

Immediate Release

June 29, 2020

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Wheat Straw & Cover Crops

As wheat and barley harvest progresses, farmers often ask what should they do with wheat straw? Should I keep the straw on the field to build soil organic matter (SOM) or should I sell it? What is the value of the wheat straw and how many nutrients are being lost? Does straw residue hurt the next crop? Straw is a valuable resource in high demand for bedding or mulch and livestock farmers are even using straw to add fiber to their livestock rations. Fewer farmers are growing wheat today although some barley is being grown.

At a minimum, straw sellers should consider the value of nutrients leaving the farm plus the value of the lost organic material plus the harvesting cost. The nutrient value of straw varies but 9-12 pounds of nitrogen (N), 3-4 pounds of phosphorus (P_2O_5) and 25-45 pounds of potassium (K_2O) per ton can be lost on fields that yield 1-2 tons straw per acre. Based on N-P-K values of \$.40-\$.50-\$.30 per pound, the nutrient value per ton varies for N from \$3.60-\$4.80, for P, \$1.50-\$2.00 and for K, \$7.50-\$13.50 or ranges from \$11.60-\$20.30 per ton or averages \$16 per ton. Nutrient content varies based on environmental conditions and growing season, so straw plant samples can be analyzed by most agricultural testing laboratories.

Trying to value SOM can be difficult. About 80-85% of SOM comes from the roots, not from surface residue. Surface residue is important for improving water infiltration and keeping soils from eroding. Straw residue reduces the velocity and impact of rain drops and also keeps the soil temperature cooler. Straw's negative effect is that the high carbon to nitrogen ratio of the crop residue may reduce crop yields especially in corn and most cover crops. Straw residue may have an allelopathic (negative) effect on the next crop's growth. Soybeans, legumes, and clover crops fare better because they produce their own N to break down the straw. Farmers should consider planting cover crops or applying manure to replace the organic material if straw is harvested. A happy medium is leaving several inches of straw residue to protect the soil surface and planting a cover crop to build SOM. After wheat harvest, there is a long growing season to replenish SOM.

Grasses or cover crops mixtures can increase SOM rather quickly especially if fertilized with manure. Sorghum, Sudan, or Sorghum-Sudan species are great for reducing soil compaction and building SOM. These species need to be mowed or harvested when 3-4 feet tall so that they tiller and produce 5-10X more roots. Roots, is where most SOM originates so building roots and keeping the soil covered with live plants builds SOM and soil health. The sugars and root exudates from live roots produce active carbon which forms crumbly soil (macroaggregates). So

harvesting wheat straw is a good practice as long as a cover crop and/or manure is added to replace the lost carbon and harvesting the straw may even improve future crop growth.

Oats is a great cover crop to grow or add to the cover crop mixture. Oats are a “nurse crop” to many other crops, with oat’s positive effects sometimes lasting several years. Oats produces abundant root exudates (active carbon) which improves soil structure, water infiltration, and overall SOM levels. Oats and Sorghum-Sudan grass varieties promote mycorrhizae fungi and many other beneficial soil organisms. Recently it was discovered that oats reduce soil disease species like *Fusarium*. *Fusarium* is known to reduce the plant availability of soil manganese and oats promotes beneficial microbial species that make manganese (Mn^{2+}) plant available while suppressing *Fusarium*. Almost 90% of all crops (corn, soybeans, and wheat, most cover crops) are deficient in plant available forms of manganese, so planting oats is important for making manganese plant available.

One of the reasons manganese has become less plant available is due to the use of glyphosate. Glyphosate is still the most commonly used herbicide in agriculture and it is a chelator, which means that it ties up some essential soil nutrients, especially manganese. While the negative effects of glyphosate use to soil health are generally short-term; the repeated, multiple use, or over use of glyphosate can be detrimental to soil health long-term. Using cover crops improves plant growth so plants can outcompete weeds, insects, and disease-causing organisms and overall may reduce our reliance on using some pesticides.