## PROF. DR. HAYTHM SALEM ORGANIC FERTILIZATION

LECTURE NO. 5

#### FIRST LEVEL – FOOD SAFETY

#### **BIO-ORGANO FERTILIZATION**

(SELECTIVE COURSE)

### **Plant Nutrition**

- 16 Essential Nutrients for
- Normal Plant Growth

# <u>3 ways to increase yields</u>

1. Select good genetic potential crop

2. Select the best management practices

3. Good environment conditions

## **Plant Nutrition**

- Plant nutrition
  - the availability and types of basic chemical elements required by the plant – to grow & reproduce
- Plant Fertilization –

the process of adding nutrients to the soil or leaves so these chemicals are added to growing environment.

### How do plants uptake nutrients?

• Soil-water solution

• 98% obtained in soil-water solution

• 2% directly from soil

• The essential nutrient elements required by higher plants are exclusively of inorganic nature. This exclusive requirement of higher plants for inorganic nutrients basically distinguishes these organisms from man, animals and a number of microorganisms which additionally need organic foodstuffs. For an element to be considered an essential plant nutrient.

 Three criteria as proposed by Arnon and Stout (1939) must be Satisfied. These are : 1) A deficiency of the element makes it impossible for the plant to complete its life cycle. 2) The deficiency is specific for the element in question. 3) The element is directly involved in the nutrition of the plant as for example as a constituent of an essential metabolite or required for the action of an enzyme system.

 Several terms namely, deficient, insufficient, toxic and excessive, **Deficient**: When an essential element is at a low concentration that severely limits yield and produces more or less distinct deficiency symptoms. Extreme deficiencies will lead to death of the plant. Insufficient: When the level of an essential plant nutrient is below that required for optimum yield or when there is an imbalance with another nutrient Symptoms of this condition are rarely observed.

 Toxic: When the concentration of either essential of other elements is sufficiently high to inhibit plant growth to a great extent. Severe toxicity will result in death of plants. Excessive: When the concentration of an essential plant nutrient is sufficiently high to result in a corresponding shortage of another nutrient.

## Primary Nutrients in Agriculture

• <u>Macronutrients</u> –

are needed/used in large amounts

- N,P,K C, H, O, Ca, Mg, S
- If a plant receives to much nutrients
  What is it called
- Plant Toxicity

## **Primary Nutrients**

#### Nitrogen (N) –

is needed for vegetative growth and dark green color. (easily leached out)

Nitrogen is the most important nutrient.

<u>Deficiency signs</u> –

reduced growth & yellowing of lower leaves.

Yellowing is called <u>Chlorosis</u>

## Primary Nutrients in Agriculture

- <u>2. Phosphorus (P)</u> important for seedling and young plant growth and develop good root system. (not easily leached out)
- Deficiency signs-

reduced growth, poor root systems, reduced flowering. Also thin stems and browning or purpling of foliage.

## Primary Nutrients in Agriculture

- <u>3. Potassium (K)</u> mined as a rock and made into a fertilizer – can be leached.
- <u>Deficiency signs</u> reduced growth, shortened internodes and some burn, scorched marks (brown leaves).
- Too Much (K) can cause nitrogen deficiency.

### Secondary Nutrients

- 1. Calcium (Ca)
- 2. Carbon(C)
- 3. Hydrogen (H)
- 4. Magnesium (Mg)
- 5. Oxygen (O)
- 6. Sulfur (S)
- Where does the plant get C,H,O? From the Air & Water

## Micronutrients in Agriculture

- They are used in small quantities and obtained from the soil. (excess amounts are toxic)
- Boron, (B)
- Chlorine (Cl)
- Copper (Cu)
- Iron (Fe)
- Manganese (Mn)
- Molybenum (Mo)
- Zinc (Zn)

#### 16 Essential Nutrients for Normal Plant Growth

 The absence of any one essential plant nutrient will cause the plant to grow poorly or show signs of poor health

- C, H, O, P, K, N, S, Ca, Fe, Mg (10)
- B, Cu, Cl, Mn. Mo, Zn (6)

## Ways to apply Nutrients

#### **Application Methods**

Premergence – applied before germination
 Top Dress – done early in plants life
 Side Dress – done later in plants life

#### **Types of fertilizer**

Organic > liquid or dry
 Inorganic > liquid or dry

If there is to much fertilizer what could happen? Leaching Plants Burn