

New Technology in Postfire Rehab

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Abstract—PAM-12™ is a recycled office paper byproduct made into a spreadable mulch with added Water Soluble Polyacrylamide (WSPAM), a previously difficult polymer to apply. PAM-12 is extremely versatile and can be applied through several methods. In a field test, PAM-12 outperformed straw in every targeted performance area: erosion control, improving soil hydrophobicity, and plant establishment. ENCAP, LLC in Green Bay, WI, holds the patent to PAM-12.

Introduction

A new technology, available for postfire rehabilitation and restoration work, stabilizes soil, improves native seed establishment, and reduces hydrophobicity in the soil. Government entities that need to rehab fire-decimated forests are effectively demonstrating it, testing it, using it more and more, and discovering the same thing: this innovation not only does a better job than traditional means, but it is more cost effective, allowing double the acreage on average to be restored for the same amount of money. The product revolves around the use of a highly researched Water Soluble Polyacrylamide (WSPAM). WSPAMs have been used in agriculture for decades; however, it has always been a difficult polymer to apply. ENCAP, LLC in Green Bay, WI, has patented an innovative carrier technology to make application of WSPAMs easy and cost effective.

The specific product is called PAM-12™ and with the help of Dr. Aicardo Roa, from the University of Wisconsin-Madison, it has been perfected as an extremely powerful yet cost effective tool that can be added to any erosion control program, especially postfire rehab. Specifically, PAM-12 is a recycled office paper byproduct made into a spreadable mulch impregnated with WSPAMs patented as Advanced Soil Technology™ (AST™). PAM-12 is extremely versatile in its application methods as it can be applied through traditional spreaders, drill-seeded, or hydro-seeded. Or uniquely, PAM-12 can be combined with any seed variety need and can be applied in one step saving even more time and money.

TRI, a reputable, independent testing agency, put PAM-12 to the test (as requested by Wisconsin Department of Transportation) by requiring it to pass the test that is required for erosion control blankets to pass. The passing grade is a C factor of 0.2 or below. The 0.2 is the amount of soil loss that 2,000 lb/acre of straw produces. At only 600 lb/acre, PAM-12 produced a C factor of 0.12. This paper reports the field trial results that show at only 600 lb/acre, PAM-12 outperformed straw (at 3,000 lb/acre) in every targeted performance area: erosion control, improving soil hydrophobicity, and plant establishment.

In: Butler, Bret W.; Cook, Wayne, comps. 2007. The fire environment—innovations, management, and policy; conference proceedings. 26-30 March 2007; Destin, FL. Proceedings RMRS-P-46CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 662 p. CD-ROM.

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Methods

Uinta National Forest Red Bull Fire

The Red Bull Fire burned through the Uinta National Forest in the Spanish Fork Canyon near Provo, UT, in July/August 2004. The 1,836 acre fire burned for 6 days before being contained on August 3, 2004. Specialists with backgrounds in soil science, hydrology, ecology, archaeology, range management, and erosion control analyzed the burned area and proposed several treatments as part of the Burned Area Emergency Response (BAER) report/plan.

The rehabilitation treatments revegetated burned slopes through use of combining native seed species with use of straw mulch and PAM-12 to aid vegetative recover, reduce erosion, and prevent degradation of soil and water resources.

High severity burn areas experience higher rates of soil/vegetation loss from erosion due to high overland flow, decrease in infiltration (water repellency), and loss of vegetation coverage.

Objectives—Compare performance capabilities of PAM-12 to straw in the following targeted performance areas relating to revegetation:

- Soil hydrophobicity—scarred soil’s tendency to resist water intake
- Erosion control
- Seed establishment and revegetation

Demonstration/evaluation method—In total, four demonstration sites were created (with seed): PAM-12, straw, Pam-12 plus straw, and a control

Participation/evaluation leadership team—Team members were:

- USDA Forest Service Soil Scientist Bob Davidson
- USDA Forest Service and BAER Leader: Ken Luckow
- USDA Forest Service Hydrologist Jeremy Jamecke
- Manufacturer: ENCAP, LLC, Mike Krysiak, President
- Distributor: UAP Timberland, Pat Thomas
- Pilot: Stephen West from Reeder Flying Service

Application—A helicopter aircraft was used for all aerial applications. A seeding bucket was used by the aircraft for application of the seed and PAM-12. Traditional aerial application methods were used for straw mulching and hay bale bombing. Application rates of products were as follows: seed = 46 lb/acre, PAM-12 = 600 lb/acre, straw = 3,000 lb/acre.

Test protocol—Objective test protocols were established by the USDA Forest Service for each aforementioned Targeted Performance Area. Data were collected in triplicate per demonstration site for accurate representation.

Results and Discussion

After more than 9 months of field observation relating to revegetation, data conclusively demonstrate that PAM-12 outperformed straw in all three targeted performance areas: seed establishment, erosion control, and soil hydrophobicity.

Hydrophobic Soil Test Results

Both demonstration sites that utilized PAM-12 saw significant improvements in water infiltration of the treated soil. When directly comparing PAM-12 to straw, PAM-12 showed a 38 percent improvement in the hydrophobicity of soil, versus a 0 percent improvement shown in the straw plot (fig. 1).

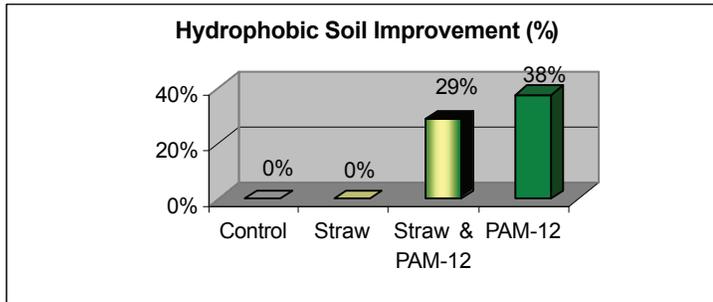


Figure 1—Comparison of four treatments and the hydrophobic soil improvement.

Erosion Control Test Results

PAM-12 outperformed straw in its ability to control erosion and reduce the total soil movement by over 60 percent. In addition, both demonstration plots treated with PAM-12 (strictly PAM-12 and PAM-12 with straw) did significantly better than plots not treated with PAM-12 (fig. 2).

Plant Establishment Test Results

Use of PAM-12 resulted in more plant life than straw by a ratio of more than 2:1. On the plot where PAM-12 was added with straw, the plot generated 78 percent more plant life than straw alone.

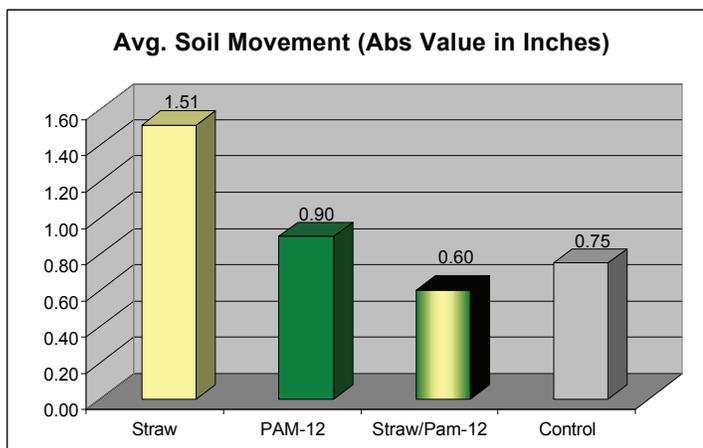


Figure 2—Erosion control test results on four treatments.

Observations

Successful germination and establishment of plant life is impacted by variables such as erosion, soil's hydrophobic nature, and soil type. PAM-12's performance in the other two targeted performance areas was certain to aid in helping to achieve better results in this third and final targeted performance area (fig. 3).

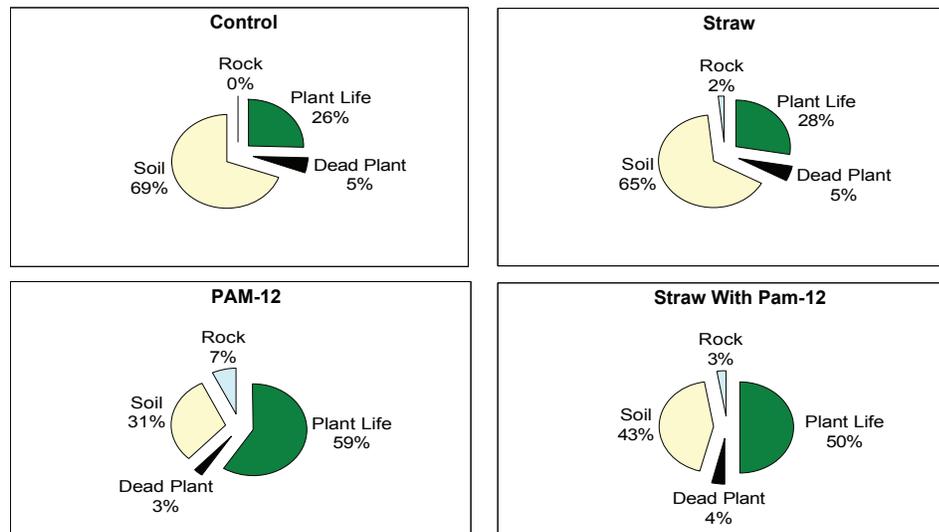


Figure 3—Plant establishment on four treatments.

Summary and Conclusions

In conclusion, PAM-12 is a proven product for forest fire rehabilitation and restoration. More and more government entities are adding PAM-12 to the list of tools in their toolbox. PAM-12 has the ability to not only control erosion, but to improve plant establishment and improve the hydrophobic layer formed in the soil after a burn. In addition, PAM-12 is effective in conjunction with other tools as the data above suggest. This gives one a “belts and suspenders” approach for those extreme cases where multiple means are needed to restore a mountainside.

In addition to all the aforementioned benefits PAM-12 brings, it is extremely cost effective as well. This is important as year after year, budgets get tighter and tighter. Utilizing PAM-12 in the rehab program allows an end user to rehab on average twice the amount of acreage than traditional methods (600 lb of PAM-12/acre versus 3,000 lb of straw per acre). Or instead of applying it by itself, PAM-12 has the unique ability to be combined with seed to do application of mulch and seed both at the same time saving time and money.