Healing in a Fire's Aftermath

Engineered WoodStraw™: Effective, new erosion-control product

Roy C. Anderson and Jim Dooley

According to the National Interagency Fire Center, each year for the last six years, an average of 78,000 wildfires have burned 1.7 million ha (4.3 million acres) in the United States. The human response to those fires varies greatly: some are left to burn themselves out, while others are suppressed with every resource available. Generally, those fires that require a large suppression effort also require follow-up assessments and management to limit further damage to the burned area.

How can a burned area be further damaged?

In the aftermath of a fire, areas formerly covered by vegetation can be highly susceptible to soil erosion during rainstorms. Another problem is rapid water runoff, which can lead to flooding in nearby streams. In fact, in some slow-moving, intense fires, burning vegetation creates a gas that penetrates the soil. As those gases cool they condense and form a waxy coating, which causes the soil to repel water – a phenomenon called hydrophobicity. In such cases, the rate of water runoff increases dramatically. Yet another post-fire problem is soil erosion that can lead to heavy sediment loads clogging nearby streams and reservoirs. Finally, the loss of topsoil and unburned organics left on the site can reduce soil productivity and delay the recovery of vegetation. Fortunately, soil scientists and hydrologists have developed an array of tools to manage areas susceptible to post-fire damage. For example, water runoff can be slowed by felling logs across slopes, straw bale check dams can be built in drainages, and water bars can be built across roads. While all of the above are good techniques to reduce down-slope effects, they do little to protect a burned area's soil from erosion.

Stopping erosion in its tracks

One of the most common soil erosion control measures is spreading agricultural straw mulch across an erodable area. The mulch intercepts rainfall, thereby reducing the impact of raindrops hitting and displacing bare soil. In addition, mulch slows water runoff, thereby decreasing the chance for erosion. While agricultural straw is effective in controlling erosion it has some drawbacks: it can be blown off the site by wind, it decomposes quickly, and it may introduce noxious weeds into ecologically sensitive areas.

A portion of the School Fire, Umatilla National Forest, was heli-mulched with wood-strand erosion control material. *(Photos by J. Dooley)*

The birth of WoodStraw™

After recognizing the problems associated with agricultural straw, researchers at Forest Concepts, LLC, Federal Way, Wash., began development of an alternate erosion control product. They spent two years "figuring out the science behind why agricultural straw does what it does" and then created a substitute made from wood-based materials.

WoodStraw™, the research result, is an engineered wood-strand mulch – a mix of long and short wood strands that are spread over an erodable area to control soil erosion. Both the long and short strands are 4.7 mm wide by 2.5 mm (0.2 by 0.1 in.) thick, but the long strands are 160 mm (6.3 in.) long whereas the short strands are 64 mm (2.5 in.) long. Identifying the optimum strand size and best blend between long and short was a cooperative effort between

Wood-strand width, length, thickness, and blend are designed to provide functional performance. WoodStraw™ mulch includes a blend of sliced veneer strands based on lab and field research results.

Wood-strand mulch is "weight-easy," baled for handling on small projects like Weyerhaeuser's forest road maintenance. ***(Photos by M. Brooks)***

Forest Concepts and the USFS Rocky Mountain Research Station in Moscow, Idaho, that included more than 200 experimental runs on laboratory rainfall simulators. ASABE members Bill Elliot, Randy Foltz, Pete Robichaud, Jim Fridley, and Joan Wu were valuable cooperators in the development of the woodstraw mulch.

Water-repellent when tested

After the initial laboratory research efforts, field trials were carried out to compare the erosion control effectiveness of WoodStraw™ and agricultural straw. Controlled studies were conducted in western Washington and central California on highly erodable loam soils. On slopes ranging between 15 and 25 percent, several 5- × 30-m (16- × 98-ft) plots were established. Some of the plots were covered with WoodStraw™ mulch, others were covered with agricultural straw, and others were left bare to serve as controls. The amount of erosion that occurred on each plot was then monitored for several months. The results indicated that the WoodStraw™ engineered wood-strand mulch and the agricultural mulch were equally effective in controlling erosion.

A truck driver straps large bales of wood-strand mulch soon en route to a wildfire rehab project in Idaho. ***(Photo by M. DeTray)***

However, after about three months, much of the agricultural straw mulch had decomposed, and thus it's effectiveness in controlling erosion was reduced. The Woodstraw™ engineered wood-strand mulch was still intact.

Another study is currently underway at the University of Washington Research Forest to monitor the long-term performance of WoodStraw™ mulch relative to agricultural straw.

Dollars and sense

While WoodStraw™ mulch costs somewhat more than agricultural straw, it lasts longer, is inherently free of noxious weeds, is more ecologically compatible with forest soils, and is less likely to blow away in the wind.

The product is made in a process similar to paper passing through a shredder. Forest Concept's engineers developed a machine that "eats" sheets of wood veneer and spits out Woodstraw™ strands on the other end. Processed wood strands are baled into 23-kg (50-lb) and 270-kg (600-lb) bales that are easily shipped and can be handled and spread on a site like agricultural straw.

The first commercial sales in early 2005 were to Weyerhaeuser Company, Washington State's King County, and the USDA Forest Service. Production from a pilot plant resulted in sales of more than 82 Mg (90 tons) of WoodStraw™ erosion-control mulch, including use on the School Fire in eastern Washington and the Snake 1 Fire in Idaho. The market continues to develop. **R**

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WoodStraw™ engineered wood-strand mulch products will be featured in an exhibit at the ASABE Annual International Meeting this summer in Portland, Ore. For more information about WoodStraw™ contact ASABE member Jim Dooley, Forest Concepts, LLC, 1020 S 344th St. Ste. 211, Federal Way, WA 98003 USA; 253-838-4759, dooley@seanet.com or Rich Lane, Natural Resource Solutions, 406-370-4767.