STRAW DECOMPOSITION

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When straw is plowed into moist warm soil, the straw almost immediately begins to decompose. Billions of microorganisms that are always living in fertile soils use the straw for energy and mineral nutrients that they require for growth and reproduction. Nitrogen is one of the nutrients and it is frequently in short supply in straw. During straw decomposition the microorganisms use the nitrogen and conserve it very efficiently while much of the carbon in the straw is used and given off as carbon dioxide. Under conditions of extreme nitrogen deficiency, decomposition may be slowed from lack of nitrogen.

Wheat straw grown in southern Idaho usually contains between 0.25 and 1.00% nitrogen, with most samples being in the low range. During decomposition the relative proportion of nitrogen in straw increases because of carbon loss. After the nitrogen reaches about 1.75%, some of the nitrogen in the decomposing straw may become available to plants growing in the soil where the straw is decomposing. This process may take a long time and nitrogen may not become available to plants from straw for 2 years or longer. When nitrogen is applied to straw, some of the nitrogen becomes tied up in the decomposing straw and will not be available to the following crop. If decomposition has progressed part way before the nitrogen is applied, there is a better chance for more efficient nitrogen use by the crop grown following the grain crop.

Experimental Results

In 1966, straw samples of Lemhi, Idaed, and University of Idaho No. 59-10320 soft white spring wheats were buried in glass-cloth bags in plots on which they grew the previous year. Most of the straw on the plots from the previous crop was disced into the soil. Pinto beans were grown and irrigated as needed.

The Lemhi straw in the bags decomposed 40% in 3 months. The University of Idaho No. 59-10320 straw decomposed 49% in 3 months. Nitrogen fertilization did not influence the decomposition rate in either case. The Idaed straw, however, decomposed 39% without nitrogen and 47% with 100 lbs. and 44% with 300 lbs. nitrogen per acre in 3 months.

In almost every case the nitrogen percentage in the straw after decomposing 3 months was higher with the nitrogen fertilizers than it was without fertilizer. The Lemhi wheat straw was 24% higher, Idaed was 22% higher and 59-10320 was 6% higher in nitrogen with the high fertilizer rate than with no fertilizer. This shows that there was nitrogen left in the soil from the previous crop and that the straw was increasing in nitrogen more rapidly with nitrogen fertilization. Thus, although application of nitrogen did not increase the decomposition rate of two straws, it did hasten the release of nitrogen from the straw for use by plants.

Decomposition of straw in soil is generally thought to bring about complete disappearance of the straw or at least darkening and discoloration of the straw. Many farmers have plowed up straw that has been in the ground for 1 or more years and have found it to be the same color and apparent texture as when it was plowed down. The straw in the glass-cloth bags that was buried in the field plots in this experiment came out of the ground looking as bright and clean as when it was

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buried. There was no darkening and very little visible change had taken place. But the straw had decomposed for the most part! Although an average of 44% of the straw had decomposed, the appearance had not changed materially. Only a "skeleton" of the original straw remained, and this would quickly become scattered and disappear after being plowed to the surface of the soil.

Recommendations

If you want your straw to decompose rapidly in the fall, pre-irrigate if the ground is too dry to plow, then plow or disc the straw into the soil early in the fall. With warm weather and moist soil, much of the straw will decompose.

Additional experiments are being conducted at the Snake River Conservation Research Center at Kimberly to determine the need for nitrogen fertilizer in straw decomposition. Information about these research results will be released as it is obtained.

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