TURF & SULFUR

Sulfur has been recognized as one of the many elements required for plant growth for nearly 130 years. Deficiencies of this plant nutrient were identified as early as 1900 on certain soils in the Pacific Northwestern states. In Canada, this deficiency was first discovered in 1927 on some soils in Alberta. In spite of these early records of the need for sulfur, it has received only limited attention until quite recently.

Interest in sulfur as a plant nutrient has increased greatly in the past few years, partly because reports of sulfur deficiency through-out the world are becoming more frequent and extensive. The main reasons for greater occurrence of sulfur deficiencies are:

1. Increased use of high analysis, essentially sulfur-free fertilizers.
2. Decreased use of sulfur as a fungicide and insecticide.
3. Increased crop yields which require larger amounts of all of the essential plant nutrients.
4. Increased consumption of low sulfur fuels and increased emphasis on control of air pollution.
5. Increased ability to identify soils low in sulfur.

ROLE IN THE PLANT

Sulfur is required by the plant for:

1. The synthesis of the amino acids cystine, cysteine, methionine and hence for protein elaboration
2. The activation of certain proteolytic enzymes such as the papainases
3. The synthesis of certain vitamins (biotin and thiamin or vitamin B1), glutathione and of coenzyme A
4. The formation of the glucoside oils found in onions, garlic and cruciferous plants.
5. The formation of certain disulphide linkages which are associated with the structural characteristics of protoplasm. The concentration of phydril. (-SH) groups in plant tissues has also been shown to be related to increased cold resistance in some species. Sulfur was recently shown to be present in the nitrogenase enzyme system which is involved in the fixation of nitrogen by microorganisms. In certain situations free living nitrogen-fixing organisms in the soil and the nodule bacteria in legumes will make significant contributions to the nitrogen supply in soils.

Nitrogen and sulfur requirements are closely linked because both are required for protein synthesis. Plant protein contains about 1% S and 17% N. The need for sulfur fertilization often depends upon the supply of N and other nutrients and fertilization at high rates with these elements may induce a sulfur deficiency.

Why is sulfur important?

In the absence of sulfur, turfgrass exhibits a chlorosis that frequently occurs as an intense yellow color. In mild cases one may think of nitrogen deficiency or even iron deficiency.

On the positive side, we find that sulfur enhances color, density and growth. There seems to be a direct relationship with nitrogen. The turfgrass fertilized with the higher quantities of nitrogen show increased response to sulfur. It has been reported that when 12 pounds of nitrogen are used, there is a requirement for 8 pounds of potassium oxide and 3.45 pounds of sulfur.

The net effects of adequate sulfur in combination with N, P and K are several.

1. Better decomposition of residues (thatch)
2. Stimulation of soil microorganisms
3. Improved color, density and composition of turfgrass
4. Greater drought tolerance
5. Improved winter hardiness

Well-documented studies by Goss, Gould and others in the Pacific Northwest reveal some very convincing reasons for applying sulfur along with nitrogen, phosphorus and potassium. Adequate sulfur reduces *Fusarium* patch in turfgrass by 86%.

This property of controlling disease really should cause no great surprise because we have known this about sulfur for a long time. The surprising thing is that so many of us have forgotten it or have not put the knowledge to use.

Another turfgrass disease that has been checked and controlled to a large degree with sulfur is *Ophiobolus* patch.

When Merion Kentucky Bluegrass is short of sulfur, it is much more susceptible to powdery mildew.

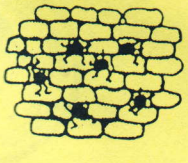
Dollarspot fungus in warm-season grasses in Florida was reduced by the use of sulfur in fertilizers. This may be a bit hard for many to believe, but data from the Pacific N.W. shows that adequate sulfur prevented *Poa annua* from infesting bentgrass turf. At the same time the blue-green algae was reduced significantly.

Perhaps some of the advantages found in using adequate sulfur come from the fact that turf is rendered more vigorous, and is an obvious sign of healthier grass. Healthy turf resists injuries and recovers faster if injury does occur.

HOW SULFUR & GYPSUM RECLAIMS SODIUM SOILS

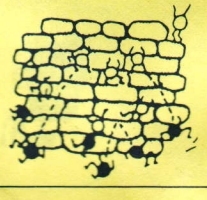
ABSORBED SODIUM

Too much sodium attached to clay particles tends to make the particles pack together in such a way that water cannot get through.



SOLUBLE CALCIUM

Sulfur materials furnished soluble calcium, which replaces the excess absorbed sodium.



WATER

This replacement allows the soil particles to group themselves so that larger pore spaces are formed.

EXCESS SALTS

Then when the soil is flooded, the water can pass through and wash out excess salts, including sodium.