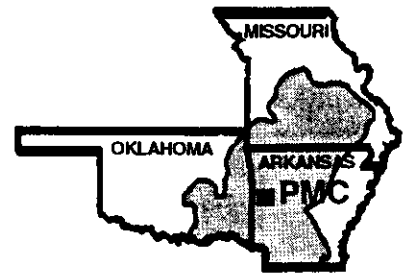
BOONEVILLE PLANT PRESS

USDA - NATURAL RESOURCES CONSERVATION SERVICE



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SOIL WATER NITRATES

Nitrate is the major source of nitrogen for plants. It is an essential plant nutrient without which plants cannot live. Intensive farming operations can deplete the soil of natural nitrogen sources resulting in the need for supplemental additions of nitrogen through fertilizers. When excessive nitrogen is added to the soil plants cannot utilize all the nitrogen efficiently. When this situation exists, excess nitrate can leach into groundwater supplies and contaminate wells.

The most efficient way to ensure a safe water supply is to accurately control the application of nitrogen to the surface of the ground. The key to sound nitrogen management is to match the nitrogen application to the needs of the crop.

Various factors should be taken into consideration and calculated prior to adding nitrogen to the soil. Some of these may include: type of manure, concentration of nutrients in the manure, irrigation, type or types of plants growing in the field or pasture, and the natural decomposition of dead plants.

Areas most likely to have problems with agricultural nitrate in groundwater are those with large acreages of highly fertilized crops, large numbers of concentrated livestock and poultry operations. The amount of water available is also a factor. More rainfall leads to more total leaching.

In a study conducted by the Booneville Plant Materials Center (mentioned in Vol. 1 Num. 4) we applied poultry litter to various forage crops to determine nutrient uptake efficiency. Poultry litter application rates were 0-, 4-, and 8-tons/acre.

One of the several analyses conducted during the study was on soil water nitrate-nitrogen (NO_3-N) expressed as parts per million (ppm). Parts per million converted to time, is approximately 1 second per 11.5 days or 32 seconds in a year. Generally, NO_3-N concentrations for grass species increased as poultry litter rates increased. The maximum level of NO_3-N in drinking water that is considered to be safe for human consumption is 10 ppm. Indications from this study reveal that several of the grass species even at the high poultry litter application rate of 8-tons/ac may be able to utilize sufficient nitrogen to contribute to acceptable NO_3-N levels in groundwater.

Nitrate-nitrogen concentrations reflect the time of year the sample was obtained and the growth cycle of a particular grass species. For example, soil water NO_3-N levels, at the 8 ton/ac poultry litter rate for bermudagrass taken during April, May and July were 14.5, 2.93 and 0.80 ppm, respectively. Nitrate-nitrogen levels for switchgrass during the same sample periods were 6.67, 4.49, and 0,89, respectively. Conversely, the ppm for orchardgrass, a cool season grass species increased as it went into dormancy from spring to summer.

The soil water NO_3-N levels increased for each observation during April, May, and July with values of 3.79, 6.98, and 10.43, respectively at the 8 ton/acre poultry litter rate.

Tall fescue, on the other hand, assuming adequate soil moisture levels , continues some growth throughout the year and NO_3-N concentrations remain more constant than grass species that experience a dormant period during some part of the year. The ppm for tall fescue during April, May, and July were 0.33, 1.37, and 1.83, respectively, at the 8 ton/acre litter rate.

As mentioned earlier, the timing of a litter application relative to periods of high rainfall may influence the nutrient runoff or soil water contamination.

The soil water NO_3-N concentrations for several grass species were well below the 10 ppm allowed by the Environmental Protection Agency. Warm season grasses that fall into this category are bermudagrass, eastern gamagrass, and switchgrass; the cool season grasses include tall fescue, orchardgrass, and reed canarygrass.

SENATOR BUMPER'S DEDICATION

As mentioned in a previous edition, on April 1, 1997 this location which includes the Booneville Plant Materials Center, Agricultural Research Service, and the Arkansas Cooperative Extension Service will become the

DALE BUMPERS
SMALL FARMS RESEARCH CENTER

Schedule of events:

10:00	Registration
11:00	Dedication
12:00	Lunch provided

Each of you are cordially invited to participate in this event honoring Senator Dale Bumpers for his many years of service to Arkansas and the agricultural community.

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