

Turf and Landscape Nutrient Management Certification Knowledge Areas

General Nutrient Management

1. Define nutrient management
2. Objectives of nutrient management
3. Nutrient cycling and nutrient balance in regions, localities

Basic Soil Science

1. Soil Texture
2. Soil Structure
3. Determinants of organic matter content
4. Water holding capacity
5. Tillage effects on soil structure
6. Identification of major soil horizons categories
7. Soil properties that affect infiltration rate and runoff
8. Soil compaction
9. Crop adaptation to physical and chemical properties of soils
10. Use of soil survey maps and information in nutrient management

Environmental Management

1. Hydrologic cycle and relationship of ground and surface waters
2. Effects of nutrients in ground and surface waters
3. Factors causing the decline of the Chesapeake Bay
4. Nutrient loss mechanisms to ground and surface waters
5. Identification of environmentally sensitive site features
6. Nutrient management practices for environmentally sensitive sites
7. Critical times when nutrient losses are most likely to occur
8. Use of cropping systems and plant species to reduce nutrient losses
9. Management of applied nutrient sources near impervious surfaces and other environmental site features, including buffers and setbacks

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Sampling, Testing, and Analysis for Nutrient Management

1. Soil sampling procedures
2. Frequency of sampling
3. Causes of variability of sample results over time
4. Relationship of nutrient availabilities to likelihood of crop response
5. Correlating numerical soil sample results to soil test levels (L, M, H, VH) and to a nutrient recommendation using Virginia Nutrient Management Standards and Criteria (revised October 2005).
6. Conversion of soil test results from various testing labs
7. Nutrient trouble shooting techniques using plant tissue and soil tests
8. Appropriate growth stages and plant parts for tissue samples

Basic Soil Fertility

1. Leibig's Law – limiting factors of plant growth
2. Recognize essential elements for plant growth and categorize as non-mineral, primary, secondary, and micronutrients
3. Relative mobility of nutrients in soils
4. How pH influences availability and toxicity of nutrients
5. The nitrogen cycle in the soil including mineralization, nitrification, denitrification, leaching, and C/N ratio concepts
6. Appropriate timing and placement of N fertilizers for plant and environmental benefits
7. Phosphorus cycle and soil phosphorus availability
8. Phosphorus loss mechanisms from soils, and management practices to minimize potential loss
9. pH relationship to soil P forms and retention by soils
10. Appropriate timing and placement of P fertilizers for plant and environmental benefits
11. Potassium cycle, movement, and deposition within the soil profile
12. Timing and placement of K fertilizers
13. Behavior of secondary nutrients
14. Common sources of secondary nutrients
15. Common sources of micronutrients
16. Placement techniques for micronutrient fertilizers
17. Cation exchange capacity related to soil properties and productivity
18. Determination and relevance of percent base saturation
19. How cations are held in soils

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Basic Soil Fertility (cont.)

20. Differences in major liming materials
21. Lime quality
22. CEC and lime requirements
23. Use of buffer pH on soil tests to determine lime requirement
24. Timing and placement of lime
25. Lime properties affecting reaction rate of lime

Fertilizer Management

1. Mathematical conversion of P and K to P_2O_5 and K_2O
2. Types of fertilizers (bulk blends, clear liquid, etc.)
3. Nutrient analysis of various fertilizer materials
4. How climatic factors affect liquid fertilizer analysis
5. Relative losses of N from inorganic sources containing Ammonia with delayed incorporation or if surface applied
6. Basic fertilizer calculations relating grades and quantities of material applied to meet nutrient requirements
7. Calculate ingredient blends using basic fertilizer materials to meet nutrient recommendations
8. Calibration of fertilizer applicators
9. Fertilizer application methods and advantages, disadvantages of each
10. Proper storage of fertilizer materials
11. Application limits of various types of spreaders
12. Sources of slowly available and quickly available nitrogen
13. Management of fertilizer applications near impervious surfaces

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Organic Materials Management

1. Relative levels of N, P₂O₅, and K₂O in organic materials compared to plant removal
2. Forms of N in organic materials such as composts, pelletized manures and biosolids
3. Proper timing and placement of organic materials
4. Timing and placement of supplemental fertilizers used with organic materials
5. Organic materials analysis

Irrigation Water and Wastewater Management

1. Methods of determining or estimating soil moisture content and pros and cons of each
2. Forms of nitrogen in wastewater
3. Determining available nutrients in wastewater and other irrigation water
4. Determining nitrogen residuals from past applications
5. Timing and method of application for supplemental fertilizers used on sites receiving wastewater or other irrigation water
6. Buffers and setbacks for wastewater application
7. Concept of water balance relative to irrigation management, including field capacity, water inputs and evapotranspiration
8. Types of irrigation systems for applying wastewater and advantages/disadvantages of each
9. Phosphorus management for sites receiving wastewater
10. Sensitivity of vegetation to other constituents that may be in some irrigation waters
11. Irrigation using natural and recycled sources of water
12. Determine maximum appropriate irrigation rates per hour for various soil and site characteristics

Turfgrass and Landscape Plant Management

1. Description and primary uses of adapted cool and warm season grasses
2. Anticipated seasonal growth responses of cool and warm season grasses
3. Climatic and edaphic variables that affect turfgrass selection, performance and fertility
4. Turfgrass establishment and fertilization strategies including seeding, sodding, sprigging, plugging, over-seeding and renovation

Turf and Landscape Nutrient Management Certification Knowledge Areas

Turfgrass and Landscape Plant Management (cont.)

5. Maintenance fertility needs for cool and warm season turfgrass on lawns, golf courses, athletic fields and sod farms.
6. Mowing strategies and clipping management
7. Roadside nutrient management strategies
8. Classify different grasses as either warm season or cool season
9. Life cycles of annuals and perennials for landscape plants
10. Soil testing and pH requirements for landscape plants
11. Timing and placement of nutrients related to life cycle, stage of maturity and vegetation type of ornamentals
12. Nutrient uptake differences for different families of ornamentals in the landscape

Incentives and Regulations

1. Nutrient Management Training and Certification Regulations
2. Chesapeake Bay Preservation Act
3. Virginia Nutrient Management Standards and Criteria (Revised October 2005)
4. Plan writing guidance documents issued by the Virginia Nutrient Management Program
5. Criteria for proper use of inorganic fertilizer and organic nutrient sources
6. Nutrient management related provisions of wastewater reuse and reclamation regulations
7. Nutrient management related provisions of Erosion and Sediment Control regulations
8. Nutrient management related provisions of MS4 regulations
9. Requirements for Nutrient Management Plans on certain state owned lands

Development of Nutrient Management Plan Components

1. Use Virginia Standards and Criteria (revised October 2005) tables and soil test information to develop plant nutrient recommendations
2. Know how to calculate phosphorus application rates based on soil tests or plant removal.
3. Know when phosphorus applications are not allowed based on soil phosphorus saturation level
4. Understand specific nitrogen management criteria when dealing with environmentally sensitive sites as related to various nitrogen sources and plants
5. Develop a schedule for the timing and placement of fertilizers

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Development of Nutrient Management Plan Components (cont.)

6. Develop an integrated nutrient balance sheet for all nutrient sources, application rates and timings
7. Understand issues to address in a plan narrative
8. Determine hydrologic unit code from Virginia National Watershed Boundary Dataset maps
9. Generate appropriate maps to:
 - a. show site and boundaries where nutrients will be applied,
 - b. delineate management areas and indicate size in acres or square feet, environmentally sensitive areas,
 - c. setback areas for application of organic materials
10. Identify character of disturbed, imported or manufactured soils and determine appropriate nutrient management related management considerations
11. Determine how to define management areas as a function of use or vegetation type and how that impacts nutrient application
12. Determine available nutrient application rates from a wastewater nutrient analysis and the amount of water applied
13. Determine acceptable periods of nitrogen application for various turfgrass types based on location in Virginia and characteristics of the fertilizer to be applied
14. Selection and management of de-icing materials to reduce water quality impact
15. Stormwater management principles to reduce runoff pollution

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