

Early establishment of a vigorous plant stand is essential. Prepare a weed-free seedbed that is firm, fairly fine and has good moisture. This will provide the seed-soil contact and moisture necessary for rapid emergence. Overworking seedbeds reduces surface moisture and promotes soil crusting. Some surface crop residue can be tolerated if seed can be properly placed in the soil.

Seed as early in spring as possible to avoid late-season moisture stress and heat stress and the resulting yield loss. Seed as soon as soil at 1 inch is 45°F or warmer. Seeding into cooler soils may be possible with appropriate seed protectant treatments.

Seed mustard at 8 to 12 pounds per acre on a pure live seed basis. If seeding conditions are less than optimum, increase the seeding rate to ensure establishment of the desired stand. Most commercial grain drills

can be set to plant mustard seed at these relatively low rates. To ensure good seed and soil contact, use a grain drill equipped with double disk openers and press wheels. Avoid using planting equipment or tillage techniques that result in poor stand establishment or cause soil crusting.

Mustard should be planted ½ to 1 inch deep into moist soil. Under good soil conditions, seed may be placed as deep as 2 inches to reach moisture, but deep seeding may delay emergence and cause reduced stand establishment. Row spacings of 6 to 8 inches are preferred to allow early row closure, provide competition with weeds and ensure high seed yield.

Fertility management

Nitrogen (N), phosphorus (P), sulfur (S) and boron (B) are the nutrients most likely to limit mustard production in northern Idaho.

Nitrogen

The total amount of N required to produce mustard is based on yield potential. Mustard seed crops yielding 1,500, 2,000, 2,500 and 3,000 pounds per acre will require 130, 145, 175 and 200 lb/acre of N, respectively. To determine the N fertilizer rate required to produce the desired yield, subtract your soil test N value from the total N requirement based on yield potential.

If soil tests are not available, the following N recommendations can be used based on a potential seed yield of 2,000 pounds per acre:

- 75 to 95 lb/acre on fallow ground
- 105 to 135 lb/acre following grain (residue removed)
- 140 to 165 lb/acre following grain (residue plowed down)
- 50 to 75 lb/acre following green manure

Phosphorus

Phosphorus fertilizer should be banded at a rate of 40 to 60 lb/acre of P₂O₅ (18 to 26 lb P) to soils containing less than 4 ppm sodium acetate extractable P. Mustard seed is very sensitive to in-furrow fertilizer. Place bands below and to the side of the seed furrow.

Sulfur

Apply S fertilizer at a rate of 20 to 25 lb/acre of S to soils containing less than 10 ppm SO₄-S.

Micronutrients

Levels of copper, iron, manganese, molybdenum and zinc are adequate to produce mustard in most Idaho soils. However, boron (B) may be limiting. On deficient soils — soils testing at less than 0.5 ppm B — apply 1 to 2 lb/acre of B in a uniform broadcast

application. Never band B. For information on B and availability of specific fertilizer materials, see University of Idaho CIS 608, *Essential Plant Micronutrients: Boron in Idaho*.

Weed control

Perennial weeds

Control perennial weeds such as Canada thistle, field bindweed and quackgrass before planting mustard. A combination tillage and herbicide program is usually most effective. It is best to apply herbicides to perennial weeds after fall harvest and before fall tillage operations. As in all applications of agricultural chemicals, follow herbicide label rates and recommendations.

Mustard is sensitive to residues of dicamba (Banvel), picloram (Tordon) and chlorsulfuron (Glean). Select fields that are free of these residues.

Chemical control of quackgrass — Apply Roundup when quackgrass is 8 to 12 inches high and growing actively. Allow at least 3 days between application and tillage and 30 days between application and planting.

Alternatively, treat actively growing quackgrass with Fusilade when it is 6 to 10 inches tall and cultivate after 7 days. Do not plant mustard within 60 days of applying Fusilade.

Chemical control of Canada thistle — Apply Roundup before the last killing frost in fall when Canada thistle is actively growing. Spring treatment before mustard planting is usually inadequate.

Chemical control of field bindweed — Apply Roundup when field bindweed is actively growing in moist soil and is at or beyond full bloom, preferably in late summer or fall the year before growing the mustard crop.

Tillage — Most perennial weeds can be controlled with a thorough fallow tillage program. However, tillage can spread perennial weeds across fields, and thus herbicide-tillage combinations are often more effective. It can take several years to control perennial weeds with cultivation alone.

Begin cultivation 12 to 14 days after weeds emerge. Allow about 14 to 18 days between subsequent tillages. Cultivate when newly emerged Canada thistle rosettes are 2 to 4 inches in diameter, field bindweed vines are less than 4 inches long and quackgrass is less than 6 inches tall. The most effective cultivation depth for perennial weed control is 3 to 4 inches. For quackgrass, use a spring-tooth harrow to pull the rhizomes to the surface to dry out and die.

Annual weeds

Growing weed-free crops or summer fallowing before planting mustard will reduce the numbers of most volunteer crops and annual weeds. Grain cropping allows use of herbicides, whereas no herbicides are currently registered for mustard seed production in Idaho.

Early planting allows mustard to compete well with most annual weeds because mustard grows well in the cool conditions of early spring and withstands moderate freezes. Some weeds such as weedy members of the mustard family, wild oat and volunteer cereals can become problems, but the rapidly growing mustard will outcompete most early season weeds.

Insect pest management

Insect pests of mustard have not been studied extensively in Idaho. We anticipate that insects associated with rapeseed such as flea beetles, cabbage and turnip aphids, diamondback moths, cutworms and armyworms, lygus bugs and the cabbage seedpod weevil could attack mustard (see University of Idaho publications CIS 782, *Cabbage Seedpod Weevil Control on Winter Rapeseed*; EXT 715, *Dryland Winter Rapeseed Production Guide*; and EXT 681, *Spring Rapeseed Culture in Idaho*, for more information on insect pests of rapeseed). We will not know to what degree these insects will be a problem until we gain experience with this crop.

No insecticides for any of these pests are currently registered in Idaho for mustard grown for condiment use. All insecticides currently registered for mustard are for mustard greens, which is a different crop. Cooperators in North Dakota indicate that they have state labels for control of several mustard pests. This will be helpful should we need to pursue these labels for Idaho.

Harvest and storage

Mustard should be combined directly when seed moisture is less than 10 percent. It can be swathed when the average seed moisture is 30 to 35 percent if the crop is not maturing uniformly or if green weed problems prevent direct harvest. Shattering usually is not a problem. Seed moisture should not exceed 8 percent for long-term storage.

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Pesticide residues

These recommendations for use are based on currently available labels for each pesticide listed. If followed carefully, residues should not exceed the established tolerances. To avoid excessive residues, follow label directions carefully with respect to rate, number of applications and minimum interval between application and reentry or harvest.

Groundwater

To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.

Trade names

To simplify information, trade names have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.