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Oregon State University Fertilizer Guide for

Extension Service, Oregon State University, Henry A. Wadsworth, director. This publication was produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U.S. Department of Agriculture, and Oregon counties. Extension invites participation in its programs and offers them equally to all people.

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IRRIGATED POTATOES (Central Oregon and Klamath Areas)

Good management practices are essential if optimum fertilizer responses are to be realized. These practices include use of recommended varieties and good seed, selection of adapted soils, weed control, disease and insect control, and timely harvest.

In potato production, both quality and yield are of importance. Potato quality is primarily a function of management factors. Fertilizer applications and timely irrigation affect the specific gravity, size, and smoothness of tubers. This fertilizer guide assumes good management.

It is important that the soil be sampled and tested as a guide to fertilization.

Follow recommended soil sampling procedures to insure satisfactory fertilizer recommendation. Your County Agent can provide you with instructions on correct soil sampling.

NITROGEN (N)

Potatoes require a good supply of available N, however excessive rates of N can reduce potato quality and delay maturity.

Of the suggested N application, 60 to 100 lbs/A (65-110 kg/ha) of N should be banded at planting time. The urea form of N may cause seedling injury if banded at planting. The remainder of the N should be plowed down, injected, applied through the sprinkler system, or side-dressed.

The amount of N fertilizer required depends on the following factors: the preceding crop; the N carry-over from the previous crop; the plant population; the amount and type of residue to be plowed under; and possible leaching losses due to over-irrigation.

The following fertilizer guides are for mineral soils.

N Fertilizer Guide Based On Soil Test

The amount of residual N in the soil varies considerably.

A soil test for nitrate-N ($\text{NO}_3\text{-N}$) helps in evaluating the N carry-over from the previous crops in the case of mineral soils with low organic matter content.

N soil tests are of limited value following alfalfa.

Soil samples for N should be taken from the 0-24 in. (0-60 cm) soil depth or the entire depth of soil, whichever is less. The depth of the soil sample should be reported on the soil sample information sheet.

Soil samples for soil test N should be taken following a growing season and prior to the application of N fertilizer.

$\text{NO}_3\text{-N}$ Soil Test (ppm) (to 24" depth)	N Application ^{1/}	
	lbs/A	kg/ha
0- 5	200 - 240	225 - 270
5-10	160 - 200	180 - 225
10-15	120 - 160	135 - 180
15-20	80 - 120	90 - 135
20-30	60 - 80	65 - 90
over 30	60	65

^{1/} Add 20 lbs (10 kg) N for each ton of grain straw or non-legume residue plowed down after Sept. 15.

N Fertilizer Guide Based On Previous Crop

Where a soil test is not used N fertilization would be based on the preceding crop.

A soil test is usually the most accurate method of estimating N fertilizer needs except following a legume crop.

Previous Crop	N Application	
	lbs/A	kg/ha
Grass sod	200 - 240	225 - 270
Grain	160 - 200	180 - 225
Potatoes or Mint	140 - 160	155 - 180
Alfalfa (good crop)	80 - 100	90 - 110

Phosphorus (P)

If OSU soil test for P reads (ppm)	Apply this amount of Phosphorus (P_2O_5)	
	lbs/A	kg/ha
0- 5	180 - 200	200 - 225
5-10	150 - 180	170 - 200
over 10	150	170

Potatoes usually respond to the application of P particularly when the soil temperature is low. The rate of applying P is based on the surface soil test usually taken to plow depth.

P should be banded at planting time. P bands should be located about 2 to 3 inches (5 to 7.5 cm) to one or both sides of the seed.

Plow down applications of P are not as effective as band applications. For plow down applications the rate of P application should be increased by 50 percent.

POTASSIUM (K)

Potatoes require high levels of available K.

K is most effective if banded at planting time. K_2O applications in excess of 100 lbs/A (110 kg/ha) should be plowed down or side-dressed 6" to 10" (15 to 25 cm) from the row after planting. On

some coarse sandy soils K is applied as a broadcast application.

The K soil test is based on a surface soil sample usually taken to plow depth.

If OSU Soil Test for K reads: (ppm)	Apply this amount of Potassium(K ₂ O)	
	lbs/A	kg/ha
0-200	200 - 400	225 - 450
200-300	100 - 200	110 - 225
300-400 ^{1/}	0 - 100	0 - 110
Over 400 ^{1/}	0	0

^{1/} In experiments in Klamath County potatoes have responded to K fertilizer at soil test levels up to 600 ppm.

SULFUR (S)

S requirements will vary with soil texture, leaching losses, the soil parent material, and organic matter content of the soil. Soils developed on pumice in Central Oregon have a particularly high S requirement.

In Central Oregon, 80 to 100 lbs/A (90-110 kg/ha) of S should be applied annually to the coarse sandy loam and loamy sand soils; 40 to 60 lbs A (45-65 kg/ha) of S should be applied annually to the silt loam and finer-textured soils.

In Klamath County, 25-40 lbs/A (30-45 kg/ha) of S should be applied on an annual basis.

S is frequently contained in fertilizers used to supply other nutrients such as N, P, and K and may be present in irrigation water which can be tested for S content.

Plants absorb S in the form of sulfate. Fertilizer materials supply S in the form of sulfate and elemental S.

Elemental S must convert to sulfate in the soil before the S becomes available to plants. The conversion of elemental S to sulfate is usually

rapid for fine ground (less than 40 mesh) material in warm moist soil.

Elemental S should be applied the year preceding the potato crop using fine ground (less than 40 mesh) material.

S in the sulfate form can be applied at planting time. Some S fertilizer materials such as elemental S and ammonium sulfate have an acidifying effect on soil.

MAGNESIUM, LIME, AND MICRONUTRIENTS

In Klamath County potatoes have responded to applications of copper and manganese on muck soils. These nutrients can be banded at rates of 1 lb/A (1 kg/ha) for copper and 5-10 lbs/A (5-10 kg/ha) for manganese.

Increased soil acidity, particularly in sandy soils, has been observed in central Oregon and Klamath County. This acidity has largely resulted from the use of acidifying N and S fertilizers.

Where the soil pH is 5.5 or less a trial application of 1 T/A (2.25 Tm/ha) lime is suggested. The lime should be applied and thoroughly mixed with the surface 6" (15 cm) of soil several months in advance of planting.

CONVERSION TO METRIC UNITS

In this FG, English and metric units are used. The abbreviations and Conversion Factors (C.F.) are:

From	To	C.F.
Feet (')	Meters (m)	0.305
Inches (")	Centimeters (cm)	2.54
Pounds (lb)	Kilograms (kg)	0.454
Acres (A)	Hectares (ha)	0.405
Tons (T)	Metric tons (Tm)	0.907
Pounds per Acre (lb/A)	Kilograms per Hectare (kg/ha)	1.12
Tons per Acre (T/A)	Metric Tons per Hectare (Tm/ha)	2.24

N, P, K, and lime fertilizer guides are based on soil test values from the Soil Testing Laboratory, OSU, Corvallis, Oregon.

This fertilizer guide is based on experiments conducted by Malcolm Johnson, George Carter, and T. L. Jackson, Oregon Agricultural Experiment Station, and on experience in growers' fields.

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