Table 2. Mineralizable nitrogen release rates for northern Idaho soils.

	Tillage	
Organic matter content	Conventional	Reduced
(%)	-------(lb N/acre/year)-------	
< 1.0	20	17
1.0	20	17
1.1	22	19
1.2	24	20
1.3	26	22
1.4	28	24
1.5	30	26
1.6	32	27
1.7	34	29
1.8	36	31
1.9	38	32
2.0	40	34
2.1	42	36
2.2	44	37
2.3	46	39
2.4	48	41
2.5	50	43
2.6	52	44
2.7	54	46
2.8	56	48
2.9	58	49
3.0 +	60	51

oil te t nitrogen—The amount of inorganic N in the soil can be evaluated most effectively with a soil test. Take samples from the crop's entire rooting depth because nitrate-nitrogen (NO_3-N) is mobile in soil. Winter rapeseed can efficiently remove N to a depth of 3 feet or more unless its roots are blocked by a restricting layer.

Soil test values include both NO_3-N and ammonium-nitrogen (NH_4-N) in the first foot of the soil profile. NO_3-N should be sampled in 1-foot increments to the crop's effective rooting depth. To convert soil test NO_3-N and NH_4-N

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Table 5. Phosphorus fertilizer rates for winter rapeseed based on a soil test.

Soil test P (0 to 12 inches)[1]			Application rate[2]	
NaOAc	Bray I	$NaHCO_3$	P_2O_5	P
(ppm)	(ppm)	(ppm)	(lb/acre)	(lb/acre)
0 to 2	0 to 20	0 to 8	60	26
2 to 3	20 to 30	8 to 10	40	18
3 to 4	30 to 40	10 to 12	20	9
over 4	more than 40	over 12	0[3]	0

[1]Soil test P can be determined by three different procedures: sodium acetate (NaOAc), Bray I method, or sodium bicarbonate ($NaHCO_3$). Sodium bicarbonate should not be used on soils with pH values less than 6.2. Use the column indicated by your soil test report.
[2]P_2O_5 x 0.44 = P, or P x 2.29 = P_2O_5.
[3]Under reduced tillage, apply up to 20 lb P_2O_5 per acre on soils testing in excess of 4 ppm P (NaOAc soil test).

Table 6. Potassium fertilizer rates based on a soil test.

	Application rate[2]	
Soil test K (0 to 12 inches)[1]	K_2O	K
(ppm)	(lb/acre)	(lb/acre)
0 to 50	80	66
51 to 75	60	50
over 75	0	0

[1]Sodium acetate extractable K.
[2]K_2O x 0.83 = K, or K x 1.20 = K_2O.

Potassium

Potassium ( ) levels are normally sufficient for rapeseed production, but should be applied when soils test low (Table). Fertilizer can be effectively broadcast incorporated or drill banded. Fertilizer can be placed with the seed, below the seed, or to the side of the seed.

When applied with the seed, total N and (as $_2O$) should not exceed 25 pounds of nutrient per acre and should not exceed 15 pounds per acre. Use the most convenient application method.

Sulfur

Adequate levels of sulfur (S) are necessary for maximum production of winter rapeseed. Without adequate S the rapeseed will appear light green to yellow. Plants require S to use N efficiently. Because S is mobile in soils, it is prone to leaching during winter and early spring. Consequently, soil testing for S is important. Sulfur needs based on soil test results are shown in Table 7. Sulfur application rates should never exceed 25 pounds per acre.

Sulfur can be surface applied and will move into the soil with precipitation. Elemental S is not recommended because it becomes available to plants slowly.

Table 7. Sulfur fertilizer needs based on a soil test.

Soil test S (0 to 12 inches)	S application rate	
(ppm SO_4-S)	(ppm S)	(lb/acre)
0 to 10	0 to 4	20
over 10	over 4	0

Micronutrients

oron—Winter rapeseed requires high levels of boron (B). On deficient soils (soils testing at less than 0.5 ppm B), apply 1 to 1.5 pounds 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 10 5, *Essential Plant Micronutrients: Boron in Idaho*.

in —Zinc (Zn) deficiencies are rare, occurring only in severely eroded soils. If soils are severely eroded and a soil test for Zn shows less than 0. ppm of Zn, see University of Idaho CIS 10 , *Essential Plant Micronutrients: Zinc in Idaho*. Rapeseed growers in the ootenai River alley of Boundary County should watch for Zn deficiencies.

t er ,n i ron trient —Winter rapeseed should not respond to applications of chlorine (Cl), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), or nickel (Ni). Extensive field experiments on micronutrients have not been conducted. Micronutrient applications often are more likely to create toxicity problems than to correct deficiencies. Avoid applications of these materials in northern Idaho. However, growers in the ootenai River alley of Boundary County should watch for manganese deficiencies.

Agronomy/Water quality considerations

Weeds, insects, diseases, and environmental stress can influence the effectiveness of a fertilizer program and reduce yields.

Poor N management can result in excessive nitrate leaching and groundwater pollution under certain conditions. Poor management practices can cause excessive erosion and contamination of surface waters with P.

The ammoniacal forms of N (ammonium and ammonia) do not leach as readily as nitrate. When temperature and moisture are favorable for plant growth, however, ammoniacal N and urea are quickly converted to nitrate. Thus, N applied in the early fall, regardless of its form, is sub,ect to leaching in areas of heavy precipitation.

N-Serve and other N stabilizers block conversion of ammonium to nitrate. Results obtained from N stabilizers are inconsistent although N fertilizer losses have been reduced in some areas. N stabilizers have not been effective in deep, dark-colored soils that have high organic matter contents.

Cutover timberlands (which usually have clayey subsoils) are not as susceptible to leaching losses because of the low permeability of the subsoil. Low permeability, however, makes these soils sub.ect to wetness or waterlogging that can result in N loss by denitrification (conversion of nitrate into gaseous forms of N that dissipate into the atmosphere).

Nitrogen fertilizer applications should be split between spring and fall in areas receiving more than 1 inches of annual precipitation. Research has shown that heavy fall applications can reduce rapeseed's winter hardiness. Fall-applied N is also susceptible to leaching. Consequently, no more than 50 percent of the required N should be applied in the fall. In areas receiving less than 1 inches of annual precipitation, including traditionally summer-fallowed areas, all N may be applied in the fall.

Phosphorus can either be banded below the seed or applied before planting and incorporated. Banding below the seed appears to be the most efficient method.

Potassium can be surface broadcast, broadcast incorporated, or banded below the seed. Banding below the seed appears to be the most efficient method.

Sulfur can either be incorporated or surface applied in the fall. Sulfur may also be applied with N in the spring.

Avoid banding high amounts of fertilizer close to the seed. High amounts of N and can result in salt damage during germination.

Banding fertilizer improves N and P use efficiency. Consequently, if applying N, P, or both in a band, cut the recommended fertilizer application rates by 10 to 15 percent.

Lower soil disturbance in reduced tillage systems results in lower soil temperature, which in turn reduces organic matter mineralization rates. Consequently, N fertilization rates are often slightly higher in reduced tillage systems.

Contact the UI Extension educator in your county if you need more information.

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