Streambank Stabilization Using a new BMP... Compost?

Half of the roots of these trees were exposed prior to backfilling during the restoration project.

Germinating filtersocks are growing together and into the geotextile wrapped socks stacked on the banks of the creek.

By Rod Tyler

UNIVERSITY research, private research, field demonstrations, and now commercial use of compost for erosion and sediment control show it works better than most BMP's available today, yet it continues to suffer an identity crises. Compost is an organic matter source that has the unique ability to improve the chemical, physical, and biological characteristics of soils or growing media. It contains plant nutrients but is typically not characterized as a fertilizer. Compost is the only annually renewable, recycled. 100 percent natural organic product that gives so much value to the soil. And peat moss, barks, manures and other organic sources work in combination with compost in mixtures that help contractors adjust soil pH and fertility.

It is important you understand the role of composting. The process reduces concerns with three major threats. Weed seeds, diseases and insect larvae eggs are some very important health and safety issues surrounding the use of composted products. When materials are properly composted, these three nasty foes are killed in the process. You can imagine the best possible application mechanism of spreading non-composted products with a blower truck could surely create noxious weed problems the quickest of all...so it is imperative we promote the use of composted products to break the chain of these three problematic pests.

Stabilization of streambanks has become a huge focus for watershed managers in an effort to become phase II compliant. Previous issues of Land and Water have appropriately identified many technologies for accomplishing Streambank stabilization and restoration using many good tools. The majority of us would agree that compost is not at the top of the list of products considered for this type of challenging work. But the innovation of containment and packaging systems has allowed for compost to be used in these

Live stakes of purple winter creeper, plugs of liriope and english ivy and grass, roots into the socks and into the banks.

applications and the results are an exciting chapter in the story on erosion and sediment control.

Compost is not a stranger to environmental applications. The use of compost for traditional landscaping like planting bed preparation and backfill for tree pits has been documented as a standard practice for over ten years. Compost is produced locally in nearly every major city in the US. so supplies for upcoming erosion markets should be predictable and available. Since freight is less for materials produced locally, it stands to reason that the economics behind using compost for erosion control will surely allow for continued market expansion. The technical merits of compost were stated most notably in a report issued by the USEPA in 1997 indicating the benefits of using compost for erosion control and other remedial applications. For more information on various studies regarding the use of compost, go to http://www.epa.gov/epaoswer/non-hw/compost/index.htm.

When tools are assessed for streambank stabilization and renovation, it is obvious that a number of combinations are often used in order to be successful. Rolled products, matting, excelsior products, geotextiles and other materials are all used successfully in working with the forces of water. But with the introduction use of compost, one glaring difference arises: the ability of the compost to grow vegetation - very, very well.

A Panel of Experts

"We were asked to assist on a project which seemed to border on some of our capabilities", says Jim Wilson, President of

Compost has been used in the green industry, including landscaping, topsoil blenders, and nurseries for about 20 years. Several years ago, blower truck technology began replacing the common application systems of wheelbarrows and hand application. Now this pneumatic application method is common among many top landscape management firms because it actually frees up workers for other activities rather than mulching.

The truck manufacturers, Finn Corp. in Cincinatti, Ohio and Express Blower from Eugene Oregon, are proud that the pneumatic devices are helping to revolutionize placement of organic products. Finn claims their units, which are smaller, less expensive and easier to fit into tighter areas, will replace 3-5 normal workers for average mulch or soil installations. Express Blower points out that the carrying capacity of their units, often upwards of 30-90 cubic yards, allows a unique advantage to target large projects with their vehicles application capacity. Express Blower also claims to have the only calibrated pneumatic seed injection system currently on the market, which has been used successfully in many Terraseeding' applications. Terraseeding is the process of using compost or topsoil with seed injection to establish vegetation.

"We were able to get seed to grow on a DOT roadside job last November where hydroseeding could not" claims Pat Campiletti from Precision Mulching in Cleveland, Ohio. "We used a compost blend that held the heat in the soil longer in order to give us the pop of germination to hold the area and overwinter", he said. "Our cutoff date for seeding should be September 15th!"

Theresa and Toby Hutchins of Carolina Mulch Plus found the longer seeding window to be true as well. "We seeded a project October 3rd 2001 and had a little grass by early December. The areas outside of our DOT applications were hydroseeded and straw mulched and did not germinate as well. We think the compost added a lot of heat absorbing action to the slope", said Hutchins.

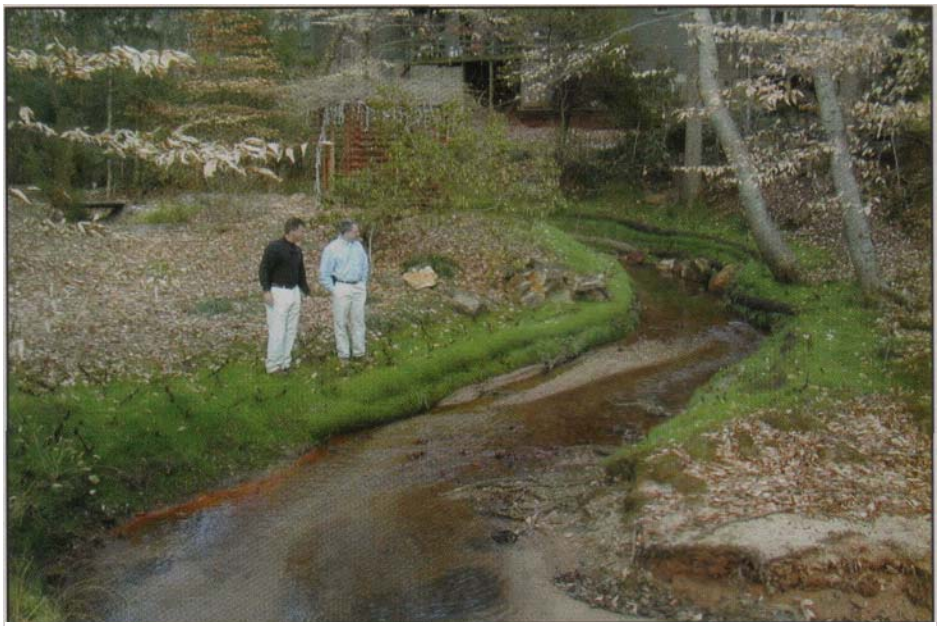
The blower trucks are able to blow the materials vertically as well as horizontally, offering special advantages for rooftop areas, ""we saved a lot of labor on our rooftop garden project", explains Connie Cannon from Replenish Products in Salt Lake City, Utah. "We were able to get the lightweight soil mix into the planter areas more efficiently, saving a lot of time. It would have taken much longer bit by bit in an elevator or by other mechanisms", she said.

eXpress scapes Inc. in Easley, S.C. "Our local landscape contractor, Lee Cline, asked us about helping on a streambank project which involved rip rap or a concrete retaining wall", he continued. At first, Wilson believed his company would be asked to pneumatically place fill materials behind a concrete or pavestone wall. The blower trucks Wilson uses are able to pneumatically deliver a number of products efficiently, without the use of wheelbarrows or a lot of heavy equipment. "Upon our inspection, it was obvious that we might be able to save the client money and increase both performance and aesthetic appeal by introducing compost products."

Wilson worked with Cline to assess the situation and involved the clients in the process. The streambank had severe erosion and a constant flow of water, bordering the backyard of the client. During heavy rains, the stream often reached a depth of 3-4 feet and had cut into the embankments of the backyard landscape and exposed roots of many tall mature trees. Oaks, poplars, sycamores and other large trees, many over a two-foot in caliper size, were at risk. The options for restoring this type of area, due to the severe undercuts, were limited.

The total streambanks were about 500 feet long and varied in depth on the sides from 2 feet deep to just fewer than 5 feet. As the creek flowed harder and harder with each rain, it was obvious that the clients would lose more of their backyard and perhaps some of the larger specimen trees. In making the decision on what stabilization method to use. Wilson consulted a local arborist to get opinions on impacts created from bringing in *heavy* equipment required for either riprap or retaining wall work. "Our consulting arborist, Scott Carlson of Arbor Guard, indicated that we could cause severe root damage to some of these older, specimen trees and that we should expect a loss from these activities. The loss of trees was a major concern to our clients due to the park-like setting in their backyard", Wilson explained.

The riprap and stone retaining walls did not fit the natural look of the landscape and they seemed over-engineered for the application. What was needed was creative bioengineering with some new tools that would satisfy the client's goals while meeting economic realities and budgets. That is when Wilson thought about compost, using a containment system for the edges of the streambank. Wilson is a Certified Installer for Filtrexx Erosion Products, manufacturer of FilterSocks, a patent pending tubular mesh netting material that works to contain the compost. "These products are a specially composted material that is used in a number of applications, including stream banks and restoration projects", he said. "We explained to our client that although we had not performed one of these projects locally, we felt these tools were their best option".



Jim Wilson & Associate review progress of the streambank stabilization project six **weeks after installation.**

Using compost materials and a containment system, together with backfill and redistribution of sediment already in the stream bed, they created the natural look that satisfied the client.

Together, the 'management team', which included the landscape contractor, Wilson, the arborist and the client decided to try the new system of stabilization. Using compost materials and a containment system, together with backfill and redistribution of sediment already in the stream bed, they created the natural look that satisfied the client.

Ironically, Wilson did not find out until after the project was underway that pricing for his system was significantly lower than the riprap or retaining wall options. "The clients agreed to do a trial section which cost about $4,000 and then once that worked, they allowed us to progress with the rest of the project", he said. The total project finished out at around $25,000, compared to $50,000-$75,000 for the other two options. Part of the high costs associated with the riprap and retaining wall options included very poor access to the site from the nearby road.

Project details

The project began on December 3-4, 2001, and when the photos in this article were taken several weeks later on January 17-18, 2002, germination and stabilization were evident. Wilson used the blower truck technology to fill the tubular mesh netting with compost, by parking on the road and dragging the blower truck hoses through the woods to the renovation area.

During the project, Wilson used a small dingo unit to help redistribute some of the sediment in the streambank to areas that needed extra fill. The combination of these techniques allowed the team to meet their objectives of zero tolerance of root disturbance or injury to the large specimen

trees. In fact, some of the trees were actually stabilized due to more soil and materials being backfilled around exposed roots hanging over the streambank.

A total of 60 cubic yards of special mixes were used to achieve stabilization,

As the seeds germinate and grow out of the containment netting, they also root into the embankments, increasing the holding capacity significantly.

including a soil blend of 30% compost, 30% clay topsoil and 40% aggregate for backfill and soil planting areas behind the contained area. The material used to fill the FilterSocks was about 40% aggregate. 30% double shredded, composted bark and 30% compost. The compost product was a local yard waste compost screened to a 12" minus specification. "The aggregate helped the materials increase our density to provide ballast in high flow rate situations", says Wilson.

During the filling of the socks and the backfilling operations, Wilson used a specially blended seed mixture consisting of fescue and rye, injected while the material was blown into place. The blower truck technologies offer a calibrated seed injection system, which gives applications like these an opportunity to pinpoint seeding densities. As the seeds germinate and grow out of the containment netting, they also root into the embankments, increasing the holding capacity significantly. "Compared to other systems with similar roll technology, we think using compost in the socks allows for the best chance for getting something to grow into the roll and into the bank", states Wilson.

For additional stability, a coarse weave geotextile was used to help secure layers of the socks together in a sandwich pattern. The fabric was placed on top of the tubular mesh netting prior to adding backfill, then

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over-layed to the next edge, then another layer of netting were added, and the process was repeated. "The geotextile served as a ribbon-like bridge and binding tie between the layers of socks and helped when the roots penetrated the mesh of both materials", explained Wilson.

The existing backyard of the clients included naturalized areas of English ivy, liriope, and purple winter creeper. Several thousand plugs of these species were planted, and incorporated in a random checkerboard stacked pattern along the composted and backfilled areas. In addition. Wilson included wetland grasses and other species as plantings in front of the oxbow areas in order for a naturalization area to again become established.

It is amazing to see how several thousand plugs make little impact on a planting area of this size, however, it is expected that with warm weather, the clients can simply live stake more plantings if they wish to invest the time and effort. "It is really easy to insert a live cutting into these socks, right through the mesh", says Wilson. "We felt it would be more economical and more engaging to allow our clients to be involved in this process if they add this during the spring months".

On one of the steeper and taller sides of the embankment, the FilterSocks were stacked nearly on top of one another against an embankment greater than 1:1 slope. "This creates what we call a 'Living Wall'", says Wilson. The area had definite stability problems from the eroding streambank, but had no load bearing support requirements that are often concerns on projects near parking lots or other more urban locations. The advantage to using a living wall in this project was that the bank required no additional excavation to create the natural angle and it allowed for existing vegetation to be tied into the steep slope at the top which offered further future protection against run-on water. On this application, the same weaving pattern using the geotextile was used to keep the containment socks from Tolling out' from underneath each other under the added weight of each layer.

Conclusions

Experts have long known about the exceptional qualities of compost as a superior filtration and erosion control material. Until now however, no one has recognized the tremendous benefits that can be derived by combining quality compost with a quality containment material for a product that is extremely versatile and effective in streambank stabilization. L&W

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