FERTILIZER guide
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# Spring grains

## *Western Oregon—west 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 cultural practices, crop response to fertilizer may not always be predicted accurately. Soil test results, field experience, and knowledge of specific crop requirements help determine the nutrients needed and the rate of application.

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.

Field experiments with spring grains in western Oregon have shown that early seeding (by April 1 or earlier) and the proper use of fertilizer give best results. Near normal yields can be obtained even if the crop is infected with yellow dwarf virus.

In recent years, yellow dwarf virus disease has reduced yields of spring grain in western Oregon. Damage has varied with the seasons and between areas. The virus is carried by aphids, and infection can be serious whenever conditions favor mass movement of aphids into the grain in the early stages of growth. If virus infection occurs when the young grain plants have only two or three leaves, severe stunting and possible crop failure may result. Damage is less severe if the plants develop at least five or six leaves before the aphid infestation occurs.

## Method of Applying Fertilizer

Banding the fertilizer close to the seed is essential for maximum seedling growth. Band applications of nitrogen, phosphorus, potassium, and sulfur have increased yields. Yield response of virus-susceptible varieties to banded phosphorus and potassium has been profitable in years when virus is present, even on soils with these nutrients at levels normally considered adequate.

Broadcast fertilizers may not be effective in increasing early seedling growth.

With early seeding in moist soil, up to 40 lb N/a + 40 lb $P_2O_5$/a + 40 lb $K_2O$/a have been banded with the seed without serious damage. Banding higher rates of fertilizer with the seed could decrease yields.

Urea and DAP (diammonium phosphate) can be toxic to seedlings and therefore should not be used as an N source when fertilizer is banded close to seed. Vigorous seedling growth has more than compensated for any fertilizer burn with other fertilizer materials.

The "burning" effect of banded fertilizer increases as the soil becomes drier and decreases when the band is located a short distance (1–2 inches) from the seed.

## Nitrogen (N)

Spring grain yields are increased by the application of N.

The application of too much N can result in lodging, particularly where weaker strawed varieties are seeded.

The amount of N recommended depends on the preceding crop (Table 1).

*Table 1.*—N fertilization rates for spring grains.

| | Apply this amount (lb N/a)[1] | | | |
|---|---|---|---|---|
| | | Band and broadcast[2,3] | | |
| **Preceding crop** | **Total** | **Close to seed** | | **With seed** |
| Good stand of legumes or row crop | 20 | 20(0) | or | 20(0) |
| Grain or grass seed[4] | 40–50 | 40(0–10) | or | 20(20–30) |

[1]The difference between total N and banded N should be broadcast before or at the time of planting.

[2]The figures in parentheses represent the lb N/a that should be broadcast.

[3]Urea should not be banded close to seed.

[4]Broadcast N should be increased by 10 lb/a for each ton of grain or grass straw incorporated in the spring.

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## Estimating N Rates from Yield Potential

About 40 lb of added N are required for each 1,000 lb yield increase. Experienced growers can adjust N rates for maximum economic yield with this formula. However, you must be realistic when estimating maximum yield potentials. Yield potential varies with crop, soil depth, drainage, and previous management.

Example: The estimated yield is 2,000 lb/a with 40 lb of applied N on a field that should produce 3,000 lb/a. To increase the yield by 1,000 lb requires about 40 lb of additional N if other factors are not limiting.

## Phosphorus (P)

Band applications of P, close to or with the seed, are much more effective than broadcast applications (Table 2). When P is broadcast, increase the rate by 50 percent.

*Table 2.*—Rate of band application of P for spring grains.

| If the soil test for P is (ppm) | Band this amount of phosphate ($P_2O_5$) (lb/a)* |
|---|---|
| 0–30 | 40–60 |
| over 30 | 40 |

*These P rates assume that soil pH is 5.6 or higher.

When the soil test value for P exceeds 30 ppm, it is doubtful that a response to broadcast P will be obtained.

## Potassium (K)

Band applications of K close to or with the seed are more effective than broadcast applications (Table 3).

With early planting and favorable soil moisture, up to 40 lb $K_2O$/a can be banded with the seed with little risk of seedling burn.

*Table 3.*—Rate of band application of K for spring grains.

| If the soil test for K is (ppm) | Band this amount of potash ($K_2O$) (lb/a) |
|---|---|
| 0–100 | 40 |
| over 100 | 30 |

When K is broadcast, increase the rate to 70 lb/a.

When the soil test value for K is greater than 125 ppm, it is doubtful there will be a response to broadcast K.

## 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.

The S requirements of spring grains can be provided by:

1. Applying 15–20 lb S/a in the form of sulfate at planting time
2. Applying 30–40 lb S/a as fine-ground elemental S the preceding year
3. Applying coarser ground elemental S at higher rates and less frequently

Some S fertilizer materials, such as elemental S and ammonium sulfate, have an acidifying effect on soil.

## Magnesium and Micronutients

To date, increases of spring grain yields from applications of magnesium and micronutrient elements have not been observed in western Oregon.

## Lime

Lime application is not suggested if the soil pH is 5.8 or higher. Lime application rates can be estimated from Table 4.

*Table 4.*—Lime application rates for spring grains.

| If the SMP buffer test for lime is | Apply this amount of lime (t/a) |
|---|---|
| under 5.5 | 3–4 |
| 5.5–5.8 | 2–3 |
| 5.8–6.2 | 1–2 |
| over 6.2 | 0 |

Lime rate is based on 100-score lime.

Mix lime into the seedbed several weeks before seeding. Lime applications are effective for several years.

Some soils may have a fairly high SMP buffer value (over 6.2) and a low pH (below 5.3). This condition can be caused by the application of acidifying fertilizer. This temporary "active" acidity from fertilizer is found after applications of most nitrogen fertilizers. Acidifying fertilizers also have a long-term, cumulative acidifying effect on soils.

Recommendations based on experiments conducted by T.L. Jackson and W.H. Foote, Oregon Agricultural Experiment Station.



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