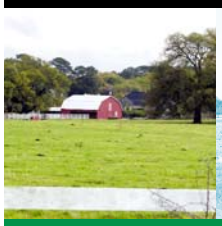
NUTRIENT MANAGEMENT

for mississippi producers



A sound soil fertility program based on management of nutrients is the foundation for profitable farming. Nutrients are necessary for abundant, high quality food, feed and fiber crops. Using fertilizer nutrients in the proper amounts and applying them correctly are both economically and environmentally important to the long-term profitability and sustainability of crop production.

Without proper nutrient management, fertilizers such as nitrogen and phosphorus have the potential to become water quality pollutants. In general, other commonly used fertilizer nutrients are not a source of concern as water quality pollutants.

Because erosion and runoff are the two major methods by which nonpoint source pollutants move into surface waters resources, Best Management Practices (BMPs), that reduce erosion or runoff are especially important in agricultural production. Similarly, practices that limit the buildup of nutrients in the soil – that can move downward to groundwater or enter surface waters through runoff – and practices that ensure the safe use of agricultural chemicals also are important.

In general, soil conservation and water quality protection are mutually beneficial; therefore, BMPs are the best means of reducing agricultural nonpoint source pollution resulting from fertilizer nutrients.

PH AND NUTRIENT MANAGEMENT

Soil pH is a major factor in agricultural production and nutrient management. Soil pH affects the availability of nutrients to plants and is a measure of the acidity or alkalinity expressed in a number from 1 to 14. The number 7 is considered a neutral sample. Samples with numbers below 7 are acidic while those above 7 are alkaline. Soil testing to determine pH and nutrient application rates is a necessary practice for environmentally and economically sound agricultural production.

NITROGEN

Nitrogen is part of all plant and animal proteins. Human survival depends on an abundant supply of nitrogen in nature. About 80 percent of the atmosphere is nitrogen gas, but since most plants cannot use this form of nitrogen, supplemental nitrogen must be supplied through the soil. A crop well supplied with nitrogen can produce substantially higher yields, on the same amount of water, than one deficient in nitrogen. Properly fertilized crops use both nitrogen and water more efficiently, thus improving environmental quality and profitability.

Supplemental nitrogen is necessary on almost all non-legume crops in Mississippi grown for profit. Producers should follow application recommendations based on soil sample results. These recommendations take into account maximum economic yield potentials, crop variety, soil texture, pH and the area of the state. Nitrogen recommendations from the MSU Extension Service Soil Testing Lab are usually ample to provide optimum economic yield

Nitrogen application has important implications to water quality. Excessive nitrate (a form of nitrogen) concentrations in water can accelerate algae and plant growth in streams and lakes, resulting in reduced oxygen levels and fish kills. Nitrate concentrations above 10 milligrams per liter in drinking water also may be unhealthy to human infants or young animals.

PHOSPHORUS

Phosphorus, like nitrogen, is essential for plant growth. Naturally occurring phosphorus exists in a phosphate form either as soluble inorganic phosphate, soluble phosphate, particulate phosphate or mineral phosphate. The mineral forms of phosphorus (calcium, iron and aluminum phosphates) do not readily dissolve in water. The amount of these elements (calcium, iron and aluminum) present in reactive forms varies with different soils and soil conditions.

The immediate source of phosphorus for plants is that which is dissolved in the soil solution. Phosphate is absorbed from the soil

solution and used by plants. A soil solution containing only a few parts per million of phosphate is usually considered adequate for plant growth. Phosphate used by plants is replaced in the soil solution by soil minerals, soil organic matter decomposition or applied fertilizers or animal waste.

Most phosphate is not readily water-soluble. Most of the ions are either used by living plants or attached to sediment, so the potential of their leaching to groundwater is low. That portion of phosphate bound to sediment particles is virtually unavailable to living organisms, but becomes available as it detaches from sediment.

Only a small part of the phosphate moved with sediment into surface water is immediately available to aquatic organisms. Additional phosphate can slowly become available through biochemical reactions. The slow release of large amounts of phosphate from sediment layers in lakes and streams could cause excessive algae blooms and excessive growth of plants, thereby affecting water quality and fish life.

NUTRIENT APPLICATION RATES

Nutrient application rates should be based on results of a soil analysis. Recommendations should be from the Mississippi State University Extension Service, certified crop advisors and certified agricultural consultants, or published Mississippi State University Extension Service data.

IMPORTANCE OF SOIL TESTING

Soil testing is the foundation of a sound nutrient management program. A soil test is a series of chemical analysis that determine the levels of essential plant nutrients in the soil. When not taken up by a crop, some nutrients, particularly nitrogen, can be lost from the soil by leaching, runoff or mineralization. Others, like phosphorus, react with soil minerals over time to form compounds that are not available for uptake by plants.

Soil testing can be used to estimate how much nutrient loss has occurred and to predict which nutrients and how much should be added to the soil to produce a particular crop and yield. Soil tests should be taken at least every three years or at the beginning of a different cropping rotation.

FOR MORE INFORMATION

For more information about nutrient management and soil testing, contact your county Extension office or the Department of Plant and Soil Sciences, Box 9555, Mississippi State, MS 39762.

Mississippi Medallion Producer Program

Mississippi State University Extension Service

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By **Terry Holder**, Extension Associate, **Jimmy Bonner**, Ph.D., Associate Extension Professor, and **Larry Oldham**, Ph.D., Associate Extension Professor
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