



The diagram shows what happens to the 135 to 290 pounds of nitrogen needed to grow 100-bushel corn. According to University of Missouri soil scientists, only 75 to 100 pounds are contained in the grain of a treated crop. The vegetative growth will require an additional 55 to 80 pounds per acre. Leaching, soil microbes and volatilization—loss to the air as a gas—will influence the amount of nitrogen that need be applied. This loss shouldn't interrupt current use of nitrogen since it has proven its financial worth through increased farm crop production and efficiency. However, this new information suggests a new field of soil investigation which may result in even greater efficiency from nitrogen fertilizers.

Midwest Tests Show Nitrogen Lost from Soil in Gaseous Form

Farmers applying nitrogen fertilizers to their crops can lose a considerable quantity of the total nitrogen to the air as gas, according to University of Missouri researchers.

Tests during the past two years have proved what has long been suspected — that only a portion of the applied nitrogen is used by the treated crop.

However, past fertilization practices have not been in error. Rather, the scientists say, the Missouri work contributes to the better understanding of some soil processes that are changing crop production from an art to more of a science.

They point out, for example, that 30 pounds of nitrogen top dressed on wheat will increase yields on many soils by 10 bushels an acre.

As a financial investment, this is a return of about \$20 for a \$3 outlay. However, as a fertility investment, these 10 bushels of wheat grain give back only 12 pounds of nitrogen.

This leaves 18 pounds of nitrogen unrecovered in the first season's grain. Some of the nitrogen is left in the straw, some grows a crop of soil micro-organisms, some is left in the sod and may be recovered by following crops, and finally, there remains a quantity unaccounted for and is the amount that is lost as gas.

Using urea, sodium nitrate, ammonium sulfate, ammonium nitrate, and aqua ammonia, the Missouri tests were made on eight soils ranging from sandy loams to heavy clays.

Numerous experiments have shown that two pounds of nitrogen to a bushel of corn is the minimum required for higher

yields.

Frequently, three or more pounds may be needed for a bushel of increase in yields of above 75 or 80 bushels an acre. Some of this extra nitrogen for higher yields is left over and available the following year.

However, even taking into account crop removal, leaching, and erosion, it has not been possible to account for all the nitrogen. This discrepancy can best be explained now through a loss of the nitrogen as a gas.

Chemical changes that happen in a soil when a nitrogen fertilizer is applied are well known. When an ammonium fertilizer is applied to an alkaline soil, some nitrogen is lost as ammonia.

However, in most Easter, and cool climate soils, this reaction is slight.

When the temperature is above 60 degrees, the ammonia put into the soil in fertilizers changes to nitrates rapidly. If a soil is so wet that most air is excluded, then soil organisms rob the nitrogen of its oxygen leaving a gas in its place that eventually escapes to the air.

This process is known as denitrification.

In well aerated soils, denitrification was not considered of much importance until recently. Now soil reaction may be changed with the heavier rates of nitrogen application.

This is particularly true where fertilizer is banded in high concentration or when broadcast on the soil's surface. The concentration would be very high in the top 1/2 inch of soil when pelleted fertilizer applied on the surface and rain does not fall for some time.

Detailed laboratory studies of losses of nitrogen through the air explain what was suggested by crops in the field. Where heavy nitrogen applications have been made in the field for a number of years, soil analyses fail to show much increase in soil nitrogen or organic matter.

On one soil, winter top-dressing with nitrogen on small grains failed to show a response by the crop. This same soil showed a loss of over 80 per cent of the applied nitrogen when kept at room temperature for five months with no crop growth on it.

Non-Communist China To Purchase Tobacco

The U. S. Department of Agriculture has announced issuance of an authorization to the Republic of China (Taiwan) to finance the purchase of up to \$427,393 worth (including certain ocean transportation costs) of tobacco from United States suppliers under Title I of Public Law 480.

The loss of nitrogen in a gaseous form need not disrupt the present use of nitrogen fertilizers. This loss has been occurring since land was first cultivated — it is just that methods of measuring the losses have not been available until recently.

This new work suggests a large new field for more investigation. When the fundamental processes of soil nitrogen reactions are known, farmers will then get greater efficiency from nitrogen fertilizers than has been obtained in the past.

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