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Terraseeding...



Reclaiming the slopes

You just knew it was bound to happen. With tighter federal Phase II NPDES regulations there came steadily increasing hydroseeding opportunities. However, along with this increase came a higher number of project disappointments, giving the industry a black eye.

For the most part, these project failures were on steep slopes where quick plant growth was needed. This harsh terrain offered little in the way of topsoil; and the initial hydroseeding failed to flourish after the first growing season.

Problematic terrains such as cut-and-fill slopes along roadsides have created tough challenges for the erosion control contractor when it comes to reestablishing vegetation. These slopes are made up mostly of decomposed granite and little else. For years, controlling erosion on sloped areas had been accomplished through hydroseeding, mulching with straw, and on the more difficult slopes, with erosion control blankets. These practices have been mostly unsuccessful in revegetating these soil stressed jobsites.

There are a couple of reasons for hydroseeding failures on these harsh areas -- first and foremost, conventional hydroseeders pay very little attention to soil composition. In hydroseeding's defense, this usually is the result of needing to get seed on the slope quickly to promote plant growth to stabilize the soil against conditions that cause soil erosion.

So we get quick initial seed germination and growth in the spring after a fall dormant seeding; but without the nutrients and beneficial soil organisms in the soil to help promote plant growth, seedlings have no way of surviving their first growing season.



Freshly applied organic compost provides its own form of heat to this steep slope, and will help jump-start seed germination in the cool climate.

Photo Courtesy: Peterson Pacific Corp

The soil's mineral balance and the health of soil microorganisms within the soil biota are crucial building blocks of vibrant soil and plant life, a factor that escapes the notice of many reclamation managers. Soil is soil to many, and some have never even ordered an analysis of the soil taken for the seeding site they are trying to revegetate.

The second reason for failure is that conventional seeding techniques take a purely agronomic view to re-establishing native species on highly disturbed project sites. This ignores the fact that native species obtain their nutrients and moisture differently than ornamental and exotic species. In addition, native species have different germination and root establishment needs.

Another reason for some of the failures lies with the hydroseeder himself. Where specs have been followed, hydroseeding is recognized as a viable erosion control option. Where there is a deviation from the specs-- whether for fraudulent "creative finance" purposes or due to an unrealistic winning low bid-- the hydroseeding industry has encountered erosion of its own. This has resulted in a lack of confidence on the part of engineers, architects and erosion control professionals, who cannot be sure of either the short-term or long-term growth results.

Recently, another soil stabilization option has shown great success in the reclamation and revegetating of steep slopes: terraseeding with compost using pneumatic conveying systems or “blower trucks.” This effective application system is being used by more and more natural resource managers in areas where the soil has been severely disturbed, graded, or completely removed, as in the case of mountain roadway constructions.

Project failures are costly to both contractors and state DOTs. If erosion occurs while a project is still under contract, the contractor is responsible and must reapply topsoil, seed and fertilizer, mulch and/or erosion control blankets, and will not be allowed to sign off on the project until sufficient plant growth occurs. If the erosion happens on an existing highway section or after highway construction has been completed, the state is left to deal with and pay for the resulting problems.

In my own state of Idaho, the State Department of Transportation provided the citizens of Boise an easier route through Horseshoe Bend to their winter and summer playground in McCall. This highway construction left some very harsh and extreme slopes. As I drove through this area over the next six to seven years, I always noticed some type of activity in the dead of winter or early spring on these steep slopes. What I have recently learned from the Idaho Transportation Department (ITD) is that they had been waging a losing battle for plant growth on these slopes for more than nine years.

It seemed that year after year they continued to stay with known products and practices better suited for less severely disturbed sites. Gene Ross, roadside programs coordinator for the ITD, informed me that they have tried 80-plus products, and they can’t remember the number of different seed mixes they tried that covered the spectrum of exotic to native species.

Mother Nature, if anything, has shown that she is intolerant of weak links in the design and implementation of a seeding project.

After so many failures, it was agreed that to control roadside erosion and sedimentation, they were dependent on slope stabilization and revegetation for success. They felt that to achieve maximum revegetation results required the combining of many erosion control practices in one application.

The ability to mix a combination of products together, all performing beneficial yet separate functions, has been proven to have real merit. It is gaining a following and is in a category known as reclamation seeding.

Reclamation seeding means restoring disturbed land to the natural vegetative state that existed before it was disturbed. It is a tough challenge and a major concern of the erosion control industry to reestablish sustainable plant growth on these drastically disturbed soils.

The use of a seed mixture, combined with compost or a mulch and applied in one application, has been shown to have a higher percentage of success in re-establishing plant material in steep harsh environments where there is not sufficient soil to sustain long-term plant growth.



A compost blanket being applied to help stabilize this severe slope.
Photo Courtesy: Peterson Pacific Corp

Using both seed and compost or mulch applications may or may not be more cost effective than current practices. However, in the severe cases where vegetation has not been able to establish itself, compost or mulches with seed may be the only option left to try. In the cases of projects that have continually failed, any state or county will gladly try anything to keep from repairing these eroding slopes year after year.

Basically, compost is an organic material that is in the process of decomposing. In a natural environment, leaves, twigs, wood, dead animals and insects become the building blocks for compost. When water is added along with heat, microorganisms, and the passage of time, these basic elements are transformed into a rich nutrient-filled product that plants can feed on. Over time, compost starts a new life as topsoil. Reaching ten inches in depth, this area is filled with beneficial bacteria, and fungi and it is in this zone where the largest percentage of a plant's roots will remain.

Besides occurring naturally in the wild, compost is also created in vast amounts by civilization. Yard waste, wastewater sludge, various wood and paper products, and certain animal manures all can be converted into nutrient-rich compost. This huge waste stream of product ensures local availability to your project site and low product costs.

Using compost (dry applied) or organic-based mulches and biological soil stimulants (hydro applied) has shown that they can grow vegetation on steep, highly erodible slopes. Seeding applications, primarily performed on slopes that have more decomposed granite as a topsoil, show that initial rapid germination and long-term sustainable growth is possible.

Soil amendment ingredients such as mulch or compost, combined with soil stimulants and the correct seed specie mixtures, including a combination of grasses, forbs and shrubs to help diversify the plant root depths, are ingredients for success.

Getting back to the Horseshoe Bend site, what the ITD did was hire a consultant. His first order of business was to order a soil analysis so they could develop and design a seeding plan that would have a high probability of plant sustainability.

The soil dictates what is required to be done to establish the desired growing conditions for the selected species of plant, and that is why a soil analysis is so important.

After the soil analysis, the prescription for success included the use of soil amendments to improve the soil structure, along with an organic mulch applied to the slope at a rate of one ton per acre. The seed blend chosen included a mixture of native grasses and small shrubs. With this application, the site had a higher rate of plant density, surviving the winter and summer better than all other earlier attempts. Needless to say, my friends at the Idaho Transportation Department are more than happy and have made this type of reclamation seeding a mainstay on all similar projects.

Good seeding designs are ones that perform across time. And at this time, there is no magic bullet for successful native plant reclamation projects, because each site is unique in soil, altitude, degree of slope, microbial composition, plant species, rainfall, temperature fluctuations, etc.

But there are a limited number of solutions that will dramatically increase your chances of a successful seeding effort. Working towards re-establishing a healthy soil food web in these sterile soil environments sets the stage for the natural re-establishment of site-specific mycorrhizal fungi and related soil microorganisms.

As our natural resources and landscapes continue to degrade, our concern focuses on the preservation of the environment with special regard to water runoff, soil movement and revegetation.

Maybe the key for all of the people working on revegetating disturbed sites covers not only setting attainable goals and plans but, more important, having the patience to see the project through for its long-term success. By doing this, the industry will have truly made a difference and helped make the environment better for everyone.

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