

MEASURE AND MANAGE

Diagnosing Plant Nutrient Symptoms Getting to the Root of the Problem

By Dale Cowan

dcowan@agtest.com

Agri-Food Laboratories CCA.On

Uniform plant growth across the field landscape is desirable. However, normal field variance, caused by landscape characteristics, contributes to uneven growth patterns. Precision Ag technologies have revealed the extent of these plant growth and yield variances. Differential plant growth can be caused by a host of factors; certainly differences in soil nutrient profile, depth of topsoil, moisture holding capacity, insect and plant disease and man made miscues such as soil compaction to name a few can contribute to these symptoms

Plants that encounter an environment not conducive to optimum growth will usually exhibit a definitive symptom. There are 5 basic types of symptoms

- 1) Chlorosis
- 2) Necrosis
- 3) Lack of new growth
- 4) Anthocyanin
- 5) Stunting

Chlorosis

This is usually a general yellowing or it can be interveinal. Often associated with lack of chlorophyll, It can be in the newest growth indicating a micronutrient deficiency or old growth suggesting a potassium or nitrogen deficiency. Nitrogen deficiency is usually a likely cause and can be a very specific pattern in corn of yellow tips and moving down the center of the lower leaves. Potassium is similar except the leaf margins show the symptoms. Interveinal chlorosis caused by manganese deficiency in soybeans is a classic example. Soybean Cyst Nematodes can also cause soybean plants to exhibit a chlorotic appearance. Often times it may look like potassium deficiency. In- field patterns may look like soil compaction (see image)

Necrosis

This involves plant cell death. Dead spots or stripes on leaves are evident. This can be advanced stages of a nutrient deficiency/toxicity or plant leaf disease. Insect damage and subsequent secondary infection such as feeding of flea beetles and development of Stewarts Wilt

Lack of new growth

This is self evident, new growth is slow to emerge, it may involve a micronutrient deficiency such as Boron or salts in soil at sub lethal levels. Lack of soil moisture, low temperature or chilling injury may also contribute.

Anthocyanin

This involves the development of pigmentation a red or purple color. Usually brought on by interruption of growth. Cool weather and slow growth are usually the cause. It may be low phosphorus or magnesium availabilities as well.

Stunting

This is usually obvious. Plants that are stunted maybe next to normal plants. Uneven emergence, root pruning by insects or disease, soil compaction or high salts.

Inappropriate herbicide applications can contribute to all 5 types of symptoms.

All the symptoms can have their origin associated with a root zone environment that is not conducive to good growth. Roots are the brains of the plant. The environment encountered by emerging roots usually determines the type of symptoms, severity and duration. This is one reason why diagnosing nutrient deficiencies by first appearance can be misleading and confusing. The nutrient deficiency being exhibited may not be the limiting factor. Conditions that limit root extension usually cause certain symptoms to appear. Non-mobile nutrients (potassium) usually are the ones exhibited in root restricted situations.

When walking fields and observing the growth differential always look at the roots.” Big yields come from big plants and big plants have big roots.” Observe the character of growth and the soil conditions.

When all observation is exhausted the use of a soil and plant tissue sample from the affected area will help to provide a science and fact based source of information that can be used to diagnosis the problem areas. Often times the yield damage has already been done. This information can be used to increase the situational awareness and plan a better strategy and solution for the following crops.

In some of the higher value drip irrigated crops a regular plant tissue “Monitoring” program can be used to assess the nutrient status on a weekly basis and make adjustments through the feeding program.

Manganese in Soybeans



Potassium in Soybeans



Soybean Cyst Nematode

