Soil Fertility Requirements

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Mineral Nutrient Requirements for Canola

Nitrogen (N), phosphorus (P) and potassium (K) requirements of canola and mustard are similar to those of small grains. Sulfur (S) requirements for canola are higher than most crops. Soil cores should be taken from 0 to 24 inches deep and divided into 0- to 6-inch and 6- to 24-inch samples. P and K should be analyzed on the 0-to 6-inch sample, while N and S should be tested on each depth.

Nitrogen

Nitrogen recommendations are based on the following formula:

NR = (YP X 0.065) STN - PCC

where NR = supplemental nitrogen recommended

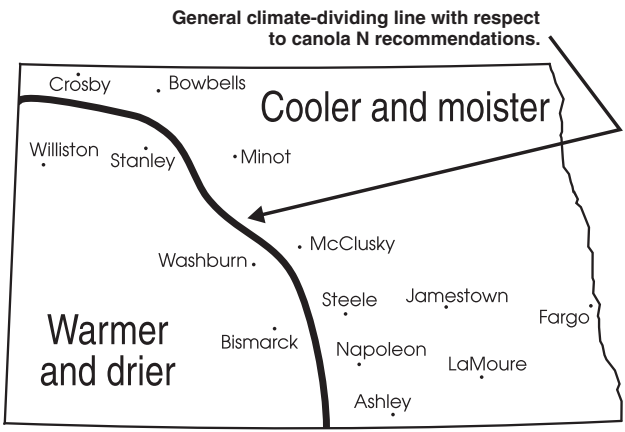
YP = yield potential in lb/a (pounds per acre)

STN = soil nitrate-N 0- to 24-inch depth

PCC = previous crop credit if legumes were grown the previous season.

Nitrogen recommendations at selected yield potentials are shown in the table **"N, P and K recommendations,"** with an upper limit of 150 lb/a N for cooler, moister areas and 120 lb/a for warmer, drier areas. See the map below. Yield potential should be conservative, based on a five-year average and not on an optimistic yield such as what a wheat grower might produce.

Ammonium sources of N may be fall-applied on most North Dakota soils, except on sandy loam or coarser textures, or where flooding is expected in the spring. Spring application may be made preplant or at planting.



General climate map of North Dakota with respect to canola production. In any given year, the line separating cooler, moister areas from warmer, drier areas may move east or west considerably.

Canola is very sensitive to fertilizer salts. No more than 5 lb/a of N is recommended with the seed in 12-inch row spacings for medium-textured soils, but the rate can be increased proportionally with narrow row spacing or increase in seed spread *(see table **"Maximum rates of seed-placed N + K_2O for canola,"** page 20)*.

Phosphorus (P) and Potassium (K)

P and K recommendations are shown in table ***"N, P and K recommendations,"*** *(page 19)*. Canola is a good scavenger of P, and a row-starter fertilizer rate of 20 to 30 lb P_2O_5/a is sufficient for most soil test levels. On light soils where no nitrogen is recommended, 11-52-0 (MAP) would be a better seed-placed choice of phosphate because its nitrogen component is not as likely to injure seed as 18-46-0 (DAP).

K, if needed, may be added to row starter if final N + K_2O is 10 lb/a or lower, using a double disc opener with 12-inch row spacing *(see table **"Maximum rates of seed-placed N + K_2O for canola,"** page 20)*. Broadcasting P and K is acceptable. However, I recommend a small amount of P as a row starter in addition to any broadcast application.

N, P and K recommendations for canola.

Yield Potential	Soil N + Supplemental N	Olsen-P, ppm VL 0-3	L 4-7	M 8-11	H 12-15	VH 16+	Soil test K, ppm. VL 0-40	L 41-80	M 81-120	H 121-160	VH 160+
lb/a	lb/a at 0-2 ft.	lb P_2O_5/a					lb K_2O/a				
1,500	100	49	36	23	9	0	70	50	30	10	0
1,850	120[1]	60	44	28	12	0	86	62	37	12	0
2,300	150[2]	75	55	35	15	0	95	77	46	15	0
3,000	150[2]	80	60	35	15	0	140	100	60	20	0

[1] Indicates cap for warmer and drier areas in the state.
[2] Indicates cap for cooler, moister areas in the state.

Maximum rates of seed-placed N + K_2O for canola.

Soil Texture	Disc or Knife (1-inch spread) Row Spacing			Spoon or Hoe (2-inch spread) Row Spacing			Sweep (4- to 5-inch spread) Row Spacing		
	6 in.	9 in.	12 in.	6 in.	9 in.	12 in.	6 in.	9 in.	12 in.
	lbs N + K_2O /a								
Light	5	0	0	20	15	10	30	20	15
Medium	10	5	5	25	20	15	35	25	20
Heavy	15	10	5	35	25	20	45	30	25

Sulfur

Canola has a special requirement for sulfur. The consequences of low soil S levels are very serious in canola production. Yield increases due to sulfur application have been demonstrated in North Dakota (see response table). 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 tests, growers should apply 20 to 30 lb/a S. At high soil sulfur levels, the recommended rate is 10 to 15 lb/a S. Canola takes up sulfate-S. The form of sulfur fertilizer may be ammonium sulfate (21-0-0-24S) or other sulfate fertilizer, such as ammonium thiosulfate or potassium thiosulfate. Elemental sulfur forms have not performed well in regional trials.

Micronutrients

Canola yield has not responded to any micronutrient in North Dakota.

Response of canola to ammonium sulfate and degradable elemental sulfur on three soil types on conventional till and no-till, Rocklake, N.D.

Rate	Source	Tillage	Soil Types		
			Buse	Barnes	Svea
lb S/acre			Yield in lb/a		
0		CT	400	1,020	1,180
20	AS	CT	1,810	1,980	1,860
40	AS	CT	1,890	1,670	1,980
40	ES	CT	1,260	1,290	1,470
0		NT	30	240	1,450
20	AS	NT	1,650	1,680	2,100
40	AS	NT	1,810	1,870	1,810
40	ES	NT	620	1,060	1,630

LSD 5% within tillage treatments 155 lb/a.

Sources: AS= ammonium sulfate (21-0-0-24S)
ES= degradable elemental sulfur (0-0-90S)
Tillage: CT= conventional tillage; NT= no-till.

Source: Canola response to sulfur fertilizer applications under different tillage and landscape positions. 1996. Annual report to USDA/CSREES/Special programs, Northern Region Canola Grant and the North Dakota Oilseed Council. E.J. Deibert, S. Halley, R. Utter and J. Lukach.