Regional Feedstock Partnership Highlights—Corn Stover

Stover, the aboveground plant material left after grain harvest, was identified as a major feedstock for bioenergy production because of the vast area used for corn production in the US. The Regional Partnership Corn Stover team clearly documented that ***corn stover is not a "waste" product associated with grain production***. Stover and all other crop residues are essential for protection against soil erosion, provision of soil carbon, and cycling of essential plant nutrients. Excessive biomass harvest for any use can easily disrupt these important functions, or ecosystem services. The quantity of stover harvested at all sites showed substantial seasonal variability due to differences in growing conditions (i.e., planting dates, rainfall, temperature patterns, etc.), field-specific lodging caused by severe wind storms, and/or yield loss due to drought or hail.

Stover harvest increased mean annual N, P, and K removal by an average of 24, 2.7, and 31 kg ha^{-1} (22, 2.4, and 28 lb ac^{-1}), respectively, for the moderate-removal treatment and by 47, 5.5, and 62 kg ha^{-1} (42, 4.9, and 55 lb ac^{-1}), respectively, for the high-removal treatment. Among locations, there was substantially more variation in nutrient removal than might be implied by the overall means due to factors such as hybrid, time of sampling and growing season conditions.

Enhancing the ARS-Resilient Economic Agricultural Practices (REAP) (formerly the Renewable Energy Assessment Project) efforts through the ARS-REAP/Sun Grant Regional Partnership helped provide sufficient technology to show that critical feedstock supply needs can be met in an agronomically, environmentally, and economically sustainable manner. An outcome of the Corn Stover Team partnership was the inclusion of soil organic carbon (SOC) constraints in the revised billion ton report (BT2) and Biomass Research and Development Board (BRDB) reports. This optimism is also being confirmed by the 2014 launch of three full-scale corn stover bioenergy conversion facilities in the US. Indeed, this is a strong market signal, but it also indicates that cellulosic feedstock supplies must increase dramatically to meet bioenergy production demand in a sustainable manner.

The most important point of this comprehensive SOC and crop residue study is that extreme variability refutes any notion that there is a universal minimum residue requirement. Instead, the Corn Stover Team unanimously recommends that crop residue harvest decisions must be made at the local level if not the individual field, or better yet, subfield management level.

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