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Idaho Fertilizer Guide

SUGAR BEETS

These fertilizer guidelines are based on relationships established through research by the University of Idaho, Amalgamated Sugar Company, Utah-Idaho Sugar Company and Agricultural Research Service. Results and experience indicate that the guide rates suggested will 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 represent the area to be fertilized, and (2) the crop history information supplied is complete and accurate.

These fertilizer guide rates and critical levels are subject to change and adjustment as additional research information becomes available.

NITROGEN (N)

Controlling the amount of nitrogen available to the sugar beet is critical in producing high beet tonnage with high sugar content. Nitrogen in excess of crop's need can reduce sugar percentage and, therefore, gross income per acre. The nitrogen soil test is one of the best methods to estimate N fertilizer needs. Approximately 10 pounds N per acre are required to produce 1 ton of sugar beets per acre. This N need is met by N released from organic matter decomposition, by residual N carry-over from previously fertilized crops and by addition of fertilizer N.

Nitrogen Soil Test

A nitrogen soil test can evaluate the residual N carry-over from heavily fertilized crops such as potatoes, onions or sugar beets.

Nitrate nitrogen (NO_3N) is mobile in the soil. Therefore, soil samples should be taken from the 0- to 12-inch and 12- to 24-inch soil depths or the effective root zone, whichever is less. These depths should be sampled and kept separate for analysis. If the first foot is low in N, a starter fertilizer may be needed even where N is adequate at lower depths.

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

If soil test information is not available, you can base N fertilization rates on previous crop (Table 2).

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PHOSPHORUS (P)

Sugar beets will respond to phosphorus fertilizer if soil levels are low. The soil test is based on extractable phosphorus present to the depth of sampling — generally either plow depth (0 to 9 inches) or 0 to 12 inches. Table 3 shows rates of P to apply for different soil test levels.

Phosphorus should be plowed down or applied to rough-plowed ground and worked into the seedbed. Side dressing in beds is recommended when late applications are necessary, but high rates should not be placed with or immediately below the seed.

Table 1. Nitrogen fertilizer guide for sugar beet yield goals based on N soil test.

Soil test[1] 0-24"	Yield goals per acre[2] 30 tons	25 tons	20 tons	15 tons
N ppm[3]	N application rate (lb/acre)[4]			
0-10	230-170	150-100	100-50	50-0
11-20	169-110	99- 50	49- 0	0
21-30	109- 50	49- 0	0	0
31-40	49- 0	0	0	0
over 40	0	0	0	0

[1] Or to effective root depth

[2] Nitrogen rates suggested should produce these yields if stand, planting date, irrigation, disease or other factors are not limiting production. Choose a realistic yield goal which is consistent with your past experiences, climatic conditions and fertilize accordingly.

[3] Multiply ppm x 4 to give pounds N/acre. Soil test N = NO_3 + NH_4

[4] Add 15 pounds N for each ton of grain straw or nonlegume residue plowed under up to 50 pounds N/acre. Yields of grain straw or corn stover are normally 3 to 4 tons/acre.

If mineralizable nitrogen has been determined, nitrogen fertilizer rates may be estimated from the following calculation:

$$\text{Pounds N/acre} = \frac{\text{crop need - N (150) lb - soil test N (organic matter)}}{\text{0.65 (efficiency of fertilizer N recovery)}}$$

Example: Expected crop yield = 30 tons/acre
Total N needed = 30 x 10 or 300 lb/acre
Soil test N is 20 ppm x 4 = 80 lb/acre

$$\text{N fertilizer/acre} = \frac{300 - 150 - 80}{0.65} = 108 \text{ lb N/acre}$$

Table 2. Nitrogen fertilizer guide for sugar beet yield goals based on previous crop.

Previous crop	Yield goals per acre* 30 ton	25 ton	20 ton	15 ton
	Pounds nitrogen per acre to apply			
Grain or corn (residue removed)	230	150	100	50
Row crop	170	100	50	0
Peas, beans, alfalfa	110	50	0	0
Green manure, legumes	50	0	0	0

[1] Nitrogen rates suggested should produce these yields if stand, planting date, irrigation, disease or other factors are not limiting production. Choose a realistic yield goal which is consistent with your past experiences, climatic conditions and soil conditions and fertilize accordingly.

[2] Add 15 pounds N for each ton of grain straw or nonlegume residue plowed under up to 50 lbs. N/acre. Yields of grain straw or corn stover are normally 3 to 4 tons/acre.

POTASSIUM (K)

Sugar beets require less K than potatoes and alfalfa. Potassium fertilizer should be incorporated into the seedbed. Table 4 shows rates of K to apply for different levels of extractable potassium determined by soil test at plow depth (0 to 9 inches) and at depths of 0 to 12 inches.

MICRONUTRIENTS

Zinc - Deficiencies of zinc have not been widespread on sugar beets. When soil test for zinc is below 0.8 ppm in the plow layer or 0.6 ppm in the 0- to 12- inch soil depth, or where land leveling has exposed white, limey subsoil, apply zinc fertilizer at a rate which will supply 10 pounds of zinc per acre or equivalent.

Other Micronutrients - "Shotgun" applications of micronutrient mixtures containing boron, manganese, iron and copper "for insurance" have not been found to be responsive or economical and are not suggested.

SULFUR (S)

Sulfur should not be deficient in the major sugar beet-growing region of Idaho irrigating with Snake River water. In areas known to be sulfur-deficient and in soils testing less than 10 ppm SO_4 -S in the plow layer, 8 ppm at 0- to 12-inch soil depth, add 30 pounds S per acre.

GENERAL COMMENTS

Nitrogen fertilizers can be applied in fall on loam and silt loam soils, but greater efficiency may be obtained from preplant application in spring or by side dressing before July 1. Nitrogen applied after July 1 tends to stimulate vegetation growth, lowers percent of sugar and contributes very little to total yield.

On sandy soils where over-irrigation and leaching of nitrogen are likely, side dressing or applications of nitrogen through irrigation water before July 1 are suggested for at least half of the rate used.

Irrigation practices, weed, insect and disease control significantly influence the efficiency and effectiveness of your fertilizer applications and your ultimate crop yield.

Fertilizer materials such as phosphorus, potassium and zinc can be effectively fall-applied as they are not readily leached over winter.

Zinc-sensitive crops such as beans or corn when following sugar beets should receive 10 pounds Zn/acre.

Uniform plant populations (100 to 120 plants / 100 feet of row) after thinning have produced the highest yields and sugar contents.

If you have questions regarding the interpretation of this information, please contact your county Agricultural Extension agent or sugar company fieldman.

Table 3. Phosphorus fertilizer rates based on soil test.

Soil test inches soil depth 0-9	0-12	Apply pounds per acre P_2O_5	(P)**
Phosphorus (P) ppm*			
0-4	0-3	240	(106)
5-8	4-6	160	(71)
9-12	7-10	80	(35)
over 12	over 10	0	(0)

* Soil extractant for P is $NaHCO_3$

** Phosphorus is expressed as oxide form with the elemental form in parentheses.

Table 4. Potassium fertilizer rate based on soil tests.

Soil test inches soil depth 0-9	0-12 / 24	Apply pounds per acre K_2O	(K)**
~~Phosphorus (P)~~ (K) ppm*			
0-50	0-38	(240)	(200)
51-100	39-75	(160)	(133)
101-125	76-94	(80)	(66)
Over 125	Over 94	(0)	(0)

* Soil extractant for K is $NaHCO_3$

** Potassium is expressed as oxide form with the elemental form in parentheses.

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