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WOOD STRANDS AS AN ALTERNATIVE TO AGRICULTURAL STRAW FOR EROSION CONTROL

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BACKGROUND

Agricultural straw is used in forested areas of the United States for erosion control on burned areas, harvest landings, decommissioned road prisms, road cuts and fills, and other areas of disturbed soil. However, an increased agronomic and ecological value for straw; an increased utilization for energy production, fiber panels, and other higher value uses; a realization of the potential of a weed and chemical residue source; and a realization of straw as a source of allergens to workers that handle straw have challenged the perceived advantages of agricultural straw.

A Wood-Strand Alternative to Straw

A wood-based product that performs as well or better than straw mulch seems to be a suitable replacement in most applications. The benefits include use of wood from smaller-diameter poles and species unsuitable for other products, a more profitable use of small-diameter timber due to the low capital cost for manufacturing equipment and local product markets, and lower transportation costs than agricultural straw. The wood-based product is also inherently free of noxious weed seeds and likely to be free of pesticide residues, has a high structural integrity, and has a zero to low probability of producing dust or allergens during application.

A small business cooperator is developing the material and methods for its manufacture. As shown in figure 1, narrow veneer strips of various lengths can be blended to produce a functional analog of straw. The manufacturing process allows the application of disciplined design techniques to specify length, width, and thickness of individual components, as well as blends.

Figure 1—Narrow strips of wood veneer used as an alternative to straw mulch.

Design and Testing

For the initial design, two widths of strands were tested in the Rocky Mountain Research Station rainfall simulator laboratory. A wide group had a width of 16 mm, while a narrow group was 4 mm wide. Both groups used lengths of 60, 120, and 240 mm. To compare the erosion mitigation of wood strands to that of straw, tests employed a replicated experimental design consisting of four soil treatments with three repetitions. The four soil treatments were bare, straw, wide wood strands, and narrow wood strands on a gravelly sand soil. A constant rainfall rate of 50 millimeters per hour plus added inflow to simulate a longer length slope produced a rain and added inflow sequence. One soil, one 30-percent slope, and one 70-percent cover for both the straw and the wood strands was used. This set of treatment conditions provided a first assessment of the potential efficacy for the wood strand mulch materials and a baseline for future experiments.

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Results

The two blends of wood strands were statistically equal to straw in reducing both runoff and sediment production. Both the straw and each of the wood fiber mixes reduced erosion by 98 percent as compared to the bare soil. This result implies that wood fibers are an acceptable alternative to agricultural straw in erosion control applications. Further work is underway to determine optimum width and length mixes, application rates, and decomposition rates for the wood fibers.

Table 2.2—Approximate Metric System Conversion Factors

Approximate Metric to English System Conversion Factors

To Change	To	Multiply by
millimeters	inches	0.03937