Nutrient Management

Conservation Practice Job Sheet **590 01**

Landowner_____

WHAT IS NUTRIENT MANAGEMENT?

Nutrient management is managing the amount (rate), source, placement (method of application), and timing of plant nutrients and amendments.

PURPOSE

Nutrient management utilizes nutrient resources to:

- Budget, supply, and conserve nutrients for plant production
- Minimize agricultural nonpoint source pollution of surface and groundwater resources
- Properly utilize manure or organic by-products as a plant nutrient source
- Protect air quality by reducing odors, nitrogen emissions and the formation of atmospheric particles
- Maintain or improve the physical, chemical, and biological condition of the soil.

HOW IT HELPS THE LAND

Managing nutrients properly by applying at recommended rates and at appropriate times for optimum plant growth will minimize nutrient losses from fields thus protecting surface and ground water supplies and ensuring an adequate supply of nutrients for plant growth.

WHERE THE PRACTICE APPLIES

Nutrient management is applicable to all lands where plant nutrients and soil amendments are applied.

WHERE TO GET HELP

For assistance and additional information on nutrient management, contact your local Natural Resources Conservation Service or your local Conservation District office.

APPLYING THE PRACTICE

Proper soil sampling is the key for determining fertilizer application rates. Soil samples should be taken at least once every three years for analysis or sooner if the crop rotation changes. Soil samples should be collected at the 0 to 6 inch soil depth. A minimum of 15 to 20 core samples should be

randomly collected from the field or sample area. They should be mixed thoroughly together in a clean plastic container. Approximately 1 pint of the soil sample needs to be placed in a bag for testing. The Oklahoma Cooperative Extension Service Office is available to assist with the soil testing process.

The soil analysis should contain results for nitrogen (N), phosphorus (P), potassium (K), and pH as a minimum. Analysis of other nutrients may be requested when desired. A fertilizer recommendation will be made based on the crop and yield goal.

COMMERCIAL FERTILIZER

When applying commercial (inorganic) sources of fertilizer, actual application rates should not exceed the OSU fertilizer recommendation rates. Timing of application should correspond with the plants nutrient uptake characteristics.

ORGANIC FERTILIZER

Nutrient values of organic fertilizers (manure or organic by-products) need to be determined by laboratory analysis prior to application. The analysis should include a minimum test for moisture content, N, P, K, pH and EC. Manure analysis must be performed at least annually or sooner depending on federal, state, or local laws.

COMMERICAL STARTER FERTILIZERS

Starter fertilizers containing N, P, and/or K may be needed for row crops to help overcome early stress of the root environment such as cool, wet soil. Starter fertilizers are applied in the row with seed or banded alongside the seed. Banded rates may vary depending on crop and climate. The amount of starter fertilizer applied will be included in the nutrient budget. The Oklahoma Cooperative Extension Service is available for detailed assistance.

NUTRIENT BUDGETS

A nutrient budget needs to be developed that accounts for all sources of nutrients applied to the area.

NUTRIENT MECHANICS

Phosphorus

Phosphorus is an essential element in plant growth and is necessary to maintain profitable crop production. However, phosphorus enrichment of water bodies can increase the biological productivity of surface waters by accelerating eutrophication. Eutrophication is the natural aging of lakes or streams brought on by nutrient enrichment. Eutrophication can cause use restrictions of water due to increased growth of undesirable algae and aquatic weeds. Excessive plant growth can lead to reduced dissolved oxygen levels in the water as plants die and use oxygen in the decomposition process. Low oxygen levels are detrimental to fish and other aquatic life. Associated surface blooms of algae brought on by phosphorus nutrient enrichment may cause problems such as foul smelling water and water that is highly toxic to humans and animals. This can lead to increased costs for water suppliers to treat the water.

Although phosphorus is an essential nutrient, most plants require relatively small amounts for proper growth. Many grasses and legumes only contain about 0.2% to 0.3% phosphorus per pound of dry matter. For example, three tons of bermudagrass would use about 12 lbs. of P (6000 x 0.002 = 12 lbs. of P). Some annually planted crops can use almost as much phosphorus as grasses depending on the yield achieved. OSU estimates that for each 15 lbs. of P_2O_5 (6.6 lbs. P) applied but not used by the plant, the soil test P Index will increase approximately 1 lb. per acre. Therefore applying phosphorus at levels well above crop requirements will rapidly cause a buildup of phosphorus in the soil.

The loss of phosphorus in runoff occurs in sediment bound and dissolved forms. Sediment bound phosphorus includes phosphorus attached to soil particles and organic matter leaving the field during flow events and transported in surface runoff. This occurs primarily on cropland. Surface runoff from grass or forests carries very little sediment and therefore is dominated by dissolved phosphorus in the runoff. This dissolved phosphorus comes from the release of phosphorus as runoff water flows across the soil surface. Evidence suggests that as soil test phosphorus increases, so does the potential for dissolved phosphorus to increase in runoff. Research is also showing that characteristics such as, slope, application timing, method, and application rate also play a part of phosphorus leaving the site. The Oklahoma Phosphorus Assessment tool was developed to assess the transport of phosphorus from fields where manure applications are made.

The overall goal to reduce phosphorus losses from the field to surface water should include balancing phosphorus inputs in feed and fertilizer with phosphorus outputs from crops and animals. However, this may not always be possible and other treatments will be needed. Conservation practices that reduce soil erosion, slow or eliminate runoff, trap sediment and increase water infiltration in the field help reduce phosphorus loss from fields.

Nitrogen

Nitrogen in the soil reacts much differently than phosphorus. It is much more water soluble than phosphorus and therefore, can dissolve in runoff or leach through the soil profile before being used by the plant. It is also more volatile and can be lost as a gas to the atmosphere.

Movement of nitrogen into surface waters occurs through runoff or leaching into groundwater. As nitrogen levels increase in surface waters, aquatic weed and algae populations increase accordingly. This can reduce the oxygen supply in water and cause the same problems for fish and aquatic organisms as described for high levels of phosphorus. High nitrate nitrogen in drinking water is also detrimental to other animals and humans. Nitrogen should always be applied at recommended

rates and balanced with the crop capacity to utilize nutrients.

MAINTAINING THE PRACTICE

Fields receiving animal manures must be monitored for accumulation of phosphorus in accordance with Oklahoma State University guidance and state law.

Significant changes in animal numbers, management, and feed management will necessitate additional manure analyses to establish a revised average nutrient content.

Calibrate application equipment to ensure accurate distribution of material at planned rates.

Records must be maintained for at least 5 years to document nutrient application.

Nutrient Management – Job Sheet

Landowner_____ Field number_____ Date_____

Purpose (check all that apply)	
☐ Budget, supply and conserve nutrients for plant production	☐ Protect air quality
☐ Minimize agricultural nonpoint source pollution of water	☐ Maintain or improve condition of soil.
☐ Properly utilizer manure or oganic by-products as nutrients	

Nitrogen Risk Assessment			
Leaching Index	Groundwater Vulnerability Rating	Mitigating Activities	Rating

Phosphorus Risk Assessment (Refer to OK Phos. Assessment Worksheet)			
Nut. Limited WS (Y or N)	Rating	Soil Test P Index	Application Rate (lbs P_2O_5)

Vegetation	
Crop Sequence/Rotation:	Yield Goal:

Current Soil Test Results						
Date	N	P	K	pH	SOM%	EC

Recommended nutrients to meet yield goal				
N	P_2O_5	K_2O	Lime	Other

Nutrient Content of Manure			
Type of manure:			
N	N Remaining	P_2O_5	K_2O

Recommended commercial fertilizer application				
Fertilizer Blend	Lbs/Ac	Applied N	Applied P_2O_5	Applied K_2O

Recommended manure application			
Maximum lb's of P_2O_5 allowed (refer to OK Phos Assess Wkst):			
Tons/Ac	Applied N	Applied P_2O_5	Applied K_2O

Lime Requirement		
Crop pH preference	Buffer Index	ECCE lime (tons/Ac) recommendation

Nutrient Management – Job Sketch

If needed, an aerial view or a side view of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included.

Scale 1"=_____ ft. (NA indicates sketch not to scale: grid size=1/2" by 1/2")

Additional Specifications and Notes:

The U.S. Department of Agriculture (USDA) prohibits discrimination in all of its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex (including gender identity and expression), marital status, familial status, parental status, religion, sexual orientation, political beliefs, genetic information, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD)." To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.