



Field corn

Eastern Oregon—east of Cascades

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

Because of the influence of soil type, climatic conditions, and other cultural practices, crop response from fertilizer may not always be predicted accurately. Corn grows best on deep, well-drained soils. Soil test results, field experience, and knowledge of specific crop requirements help determine the nutrients needed and the rate of application.

The fertilizer application should ensure adequate levels of all nutrients—optimum fertilization is essential for top quality and yields. Corn requires comparatively high rates of fertilizer for optimum production.

Follow recommended soil sampling procedures to estimate fertilizer needs. The Oregon State University Extension Service agent in your county can provide you with soil sampling instructions, soil sample bags, and information sheets.

Plant Population

The fertilizer applications suggested in this guide are based on a population of 25,000 to 30,000 plants/a and yields of at least 150 bu/a. Fertilizer rates can be adjusted proportionately up or down when plant population and predicted yield deviate from these values.

Nitrogen (N)

Field corn requires a good supply of available N. An optimum response to N fertilization depends on adequate irrigation. An irrigation when corn is 12–18 inches high will ensure most efficient utilization of banded fertilizer.

Part (40–60 lb/a) of the N should be banded at planting time. Apply the remainder before planting and/or during the growing season before tasseling, particularly where leaching is likely to be a problem.

If the band application of N exceeds 60 lb/a, there is danger of seedling injury from the concentration of salt. Fertilizer salt injury can be reduced by using two fertilizer

bands rather than one, not banding too close to the seed, and irrigating immediately at the first sign of crop injury. Salt injury is likely to be greater in sandy soil compared to finer-textured soil and in dry, compared to moist, soil.

The urea or diammonium phosphate forms of N may cause seedling injury if banded close to the seed at planting, especially where the soil pH exceeds 7.0.

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

The following fertilizer recommendations are for mineral soils with low organic matter content.

N fertilizer rates 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 carryover from the previous crops in the case of mineral soils with low organic matter content. Soil samples for $\text{NO}_3\text{-N}$ should be taken following a growing season and prior to the application of N fertilizer.

Take soil samples from the 0- to 2-foot and 2- to 5-foot depths on deep soils. The soil samples should consist of soil cores removed from these entire depths of soil. On soils shallower than 5 feet, take soil samples from 0–2 feet and from 2 feet to the expected rooting depth.

Soil test results for N are reported in ppm. One ppm N in a 1-foot depth of soil equals about 4 lb N/acre. See Table 1.

Table 1.—N quantities according to soil depth.

Soil depth (ft)	$\text{NO}_3\text{-N}$	
	(ppm)	(lb/a)
0–2	4	32
2–5	3	36
	Total	68

The total $\text{NO}_3\text{-N}$ soil test values are used to estimate the N fertilizer requirement shown in Table 2.



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Table 2.—N fertilization rates for field corn according to total $\text{NO}_3\text{-N}$ soil test values.

If the soil test for $\text{NO}_3\text{-N}$ is (lb/a)	Apply this amount of N (lb/a)	
	After nonlegume crop*	After beans, peas, or alfalfa
0	300	250
50	250	200
100	200	150
150	150	100
200	100	50
250	50	0
300	0	0

*When straw is incorporated after September 1, increase the N fertilizer rate by 30–50 lb/a.

If the soil test value for $\text{NO}_3\text{-N}$ is less than 2 ppm in the 0- to 2-foot soil depth, apply a minimum of 30 lb N/a regardless of the soil test value for N below 2 feet. This application is to ensure adequate initial growth of plants.

Phosphorus (P)

P is essential for vigorous early growth of seedlings. All of the P should be banded 2 inches to the side and 2 inches below the seed at planting (Table 3).

Table 3.—P fertilization rates for field corn.

If the soil test for P is (ppm)	Band this amount of phosphate (P_2O_5) (lb/a)*
0–5	100–150
5–12**	0–100

*Double the rate of P application when P is plowed down.

**For early plantings into cool soil when the P soil test exceeds 12 ppm, apply 20–30 lb P_2O_5 /a in a 2-inch x 2-inch band.

Potassium (K)

Broadcast K and plow it down before planting (Table 4).

Table 4.—K fertilization rates for field corn.

If the soil test for K is (ppm)	Apply this amount of potash (K_2O) (lb/a)
0–100	150–200
100–150	100–150
150–200	0–100

Sulfur (S)

Plants absorb S in the form of sulfate. Fertilizer materials supply S in the form of sulfate and elemental S. Elemental S must be converted to sulfate in the soil before the S becomes available to plants. The conversion of elemental S to sulfate usually is rapid for fine-ground (less than 40-mesh) material in warm, moist soil.

Apply elemental S the year preceding the crop using fine-ground (less than 40-mesh) material. Elemental S is a strong soil acidifier. S in the sulfate form can be applied at planting time (Table 5).

Table 5.—S fertilization rates for field corn.

If the soil test for $\text{SO}_4\text{-S}$ in the 0- to 2-foot soil depth is (ppm)	Apply this amount of S*	
	Loamy soil (lb/a)	Sandy soil**
0–2	20–30	30–40
2–5	0–20	20–30
5–8	0	0–20

*When the irrigation water contains over 2 ppm of S, additional S fertilizer probably is not required.

**Increase these rates by 50 percent for sandy soils in central Oregon.

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

Zinc (Zn)

Field corn has a relatively high requirement for Zn. An application of Zn is suggested when the Zn soil test value is below 0.8 ppm.

Where Zn is required, either broadcast 10 lb Zn/a and work it into the soil prior to planting, or band 3–4 lb Zn/a with the fertilizer at planting time. An application of 10 lb Zn/a should supply Zn needs for 2 or 3 years.

To correct Zn deficiency during the growing season, thoroughly wet plants with a solution containing 1 lb Zn in 50 to 100 gal of water.

Boron (B)

Responses of field corn to B have not been observed in eastern Oregon. Where the soil test value for B is below 0.4 ppm, trial applications of B are suggested.

Other Nutrients

Responses of field corn to other nutrients such as copper and iron have not been observed in eastern Oregon.

Lime

Responses of field corn to lime have not been observed in eastern Oregon; however, where the soil test pH value is less than 5.5, a lime application is suggested. Measure soil pH before applying fertilizer.

Where the subsoil is calcareous or has a higher pH, deep plowing will reduce surface soil acidity.

On sandy soils where soil acidity is most prevalent, 1 ton of dry 100-score lime raises the pH about 1 unit. In most instances, 1 to 1½ t/a of lime is adequate to correct soil acidity. With silt loam and clay loam soils, 2 to 3 t/a of lime respectively will raise soil pH about one unit.

Mix lime into the seedbed at least several weeks before seeding. A lime application is effective for several years.

The liming rate is based on 100-score lime.

Salty Soils

The growth of field corn likely will be restricted when the soil test value for soluble salts exceeds 4 mmhos/cm.

For More Information

How to Take a Soil Sample ... and Why, EC 628, by E.H. Gardner (revised 1997). No charge.

A List of Analytical Laboratories Serving Oregon, EM 8677, by J. Hart (revised 1997). No charge.

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Fertilizer and Lime Materials, FG 52, by J. Hart (reprinted 1997). No charge.

You can access the above publications, as well as FG 71, *Field Corn: Eastern Oregon—East of Cascades*, our Publications and Videos catalog, and many other publications via our Web site at eesc.orst.edu

This guide is based largely on the results of experiments conducted by Washington State University and on observations of growers' fields.

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