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Idaho Fertilizer Guide

POTATOES

These fertilizer guidelines are based on relationships established between University of Idaho soil tests and crop yield response. The fertilizer rates suggested are based on research results and are designed to produce yields shown if other factors are not limiting production. Thus the fertilizer guide assumes good crop 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.

NITROGEN (N)

Most Idaho potato fields will respond to fertilizer nitrogen. The N rate used, along with other management factors, particularly irrigation, can have a marked effect on the yield and quality of the potato crop.

Nitrogen application rates required depend upon one or more of the following: preceding crop, N carryover from the preceding crop, mineralized N, plant population, planting and harvest date, crop residues plowed down, soil type and leaching losses from overirrigation or heavy winter precipitation.

Nitrogen rates in the accompanying tables were determined by the soil test for nitrogen and show the effect of the preceding crop.

Nitrogen Soil Test

A nitrogen soil test can evaluate the carryover from heavily fertilized row crops such as sugar beets and potatoes. Since nitrogen in the form of nitrate NO_3 is mobile, soil samples should include 0- to 12-inch and 12- to 24-inch soil depths.

The soil test values in Table 1 represent the sum of the nitrate nitrogen and ammonium nitrogen (NH_4) in the top 2 feet of soil by 1 foot increments. (Multiply ppm x 4 to give pounds N/acre.)

In the absence of soil test information, crop history may be used to approximate nitrogen need (Table 2).

PHOSPHORUS (P)

Potatoes will respond to phosphorus fertilizer if the soil level is low. Since the soil test is based on available phosphorus in sample analyzed, the depth to which the sample was taken must be known. Samples are being

Table 1. Nitrogen rates based on N soil test.

Soil depth* 0-24"	Yield range, cwt per acre				
	200	300	400	500	600
N ppm	Pounds nitrogen per acre**				
0-10	120-60	190-125	225-160	270-200	340-280
11-20	59-0	124-60	159-100	199-150	279-220
21-30	0	59-0	100-40	149-90	219-160
31-40	0	0	39-0	89-30	159-95
41-50	0	0	0	0	94-60
51-60	0	0	0	0	59-0
Over 60	0	0	0	0	0

* Or to effective root depth if less than 24 inches.

** Rates based on: $\frac{\text{crop need} - (\text{mineralized N} - \text{soil test N})}{0.65\ (\text{percent recovery of fertilizer N})}$

Add 15 pounds N for each ton of grain straw or nonlegume residue plowed under up to 50 pounds N per acre. If the surface foot is low in N, a small amount of fertilizer N should be applied to get the plants started.

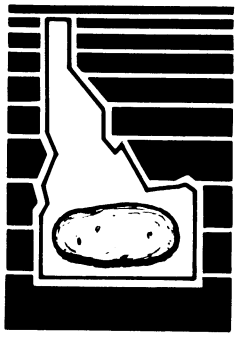

Table 2. Nitrogen rates based on previous crop.

Previous crop	Desired yield range, cwt/per acre				
	200	300	400	500	600
	Pounds nitrogen per acre to apply				
Grain (residue returned)	120	180	240	300	360
Grain (residue removed)	80	140	200	260	320
New land	60	120	180	240	300
Row crop (nonlegume)	40	100	160	220	280
Alfalfa stubble, peas or beans	0	60	120	180	240
Green manure legume	0	20	80	140	200

taken to plow depth, usually 0 to 9 inches, and to depth of 0 to 12 inches. Soil levels and rates of P_2O_5 needed are shown in Table 3 for both sampling depths.

POTASSIUM (K)

Potatoes require high levels of available soil potassium. Soil levels and rates of fertilizer needed to produce potatoes are shown in Table 4.

MICRONUTRIENTS

Zinc

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

Other micronutrients

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

GENERAL COMMENTS

1. Fertilizer applied more nearly to time of plant need is used most efficiently. However, time of fertilizer application and placement is largely a matter of personal preference, convenience and availability of material and equipment.

2. Nitrogen applied with irrigation water is an effective way to supplement the crop during the growing season. Do not use aqua or anhydrous ammonia in sprinkler system application.

3. Nitrogen can be applied during the growing season to meet plant needs as indicated by petiole analysis.

Table 3. Phosphorus fertilizer rates based on soil test.

Soil test inches soil depth		Apply pounds per acre	
0-9	0-12		
Phosphorus (P) ppm*		P_2O_5	(P)**
0-7	0-5	240	106
8-14	6-10	160	70
15-20	11-15	80	35
over 20	over 15	0	0

* Soil extractant for P is $NaHCO_3$.

** Phosphorus is expressed as both oxide and elemental forms. $P_2O_5 \times 0.44 = P$ or $0 \times 2.29 = P_2O_5$.

Table 4. Potassium fertilizer rate based on soil tests.

Soil test inches soil depth		Apply pounds per acre	
0-9	0-12		
Potassium (K) ppm*		K_2O	(K)**
0-75	0-55	240	200
76-150	56-110	160	133
151-200	111-150	80	66
over 200	over 150	0	0

* Soil extractant for K is $NaHCO_3$.

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

Be careful not to apply too much nitrogen late in the growing season. Charts showing levels of nitrate-nitrogen needed to produce potatoes, depending on time of year and plant development, are included in College of Agriculture CIS 240: Tissue Analysis, a Guide to Nitrogen Fertilization of Idaho Russet Burbank Potatoes.

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

5. Over-irrigation and nitrogen leaching are hazards on sandy soils and may require use of high rates of nitrogen or midseason applications to supply the crop needs.

6. Irrigation frequency and quantity are as important as fertilizer additions in producing a high yield of quality potatoes.

7. Fertilizer materials such as phosphorus, potassium and zinc should be thoroughly incorporated by plowing or discing. These materials can be effectively applied in the fall.

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