## REPLACING CONVENTIONAL METHODS

# COMPOST FILTER BERMS AND BLANKETS TAKE ON THE SILT FENCE

*The success of compost and composted mulch in erosion control projects is creating a groundswell of excitement among state and local departments of transportation, construction companies, landfill managers and contractors.*

*Rod Tyler*

FOR THE last ten years, the use of compost in environmental applications and markets has been increasing at a steady rate. Environmental applications include slope stabilization and erosion control, storm water filtration, vegetation establishment, and replacement of silt fence with compost filter berms. This article focuses primarily on compost filter berms with and without compost application.

Silt fence — a sediment-trapping practice utilizing a geotextile fence, topography and vegetation — has been used for erosion control on slopes and around the edges of construction sites for years. While it is not the only method accepted for slopes — and is often combined with other measures as the severity of slopes increase — it is the accepted standard for environmental containment of silt and sediment. Silt fence is used on nearly 100 percent of construction projects in the U.S., but there are some inherent problems with its use. First, it does not work as well as originally thought. Second, it has to be removed when the job is completed.

Compost, when properly installed in long filter berms, has been shown to work better than silt fence in keeping both suspended and settleable solids out of water sources moving on the surface. In 1993, Bill Stewart of Portland, Oregon conducted research which showed surprising results using compost in a number of erosion applications — including a "barrier" at the toe of the slope (essentially a filter berm) — on a local roadway that had extremely steep slopes (see "Yard Debris Compost for Erosion Control," December, 1993).

The research showed how ineffective the silt fence was in containing solids. On a 34 percent slope, total settleable and suspended solids in the water that passed through the silt fence was 32 ml/L and 26,000 ml/L, respectively versus the compost barrier (made from mixed yard trimmings) at 2.6 ml/L and 1,300 ml/L, respectively.

In 1994, the Maine Waste Management Agency tested compost in Kennebec County to determine if the erosion control results were predictable. This was followed in 1996 with Clyde Walton from the Maine Department of Transportation (DOT) becoming one of the first to specify compost filter berms on DOT projects. In 1997, the U.S. Environmental Protection Agency recognized the use of compost for erosion control — and specifically the use of filter berms — to reduce environmental problems associated with erosion. California's DOT, CalTrans, has been working on many projects for the last ten years and now has a very progressive program.

Until the advent of blower trucks, accessibility and efficient application of compost or composted mulch was hard to achieve. Manual application on 2:1 slopes would be nearly impossible. Application of filter berms around construction sites would require a Bobcat, loader or other equipment and would simply be less efficient. Now that a more optimal application method is available — combined with the positive results from trials and actual jobs — compost filter berms are positioned to be an effective competitor.

Compost filter berms have the following advantages: Amends native soil, assisting in vegetation establishment and can be easily incorporated when the job is completed; Can apply in areas where water has already accumulated; Can apply in any direction or configuration or adjust to outlines of areas; Lower cost than silt fence and more effective in removing sediment and preventing phosphorus and other chemical leaching, thus cleaning up waterways; More effective at removing chemical compounds from runoff; and Compost is an annually renewable resource, all organic, and 100 percent natural. Silt fences, on the other hand, are less effective at containing suspended and settleable solids, are hard to keep up during construction projects and are often left on site after construction, which is unsightly. They also are a nonrecycled material that needs to be disposed.

### FILTER BERM AND "COMPOST BLANKET" COMBO

When filter berms are used in combination with slope protection via a layer of compost or composted mulch (compost blankets), minimal erosion can be expected. Filter berms reduce the speed of water flowing on a given slope, which reduces the speed of soil particles tumbling down. Overall displacement of other soil particles is reduced. Many applications have placed a series of filter berms down the slope, which has worked well to slow the water long enough to reduce erosion.

Soil particles are normally round and roll easily once displaced by water. As they gain speed and momentum, they displace other soil particles which channel together in faster moving water, creating small rills. Rills lead to channels and channels lead to gullies. A layer of compost or composted mulch applied to the slope acts like a "wet blanket" or a "wet deck of cards" scattered randomly over the surface that prevents the soil from rolling or gaining this momentum.

A secret of success in the field is making sure that water is not able to get under the blanket at the top of the slope. If water gets under the layer of compost, and if the slope is steep, you can expect erosion and the compost or composted mulch will float away.

Compost filter berms amend native soil, assist in vegetation establishment and can be easily incorporated when the job is done.

**At a field trial that tested both a compost filter berm at the top of the slope and compost applied to the slope, a portion of the berm was destroyed during installation of the guardrail (far left). A Band-Aid approach — blowing compost on the slope and repairing the berm (left) — was done with minimal equipment and no damage to other areas of the slope.**

Organic materials help water infiltrate into the soil underneath, which is crucial to new seedling germination when vegetation needs to be established on the slope.

However, by having a filter berm at the top of the slope and keeping the compost layer continuous over the "shoulder" of the slope, the water will hit the slope and ride all the way to the bottom on top of the blanket of organic materials.

Because organic materials are more flexible, lighter, and absorb more water than soils in general, they also aid in helping water infiltrate into the soil underneath. For vegetation establishment, this is crucial to new seedling germination.

Depending on the charge for installation and the cost of local compost or composted mulch products, filter berms are competitive and thus cost is not a real barrier to their use. In a study conducted in South Carolina with one of the very largest builders, it was determined that silt fence would cost about $1.50/linear foot installed, versus $1.80/linear foot for compost filter berm installation on flat surfaces.

In many markets, the cost of compost application matches the cost of the product. For instance, compost priced at $20/cubic yard (cy) would cost $20/cy for application. Many blower truck operators simply double the price of materials to arrive at an installed cost for organic materials. This is a good rule of thumb to use. When calculating the amount of compost or composted mulch required, it was determined that one cubic yard provides 20 linear feet of filter berm one foot high and two feet wide. This size is adequate for the majority of silt fence replacements, which are actually demarcations of the work zone itself. Much of the silt fence installation, when performed on flat ground, is simply to show the perimeter of the active work zone.

## FIELD REPORTS

Four field projects have been completed recently that focus on the principal objectives outlined earlier: reducing erosion on slopes using compost blankets and installing compost filter berms instead of silt fences.

*Richmond, Virginia*: A project was coordinated in Richmond with the Virginia Department of Transportation (VDOT) to determine the effectiveness of compost for mulch and as filter berms. The site chosen by VDOT was to be a true challenge for vegetation establishment. "We wanted to use a worst case scenario to try the materials," says Ken Orstaglio of VDOT. "This particular site was a problem for us due to the steep slopes and the sandy, highly erodible soil. We only regret we did not try seeding at the time of application. That is on our wish list of next projects, which we are now planning."

VDOT did not want to use filter berms alone because it had already seen the heavy erosion without protecting the slope and did not want to incur more repair costs. Besides, when slopes are so severe, more than filter berms are needed for best protection.

Four compost materials were used in two different applications (two-inch and four-inch application depths) for a total of eight treatments. The treatment areas ran the entire length of the slope. A one-by-two-foot compost filter berm ran along the entire treatment area. The yard trimmings-based composts were applied with a Finn blower truck. Four different variations of compost were used: a two-inch minus, a half-inch minus that was heavy on brush and light on grass, a half-inch minus reground leaf compost and one-inch minus recycled and reground screening overs. The overs were rather coarse and a little on the larger side, but seemed to work adequately in the blower trucks.

Results were similar for all four treatment areas, with no noticeable erosion of soil on any of the applications. The one exception was where a road crew installing a guard rail drilled holes in the filter berm to let water that had accumulated drain quickly. In the process, water got under the compost blanket, causing some erosion. The berm was repaired and more compost was applied to the slope. The final determination based on the four materials used on the slopes was that the two-inch application rates provided enough protection to reduce erosion to acceptable levels. From a visual perspective, all composts worked equally well because they allowed the water to travel on top (by creating an interlocking cover) and prevented round soil particles from gathering momentum.

The two-inch application rates are competitive when repair costs experienced on traditionally treated severe slopes are factored into the comparison. The costs of repair involve bringing in more heavy equipment for regrading, hydroseeding and even the application of more straw. Some sites in Virginia have been reworked several times. "Cost comparisons with existing erosion control methods may not be telling the whole story," says Orstaglio. "Vegetation establishment is one budget and maintenance is another. We can substantially impact the maintenance budget if we can keep from reseeding some of these problem areas for many years in a row." He believes that working compost into the slopes prior to seeding will help increase organic matter and result in more permanent vegetative cover.

The VDOT plans to conduct more trials, and they have a project pending in the Tidewater area that will include compost in the bid specifications. "That will give us good feedback to judge what kind of numbers to expect from contractors who will provide this new service," he adds.

*Columbus, Ohio:* Harry Kalipolitis with the Ohio EPA (OEPA) in Columbus is responsible for field monitoring of controls installed for sediment and runoff at construction sites. Jet Mulch, a company expanding into compost filter berm and compost blanket installation, approached Kalipolitis about performing a trial on a problem area. They jointly selected a new construction site near a WalMart that served to show how the installation of compost filter berms and compost blankets worked (using a three-quarter-inch minus yard trimmings compost).

The project was started September 5, 2000 and ended recently as construction of the final buildings on site were completed.

Kalipolitis was surprised about the berms' ability to retain water on site and then have it seep through slowly. "We still have concerns about concentrated flow areas, like channels," he says, "but for sheet flow, all of the demonstrations seemed to work very well with compost filter berms and compost blankets." Concentrated flows come down the slope perpendicular to the berm and have the most force. Areas of impact are identified by the site engineer prior to installation of a berm or silt fence. To minimize impact from concentrated flows, installers can invert the compost filter berm in a "V" shape going up the slope so that water is channeled off at the point in the V at 45-degree angles. Other installers have used a series of V or horseshoe-shaped berms in the direction of the flow to slow down the water.

Compost also may have an advantage over silt fences and straw in cold weather. "Many people ask about what applications they can use for erosion in the winter," explains Kalipolitis. "They find that tackifier — the gluey substance used to stick the paper fiber and seed to the slopes — does not work as well in cold winter months. And any water-requiring process could be impeded by frozen conditions or equipment. The compost filter berms and compost blankets work even in cold weather. Straw is hard to crimp in when the ground is frozen and the only other alternatives are netting or erosion cells, which raise costs significantly."

*Sun City, South Carolina:* Del Webb, a large developer, ran several tests in Sun City using compost for erosion control and filter berm replacement. In one project, the company is building up to 500 houses/year, with a total of 6,000 houses. The state requires that silt fence be properly installed around each new construction phase.

One-foot high by two-foot wide berms were installed and seemed to hold up well in most areas. In a few cases, where the berm became damaged from traffic or equipment, Del Webb fixed it by adding a small amount of compost with a Bobcat.

The final analysis of the filter berms at Del Webb is that they work well enough to consider using them in all future construction. The company is analyzing costs and has asked to move to the next stage — using filter berms for construction of a new neighborhood. Installation will be an excellent test to determine how the berms hold up through an entire project rather than just for a couple of months. Another application at Del Webb is the use of compost for seeding in replacement of hydroseeding or sodding.

*SWACO Landfill, Columbus, Ohio:* A project at the Franklin County Solid Waste Authority (SWACO) landfill in Columbus is testing use of composted screened overs from a yard trimmings composting facility for slope stabilization. "The reprocessed overs used for erosion control on landfill slopes is an ideal application for these materials," says Tom Kurtz, a partner in Kurtz Bros., Inc. in Columbus and Cleveland, Ohio, which supplied the overs. "We have been searching for five years for an application like this because getting plastic out of the overs is just challenging and expensive. There should be no issues with minimal contamination from plastic here on the landfill slopes."

The trial, which took place in early December, was conducted using the installation services provided by Jet Mulch. A filter berm made from overs was installed at the top of the slope and another one at the end of the test area, which measured about 75 feet by 100 feet. A blanket made from composted overs, applied about two to three inches deep, connected the two berms. From the lower elevations, the trial area looks like a black postage stamp. "If this works well, we can use the trucks to install the berms, but we will probably go with a heavier application on the slopes and use our dozers here on site for that," says Rick Dodge, landfill manager.

## DEVELOPING SPECIFICATIONS

Silt fence isn't actually specified in many erosion control bids. Instead, the contractor has to submit an erosion control or water discharge plan that calls for some recognized method to reduce erosion. Silt fence, because it is so common, is the leading tool used to respond. When contractors put compost filter berms or compost blankets into their plan, the officials have to determine if this tool is acceptable. Brett Bergefurd, urban conservationist for the Franklin County, Ohio Soil and Water Conservation District (SWCD), first saw filter berm information in the U.S. EPA documents created in 1997. "At the time, it appeared to be great stuff and we were very interested in it, but nobody around here had any projects to review in the field," says Bergefurd. "We needed more demos and examples to analyze and make sure they worked as depicted."

Bergefurd and Kalipolitis of Ohio EPA are in the process of rewriting the *Rainwater and Land Development Guide — Ohio's Standards for Storm Water Management, Land Development, and Urban Stream Protection*. This guide is used for referenced control measures of sediment, runoff and water movement (e.g. basins, traps, silt fence, drain inlet protection) on any commercial construction in Ohio. They are considering inclusion of compost filter berms in the revision of the guide — which currently includes only one-and-a-half pages on mulching, with no recommendations on using compost. In terms of slope stabilization, the specifications for mulching listed in the handbook are straw, hydroseed, wood cellulose fiber, mulch netting, asphalt emulsion and synthetic binders.

Even though a material such as compost may not be specified, it can be approved as an acceptable alternate if it is proven on a local basis. Alternate specification language has been made available to Ohio for

"We can substantially impact the maintenance budget if we can keep from reseeding some of these problem areas for many years in a row," says Ken Orstaglio of VDOT.


its handbook revision. "We are happy to have this language in specification format, especially during this critical time of rewriting these handbooks for all types of storm water control," says Bergefurd. "The applications we have seen in coordination with Harry Kalipolitis and the Ohio EPA, and recently at the landfill, indicate enough successes on local projects to warrant serious consideration for the applications of these materials in a number of differing erosion settings."

Other states, including Texas, Connecticut, Maine and California, already have compost specifications in their handbooks. Texas has published specifications for its purchase of general use compost, compost manufactured topsoil, and compost filter berms (see www.dot.state.tx.us/insdtdot/orgchart/des/landscape/compost/topsoil.htm).

**In the Virginia trial, it was determined that the two-inch compost application rates were enough to reduce erosion to acceptable levels.**

## ISSUES AND ROADBLOCKS

Silt fence and hydroseeding have been the standard erosion control methods over the last ten or 20 years. Lack of awareness about compost filter berms and compost blankets in many local areas is a leading roadblock to rapid future development.

Training and education are critical to moving compost use in this sector forward. A handful of states have active programs, including research and field demonstration projects. In 2000, the U.S. Composting Council received a grant from the U.S. EPA to promote compost use by state departments of transportation in landscaping, turf management, erosion/sediment control and other environmental applications.

In states that have annual printing of specification books for DOT or other agencies, compost use needs to be automatically included with the appropriate drawings. Finally, nothing substitutes for field projects demonstrating the value of what has been discussed above. The field projects we coordinated helped us learn first hand about the issues, roadblocks and politics involved. ■

---

*Rod Tyler is the owner of Green Horizons, a consulting firm outside Cleveland, Ohio and can be reached at rodndon@gte.net.* *He thanks the people and companies enabling these field demonstrations to be conducted. A portion of this material was presented by Tyler at the Y2K Composting in the Southeast Conference in October, 2000.*

Reprinted From:
January, 2001
BIOCYCLE
JOURNAL OF COMPOSTING & ORGANICS RECYCLING
419 State Avenue, Emmaus, PA 18049-3097
610-967-4135
For more information, visit: http://www.biocycle.net