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TECH TALK

RECYCLING PINE TREES USING STATIC ELECTRICITY - REALLY?

BY GARY BEERS • FOR ENERGY PIPELINE

WHEN PINE TREES ARE HARVESTED, approximately 66 percent of each tree (about 300 pounds) is left behind as waste (slash), which is typically burned. The residual limbs, bark, needles, leaves and cones are storehouses of nutrients and other important chemicals that should be recycled for various uses. Also, this slash includes vegetation from the forest floor, such as hay, flowers, grass and berries.

Recognizing the needless loss of this resource, many approaches to recycling have been proposed and tried but abandoned due to costs. Simply, the expense to recycle slash to a marketable product exceeds the projected revenue from the sale. A sustainable, economic solution would require lowering the costs of processing the slash to provide a recyclable material that could be incorporated into a marketable, high-value product.

How can the processing become more efficient and less expensive?

Here is a wild idea.

What if the slash were placed in a large pile and struck with a lightning bolt to produce small pieces that can be recycled into useful, valuable products?

If this outrageous idea was tested by the scientists on the popular television show, "MythBusters," everyone would expect the conclusion to be "busted."

Well - a scientific inventor and entrepreneur (who owns 42 acres containing 17,000 pine trees located west of Fort Collins) has proven the science of the wild idea is true. Basically, he creates lightning in a tube to reduce slash to small pieces as follows:

- A chipping machine reduces the slash to small pieces (Image 1)
- Several pounds of chipped slash is placed in plastic tube (6 inches in diameter, 24 inches long) with metal rods and then closed with end-caps.

- Tube is turned on mechanical roller for a few hours.
- The small pieces of slash are removed from tube and passed through a sieve to improve homogeneity (Image 2).
- In some cases, the further sifting is necessary to provide a fine powder (Image 2).

The two sizes of materials are now ready for further processing into commercial products.

By the way, the above process is an important scientific break-through. As youngsters, our first fun experience with static electricity happened on touching a Van de Graaff generator (Graphic 3). These electrostatic generators are used to generate high voltages in various science experiments, but have not received much commercial use in the everyday world. The above use of a static electricity to breakdown slash is probably the only commercial application of an electrostatic generator in a viable business. This process is protected under three, full patents.

HIGH-VALUE PRODUCTS (UPCYCLING)

The slash pieces generated in the plastic tubes is upcycled into two commercial products with established markets. These products retail in the range of \$8 to \$10 per pound.



For over 50 years, **GARY BEERS**, has worked in numerous fields of environmental science as a consultant, regulator and educator. This career included senior management position with major consulting, nonprofit and public organizations. He has founded several successful firms to capture emerging resource management markets. One of his latest ventures, EnviroScienceINFO, provides content for public media.



SOAP

The antioxidant-rich powder is mixed with borax, sodium soap with Lanolin to prepare a soap, which is biodegradable. Besides cleaning skin, the soap is used to spot clean clothes, tools and other items. This product is distributed and sold in 15 to 20 states and the overseas demand is growing (i.e., large standing order recently received from China).

FERTILIZER

The homogenous particles are a valuable, dry, natural organic fertilizer marketed for uses in indoor and outdoor potted plants. The small pieces allows convenient handling and application in a uniform manner, as well as being mixed with water and sprayed on plants as a liquid fertilizer. Colorado State University scientists conducted an investigation to determine the effectiveness of this product as an organic fertilizer, when used in a lettuce growth test.

Findings included:

- Lettuce - improved growth, increased nutrients, lower metals content.
- Soils - improved sandy/silty soil, loosened clay soil to improve.
- Drainage - increased cation-exchange capacity.

Further research and development is underway to identify additional interested markets for upcycled products derived from the particles generated by the electrostatic process. Attractive avenues of development are based on the patented process that results in isolation of useful chemicals and the breakdown of longer-chain hydrocarbons.

One attractive avenue is the isolation of natural antioxidants that may be incorporated into pharmaceutical products.

Some users of the soap have reported unexpected side-benefits. In addition to cleansing properties, the soap seemed to reduce rashes and related skin conditions. Pine needles are known to contain strong antioxidants. Thus, recycled pine slash may be a

key ingredient for pharmaceutical products to treat certain types of skin disorders.

Another attractive avenue, especially in the oilfield sector, is the addition of recycled pine slash to drill cuttings and impacted soil (i.e., containing petroleum spills) to generate enriched, soil suitable for farming.

The pine tree has already created the required balance of nutrients and minerals during the growth process which upon decay strongly supports growth of seedlings. In a sense, the particles from the above recycling process are able to provide these growth-supporting compounds in a more available form for development of soil micro-organisms and subsequent plant communities. The scientific inventor is finding the addition of the particles to traditionally nutrient-poor mountain soils is resulting in productive gardens with rich sustainable soils. The possibility exists that the particles can serve to inoculate cuttings with the appropriate balance of chemical to kick-start the development of useable soil.

We will be hearing more about the growing success of "green" products from this break-through recycling process. ♠



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