



STEM-ing Up Plant Nutrients

Nutrients for Life Foundation

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Essential Plant Nutrients

- 17 elements essential for plants.
- An element is essential to a plant if:
 - The element must be required by the plant to complete its life cycle
 - The element cannot be replaced by another element
 - The element is required for essential plant functions
 - The element is required by a substantial number of different plant species

Essential Plant Nutrients

- *Mineral*

- *Macro- Needed in relatively large amounts.*
 - *Nitrogen (N), phosphorus (P), and potassium (K)*
 - *Calcium (Ca), sulfur (S), and magnesium (Mg) are called secondary macronutrients*
- *Micronutrients- Needed in relatively small amounts.*
 - *Just as essential to plant health as macronutrients.*

- *Non-mineral*

- *Carbon, hydrogen and oxygen are classified as non-mineral because they are obtained through the atmosphere and water.*

Essential Plant Nutrients

ELEMENT TAKEN INTO THE PLANT	SYMBOL	CLASSIFICATION	CHEMICAL FORM
Hydrogen	H	Nonmineral nutrient	H ₂ O
Oxygen	O	Nonmineral nutrient	O ₂ and CO ₂
Carbon	C	Nonmineral nutrient	CO ₂
Nitrogen	N	Primary macronutrient	NH ₄ ⁺ and NO ₃ ⁻
Phosphorus	P	Primary macronutrient	H ₂ PO ₄ ⁻ and HPO ₄ ²⁻
Potassium	K	Primary macronutrient	K ⁺
Calcium	Ca	Secondary macronutrient	Ca ₂ ⁺
Magnesium	Mg	Secondary macronutrient	Mg ₂ ⁺
Sulfur	S	Secondary macronutrient	SO ₄ ²⁻
Boron	B	Micronutrient	B(OH) ₃
Chlorine	Cl	Micronutrient	Cl ⁻
Copper	Cu	Micronutrient	Cu ₂ ⁺
Iron	Fe	Micronutrient	Fe ₂ ⁺ and Fe ₃ ⁺
Manganese	Mn	Micronutrient	Mn ₂ ⁺
Molybdenum	Mo	Micronutrient	MoO ₄ ²⁻
Nickel	Ni	Micronutrient	Ni ₂ ⁺
Zinc	Zn	Micronutrient	Zn ₂ ⁺

The Florida Fertilizer Label

- Florida License Number:
- Brand Name
 - Name used by the licensee to identify the product.
 - Grade
 - Percentages of total nitrogen (N), phosphate (P_2O_5), and soluble potassium (K_2O) in fertilizer. State in whole numbers in that order.
- Net weight
- Name and street address of the manufacturer
- “Organic”
 - If used, this term indicates the water-insoluble nitrogen must not be less than 60% of the total guaranteed nitrogen stated.
- “Guaranteed Analysis”
 - Divided into the percentage of total nitrogen (sum of all forms present), available phosphate, soluble potassium and a statement of each secondary plant nutrient present.

BRAND NAME
Nitrogen -5% Organic (3% synthetic, 2% natural)

GUARANTEED ANALYSIS

Total Nitrogen..... %

___ % Nitrate Nitrogen

___ % Ammoniacal Nitrogen

___ % Water Soluble Organic Nitrogen
(And/or Urea Nitrogen)

___ % Water Insoluble Nitrogen

Available Phosphate (P_2O_5)

Soluble Potash (K_2O)

Chlorine, (CL) Not More Than

Derived from: (Actual source materials for primary plant nutrients, e.g., Urea, Concentrated Superphosphate, Potassium Chloride, Milorganite, etc.)

Statement of Secondary Plant Nutrients

___ % Total Magnesium as Mg

___ % Water Soluble Magnesium as Mg

___ % Total Manganese as Mn

___ % Soluble Manganese as Mn

___ % Total Copper as Cu

___ % Soluble Copper as Cu

___ % Total Iron as Fe

___ % Soluble Iron as Fe

___ % Sulfur (combined) as S

___ % Sulfur (free) as S

Derived from: (Actual Materials and in forms used in the fertilizer mixture, e.g., Manganese Oxide or Manganese Sulfate, etc.)

Manufactured by:
Name (Fxxxx)
Address
City, State, Zip
Net weight ___ lbs.

Nutrient Leaching

- Downward movement of dissolved nutrients in the soil profile with percolating water.
- Nutrients moving below the rooting zone are unavailable to the plant.
- Leached nutrients have the potential to contribute to groundwater contamination



The 4R's

- The fertilizer industry endorses a best management practice (BMP) known as 4R Nutrient Stewardship



Nutrient Deficiencies



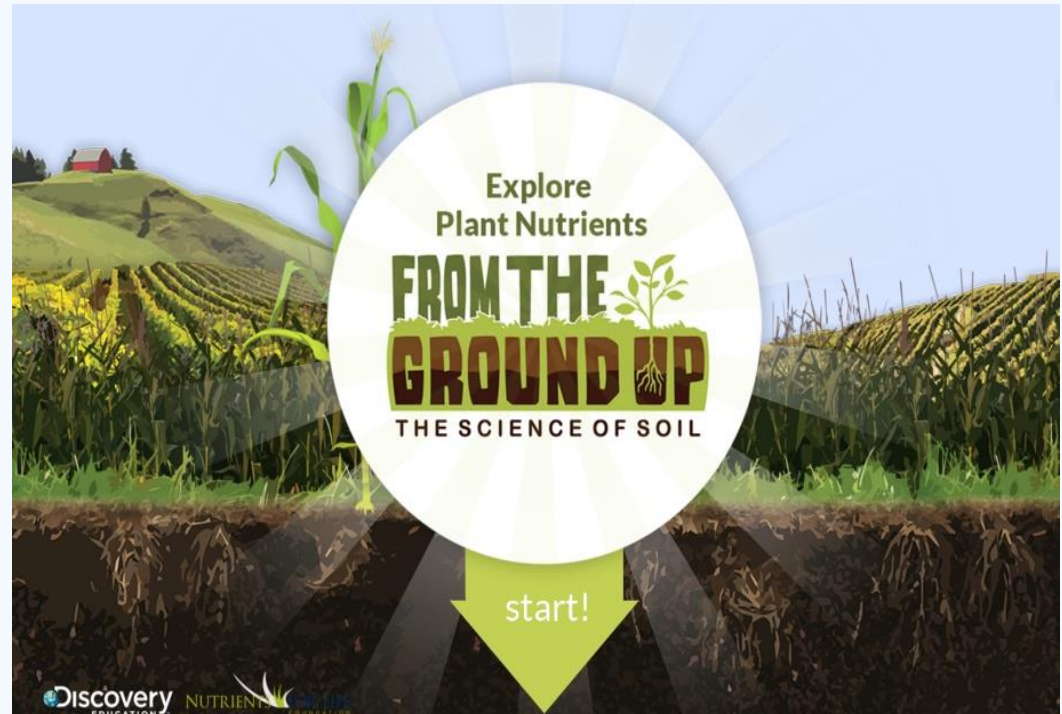
- Plants grown in depleted soils may display a wide variety of symptoms and limit the quantity and quality of harvested crops.
- When fertilizers are added to soil in the proper amounts they replenish nutrients people indirectly extract from the soil when harvesting plants.

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Your Day with NPK



Exploring Plant Nutrients



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