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ARS Improves Crop Residue Management

June 12, 2009

Researchers at agricultural Research Service (ARS) -- the main scientific research agency of the US Department of Agriculture (USDA) -- have found some barley and wheat cultivars produce crop residues that differ in fiber composition, carbon/nitrogen ratios, and other characteristics. Growers rotating crops can use this information to select wheat and barley cultivars with residues that can optimize field conditions for subsequent production. This refined crop residue management can help build soil organic matter, curb soil erosion, retain soil moisture, and maximize crop yields.

ARS soil scientist Ann Kennedy and Tami Stubbs of Washington State University (WSU), US, conducted a two-year study of post-harvest crop residues with other WSU and ARS colleagues. They identified links between decomposition processes and fiber and nutrient characteristics of the straw from residues of 17 cultivars of winter wheat, 16 cultivars of spring wheat, and nine cultivars of spring barley grown at four locations in southeastern Washington. The team measured the content of hemicellulose, cellulose, and lignin in each type of residue, as well as residue levels of carbon and nitrogen and the ratio of the amount of carbon to nitrogen (C/N).

The research team found that the straw from the different cultivars had notable differences in fiber composition and C/N ratios, which -- along with carbon levels -- also varied significantly by location, probably because of different soil and growing conditions. Results of tests on the straw residues indicated that 14% of the cultivars had characteristics for slow residue decomposition and 14% had characteristics indicating a potential for rapid decomposition. Rapidly decomposing cultivars are less likely to impede no-till seeding in higher rainfall areas where more straw is produced.

The identification of differences in these crop characteristics could help growers select cultivars that produce residues best adapted to reduced-tillage cultivation. These residues may also benefit subsequent crop establishment, maximize soil organic matter to improve yield and increase carbon stored in the soil.

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