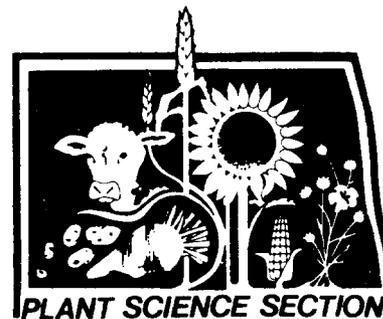




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Tame Mustard Production

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Mustard is an economic cash crop that has a distinct place in rotation with small grain crops. There are three types of mustard, yellow, brown and Oriental. Yellow mustard (*Brassica hirta*) is the most commonly grown in North Dakota, and only small acreages of brown and Oriental (*Brassica juncea*) are being grown. Yellow mustard is most commonly used for a table or "hotdog" mustard while brown and Oriental are used for oil and spices. All mustard should be grown under contract, assuring the producer of a guaranteed sale. Acreage of mustard planted in North Dakota has been approximately 95 to 100,000 acres annually.

Adaptation: Mustard is generally adapted to fertile, well-drained soils. Dry sand and dry sandy loam soils should be avoided. Mustard is adapted to saline soils similar to barley. Yellow mustard varieties will mature in 80-85 days whereas the brown and Oriental types require 90-95 days to reach maturity. As with other crops, mustard will usually yield better on high fertility soils and summerfallow, but given suitable moisture and fertility, it will produce economic yields on small grain stubble.

Mustard Growth Characteristics: Mustard seedlings emerge rapidly but tend to grow slowly after emergence. Under favorable moisture and fertility conditions, the ground will be covered in four to five weeks.

Five weeks after emergence, the plants begin to bud and the crop will tend to appear rather uneven. A week later it will develop into full yellow bloom and

the stand will appear even. Good moisture supplies favor a long blossoming period. The longer the blooming period, the higher the yield potential. Full grown plants will usually vary in height from 30 to 45 inches, depending on type and variety.

Mustard plants are sensitive to herbicides such as 2,4-D and MCPA. Drift from spraying nearby grain fields must be avoided.

Crops following mustard in rotations will do as well as after small grains. Crops that can be sprayed with 2,4-D or MCPA should follow mustard so that any volunteer plants can be controlled. Crops such as sunflower, rapeseed, safflower, dry beans and soybeans are not recommended in close rotation with mustard.

Seedbed Preparation: The seedbed for mustard should be clean of previous crop residue, firm and fairly level. Shallow tillage, just deep enough to kill weeds, will keep soil moisture close to the surface and leave the seedbed firm. This will permit shallow seeding and encourage quick, uniform emergence. Seedbeds should be packed before planting using a roller packer, empty press drill or rodweeder.

Varieties: Yellow mustard varieties tend to be shorter, earlier maturing and lower yielding than brown or Oriental varieties. Seed mustard of selected varieties is usually made available by contracting firms. Varieties of yellow mustard include Yellow No. 2, Gisilba, Kirby, Ochre and Tilney. Oriental mustard varieties include Stoke, Lethbridge 22A,

14.3
Y9
8
2, 85

Domo and Carrow 85, while Ekla, Common Brown, Blaze and Burgonde A are brown mustard varieties. Consult variety trial data in your respective areas for varietal performance information. See Table 1 for recent mustard yield data.

Seeding Date and Rate: Early seeding is recommended but should be late enough to avoid damage from spring frost. Young mustard seedlings are quite tolerant to frost just after emergence. Seeding should occur from May 1 to 25 with seedings later than May 15 usually resulting in lower yields.

Yellow mustard is seeded solid with a grain drill at the rate of 10 to 14 lb/A. The higher rate should be used on heavy, fertile soils. Oriental and brown type mustards, which have a smaller seed, should be solid seeded at a rate of 6 lbs/A. Mustard seeds are small and must be planted shallow ($\frac{1}{2}$ to $1\frac{1}{2}$ inches deep) in moist soil to insure rapid germination and emergence. Soil crusting prior to emergence can cause problems. Do not backharrow. If mustard stands are poor, decisions should be made rapidly to rework and reseed to mustard or some other crop.

Fertilizer: Mustard responds to nitrogen and phosphate fertilizer similar to cereal grains. Avoid using more than 10 lb/A actual N with the seed as germination injury can occur. Some growers mix low rates of fertilizer (10 lb. N and 20 lb. P_2O_5 with mustard seed and plant them together. Potash is rarely needed to increase mustard yields. Consult Extension Circular SF-7 for mustard fertilizer recommendations based on soil tests.

Weed Control: Weeds are a serious problem in mustard production. They not only reduce yields, but weed seeds such as wild mustard, wild buckwheat and foxtail are difficult to remove and can cause severe cleaning losses and market grade reductions. Such losses reduce returns to the grower.

All mustards, but especially the Oriental and brown types, should be sown on fields known to be relatively free of wild mustard infestation. Wild mustard can be mechanically separated from yellow mustard but separation is not possible with the other two mustard types. Wild mustard contamination will reduce grades of Oriental and brown mustard, often to the sample grade level.

Carbyne 2EC has label clearance for wild oats control. A rate of 0.37 lbs/A (1.5 pt) is recommended. Treflan at 0.5 to 0.75 lb/A (1 to $1\frac{1}{2}$ pints/A) is cleared for other weeds and grasses. Treflan will not control wild mustard. Treflan must be applied prior to seeding and incorporated thoroughly in the soil for maximum effectiveness.

Weed control must be based on clean field selection and shallow seeding for quick and uniform emergence to obtain a good uniform stand. The mustard crop cannot be harrowed or tilled after emergence.

Insects: Insects can cause serious yield losses and growers should monitor fields closely for problems. Flea beetles and diamondback moth caterpillars have been the most troublesome insects. Flea beetles are shiny, black, jumping beetles about $\frac{1}{8}$ inch long. They eat small holes in leaves and feed on pods. Flea beetles attack young seedlings as well as the adult plants. Diamondback moth caterpillars are $\frac{1}{2}$ inch in length and are colorless to green. The larva eat leaves, flowers and green pods and are extremely active when touched. Malathion EC at $1\frac{1}{4}$ lbs/A and Sevin at 1 lb/A can be used to control flea beetles.

The use of Malathion at a higher rate will control the diamondback moth caterpillar. Read the labels for waiting period and correct timing of applications. See Extension Circular E-688 for more information on mustard insect pests.

Diseases: Mustard is attacked by several diseases. Among the most serious are downy mildew, white rust, Sclerotinia stalk rot (white mold), leaf spots and virus mosaic. It is not recommended to plant mustard into crop rotation systems containing crops such as sunflower, rapeseed, dry edible beans, crambe or safflower. These crops have similar disease problems and disease infestations can build to economic levels. Several broadleaf weeds also serve as hosts or reservoirs for these diseases. Among the more prominent are shepherdspurse, pigweed, wild mustard and field pennycress. Mustard grown in a small grain rotation is one of the best preventives of serious disease problems and provides an excellent biological break for cereal grain leaf diseases.

Harvesting: Normal wind, rain and drying generally does not cause mustard to shatter before cutting. The actual harvesting operations can cause severe shattering losses when the crop is overripe.

If the fields are not weedy and the crop is uniformly ripe, straight-combine yellow mustard. When direct combining, wait until the crop is mature and dry. The reel may cause shattering when straight combining but it can be removed or lifted above the crop if the stand is good. If the reel is needed, it should be reduced in speed and half the bats removed.

Brown and Oriental mustard varieties should be swathed. Yellow mustard should be swathed if the crop is weedy or uneven in maturity. This should be done quite early to avoid shattering. Mustard should be swathed following general leaf drop and overall field color changes from green to yellow/brown. Pods selected from the middle of the racemes of several plants in areas representing the average maturity of the field should be examined for physiological maturity of the seeds. Most varieties are at the optimum maturity for swathing when brown. The remaining 25 percent green seeds will mature in the

swath prior to harvest. Swathing in early morning hours will aid in reducing shattering losses from ripe pods. The windrow is inclined to be bulky and easily scattered by the wind. To help prevent this, many growers pull steel drums over the top of the windrow to help push it into the stubble. Be sure to swath before the plant is dry and brittle to avoid shattering.

The combine should be adjusted so that the seeds are all threshed out while using the lowest possible cylinder speed. Cylinder speed should be set at approximately 600 RPM. Careful adjustment of the cylinder speed and cylinder opening is important to avoid cracking. When the crop is very dry, every other cylinder bar may have to be removed. To test for cracking, run your hand into the threshed seed. If cracked mustard is present, it will adhere to the hair on the back of your hand, indicating the need for further combine adjustment. Cracked seed is dockage and a loss to the producer.

Storage: Mustard seed can be stored safely when the moisture content reaches 10 percent or less. Care should be taken to avoid cracking the seed while moving the crop in and out of storage. Cracked seed ends up as dockage and is a loss to the producer. When drying, it is essential that air temperature does not exceed 150°F and the seed temperatures 120°F. Tight bins, free of cracks or holes, are essential for storage of mustard.

Table 1. MUSTARD VARIETY COMPARISONS AT VARIOUS NORTH DAKOTA LOCATIONS

RESULTS AT WILLISTON

Variety	Type	Plant height (in)	Flower date*	Test weight (lbs/bu)	Yield, lbs/A	
					1982	1981
Blaze	Brown	38.4	24	54	1425	1020
Domo	Orient.	39.2	22	53	1799	1003
Lethbridge 22A	Orient.	41.1	24	54	1613	1151
Tilney	Yellow	32.1	22	56	1293	132
Ochre	Yellow	36.0	21	57	1335	427
Kirby	Yellow	34.3	21	57	1368	431

*First flower date
Sown on May 14, 1982 on fallow. Harvested on August 9, 1982.

RESULTS AT MINOT

Variety	Type	Days 50% flower	Plant height (in)	Yield, lbs/A	
				1982	1981
Blaze	Brown	48	36	1304	1380
Domo	Orient.	48	38	1600	1537
Lethbridge 22A	Orient.	48	36	1578	1068
Tilney	Yellow	49	28	1240	796
Ochre	Yellow	49	29	1062	892
Kirby	Yellow	49	29	1092	829

RESULTS AT FARGO

Variety	Type	Plant height (in)	% lodged	Yield, lbs/A		
				1982	1981	1980* 1979
Gisilba	Yellow	36.5	7.5	1679	775	466
Kirby	Yellow	37.0	6.3	1700	884	505
Yellow #2	Yellow	35.5	10.0	1766	1023	590
Domo	Orient.	42.8	2.5	2201	1489	1216
Lethbridge 22A	Orient.	45.8	6.3	1664	678	982
Common Brown	Brown	41.0	0	1403	458	940

*Not sown because of drought.

RESULTS AT LANGDON

Variety	Type	Test wt. (bu.A)	Yield, lb/A	
			1982	1981
Kirby	Yellow	55	887	1148
Tilney	Yellow	55	993	1026
Ochre	Yellow	55	899	966
Domo	Orient	52	1196	1075
Lethbridge 22A	Orient	53	1253	768
Blaze	Brown	52	1148	—
Common Brown	Brown	—	—	757

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