COMPOST PRODUCT PERFORMANCE

Field experiences demonstrate the importance of matching the physical characteristics of compost products to the task at hand. Tapping the overs fraction at composting facilities may help fill product demand.

Nora Goldstein

WHEN AN opportunity arose for Carolina Mulch Plus in Pisgah Forest, North Carolina to work on a slope stabilization/revegetation project with the Federal Highway Administration (FHWA) Eastern Federal Lands Highway Division, the owners jumped on board. It provided a valuable inroad for use of compost in highway projects. "The first time I drove up and saw the site, however, I said who in the world thought we could do this," recalls Theresa Hutchins, who owns Carolina Mulch Plus with her husband Toby. "The slope looked very formidable with its variable slope ratio of 1:1 and .5:1. Then I got to the point where I thought, this is a challenge, this is cool. My husband and I as well as our employees have rock climbing experience and we had the compost and climbing equipment necessary to tackle the job. It was the first time that all our skills and expertise merged!"

The site is an excavated cut slope on the Blue Ridge Parkway, about eight miles south of Asheville, North Carolina. The cut is about 130 feet horizontally and 130 feet in height, notes Lloyd Middleton of the FHWA, who is based in Sevierville, Tennessee. "The objective of the project was to test the effectiveness of compost blankets and berms on steep slopes for controlling erosion and establishing sustainable turf," he says. "Even though FHWA had some concern as to the compost blanket stability/ resistance to rain drop energy and erosion on a steep slope, we were looking for something other than conventional means. In this case, the conventional way is to hydroseed the slope, and use a turf reinforcement material to hold the seed in place until the grass germinates. The reinforcement adds strength to the root system of the vegetation, especially because you are dealing with shallow soils. Most of the articles on using compost on slopes talk about a 2:1 slope. You might say we were pushing the envelope with this project!"

About 270 cubic yards (cy) of compost were used for the job; it was applied at an average of two inches thick in most places with a Rexius pneumatic blower truck. A tall turf fescue blend mixed with quick germinating rye seed was injected into the compost as it was blown on. "We had about 400 feet of hose going up to the top of the slope, which is a 135-foot vertical reach," says Hutchins. "We tied off our employees and the hose, which gets pretty heavy by the time you get 400-feet with compost in it going vertically." A seeded berm was installed at the top of the slope to slow down the flow of water. A 65-foot lift was rented to do the application on the lower part of the slope, which is the widest portion.

In addition, contained compost berms – in netting socks supplied by Filtrexx International – were used across the slope on the contour in about 30-foot increments to slow down the water flow and prevent rilling. Socks also were placed in the ditch at the bottom of the slope to slow down and filter water coming off the slope. Because of the severity of the slope, a lock down netting made out of high density polyethylene was rolled out and tacked onto the slope to provide reinforcement.

The application took place about the last week of June 2002, "not exactly the best time for vegetation establishment," says Middleton. There was a storm on the second last day of the installation that brought three inches of rain per hour. "We had a small breech on the mountain side which self-healed and there was a little rilling but then it stopped," says Hutchins. Adds Middleton: "I was apprehensive how well the compost would stay on this steep of a slope, but it did not erode."

The FHWA's performance standard for hydroseeding is the establishment of grass up to around three-inches high. "That is one of the normal requirements and contractors will not be paid in full until it is obvious there are three inches of turf," he explains. "We didn't put that requirement in with this contract because we were pretty certain we would get that turf establishment." As it turned out, a severe drought throughout the summer months led to less vegetation than expected, although rains that came in late September should lead to more germination, he adds.

Carolina Mulch does not have its own production facility; instead, it purchases compost and mulch from different suppliers. It often uses a manure-based compost but for this project, the Hutchins felt it was too fine-textured. "We chose to use a biosolids-based

An average of two-inches of compost with grass seeds was applied to this slope on the Blue Ridge Parkway. Reinforcement netting was put down and filter socks in 30-foot increments were installed across the slope.

compost marketed by ERTH Products, LLC in Peachtree, Georgia," she says. "We used this compost both for its nutrient value – to help germinate the grass seeds quickly – and because it has more coarse particles than the manure compost we use. We also mixed that product with a leaf compost and a wood fibrous composted mulch. On the shoulder, we mixed the biosolids compost with an aggregate screened to three-eighths of an inch or less." The coarser particles are more resistant to rain drop energy and erosion, adds Middleton.

IT'S NOT JUST ABOUT PARTICLE SIZE

Wayne King, owner of ERTH Products, is very active in using compost for erosion and sediment control and storm water management. Recently, he and a partner formed a new company, ERTH Environmental Partners, which markets specialty soil mixes and services for use in environmental applications. Last spring, the company had a contract with Clemson University for a shoreline restoration that involved a severely eroded, very steep slope. Contractors with mountain climbing experience had to be used for this job as well. Compost was applied, a cotton netting was laid on top to hold it in place, and then the surface was lightly topdressed with compost. The ERTH biosolids compost, which is made with peanut hulls and is screened to under a half-inch, was used.

"The compost was applied using a Finn blower truck which we had to put on a barge in order to access the slope," says King. "We put on a one-inch layer of compost, which we wetted while it was being applied to help it adhere. We found that a one-inch layer worked well. If we tried to blow on two to three inches, as some specifications require for compost blankets on slopes, it would not have stuck. When pricing jobs, two to three inch application rates have often been proven to be too expensive causing us to lose the bid. Most of the time, we have found that approximately a one inch application rate is adequate and it gives compost the competitive edge in both price and performance."

King uses his three-eighth to half-inch screened compost for filter berm applications as well, even though conventional thinking has been that larger size particles are needed to get the water to flow through. "We have to be careful with these national specifications that suggest a half-inch to two inch minus particle size for filter berms," he notes.

A stream bank restoration project in the city of Atlanta incorporated compost blankets and contained berms (left half of photo). The picture shown is after a flood totally submerged the restored area in water.

"Whether you are using compost A, B, or C, the compost berm filters better than silt fence and at the same time, more storm water is able to pass through," says Wayne King.

"This is based on the premise that the bigger particle size used in berms will have a better flow through rate. We have to remember that composts are made with various feedstocks. Our compost has peanut hulls in it. You would think that it would clog up, but it doesn't. It filters. The bottom line is our compost berms are competing with silt fence. Whether you are using compost A, B, or C, the compost berm filters better than silt fence and at the same time, more storm water is able to pass through."

The key, he adds, is to be part of compost quality programs like the U.S. Composting Council's Seal of Testing Assurance (STA), which requires testing of compost products to ensure basic quality and consistency. Then, its actual use is determined by the task at hand. "With compost, not one size fits all – inlets, versus banks, versus slopes – all have some bearing on the particle size and application rate, especially if we are talking about slopes. And even at that, at some point, you will have to test it – you can have a lab test, but there is no substitute for field experiences."

ERTH Environmental Partners had one of the best tests of its compost product very recently. The company was hired to do a stream bank restoration project for the city of Atlanta in an area where there had been a history of flooding. Large size tree logs and rocks were placed at the bottom along the creek, then coming up the bank, compost-filled Filtrexx socks with seed were installed and staked in. A seeded compost blanket was applied between the heel and toe of the slope using a pneumatic blower. Two layers of cotton netting were used to sandwich the compost and then sod staples were used to lock down the application. Finally, a light layer of compost was applied to cover the netting, and the area was hand seeded. A filter berm in a sock was installed along the perimeter of the seeded area.

It was only a few days later when a rain event caused by a hurricane further south of Atlanta brought four-inches of rain over a 24 to 36 hour period. "The creek flooded and the entire area was submerged in water," says King. "Everything we installed stayed in place. The compost held on the slope and there was no erosion. The berm at the top of the slope held all the sediment back as the flood waters receded. The seeds had actually started to germinate prior to the flood, and afterwards the socks looked like mounds of grass. I never thought you could submerge an installation like that in water and have it still stay there."

Interestingly, he adds, an installation ERTH Environmental Partners did at the

University of Georgia in Athens during this same time frame specified the use of only a one inch seeded compost blanket and did not provide for the netting or the socks. The slopes treated with compost exceeded 2:1 and were very long. "After experiencing two months of no rain they received eight inches of rain in 24 hours, getting over 2.5 inches in the first hour or two," notes King. "We ended up with a lot of rills and gullies at this site and quite a bit of the compost washed away. What compost remained germinated and looked good. One of the construction supervisors after observing the damage done after the storm commented that nothing but concrete would have held up against such an intense rain. Britt Faucette with the University of Georgia noted that with anything over the 25 year/24 hour storm event (3.4 inches for Athens), the erosion and sediment control measures – no matter what was installed — are not expected to hold up."

1) Eroded slope along Lake Keowee shoreline at Clemson University. 2) A barge transporting blower equipment to apply compost to the slope. 3) Installing cotton netting to lock down the one-inch compost application, followed by light topdressing (all compost was seeded). 4) The completed installation, with vegetation establishment on the slope.

"HIDDEN SUPPLY" IN THE OVERS PILE

As the performance of compost and various blends is continually met with customer satisfaction, there are some who voice the concern of whether there will be an adequate supply of product to meet demand. "Most states will use several million feet of silt fence a year," says Rod Tyler, president of Filtrexx International LLC in Grafton, Ohio. "Convert that into its compost equivalent — one to two million feet of silt fence divided by 20 linear feet/cubic yard of compost equals 50,000 cy to 100,000 cy of market potential in one state alone."

One option, he suggests, is tapping into the stockpiles of screened overs at composting operations. "We have found that the half-inch to two inch size particles typically found in the overs piles at yard trimmings composting facilities meet the specifications for many of our erosion control products, especially for the berms or FilterSocks," says Tyler. Currently, this overs fraction costs many facilities money, either to rescreen to remove fines that didn't pass through the screen, to put them back through the composting system which takes volume away from new feedstocks that bring in tipping fee revenue, or by taking up space on the site footprint that could be used for additional processing."

He uses the example of a composting site with a screen that sorts into two fractions – half-inch minus and overs. The overs include the half-inch plus to two inch size pieces that could be used in erosion and sediment control and storm water management applications, as well as the two-inch-plus portion that either has to be reground, sold for a low-cost fuel or disposed. In the best of screening scenarios, he estimates that the half-inch minus represents about 60 percent of what is screened, with the overs accounting for about 40 percent (although it is more like a 50/50 split). "Say that site produces 100,000 cy of compost/year," explains Tyler. "That means there are 60,000 cy of screened compost for general uses, such as soil mixes and bulk sales, and 40,000 cy of oversize and "waste" material not fit for resale in its current form and thus presents a cost to the operation."

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By installing a screening system that does a three-way split, or by changing current screening practices or screen sizes with existing equipment, that middle fraction – half-inch overs to two-inch minus – could be captured. Those "middles," says Tyler, account for about 30 percent of the 50 percent overs that currently require rehandling. "If the average price per cubic yard for that fraction is $2/cy for erosion and sediment control berms and blankets, that represents a significant new revenue stream for composting sites, not to mention the increased throughput capacity at the plant because those overs aren't going back through the composting system. For large facilities, this might be enough to justify the expense of changing out screens or altogether buying new ones with three product capability. The other option would be to handle the overs pile twice to get the same type of splits."

Yard Works, a yard trimmings composting and compost marketing company based in Moseley, Virginia, is a case in point. Until recently, it used a star screen that separated finished compost into two fractions – roughly a half-inch minus and overs. The half-inch minus material is marketed to landscapers, garden centers and for use as topdressing. The overs were put back through a grinder and into the composting process. "We were handling the same materials two or three times," says Robbie Urbine, who oversees the operations.

Several months ago, Yard Works purchased a mobile CEC two deck screen. The first deck has two-inch openings and the second has half-inch openings. The fines still go to the landscaping, topdressing and garden center markets; the middle split, about a half inch to 1.5 inches, is used in compost filter berms and blankets, ditch checks and other erosion and sediment control and storm water management applications. The overs are being reground and composted again. "I'd say, even though we just started using the new screen, that we are getting about 50 percent fines, 30 percent middle fraction and 20 percent overs out of the compost being screened," estimates Urbine. "This new system has cut down on the overs big time. It also has improved the product we are using for the erosion and sediment control market. We found we were getting too many fines in the compost we were using in the filter socks, and were having some problems with flow through rates achieved and ponding. With the new middle fraction, that problem has been solved. Having the right product mix is really key to getting the right flow rates." ■