Transformation of Household and Agricultural Waste into Stable and Energy Dense Biomass Briquettes

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A big problem is climate change. The U.S. uses more than 187.8 trillion pounds of non-renewable natural gas. The U.S. discards renewable products every year including 222.5 billion pounds of paper, 8.39 billion pounds of orange peels, and 35 billion pounds of coffee grounds. Unfortunately, these resources are hard to collect, transport, and store. Through shredding, soaking, and pressure, some resources can be transformed to biomass briquettes. Knowing this, I collected seven renewable resources from household waste and agricultural byproducts. After collection, the materials were shredded and dried. In some cases, briquettes were made from 100% of a material but every material was also combined with soaked paper and compressed in a homemade briquette press. The briquettes were removed from the press and dried. Densities of the starting material were calculated as well as the densities after briquette formation. Pure resource briquettes rarely worked, but combination of any resource with paper produced a useful briquette. The densities of the dry resources ranged from 0.04 g/cm3 (leaf litter; n=3) to 0.53 g/cm3 (coffee grounds; n=3). After formation of briquettes, the least dense resources gained in density by eight times and the density ranged from 0.32 (soybean fodder; n=11) to 0.55 (orange peel waste; n=12). Calories were determined using a calorimeter. The briquettes energy output ranged from 2505 calories/g (saw dust; n=3) to 2914 calories/g (paper; n=3). In conclusion, using simple household resources and equipment I created an energy dense, reusable, green and stable heat source.

Awards Won: