

# *Plant Food*

## **Nitrogen (N)**

### **Functions:**

Promote plant growth  
Increase protein content of crops  
Improves quality of crop  
Makes plant more efficient with water  
Helps for stay green and dry down

### **In General:**

Plants take up both  $\text{NO}_3^-$  (nitrate) and  $\text{NH}_4^+$  (ammonium)  
Plants can use nitrogen from the breakdown of O.M. and commercial fertilizer

### **Deficiency Symptoms:**

Yellow appearance  
Slow Growth  
Firing of leaves

### **Conditions Favoring Volatilization Losses:**

FREE CALCIUM CARBONATE IN SOIL (High pH or liming after April 1<sup>st</sup>)  
Unincorporated surface applications  
Low (CEC) Cation Exchange Capacity (sandy soils)  
Surface residue  
High soil pH  
High soil temperatures

# Phosphorus (P)

## **In General:**

Can be thought of as the plants "batteries"  
Important in energy transfer reactions  
Better water use efficiency  
Improves winter hardiness in legumes  
Improves plant resistance to diseases.

## **Function:**

Stimulates early root formation and growth  
Hasten maturity  
Aids in seed formation  
Improves crop quality

## **Deficiency symptoms:**

Dark Green, purplish leaves and stems  
Slow growth and maturity  
Poorly developed root system

**Page 3.2 from Cenex / Land O Lakes Agronomy**

# Potassium (K)

## **In General:**

Essential for plant growth

Most used by corn - grain and silage, alfalfa

Needed for a catalyst for other process in the plant

Better Nitrogen use efficiency

## **Function:**

Increase disease resistance

Strengthens stalks, thus reducing lodging

Increases winter hardiness

## **Deficiency symptoms:**

Necrosis of leaf margins (yellowing on outer leaf margins)

Lodging prior to maturity due to weak stalks

Crooked small narrow ears

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## **Secondary Nutrients**

### **Sulfur (S)**

#### **Functions:**

Required for synthesis of plant proteins

Synthesis of chlorophyll (greenness of plant)

Necessary for nodulations in legumes

#### **Deficiency symptoms:**

Uniform yellowing of the plant, resembling nitrogen deficiency, but not after V-12 or 48"

Spindly stalks

When soil tests for sulfur are low, good yield response can be expected in low O.M. soils

# Calcium (Ca)

## **In General:**

No deficiencies if soil pH is above 5.0

Deficiencies are easily taken care of with lime (even high Mg lime)

## **Function:**

Cell Wall Development

Cell Division

Root development

Shoot development

## **Conditions associated with calcium deficiency:**

Low soil pH

Coarse soil textures

# Magnesium (Mg)

## **Function:**

The core of chlorophyll molecules

Needed for energy transport within the plant

Activates certain enzyme systems

Needed for sugar formation

## **Deficiency symptoms:**

Interveinal chlorosis (stripped veins)

# Micro-nutrients

In east central Iowa we are concerned with a few micro-nutrients that may be yield limiting factors if the ppm fall below critical levels. These levels can be found on page seven of this booklet. Besides P&K, sulfur, zinc, boron, and are our primary concerns. Most of the other nutrients are kept in check by proper pH of 6.6 - 7.1

## Zinc (Zn)

### Functions:

Enzyme activator  
Hormone regulation  
Fruit and seed formation  
Cell growth

### Deficiency symptoms:

One of the most common micro nutrient deficiencies  
Broad yellow-bronze band  
Severely stunted  
Short internodes  
High soil P can prevent the uptake of Zinc

## Boron (B)

### Function:

Movement of sugars within the plant  
Influences cell development  
Synthesis of proteins  
Nodule formation in legumes

### Deficiency symptoms:

Dying of terminal plant parts  
Yellowing of top alfalfa leaves (confused with leafhopper damage)

## Iron (Fe)

### **Function:**

Needed for chlorophyll formation  
Enzyme activator in plants  
Necessary for respiration

### **Deficiency symptoms:**

Yellowing (chlorosis) between veins  
Retarded growth

## Copper (Cu)

### **In General:**

Availability decreases as pH increases  
Low amounts required by plants  
If soil test is low and O.M. is low, yield response is expected

### **Function:**

Enzyme activator in plants  
Needed for energy transfer  
Is involved in chlorophyll formation and photosynthesis

### **Deficiency symptoms:**

Discoloration of leaves and fruit  
Stunted growth

## Manganese (Mn)

### **Function:**

Activator of enzyme systems  
Needed in chlorophyll formation  
Plant metabolism