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Idaho Fertilizer Guide

BEANS

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 fertilizer is generally not needed for beans. If large quantities of crop residue such as straw have been returned to the soil, fertilizer nitrogen may be needed to aid in decomposition of the straw and provide sufficient available nitrogen for the early growth of the bean crop.

Beans grown on new land cleared from sagebrush never fertilized previously may respond to small amounts of nitrogen or seed inoculation with rhizobium inoculum.

Nitrogen fertilizer should be plowed down or incorporated into the top 6 to 8 inches of soil.

Rate of nitrogen as affected by previous crop and residues are shown in Table 1.

Table 1. Nitrogen fertilizer rate based on previous crop.

Previous crop	lb. N/acre
Grain or corn (residue returned)	80
Grain or corn (residue removed)	30
New land	50
Beans, peas, alfalfa stubble	0

Nitrogen Soil Test

A nitrogen soil test can evaluate the carryover from heavily fertilized row crops. Since NO_3-N is mobile in the soil, samples should represent soil depths of 0 to 12 and 12 to 24 inches or the effective root zone of the plant.

Soil test values and recommended nitrogen rates are shown in Table 2. The soil test values represent the sum of the nitrate-nitrogen (NO_3-N) and ammonium nitrogen (NH_4) in the top 2 feet of soil by 1 foot increments. (Nitrogen soil test following alfalfa has limited value.)

Table 2. Nitrogen fertilizer rate based on N soil test.

Nitrogen soil test 0-24" depth (N) ppm	N application* (lb. N/acre)
0	60
10	20
20	0

*add 20 pounds available N per ton of grain straw or non-legume residue plowed under up to 50 pounds N/acre. Straw yields are normally 3 to 4 tons/acre.

PHOSPHORUS (P)

Beans will respond to applied phosphorus if soil test levels are low. Phosphorus materials should be plowed down or incorporated into the top 6 to 8 inches of soil.

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 based on soil test.

Soil Test inches soil depth 0-9 Phosphorus (P) ppm*	0-12	Apply lb./acre P_2O_5	(P)**
0	0	240	106
4	3	120	53
8	6	60	26
12 plus	10 plus	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)

Beans have a low requirement for soil K. Such crops as potatoes, alfalfa and corn would normally respond to applied K before beans.

Table 4 shows soil test levels and rates of potassium to apply.

Table 4. Potassium fertilizers based on soil test.

Soil Test inches soil depth 0-9	0-12	Apply lb./acre	
Potassium (K) ppm*		K_2O	(K)**
0	0	200	166
30	22	120	100
60	45	60	50
90 plus	68	0	0

*K test is by $NaHCO_3$ extraction.

**Potassium is expressed as both the oxide and elemental forms: $K_2O \times 0.83 = K$ or $K \times 1.20 = K_2O$.

ZINC (Zn)

Beans are sensitive to zinc deficiency. Zinc deficiency of beans occurs most often on scraped spots, on fields receiving heavy applications of manure or straw and on fields following sugarbeets.

When soils test less than 0.6 ppm Zn, at the 0- to 12-inch soil depth, 10 lb/acre zinc in an inorganic form or equivalent is recommended. If a soil test is not used, apply 5 lb/acre every year beans are grown or 10 lb/acre every third year for continuous beans.

Zinc fertility materials and their effectiveness are discussed in Idaho Current Information Series 130, *Zinc Fertilizers for Beans in Southern Idaho.*

To correct zinc deficiency after the crop is up, use a foliar application of 2 1/2 lb. Zn/acre. Foliar zinc applications on fields showing deficiency symptoms have hastened maturity and increased yields when applied before July 15. Foliar zinc should be considered only as a corrective measure since soil applied zinc is available at the beginning of the plants growth period and therefore of more value to the plant.

Other Micronutrients

Deficiency symptoms for micronutrients such as manganese (Mn), copper (Cu), iron (Fe) and boron have not been observed in Idaho bean fields.

SULFUR (S)

The major bean growing regions of Idaho should not experience a shortage of sulfur. If the soil test for sulfate sulfur (SO_4-S) is less than 8 ppm, at the 0- to 12-inch soil depth, apply 30 pounds sulfur/acre.

SALINITY (SALTS)

Beans are extremely sensitive to salty soils. Soils testing over 2.0 mmhos/cm of salt would normally cause some injury to the bean plants and reduced yields. Salt readings of 3.5 mmhos/cm and over would result in severe yield losses.

Salty irrigation water can contribute to salt accumulation on soils and requires special irrigation management techniques.

GENERAL COMMENTS

1. Complete information on varieties, diseases and cultural practices are available in Idaho Experiment Station Bulletin 282, *Bean Production in Idaho*, revised 1971.
2. Zinc, phosphorus and potassium can all be effectively fall-applied or anytime before planting.
3. Irrigation, weeds, insects and disease control can influence the effectiveness of your fertilizer application.
4. Most bean plants in southern Idaho are affected by root rot to some degree. Fertilizer material should be incorporated into the top 6 inches or plowed down for maximum availability in soil.

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

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