CASE

Curriculum for Agricultural Science Education

Principles of Agricultural Science – Plant

Macronutrients

Unit 6 – The Growing Environment
Lesson 6.1 Plant Food

Plant Nutrients

Plants require 16 elements for proper growth and development.

Essential	Macronutrients	Micronutrients
Carbon	Calcium	Boron
Hydrogen	Magnesium	Chlorine
Oxygen	Nitrogen	Copper
	Phosphorus	Iron
	Potassium	Manganese
	Sulfur	Molybdenum
		Zinc

The Essentials

- Carbon (C)
- Hydrogen (H)
- Oxygen (O)
- Normally present in the atmosphere
- These elements combine in various forms:
  - Carbon Dioxide (CO_2)
  - Water (H_2O)
  - Glucose ($C_6H_{12}O_6$)

Plant Nutrients

Macronutrients – required in large amounts

Two sub-categories:

- Primary – required in highest levels
- Secondary – required in lower levels

Micronutrients – required in trace amounts

Primary Macronutrients

The three primary nutrients:

- **Nitrogen (N)**
- **Phosphorus (P)**
- **Potassium (K)**

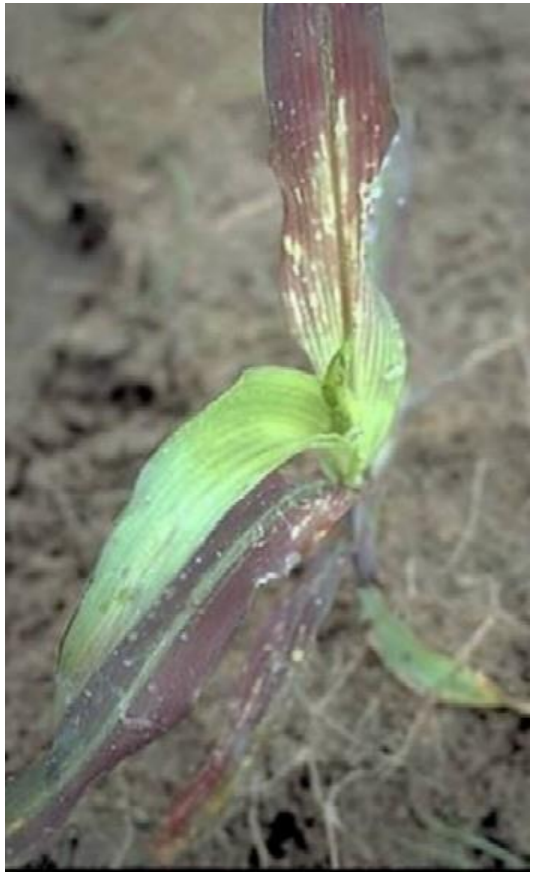
These make up the first values of a fertilizer analysis, expressed as N-P-K

Nitrogen (N)

- Present in chlorophyll
- Increases vegetative growth
- Deficiency symptoms:
  - Stunted growth
  - Pale yellow color
  - Yellow color “fires” from the bottom of the plant to the top

Phosphorus (P)

- Responsible for early plant growth
- Reproduction
- Deficiency symptoms:
  - Reddish coloring on the underside of leaves
  - Low quantity flowers and fruits
  - Weak and spindly growth



Potassium (K)

- Involved with photosynthesis, primarily sugar transformation
- Deficiency symptoms:
  - Slow growth
  - Brown leaf tips and leaf margins
  - Poor fruit and seed quality

Secondary Macronutrients

Three secondary macronutrients:

- **Calcium (Ca)**
- **Magnesium (Mg)**
- **Sulfur (S)**

Required in smaller amounts than primary nutrients, but still needed in ample quantities

Secondary Nutrients Uses

Magnesium (Mg)

- Produces chlorophyll
- Regulates other plant nutrient metabolism

Sulfur (S)

- Amino acids
- Enzyme production
- Chlorophyll formation

Calcium (Ca)

- Essential for cell division and formation
- Used for cell walls and membranes

References

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