

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 inquiries 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 that 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 not 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 absorb fungicides and herbicides. Indications are that surface applications of humic acid or humate can significantly reduce the effectiveness

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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 to 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 or 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.

Editor's Note: Reprinted from *The Grass Roots*.

Linking Up with the World of Golf

BY DARREN DAVIS
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Have you ever had a vendor come into your facility and try to sell you a product that you felt would be of absolutely no benefit to you? Later, after much thought or persuasion, you find your way clear to purchase or try the product. The months pass by, and each month you experiment with the product a little more or put more faith into it. Finally, a year goes by and you reflect back and ponder how you could have ever survived without this great product.

Sound familiar? Well, this is a true



Olde Florida Assistant Superintendent Scott Whorrall checks latest weather radar on Golf Link.

story and it happened to me recently. The product is Golf Link, a complete weather and information satellite service.

Like most of you, I am very picky how I spend my club's money, and I treat it as if it were my own. When a vendor came by with a demo of this product I wondered to myself how I could ever justify leasing a product like this. Then he told me about a trial offer that guaranteed me that if I did not like the system, I could return it. That sounded fair, and I trusted the vendor, so I checked a couple of references and agreed to the trial.

What is Golf Link? Among other things, Golf Link is an electronic weather system. Golf Link is a division of Broadcast Partners. Broadcast Partners supplies Golf Link with the electronic weather information. This information is also supplied to other similar companies, one of which is FarmDayta. This is the system I originally leased and which many other superintendents still have. The

FarmDayta system provides excellent weather information. However, some of the other information, such as the price of beef in Iowa or the stock market figures, had no bearing in my grass-growing world. I consider myself a well-rounded person, but I didn't find this information relevant to the golf course that is paying for this service.

One day I was thumbing through a copy of a trade magazine and came across an article on Golf Link. The article stated: "Golf Link is designed for the golf industry, providing subscribers with news that superintendents would enjoy. This includes turf tips, national and local association updates, research, new product information and commentaries. And, probably most importantly instant Doppler weather radar, weather forecasting capabilities and soon lightning strike maps." After reading the article on Golf Link, I thought it sounded just like my system with one major difference. The