Introduction


During 2013, we looked at various on-site waste materials as possible feedstocks for making biochar, with the expectation that some would perform better than others. Composition is one important factor in performance. Better feedstocks are generally those that are high in lignin, which produce higher yields of char (Lehmann and Joseph 2009; Orfao et al. 1999). Feedstocks higher in cellulose do not do as well. We understand this to be a matter of time, temperature, and heat.

Our retort only heats the feedstock to about 350º C (662º F). Cellulose does not start to degrade until temperatures reach 300º F to 315º F, depending on the nutrient content of the feedstock. Feedstocks like okra stalks, with high cellulose content (>60%) do not char very well because the retort only exposes the feedstock to high temperatures for a relatively brief amount of time. Okra stalks may need more heating time because cellulose is a natural insulator. With a two-barrel nested retort, longer heat exposure would mean conducting a burn twice, and this is impractical.

The accompanying table lists possible biochar feedstocks found in Oklahoma and their proportions of cellulose, hemicellulose, and lignin. Ideal feedstocks for use with a two-nested barrel retort are highlighted [1].

The “moderate suitability” feedstocks will probably produce biochar of middling quality. The “high suitability” materials will probably produce excellent quality biochar in good, satisfying quantities. The “low suitability” feedstocks should probably be avoided because of their high cellulose content. Newspaper may or may not produce decent biochar, as its lignin and cellulose content can vary widely from publisher to publisher.

The final choice of feedstocks is not dependent on composition alone. Manure, for example, is packed with nutrients and beneficial organisms. It would be better composted and applied as such to the soil [2]. Another issue might be handling and transportation. Woody materials are more dense than crop residues, which would make them more efficient to transport. Also, crop residues are very directly important in soil protection and the cycling of organic matter and nutrients. Removing them from the field to make biochar may be counterproductive, an inefficient use of resources, and a potential contributor to soil erosion due lack of groundcover.
Notes

1. Information on many other feedstocks can be found at http://www.ecn.nl/phyllis2/Browse/Standard/ECN-Phyllis.

2. Burning manure is prohibited for certified organic production under the current National Organic Standard.

References


<table>
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<th>FEEDSTOCK</th>
<th>SUITABILITY</th>
<th>CELLULOSE %</th>
<th>HEMICELLULOSE %</th>
<th>LIGNIN %</th>
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