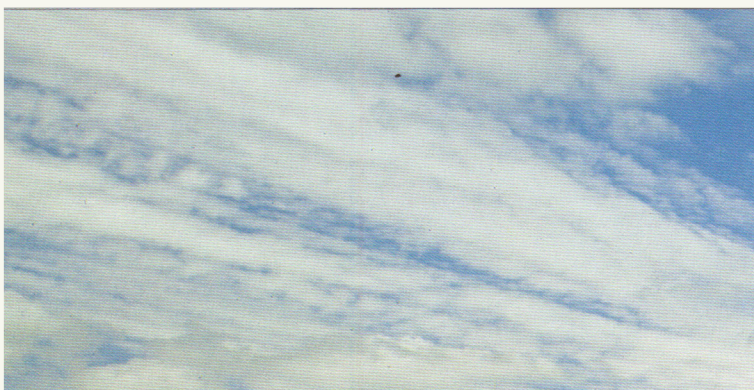


SULPHUR

DO CANADA'S CROPS GET ENOUGH?





High-protein crops such as alfalfa and canola are most susceptible to sulphur deficiency, though wheat, oats, barley, and corn have also responded to sulphur fertilization.

“If soils are very deficient in sulphur, you have to use the nutrient in your fertilizer program. If you don’t, it’s hardly worth planting a crop like canola. . .”

—W.F. Nuttall

**Research Station
Melfort, Saskatchewan**

Wet weather can also increase the need for sulphur. Like nitrogen, sulphur is a mobile nutrient—one that’s easily leached from coarse-textured soils. In heavy soils, excess moisture may prevent root systems from tapping rich sulphur reserves in the subsoil.

How to Test for Sulphur

Research indicates that soil samples should be taken from increments of 0-6 inches (0-15 cm), 6-12 inches (15-30 cm), and 12-24 inches (30-60 cm). Separate samples should also be taken from mid-slope and low-lying areas because sulphur deficiency tends to be more common on knolls.

Plant analysis, or tissue testing, is also useful in determining sulphur need—especially when done as follow-up to a soil test. For best results, samples should be taken at the rosette stage of canola and at similar stages of other crops.

Watch Those N:S Ratios

A crop’s internal nitrogen-sulphur ratio is yet another way to assess sulphur fertilizer requirements. Because N and S are required for protein formation, a shortage of either nutrient can affect the crop’s ability to make good use of the other.



CANOLA & SMALL GRAINS

Alberta British Columbia Manitoba Saskatchewan

Sulphur—the Fourth Major Nutrient

Fifteen years ago, only a handful of farmers in Western Canada made *deliberate* applications of sulphur.

Not many dealers promoted it. Local soil specialists generally did not recommend it. And few soil or plant-tissue samples were tested for the nutrient.

But today, crop responses to applied sulphur are being recorded throughout the Western Provinces—particularly in the Black and Gray soil zones with coarse-textured soils that are low in organic matter.



In wheat, sulphur deficiency appears as a general, intervenal yellowing.

As a result, government researchers, fertilizer dealers and farmers are taking a harder look at sulphur—or what many now call “the fourth major nutrient.”

“Ten or 15 years ago, we had a lot of soils that still contained enough sulphur to produce a good crop. But today, these same soils are testing very low in sulphur and have definitely become a factor in decreased crop production. . .”

—Harry Ukrainetz
Agriculture Canada
Saskatoon, Saskatchewan

Why It's Needed

Sulphur is a building block of protein and a key ingredient in the formation of chlorophyll. Without adequate sulphur, crops cannot possibly reach their full potential in terms of yield or protein content. Nor can they make efficient use of nitrogen, phosphorus, and other vital elements.

What's more, research has shown that sulphur-deficient forage crops—when fed to livestock—can actually reduce animal performance.

“If there isn't adequate sulphur in an animal's feed, that animal is going to be short on vitamin A. . .”

—L.D. Bailey
Canada Research Station
Brandon, Manitoba



University test plots have demonstrated canola's need for sulphur.

And flour made from sulphur-deficient wheat has consistently received poor marks for milling and baking qualities.

Sulphur—Now More Than Ever

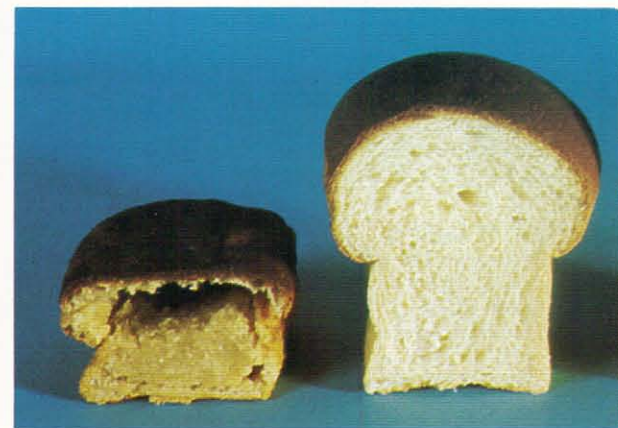
The importance of sulphur as a plant nutrient is not something new. Scientists first discovered the nutritional benefits of sulphur salts in the mid-1700's. And, in the late 1920's, soil specialists in Canada determined that sulphur deficiency could be holding back crop performance in a few isolated areas.

In recent years, however, sulphur deficiencies have become more pronounced in Western Canada—for a variety of reasons.

- Record crop yields and more intensive land use naturally withdraw more sulphur from the soil. A 35 bu/ac (1.96 t/ha) canola yield, for example, removes about 21 lbs/ac (23 kg/ha) of S from the soil, as will a 60 bu/ac (4.04 t/ha) wheat crop or a 4 ton/ac (8.97 t/ha) yield of alfalfa.

- Many of today's high-analysis fertilizers—materials such as urea, conventional N solutions, triple superphosphate, and muriate of potash—contain little or no incidental sulphur.
- And, in some areas, pollution-control programs have reduced the amount of “free” sulphur that crops receive from the atmosphere.

What this means is that farmers have been withdrawing sulphur from the soil at a faster rate than they have been putting it back. And now, it's beginning to catch up with them..



Bread loaf on left was baked with flour made from sulphur-deficient grain.

Where to Find It


All crops require a certain amount of sulphur to produce optimum yields. How much you need to apply depends largely on the amount of available sulphur in your soil, target crop yield, and the type of crop that will be planted.

Sulphur deficiency is most commonly found in areas with well-drained, coarse-textured soils that are low in organic matter.

In Western Canada, crops grown in Gray Wooded and Dark Gray soils are strong candidates for sulphur deficiency. Despite their fairly high levels of organic matter, Black soils can also run short of sulphur, as can fine-textured, Dark Brown soils.

“I can't remember seeing so many crops in Western Canada with visual symptoms of sulphur deficiency. It's really getting to be a big concern. . .”

—L.D. Bailey
Canada Research Station
Brandon, Manitoba



“Sulphur deficiency can really hurt yields. Where you get into trouble, though, is when nitrogen alone is applied year after year on sulphur-deficient fields. That makes the sulphur deficiency even worse, and in the case of canola, the crop may be lost. . .”

***—Marvin Nyborg
University of Alberta***

For optimum results, the N:S ratio should be 7:1 for canola and 10-15:1 for most other crops. Applying nitrogen without sulphur may widen a crop's N:S ratio and actually induce a sulphur deficiency.

Talk to a Specialist

Not all farmers in Western Canada need to use sulphur in their fertilizer programs. The point is, there's a greater potential for S deficiency today than there was 10-15 years ago, and it makes good sense to keep close tabs on the sulphur content of your crops and soils.

Talk to your fertilizer dealer about the best way to incorporate sulphur into your fertilizer program. A small investment in “the fourth major nutrient” could pay handsome dividends at harvest.

“Many farmers have made sulphur a staple in their fertilizer programs. They've seen how devastating S deficiency can be of canola or a legume, and they want to make sure they don't see it again. . .”

***—Harry Ukrainetz
Agriculture Canada***

Additional information about sulphur in agriculture can be obtained by contacting:



The Sulphur Institute
1140 Connecticut Avenue, NW, Suite 612
Washington DC 20036, USA
Telephone: +1 (202) 331-9660
Facsimile : +1 (202) 293-2940
E-mail: sulphur@sulphurinstitute.org