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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 (Columbia Basin-Malheur County)

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.

The amount of N fertilizer required depends on the following factors: length of the growing season; 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.

Of the suggested N application, 40 to 100 lbs N/A should be banded at planting time. The urea or diammonium phosphate forms of N may cause seedling injury if banded close to the seed at planting. The remainder of the N should be plowed down, injected, applied through the sprinkler system, or side-dressed.

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 (NO_3^- -N) helps in evaluating the N carryover from the previous crops in the case of mineral soils with low organic matter content.

Nitrogen soil tests are of limited value following alfalfa.

Soil samples should be taken from the 0-24" soil depth.

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

NO ₃ -N Soil Test (ppm) (to 24" depth)	N Application (lbs/A) ^{1/}			
	Short Season Crop		Long Season Crop	
	Malheur Co.	Columbia Basin	Malheur Co.	Columbia Basin
0	200	240	240	340
5	160	200	200	300
10	120	160	160	260
15	80	120	120	220
20	40	80	80	180
25	40	40	40	140
30	40	40	40	100
45	40	40	40	40

^{1/} Add 20 lbs 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.

As the amount of residual N in the soil varies considerably, 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)			
	Short Season Crop		Long Season Crop	
	Malheur Co.	Columbia Plateau	Malheur Co.	Columbia Plateau
Grain ^{1/}	160-200	200-240	200-220	300-340
Row Crop	120-160	80-160	140-180	150-250
Alfalfa (good crop)	100-140	100-150	120-160	150-200

^{1/} Add 20 lbs N for each ton of grain straw plowed down after Sept. 15.

PHOSPHORUS (P)

Potatoes usually respond to the application of P, particularly when the soil temperature is low with early planted potatoes. The rate of applying P is based on a 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 to one or both sides of the seed.

If OSU soil test for P reads: (ppm)	Apply this amount of phosphorus (P_2O_5)-lbs/A
0-5	150-200
5-10	100-150
10-20	80-100
over 20	80 ^{1/2}

^{1/} When soil test for P exceeds 20 ppm, P fertilizer is not required on late plantings.

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 should be plowed down or side-dressed 6" to 10" 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_2O)-lbs/A.
0-200	200-400
200-300	100-200
300-400	0-100
Over 400	0

SULPHUR (S)

S requirements will vary with soil texture, leaching losses, and the soil parent material.

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. Crops may not require S fertilizer when irrigated from the Snake or Columbia Rivers.

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 used only on soils with pH of 7.0 or higher and 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.

Apply 25-40 lbs S/A annually to potato fields which do not receive adequate S from the irrigation water.

ZINC (Zn)

Response of potatoes to Zn have been reported on cut areas of leveled fields where calcareous subsoils have been exposed.

If the soil test value for Zn is less than 0.8 ppm, broadcast and plow down or disc 10 lbs Zn/A

or
3 to 4 lbs Zn/A can be included with the N banded at planting. Banding N with Zn increases Zn uptake.

OTHER NUTRIENTS

Potato response to manganese has been reported for some crops on sandy soil in the Columbia Basin. Mn should be banded with N at planting or sprayed on the foliage.

Boron has been applied to some potato fields. Boron should not be applied at a rate in excess of 2 lbs/A and should be evenly applied to the field. Boron should never be banded.

Responses of potatoes to lime have not been observed in Malheur County or the Columbia Basin.

N, P, K, and Zn 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 T. L. Jackson, Tom Davidson, E. N. Hoffman, and Luther Fitch, Oregon Agricultural Experiment Station, and on experience in growers' fields.

Prepared by E. Hugh Gardner, James Burr, and Darrell Maxwell, Extension Service; and T. L. Jackson and E. N. Hoffman, Agricultural Experiment Station; Oregon State University, Corvallis, Oregon. Reviewed by a committee of Eastern Oregon County Extension agents.