Natural Hardwood Charcoal: It's About Jobs and Improving the Forest Resource

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Background

Charcoal making played an important role in the industrial history of America, and its impacts on our forests can still be seen today. The iron industry depended entirely on wood charcoal for smelting and smithing until coal slowly replaced it as the fuel of choice in the late 1800s. From New England through much of the Mid-Atlantic, colliers employed large labor forces to clear as many as four acres of woodlands each day for wood to make charcoal for a single iron furnace. The work was grueling and dangerous. Many thousands of acres of land were harvested repeatedly in 20-40 year cycles that favored rapid-sprouting hardwood species like oaks and the American chestnut. (For an interesting and comprehensive treatment of the history of charcoal in Virginia, go to http://www.fs.fed.us/r8/gwj/lee/cultural/iron_charcoal_industry/index.shtml)

Charcoal was used in many ways people today might not expect. Well into the 20th century, it was the primary source of cooking fuel in many homes and apartments in the rapidly growing cities of the Eastern Seaboard. Today, although many people think of Henry Ford's patented briquette-style charcoal as the product they might use for outdoor grilling, lump charcoal is enjoying resurgence in use among backyard grilling enthusiasts who demand its superior qualities to those of briquettes.

An Economic Opportunity

Enterprising individuals in the logging or arboriculture industry may find a business opportunity in making and selling locally produced charcoal as a value-added and business diversity product, and this from what is often otherwise unused raw material, such as treetops and urban waste wood. A charcoal kiln can be as basic as a dirt oven, like the ones that are still used in many third world countries, or a 50-gallon drum, or a slightly more complex modified chicken feed hopper, or even the manufactured, "professional grade," commercial-type charcoal kiln.

The function of a charcoal kiln, whatever the design and material used, is to moderate the combustion such that it distills the wood to its raw carbon form. This is accomplished through a low oxygen burn that not only drives all the moisture away but also ignites a chemical reaction exuding gases and tar and resulting in nearly pure carbon. This "carbonization" occurs at temperatures above 518 degrees Fahrenheit. The resulting pure carbon (lump charcoal) burns nearly odorless and roughly twice as hot as a wood fire.

A cooperative project of the Virginia Department of Forestry, Virginia Tech, Virginia Cooperative Extension, and New River-Highlands and Tidewater RC&D Councils has, over the past several years, been experimenting with the reality of a portable type of kiln made out of a chicken feed hopper and other readily available material. The goal is to realize value-added opportunities for wood that might otherwise be wasted, from timber stand improvement, tree service work, or logging residue.

Small, portable, charcoal kilns have an economic advantage over centralized production facilities in that wood as a raw material is very expensive to haul. A batch of charcoal weighs roughly one-fourth the weight of the wood used to make it, and takes up only one-third of the volume. So, making charcoal near the site of wood harvesting can substantially reduce transportation costs. Producing a 300-pound batch of kiln-fired charcoal requires anywhere from 4 to 8 hours of labor. When spread out over a 24-48 hour production cycle, and running two or more batches in sequence, labor costs can be substantially reduced. The more handling required, from processing of wood residue, to sorting, packaging, and marketing the finished product, the greater the costs; therefore, partnerships and creative marketing strategies can help make an enterprise profitable. When one considers the range of prices paid for lump charcoal, from $200 per ton on international commodities markets to 70 cents per pound or more in gourmet markets, some producers ultimately find that charcoal-making is worth the effort.

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An Environmental Solution

In addition to the economic opportunity, natural lump charcoal is a specialty forest product that can be an important part of the overall goals of sustainable forestry. Sustainability stresses a continued supply of a given product. Far too often, our forests are not managed in truly sustainable ways as they are more often "mined" for the highest value products (high-grade and high-value hardwood species) without regard to the ability of that forest to continue producing high-end forest products. One reason for this is the economic structure of timber—low grade stuff just doesn't pay. While firewood and pulpwood are always options, charcoal production represents an additional value-added product that may make good forestry more economically viable. By finding more uses for underutilized wood, we can encourage more practices like timber stand improvement, invasive species control, fuel reduction, etc., and better harvesting efficiency. High-quality charcoal can be produced from most hardwood species common to Virginia, including "worthless" *Ailanthus* which, left behind in a forest disturbance, quickly out-competes many native species and drastically changes the ecology of the area.

Smoke produced from the charcoal-making process can pose an environmental hazard if not treated properly. This is an important concern as poor air quality, particularly in some parts of Virginia, is a big deal. One relatively effective solution is to insert a catalytic converter in the charcoal kiln's smoke stack. Once heated, the converter significantly reduces emissions of otherwise harmful smoke and gases. Research done by the Environmental Protection Agency has shown that charcoal making, even when done in low-tech metal and brick containers, does not produce the harmful particulates that open burning of wood waste releases into the air. Because of this, some have proposed that charcoal production is a viable alternative in land-clearing for development where treetops and stumps might otherwise be piled and burned as waste.

Lastly, another ecological value that should not be overlooked is the benefit of "local" products. Locally-produced and marketed charcoal simply does not consume the fossil fuels needed to transport the same products from elsewhere in the country. Carbon, with a smaller "carbon foot-print."

If you are interested in learning how to make charcoal, would like to purchase a bag or two of local charcoal, and even taste-test food cooked using charcoal, these unique opportunities will be available at the Charcoal-Making Demonstration in Madison County on September 5, 2009, at the Madison Farmers Market. For more information, contact Adam Downing at 540-948-6881 or adowning@vt.edu. A Virginia Tech website describing how to build the chicken feed hopper kiln and related material can be accessed at http://charcoal.fw.vt.edu/charcoal.shtml.

A portable, modified, chicken feed hopper, charcoal kiln in operation designed by Virginia Tech and Virginia Department of Forestry at last year's Farmers Market in Madison County. Photo by Adam Downing