

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 NO_3^- (nitrate) and 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 1st)
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

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