

SULFUR COATED UREA
32-0-0-0-0-24
CANADIAN INDUSTRIES LTD. PROCESS

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Many people think that sulfur coated urea is a new concept and still in experimental stage. Actually it has been under development for over 15 years, tested in 29 different countries on everything from ornamental turf to pineapples.

To those of us interested in turf, sulfur coated urea represents the combination of the most important major nutrient for turf: nitrogen and the most important secondary nutrient, sulfur in a single prill. These two (2) important and necessary nutrients together are in themselves advantageous, add the slow release benefits and we really have something to work with.

It is important to note that urea is the best source of water soluble nitrogen for turf from an availability, economical and agronomical stand point. Today, more than 30 states have sulfur deficient soils as sulfur is no longer available in adequate amounts from rainfall or regular mixed grades of fertilizer. For this reason we must supplement fertilizer with sulfur which is both available and economical. Now we can create a fertilizer containing Nitrogen and Sulfur that will uniformly feed turf all of its nitrogen in one growing season, and at competitive cost. This is a very important break through in the turf fertilizer field.

The fusion of the urea and sulfur is formed in five basic steps: First, Urea is heated to prepare its surface for sulfur coating. It then enters a rotating drum to be sprayed hydraulically first with sulfur and then with the wax sealant. The product is cooled, coated with diatomaceous earth conditioner to prevent caking, screened and transferred to storage for testing.

You understand the need and importance of nitrogen for turf, but some may not be aware of what value sulfur is to turf.

The more nitrogen that is fed to and used by turf, the greater its need for sulfur. Sulfur deficiencies in turf have the same visual signs as nitrogen deficiency; yellowing of leaves, faint scorching of leaf tip. When used in combination with proper ratios of nitrogen, phosphorous and potash, sulfur offers the following benefits:

1. Improve water penetration in soil;
2. Increases availability of iron, manganese, copper, zinc and boron to the plant;
3. Improves soil structure;
4. Builds healthy protoplasm and plant tissue to help resist drought, disease and winter damage;
5. Enhances color;
6. Promotes turf growth and density;
7. Aids the turf response when used in combination with nitrogen;
8. Helps keep alkalinity in balance;
9. Aids nitrogen release from organic matter;
10. Improves recuperation capacity.

These few slides show what sulfur can do to turf color.

SLIDE # 1 - Same amount of nitrogen on both plots. The darker green plot on the right had sulfur added.

- SLIDE #2 - Both plots had 20# of "N" per 1000 sq. ft. per year. The dark green plot on the right had an additional 3 1/2# Sulfur per 1000 sq. ft.
- SLIDE #3 - Plot on the right received nitrogen, phosphorous, potash and sulfur. The plot on the left received same amounts of all nutrients except sulfur.
- SLIDE #4 - The green strips were fed with Ammonium sulphate 21% N plus 24% sulfur and the yellow strips were fed with Ammonium Nitrate, 33% Nitrogen.
- SLIDE #5 - Lower plots received 100# S/acre with no fusarium disease. Upper plot received 50# S/acre and developed a severe case of fusarium.

With this better understanding of the need for sulfur, you can see why we call the uniting of nitrogen and sulfur the perfect marriage.

How and why does sulfur coated urea release its nitrogen and sulfur?

If you put a prill of sulfur coated urea under a microscope, the surface is full of tiny rivelets and lines resembling a finger print. There are no two finger prints alike and there are no two (2) prills of sulfur coated urea alike either. It is because of this difference that we have a steady release rather than everything releasing at once.

The wax coating acts as a sealer to help keep moisture out and fill in pores and fissures. When wax is worn off, either mechanically or by nature, the sulfur coating will allow moisture to be absorbed through its shell into the urea. This causes a pressure to build up inside. Microscopic holes are worn through the sulfur and the nitrogen solution is forced out. Because of the varying thickness of wax and sulfur and the fracturing that happens, the prills release at a different rate depending on their own physical make up and the way the elements work on them. While soil acids, and to a very small degree bacteria do affect some release, moisture is the most important factor and yet excessive moisture or high temperatures do not markedly increase the rate of nitrogen release.

If we take 10 prills of sulfur coated urea and apply them April 15th, three would start to release as soon as they received moisture and release for 2 to 3 weeks. At this time another prill would start to release and last for 2 - 3 weeks, followed by another prill until all 10 are released bringing us to the month of September or October. In other words, 30% will start to release the first week and the balance gradually over a period of 150-180 days.

There has been considerable concern about the sulfur coating breaking in shipment, while being spread or from foot, golf cart or maintenance equipment traffic, causing a quick release of nitrogen to either burn or show erratic color. There is, in fact, an actual breakage or fracturing that takes place from the time the product is shipped and actually releases. This fracturing amounts to approximately 30% and it is this percent that gives us our immediate release the first week after application. Normal foot and vehicle traffic does not exert enough pounds pressure per sq. inch to crush sulfur coated urea when it is on a turf cushion. On a couple of tees, where heavy sulfur coated urea applications are made, excessive foot traffic did increase the percent of fracture. The results were quicker tee recovery which was beneficial instead of detrimental.

C.I.L. has a super fine sulfur coated urea prill screened especially for green use. When this product is used, it should be rinsed into the turf to help prevent mower pickup. If the green is mowed with the basket, the mower

can pick up to 8% of the product only on the first mowing. If the basket is left off the mower on the first mowing, up to 10% of the product may be fractured by the blades of the mower. This 10% would not create any burn or damage and would just speed up the initial response. Regular size sulfur coated urea can be used on greens, but we do not recommend it.

When all the nitrogen has oozed out of the sulfur coated prill, a hollow shell of sulfur remains. This hollow shell is very fragile and easily crushed. Once crushed, it works its way into the soil and makes itself available to the plant. Usually up to 80% of the sulfur is available to the plant the first year and the balance the second. It is because of this lengthy process that the sulfur portion does not effect the soil pH. It is important as a nutrient, rather than pH conditioner.

Sulfur Coated Urea is not dependent on warm soil temperatures for release so it is available from cool spring through to cool fall. High temperatures or too much moisture do not cause excessive release so it is safe under all conditions.

I have had only one complaint from a golf course superintendent who put on 1 1/2# N per 1000 sq. ft. from sulfur coated urea and burned his turf. As it turned out, he applied a mixed grade of fertilizer that had some sulfur coated urea in it. It was not 100% sulfur coated.

I have heard another story about a Superintendent who lost his job because he burned all his fairways with sulfur coated urea. It turned out he used a fertilizer that contained sulfur coated urea, not all sulfur coated urea. He did damage 3 fairways, but the cause of the trouble was not the fertilizers fault and certainly not the sulfur coated urea. Many times products containing a percentage of sulfur coated urea will be referred to as sulfur coated urea, giving the impression that they are 100% sulfur coated. The greater the percent of sulfur coated urea in a mixed grade of fertilizer the safer it is from burn or quick release.

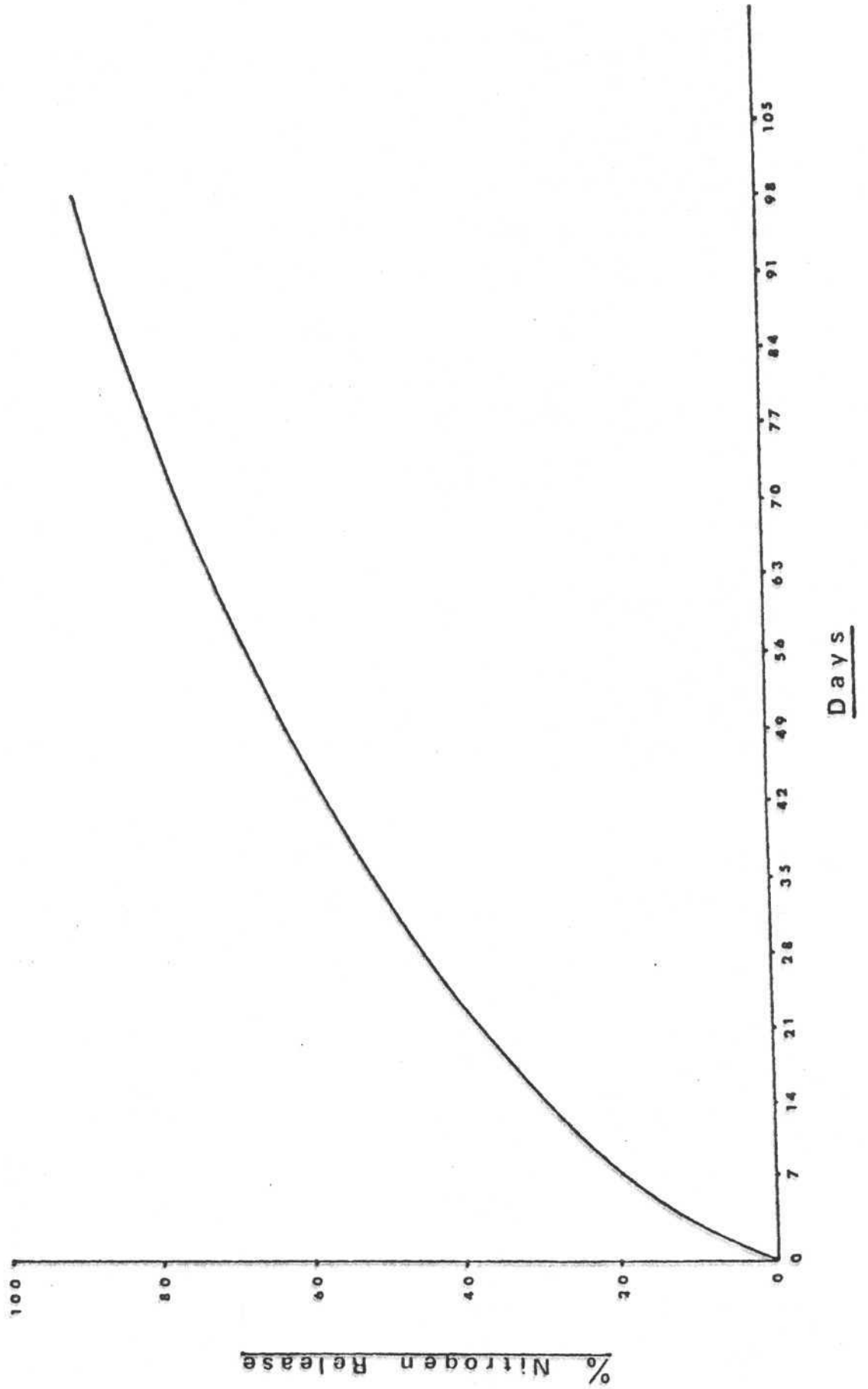
Sulfur Coated Urea is another one of several sources of slow release nitrogen. We are very fortunate to have a variety to choose from:

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|--|-------------|
| 1. Activated Sewerage Sludge | 6-7-0 |
| 2. Ureaformaldehyde | 38-0-0 |
| 3. ISOBUTYLIDENE DIUREA (I.B.D.U.) | 31-0-0 |
| 4. Sulfur Coated Urea A.I.M.* Process | 36 N + 17 S |
| 5. Sulfur Coated Urea C.I.L.** Process | 32 N + 24 S |

Some of these products will work better than others for many reasons, some known and some unknown, but unless we give them a fair and realistic trial, we won't know what we might have missed.

* A.I.M. Ag Industries Manufacturers
** C.I.L. Canadian Industries Ltd.

FIG. 1 TYPICAL S.C.U. NITROGEN RELEASE CHARACTERISTICS



THE 30 STATES THAT ARE DEFICIENT IN SULFUR ARE
AS FOLLOWS:

Washington
Oregon
California
Idaho
Montana
Wyoming
Colorado
Texas
South Dakota
Nebraska
Kansas
Oklahoma
Minnesota
Michigan
Wisconsin

Virginia
North Carolina
South Carolina
Tennessee
Arkansas
Louisiana
Mississippi
Alabama
Georgia
Florida
Alaska
Hawaii
Illinois
Indiana
Ohio