TURFCOMMS

V. 8, I. 1 **Sept. 6, '94**

PURPOSE: To pass on what we learn willingly and happily to others in the profession so as to improve turf conditions around the country.

SURFLAN (Oryzalin) VS. ST. AUGUSTINE: I used Surflan on my lawn last fall with the goal of a lot less winter annual weeds than I've had in the past. The bag I purchased was for about one and 1/2 times the square footage that I had for a lawn area to treat. Therefore having some left over I went out about one month after the first application and hit the previously weedier back lawn with the rest of the bag. This spring I found that I have gotten rid of almost all the winter annual weeds and much of the St. Augustine in that twice treated backyard and some St. Augustine in a very shady location in the front lawn. The winter here in North Texas was relatively mild so I assumed it might well be the Surflan. I went looking for the tech. rep. at a local meeting to see what he would say.

He said he had never run into problems with Surflan applied in the fall but they had experienced some problems with spring applications. He was quick to admit that Surflan did not have a big margin of safety on St. Augustine.

I was not unhappy about the loss. I had for the most part a bermudagrass and St. Augustine combination lawn that had gone to mostly St. Augustine. I assumed it had gone to St. Augustine because I raised the height of cut to two inches many years ago. It turns out there was plenty of bermudagrass in most of it. As of July 13th most all of the St. Augustine is back and my wife has stopped complaining about the appearance of the lawn. As of 9/6 you'd never know I lost it.

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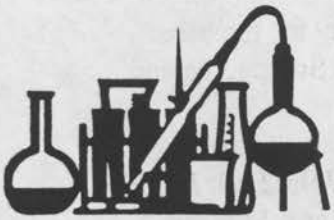

Humate and Humic Acid

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Numerous products being sold for turf use as growth enhancers or growth stimulants contain humate or humic acid. Given the number of inquires I've had about these products, the time seems right to assess their value in turfgrass culture. To begin, we need to understand something about humate and humic acid.

Humic acid can be extracted from any material containing well-decomposed organic matter—soil, coal, composts, etc. Extraction is by way of treatment of these materials with a solution of sodium hydroxide. This dissolves much of the organic matter present. If we then take this solution and add enough acid to drop its pH to about 2, organic material will begin to flocculate and can be separated from the liquid portion. The flocculated material is humic acid. What remains in solution is fulvic acid.

If we take the flocculated humic acid and dry it down to form a black mass that can be crushed and sized by dry sieving, we have humate. In other words, humate is humic acid in its solid state. Therefore, the chemical properties of humate and humic acid are basically the same.

Humic acid defies precise description except in very general terms. Black or very dark brown high molecular weight organic polymer is as good a description as any. The color of the material is effectively used as a sales or advertising attribute. Black organic matter conjures up the image of dark fertile soils covered with lush plant growth.

Chemically, humic acid contains more carbon and less hydrogen and oxygen than does the plant and animal residues from which it has formed through extensive biological decomposition. It also contains about 4 % nitrogen. But don't expect this N to be of any consequence as far as turfgrass growth is concerned. Because humic acid is one of the end products of the biological decay of organic matter, it has great resistance to further decomposition. Estimates of its microbial decay rate are often in the range of 0.3 % per year under ideal laboratory conditions.

Two properties of humic acid that may have some benefit in turfgrass culture are its cation exchange capacity and its capacity to form chelates with the metallic micronutrients, iron, copper, zinc and manganese. The cation exchange capacity (CEC) of commercially produced humic acid is in the range of 500 to 600 milliequivalents (me) per 100 grams. This is about 5 times greater than the CEC of good quality peat moss and twice as high as the CEC of soil humus.

To gain some perspective on the possibility of effectively making use of the high CEC of humic acid, we can examine the recommendations of one manufacturer that call for addition of 2 lb humate per cubic yard of 80:20 sand-peat rootzone mix or substitution of 3 lb humate for the peat moss. By my calculations, assuming the pH of the rootzone mix and sand are near 7.0, 2 lb of humate would contribute about 0.37 me CEC/100 g of the 80:20 mix. This would be in addition to the approximately 2.9 me of CEC provided by the peat moss. That turns out to be a rather expensive 13% increase in the CEC of the rootzone mix. When substituted for the peat moss, you wind up with a rootzone mix with a CEC of about 0.55 me/100 g. Considering the fact the potassium leaches readily from sand-peat mixes with 5 times more CEC than in the sand-humate combination, this doesn't seem like a wise substitution.

The chelating action of humic acid is sometimes used to produce chelated iron products. Without the addition of a nutrient such as iron, the claim is often made that humic acid has the ability to solubilize micronutrients already in the soil. This is a valid claim, but one has to realize that turfgrass roots themselves excrete organic compounds that solubilize micronutrients. Regardless, here in Wisconsin, where we've yet to confirm a deficiency of Fe, Cu, Mn, or Zn on turfgrass, the chelating action of humic acid has to be deemed to be of little or no importance.

Now let's go to the research reports on the effects of humic acid additions on turfgrass. I have but one in my files. A search of the 17,000+ entries in the Turfgrass Information Center revealed no reports where "humate" was a key word, four reports with "humic acid" as a key word, and three reports with "growth stimulant" as a key word. Only two of the seven literature citations were of relevance to this article. Both were studies that demonstrate how strongly humic acid can adsorb fungicides and herbicides. Indications are that surface applications of humic acid or humate can significantly reduce the effectiveness of systemic pesticides by reducing their absorption by plant roots and soil-borne pathogens and insects.

The single research report in my files is for a study in which 14 "non-nutritional growth enhancers" were applied to a creeping bentgrass putting green. Several humic acid and humate products were among those tested. The focus of the study was the effects of the products on rooting and root development. Data averaged over all rooting depths for the entire growing season revealed that none of the products significantly affected bentgrass root length or root to numbers.

Because so little research seems have been done with humic acid products on turfgrass, there exists the possibility that there are situations where significant positive responses can occur. My assessment is that we should not expect positive effects over a wide range of conditions. Other than possible reductions in the effectiveness of pesticide applications when the humate or humic acid resides on the soil surface, the products are rather harmless when applied at rates recommended by the manufacturers.

There is, however, no justification at this time for using them on more than a small scale, trial basis. Humic acid will not compensate for poor turfgrass cultural practices.

TISSUE TESTING: Well I now have it from two university turf experts that near infrared reflectance spectrometry (NIRS) is quite accurate for nitrogen levels. However, it lacks accuracy for the other nutrients that are often run with it. NIRS is the system Karsten (Ping), I believe Eco Soil people and others have been promoting in the last four or five years.

One of these two university experts did his dissertation on foliar analysis of turf, Dr. John Hall, III. He took time to point out a few things to consider. "The first few things to keep in mind are; 1) foliar concentrations are impacted by at least 15 factors in the environment, i.e., soil moisture, growth rate, element mobility, leaf tissue sampled, nutrient interactions, pH, CEC, plant species, frequency of mowing, height of mowing, pesticides applied, time of day, season of sampling etc. 2) Foliar concentrations are instantaneous and do not speak to the past, or future availability of the nutrient. This is not the case with a soil test."

"Therefore, with regard to point 1); realize that sampling comparisons can only be compared without confounding if these factors are equal for sampling dates, which is very unlikely and even then, the seasonal effect cannot be removed. Therefore standardization of sampling procedure, in as much as possible to minimize the known factors affecting nutrient concentration is critical. Appreciate that pesticides containing nutrients, mower blade wear elements, and soil contamination (dust) can significantly influence micronutrient concentrations."

"With regard to point 2); The value of the foliar concentration by itself is pretty inadequate in forecasting nutrient need, because without a second sampling one cannot determine whether the concentration is trending up, down or sideways. Therefore graphing of the seasonal trends is essential to forecasting trends. In addition, forecasting from the foliar analysis alone is inadequate, because it provides no means of determining in the length of time the trends observed can occur. Therefore, concomitant (same day) soil tests are very important. They predict the ability of the growing media to provide long term nutrition."

"In summary, use the foliar analysis to assess potential for toxicity or deficiency and general trends of nutritional availability." For those interested Dr. Hall included an excellent reprint from the 1992 Virginia Turf Conf. Proc. titled Plant Analysis as a Diagnostic Tool on the Golf Course, I filed it under Tissue Testing. But, a better review is probably Keith Happ's article in the July/August 1994, Record. He reaches the same conclusions: 1) the NIRS method being used by a number of vendors nationwide is accurate only for nitrogen levels. 2) My summary of his article -there are too many variables out there at this time to make tissue testing a simple, easy, and useful method of nutrient analysis.

GROUND RUBBER TIRES AS A SOIL AMENDMENT: Don Wilson, CIBA rep., sent me a copy of an article on this published in the 1975 Clemson Univ. Turfgrass Conf. Proc. It reports a small greenhouse study he did using rubber and other soil amendments where each amendment was used at the 25% level. The rubber appeared to be phytotoxic to Penncross under these conditions, and he concluded that "rubber appears to be totally unacceptable as a soil amendment for bentgrass putting greens."

In HortScience, V.29(7)774-6, July, '94, There is an article discussing research with ground automobile tires as a soil amendment for growing chrysanthemums. The researchers used Rebound material both fine and coarse ground at 33, 67 and 100% replacement of sawdust in a 1 sand : 2 sawdust media. They found a direct decrease in growth with increasing amounts of Rebound material. They attributed this to zinc toxicity. At the end of July I dropped by the Broadmoor in Colorado Springs to see how

their trials with Rebound were going. They weren't excited about it but had not reached any negative conclusions yet.

Let me say one real positive thing for ground rubber. After visiting with Tom Cook at Oregon State Univ., Corvallis and seeing ground rubber tires used as a mulch and compared to other mulches I was very impressed. Ground rubber mulch three inches deep makes a mulch that weeds to not appear to germinate in. It appears to last for ever? Well certainly for a very long time.

ACID INJECTION: For those with bad quality water acid injection is something you are apt to find you can't live without. When the bicarbonates are high and the adjusted SAR is a double digit number; bentgrass dies and bermudagrass stops growing. Under those conditions acid injection can keep the turf alive. Gary Schinderle, CGCS and now salesman for pHairway recently published some figures that provide some indication of the difficulties living with acid injection while showing its benefit. The data was provided by Lubbock C.C. which recently went to acid injection. The sodium and bicarbonates levels had built up in the greens and Gene Deeds was having trouble growing decent bentgrass. The leachate two months after the start of acid injection shows almost three times more sodium than sodium in the irrigation water, almost four times more bicarbonate, and almost twice as much total dissolved solids and with this, higher electrical conductivity. That is the good part. He is able to flush the sodium and bicarbonate out.

Also coming out in that leachate was 173 ppm calcium, 129 ppm magnesium, 71 ppm potassium and 81 times more phosphorus than was in the irrigation water. Therefore if one is managing greens with acid injection one should be regularly soil testing. And by regularly soil testing I mean a lot more often than once a year. When those sand greens flush a lot of nutrients disappear from the soil. Acid injection seems to speed up the process which is good and bad. Your job then becomes making sure you keep replacing the desirable nutrients at rates close to the rates they are flushed out and otherwise removed. I could wish you Good Luck but, I'd much rather see you use soil testing and technical know how.

ANOTHER BOOK TO READ: Do you keep running into these strange disease or what to know more about some old ones? Turfgrass Patch Diseases Caused by Ectotrophic Root-Infecting Fungi edited by Bruce B. Clarke and Ann B. Gould, APS Press is one you might consider. It covers Take-all Patch (Ophiobolus), Spring Dead Spot, Necrotic Ring Spot (earlier called Fusarium Blight), Summer Patch (kills Poa annua but not creeping bentgrass), and Bermudagrass Decline. All diseases you could do with out. All disease that are difficult to identify even for pathologist. This work is technical and is a complication of papers presented at an 1989, Phytopathological meeting. Authors include the editors, Dr. Similey now of Oregon State U., Dr. Jackson of U. of R.I., Dr. Dernoeden of the U. of MD., Dr. Shane of Michigan State U., Dr. Stier and Nameth of Ohio.

The book has 70 small but very good pictures. Very good disease symptom descriptions along with hints toward correct field diagnosis.

I THINK SUMMER IS

COMING TO A CLOSE

FINALLY!