



Useful Facts

What is Copper?

Copper (Cu) is an essential soil nutrient required for plant growth

It is important for many biochemical processes such as:

- Seed/grain production and formation
- Chlorophyll formation which directly affects photosynthesis
- Enzyme activity

Copper is required in relatively small amounts – therefore considered a micronutrient

If over-applied or applied close to the seed, Cu can be toxic. Toxic effects of over-applied Cu can last several years in the field.

Copper Deficiency Characteristics and Symptoms

Copper (Cu) deficiencies are not widespread in Saskatchewan, but can drastically reduce yield where they occur.

Deficiencies are most common on organic (peat) soils and coarse textured (sandy) soils.

High levels of other nutrients like phosphorus, nitrogen or zinc in soil or fertilizer can aggravate Cu deficiencies.

Copper deficiencies can increase the incidence or severity of some diseases. (i.e., stem melanosis, take-all, powdery mildew, and ergot on wheat; wilting of alfalfa leaves).

Deficiency symptoms include:

- Yellowing and curling of young leaves
- Pigtailing (curling) of leaf tips
- Delayed heading
- Aborted heads or spikelets
- Stem and head bending
- Brown discoloration on stems (i.e., stem melanosis)

Symptoms in Wheat



Left: copper sufficient wheat



Right: copper deficient wheat with typical 'pigtailing' and yellowing of young leaf tips

Crop Sensitivity to Copper Deficiency

Crop sensitivity to Cu deficiency is typically in the following order :



Wheat, flax, canary seed

Barley, alfalfa

Timothy seed, oat, corn

Pea, clover

Canola, rye, forage grasses

Correcting Copper Deficiency

Broadcast and incorporation of granular Cu fertilizer at 2.7 to 5.06 lb Cu/acre before seeding is an effective method to correct Cu deficiency.

Spray and incorporation of liquid Cu fertilizer at 0.9 to 1.8 lb Cu/acre formulations is also effective.

Low-rate liquid (0.18 to 0.25 lb Cu/acre) foliar application between tillering and the flag leaf stage can correct Cu deficiencies in-season.

Surface broadcast or seed-row applied granular Cu fertilizer is not highly effective.

High Cu fertilizer rates can have residual benefits in subsequent years.

Broadcast and incorporation of granular Cu fertilizer at 1.8 lb Cu/acre is not generally effective to correct Cu deficiency in the year of application.

If applying rates of granular Cu fertilizer are less than 2.7 lb Cu/acre, repeat applications over several years may be required to correct Cu deficiencies.

Not all forms of Cu fertilizers are equally effective. The effectiveness of a Cu source depends on its solubility in water which in turn affects the amount of available Cu for plant uptake and yield. Cu fertilizers containing oxides are of relatively low solubility.

Treatment Effect in Wheat



Left: copper deficient wheat



Right: wheat treated with foliar copper fertilizer

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Additional Information

For additional information on Cu refer to the article 'Feasibility of copper fertilization for optimum crop yield in the Canadian Prairies' available on the NARF website (www.neag.ca)

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