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Idaho Fertilizer Guide

Irrigated Wheat and Barley

The following fertilizer guidelines are based on relationships between University of Idaho soil test and crop yield response. The fertilizer rates suggested are based on research results and are designed to produce above average yields if other factors are not limiting production. Thus, the fertilizer guide assumes good management.

The suggested fertilizer rates will be accurate for your field provided (1) the soil samples are properly taken and represent the area to be fertilized, and (2) the crop history information supplied is complete and accurate.

NITROGEN (N)

Nitrogen rates depend upon previous crops, previous fertilizer application, release of N from organic matter, soil type, irrigation management and length of growing season. Enough nitrogen fertilizer should be applied to obtain maximum yield and the desired protein (Table 1).

Table 1. Nitrogen fertilizer rates based on previous crop.

Previous crop	Nitrogen application
Grain or corn (residue returned)	170
Grain or corn (residue removed)	120
Sugarbeets or potatoes	100
Beans, peas	80
Alfalfa, green manures (legumes)	60

Nitrogen Soil Test

A nitrogen soil test can evaluate nitrogen carryover from heavily fertilized row crops such as potatoes, sugarbeets or onions.

Soil samples should represent soil depths of 0 to 12 and 12 to 24 inches or the effective root zone since nitrate nitrogen (NO_3N) is mobile in the soil.

The soil test values in Table 2 represent the sum of the nitrate nitrogen and ammonium (NH_4) nitrogen in the top 2 feet of soil by 1 foot increments or the effective root zone.

Table 2. Nitrogen fertilizer rates based on soil test.

0-24" depth or effective root zone N(ppm)*	Nitrogen application (lb. N/acre)**
0	160
10	120
20	80
30	40
over 40	0

* ppm x 4 = pounds per acre

** Add 15 pounds available N for each ton of grain straw or non-legume residue plowed under up to 50 pounds N/acre. Straw yields are normally 3-4 tons per acre.

PHOSPHORUS (P)

Though cereals are not as responsive to applied phosphorus as most row crops, they will respond to applied phosphorus if soil levels are low. Table 3 shows soil test levels and rates of phosphorus to apply. Since soil samples are taken both at plow depth, 0 to 9 inches, and at the 0- to 12-inch depth, levels for both depths are shown.

Table 3. Phosphorus fertilizer rates based on soil test.

Soil test inches soil depth 0-9	0-12	Apply lb./acre P_2O_5	(P)**
phosphorus (P) ppm*			
0	0	160	70
4	3	120	53
8	7	60	26
Over 12	Over 10	0	0

* P test is by $NaHCO_3$ extraction.

** Phosphorus is expressed as both the oxide and elemental forms: $P_2O_5 \times 0.44 = P$ or $P \times 2.29 = P_2O_5$

POTASSIUM (K)

Cereal crops have a lower demand for soil potassium crops such as alfalfa and potatoes. Table 4 shows soil test levels and rates of potassium to apply.

SULFUR (S)

Sulfur requirements for cereal will vary depending on soil texture, soil organic matter levels, leaching losses and sulfur content of irrigation water.

Table 4. Potassium fertilizer rate based on soil tests

Soil test inches soil depth 0-9 potassium (k) ppm*	0-12	Apply lb./acre K_2O	(K)**
0	0	240	200
30	22	160	133
60	46	80	66
over 90	over 68	0	0

* K test by $NaHCO_3$ extraction.

** Potassium is expressed as both the oxide and elemental form: x 0.83 = K or K x 1.20 = K_2O

Areas irrigated with Snake River water should not experience a shortage of sulfur. Higher rainfall areas of southern Idaho, mountain valleys and foothill areas are likely areas for sulfur deficient soils.

A soil testing less than 10 ppm SO_4S in the plow layer or 8 ppm in the 0- to 12-inch soil depth, or in areas known to be deficient in sulfur, should receive 20 to 40 pounds of sulfur per acre.

Sulfur deficiency appears as a yellowing of the plant early in the growing season and looks much like nitrogen deficiency.

MICRONUTRIENTS

Deficiencies of micronutrients on cereals have not been observed in Idaho. Responses from micronutrient applications would not be experienced except on severely scraped soils.

GENERAL COMMENTS

1. Nitrogen fertilizers may be applied in fall on medium-textured soils if leaching and soil erosion are not hazards.
2. Nitrogen applied in spring will be used more efficiently and is recommended, especially on sandy soils in areas having heavy winter precipitation.
3. Nitrogen applied to the crop after the boot state — or application of excessive rates — can result in undesirable high protein levels of the soft wheats and malting barley, and is a lodging hazard.
4. Semi-dwarf hard red spring wheat may use higher nitrogen rates than suggested to increase protein levels. The economics of higher nitrogen rates versus protein premium should be considered.
5. Phosphorus and potassium fertilizer should be applied in the fall and mixed with the soils.
6. Over-irrigation and nitrogen leaching are a hazard on all soils, particularly sandy-textured soils.
7. Irrigation, weed and disease control can influence the effectiveness of your fertilizer applications.
8. Avoid a heavy first irrigation on spring cereals to prevent water-logging, reduced tillering and nitrogen leaching.

If you have any questions regarding the interpretation of this information, please contact your County Agricultural Agent.

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