Closing the loop of recycling:

Using Waste Derived Composts on Athletic Fields

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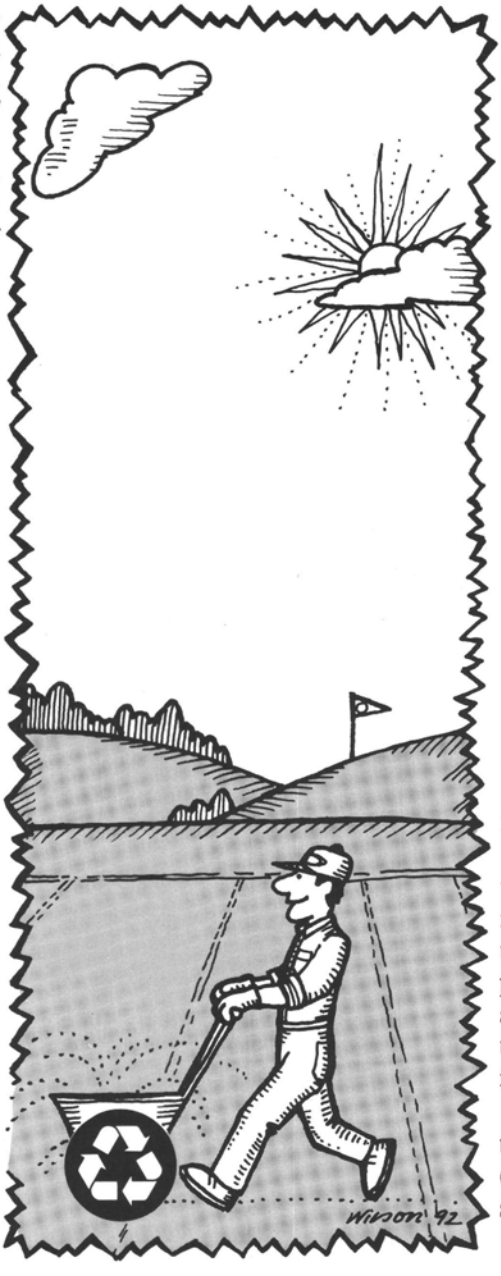
Large cities have the seemingly impossible task of maintaining a thousand or more athletic fields throughout their school and parks/recreation facilities at any given time. In any given city or municipality there are many athletic fields which are not being adequately maintained. In a time of decreasing budgets, it is time to consider the cost effective use of waste derived composts on our athletic fields. Not only will municipalities be aiding the cause of recycling, but they will also be making their fields safer to play on!

Today, athletic field safety and the issue of liability on poorly maintained athletic fields is getting more and more media coverage. The national exposure given professional athletes which have received artificial turf injuries has even accentuated the issue. Over the past several years, studies compiled at Pennsylvania State University (PSU) have shown quantitatively that properly maintained athletic fields are in fact safer to play on than fields which are not adequately maintained. They are also finding that the more use a field gets, the more care a field needs. Indeed, many natural turf athletic fields have been shown to be harder than artificial turf fields.

Researchers at PSU believe that better fields possess smoother surfaces, lower bulk densities (less compacted soil), more vegetative cover and a denser turf cover. Waste derived composts, produced from leaf and yard waste, municipal solid waste and sludge, can be utilized to enhance all of these conditions. PSU also points out that the soil's properties, as well as field maintenance practices, greatly influence the quality of the turf stand and therefore influence athletic field safety. In one study, PSU found that one out of five (20 %) athletic field injuries were "definitely or possibly field related". Consequently, if a player gets hurt and it is proven that the athletic field was not properly maintained, someone may be held liable.



At the same time, our supply of organic matter has been on the increase. The supply is being influenced by many municipalities and cities which have found an environmentally sound method of turning sewage sludge, leaf and yard waste, municipal solid waste (MSW), and other organic waste into high quality compost products. Through composting, these organic waste materials are now being manufactured into a safe, high quality, inexpensive, nutrient rich source of organic matter.

So what does all this mean? 1) The use of waste derived composts on the maintenance, renovation, and construction of athletic fields has tremendous potential, and 2) this end use could allow quantities of compost to improve the quality of turf areas currently being ignored.

This brings us to an often asked question, "Are waste derived composts (specifically municipal solid waste and sludge based composts) safe to use on

athletic fields? Of course they are. Waste derived composts which meet provincial standards are without doubt safe to use on athletic fields. However, you will find this to be a commonly asked question by members of the general public. Their common fears will be related to heavy metal content and bacteria (virus, fungi, etc.) levels in the compost. When discussing these safety related issues, it is important to know that: 1) only compost produced from "clean" or low metal organic wastes can be marketed to the general public, and 2) current composting methods were designed to create temperature high enough to destroy potentially harmful organisms. So we, as green industry professionals, must have enough technical knowledge to address their concerns. We must understand the benefits and actual dangers of using waste derived materials if we are to convey that information to the general public.

Back in February of 1987, rumour had it that Milorganite, a fertilizer derived from sewage sludge, was linked to Amyothropic Lateral Sclerosis (ALS), commonly known as Lou Gehrig's Disease. Circumstantial evidence was gathered and the press was judge and jury. It was assumed that because Milorganite was used on the San Francisco 49er's football fields and that three members of the 49ers were afflicted with ALS (two had died from it), that Milorganite was the cause of ALS. This situation got national exposure through the news media, but after a short period of time, Milorganite was cleared by a distinguished panel of federal and state health officials. Stating that "there is no evidence to indicate an increase incidence of ALS" in areas where Milorganite was used or manufactured and that "associating the disease with Milorganite was premature and speculative" Milorganite's good reputation was upheld.

Unfortunately, these types of unsubstantiated attacks are common place in the recycling or "waste to resources" industry. That is just the nature of the beast. We are often easy targets for many sceptics in the world. Unfortunately, only time and continued public education will change the negative image toward recycled products.

Though extremely versatile, waste derived composts are primarily used by sports turf professionals in three ways: 1) as a top dressing to help maintain the quality of the turf surface, 2) as a soil amendment, used in the renovation of athletic fields and 3) as a component to athletic field mixes used in the construction of new fields.

Topdressing

Topdressing has long been a reliable turf maintenance practice in the golf course industry. The practice entails applying a thin uniform layer of "topdressing" material over an established and usually declining turf area. Topdressing is performed for many reasons including: promoting seed germination, increasing the organic matter content of soil and levelling the surface of turf areas. Topdressing is usually done in conjunction with aerification and reseeding. Aerification is a practice where hollow and/or spoon like tines are projected into the soil. As they are removed, small plugs of soil are removed and deposited on the soil surface. The topdressing material would then be applied and through dragging the holes would be refilled with the topdressing material. When topdressing is performed along with aerification, many other benefits are obtained. These benefits include: improved soil drainage, increasing the water holding capacity of soil and reducing soil compaction. Commonly used topdressings are topsoil, compost, sand and sand based mixes.

Topdressing is often used as a maintenance practice on turf ares which are over used or on the decline. When topdressing is applied in conjunction with seeding, seed germination will improve. Because the topdressing improves the environment of seed germination, both the speed and percentage of seeds germinating will be improved.

When using compost as topdressing, the finer the compost is, the better. Most professionals prefer a topdressing material which is screened through a one quarter inch screener. The best equipment to use to apply topdressing are units which apply compost directly onto the soil surface and not up in the air (like manure spreaders do). By applying the compost directly onto the soil surface you will achieve better uniformity, while creating less odour and mess.

Topdressing Athletic Fields with Waste Derived Composts - Step by Step

1. Heavily core, aerifying the entire field, concentrating on most heavily trafficked areas.
2. Apply approximately a half inch layer of compost or 50/50 sand/compost mixture. The most uniform and efficient way to apply the compost is with a topdressing unit or a manure spreader.
3. Smooth the turf surface using a raking device or using a weighted drag mat. The raking/dragging will break up the soil plugs. mix them with the compost and backfill the holes.
4. Seed and water the topdressing area. It is important not to leave the grass seed on the soil surface. It should be mixed into the soil/compost layer.

Renovating

When athletic fields are over used and large portions of the vegetative cover have been destroyed, it will be necessary to renovate them. Renovating the fields entails destroying the surviving turf stand in favour of establishing a new, healthier one.

The quality of an athletic field's turf cover is greatly influenced by the amount of usage the field receives and its areas of highest wear. Each type of athletic field has its own "wear pattern" (areas of concentrated use). On football fields, most of the wear is in the centre of the field "between the hash marks". On soccer and field hockey fields, the goal area is the most heavily worn.

These areas are sparsely covered with turf and the soil beneath them is extremely compacted. The renovation process will loosen the soil allowing the grass roots to grow deeply.

The addition of compost will improve the characteristics of specific soils in different ways. In heavier, clay based soils, the compost will lighten the soil, improving drainage and slowing compaction. In the lighter, sandier soils, the compost will improve the soil's water holding capacity and nutrient utilization ability.

This new compost enriched soil will provide an excellent medium for turf growth. It will also allow the turf stand to survive through more stressful environmental conditions such as drought.

Renovating Athletic Fields with Waste Derived Compost Step by Step

1. Mechanically till the entire field, turning the soil and destroying the remaining vegetation. A rototiller or farm disk are the best pieces of equipment to use. Killing the existing turf cover with a non-selective herbicide may be worthwhile if weed infestation is significant.
2. Apply two or three inches of compost over the entire field. More product can be used in ares on the filed which have received the most wear (e.g., centre of football fields). Incorporate the compost into the filed soil to a depth of six to ten inches. Normally, the deeper you can incorporate the product the better. Work the soil until it is thoroughly mixed and clump free.
3. Shape and smooth the field using a raking device. Firm the field using a light roller. Establish a crown on the field if desired.
4. Seed and water the field. Make sure the seed is incorporated into the top one quarter inch of modified soil.

Construction

The use of waste derived composts in the construction of new athletic fields will continue to increase as the popularity of soilless sand based athletic field mixes increases. Because athletic fields are receiving so much usage, field mixes are now being designed which do not readily compact. Recommended mixes for these fields consist mainly of uniform sand, with a small amount of organic matter or topsoil added for good measure. Less and less topsoil is being used because it is difficult to find large uniform and weed free sources of it. A common mix will consist of nine parts sand to one part organic material (usually peat moss) or eight parts sand to one part top soil to one part organic material. Waste derived composts can be used to fulfil the organic matter requirement of this mix. They can also be used to replace topsoil in the mix entirely. waste derived composts will prove to be much more uniform than commercially available topsoil and less expensive than the commercially available bulk organic matter sources.

Compost screened through a three-eighths of an inch screen will work quite well in athletic field construction projects. This slightly coarser compost will improve field drainage and slow compaction.

Within a few months a new, densely vegetated , wear tolerant field will be ready for use. The field will have excellent drainage and will not readily compact.

It is becoming increasingly important for our society to reduce the amounts of waste it has to dispose of.

Constructing Athletic Fields With Waste Derived Composts - Step by Step

1. Using front end loaders or other bulk blending machinery, manufacture your field mix. To ensure uniformity, manufacture the mix in small controllable batches. mixing should be done off the construction site.
2. Spread the athletic field construction mix using a grading blade over the entire field, starting from the centre of the field and working out. For optimum results, the mix should be spread to a depth of 12 inches.
3. Shape and smooth the field using a raking device. Firm the field using a light roller. Establish a crown on the field if desired.
4. Seed and water the field. To improve seed germination, incorporate the grass into the top one quarter inch of the construction mix.

Technology has allowed us to manufacture high quality products out of many waste materials, while research has developed sound agronomic and horticultural end uses for these products. Only through usage of these newly created products can we close the loop of recycling.

The use of these products by the general public, by our business community and by government institutions is vital. Creativity will allow us to utilize these products for the betterment of all. A good example of this is the usage of waste derived compost for the improvement of athletic fields on which our children play. It aids the environment, enhances athletic field safety and gives us peace of mind. That is what I call closing the loop of recycling.

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Compost Research at GTI

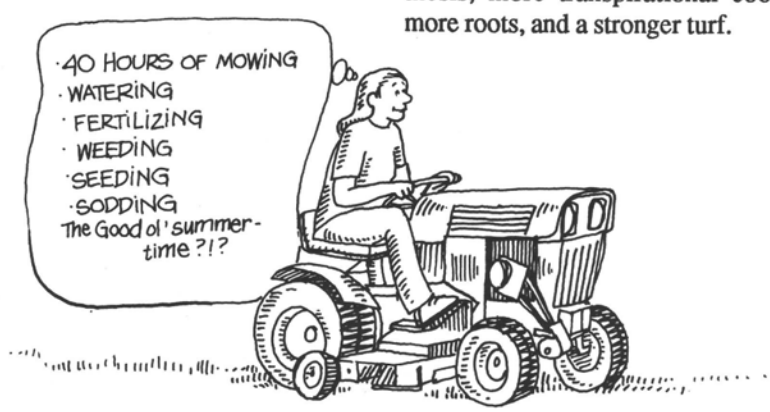
A two year (1990-1991) field study was conducted on established Kentucky bluegrass at the Cambridge Research Station. Composts prepared from leaves (LC), irradiated sewage sludge (ISSC) and animal manure (AMC) were applied at 0, 10, 20, 30, and 40 tonnes compost per hectare per year. Treatments received recommended amounts of N, P and K by supplementing the compost with chemical fertilizers. The 0 rate, a control, received chemical fertilizer only. The effects of the composts were evaluated by determination of clipping weights, visual ratings, depth of thatch and plant and soil macronutrients. Except for depth of thatch, which increased but requires further investigation, compost addition enhanced visual ratings of the bluegrass and supplied a portion of the plant N, P and K requirements.

Plant nitrate concentrations were highest in the ISSC treatments in 1990, but not in 1991, whereas plant phosphorus concentrations were consistently highest with AMC in 1990 and 1991. Plant and soil K concentrations were consistently highest with AMC which contained high K concentrations. The high K may have interfered with Ca and Mg uptake as the plant concentrations of these two elements were lower with AMC. There were few differences in clipping weights in compost treatments compared to the control. Irradiation of sewage sludge prior to composting did not result in a compost that behaved differently from composts from unirradiated sources. Compost application can benefit established Kentucky bluegrass by enhancing visual quality and supplying a portion of N, P and K.

[Reproduced from P. van der Werf, T.E. Bates and R.P. Voroney, Evaluation of Compost on Established Kentucky Bluegrass. Annual Report, Dept. of Land Resource Science U. of G. 1991]

Thoughts on Mowing

If the height of cut is raised only 1/8 inch there will be an average increase in leaf surface of 300 sq. ft./1000 sq. ft. of lawn. This will allow more photosynthesis, more transpirational cooling, more roots, and a stronger turf.



Good mowing practice calls for the removal of leaf tips when growth is about one third more than the cutting height. Therefore a lawn cut with a mower set at 1 1/2 inches should be mowed soon after the growth has reached two inches.

It is estimated that the average lawn requires 40 hours of mowing a year.

Every individual Kentucky bluegrass plant produces some three feet of leaf growth in an average season. This amounts to about five tons of clippings per acre each year. When clippings are left to decay in place, they are worth the equivalent of three applications of lawn fertilizer.