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## Temporary Early Season Nutrient Deficiencies in Corn

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How can there be an early season nutrient deficiency, if the soil test shows everything is good? Early season nutrient deficiencies, may occur in corn, whether one sees the deficiency or not. Nutrient usage by corn plants, requires a healthy, growing root system.

### **Emerging corn:**

This corn was planted on April 22<sup>nd</sup>, and emerging on May 8. This is 16 days after the date of planting. Normally, corn will emerge quicker. Cold, wet conditions delayed the corn emergence.



### **Sidewall compaction:**

If planting when the soil is wet, the sidewall of the planter disc may leave the sidewall of the furrow firm. With the V furrow being firm, the new developing roots, grow down the V horizontally, and not grow outward beyond the V. In this scenario, if a starter was applied 2" to the side and 2" down, (commonly known as 2 X 2), the roots may not reach the starter for several weeks. This in itself may cause a temporary nutrient shortage. The plants can only acquire nutrients where the roots have grown. In this case, the roots will only acquire nutrients in the seed trench. Generally, there is less concern for yield loss at this early stage. However, if the furrow is very hard, this may have consequences later in the growing season, limiting the root growth. In turn, this prevents the roots from acquiring needed nutrients, for optimum yield.

### **Cold, wet conditions after planting:**

This year in particular, we encountered some very cool to cold conditions in parts of the Midwest. On May 1, we saw snow come across the western part of the Corn Belt, with temperatures dropping into the low 30's. Some corn was planted, while some growers waited till the cold front passed. When the temperatures drop with a cold wet front, not necessarily snow as some encountered this year, many nutrients become less available till the soil warms up. Below are some key nutrients and how they become less available to the plants.

**Nitrogen:**

Depending how, and where the nitrogen was applied, would determine how quickly the roots will reach the nutrient. Was it sprayed over the top or incorporated? Nitrogen also feeds soil microorganisms, that break down organic matter. Cold, wet conditions slow the plant's root growth, and it's potential for finding N. Likewise, microorganism activity temporarily slows down, creating a possible N shortage to the plants.

**Phosphorus:**

Phosphorus is taken up by plants as orthophosphate ions. Absorption of these ions by plants is taken from soil solution. Overall absorption is less in dry conditions. Likewise, the P absorption requires actively growing plant roots, with good root respiration. Converse to the dry soils, absorption will be less in cold wet soils too. The root respiration and growth, slow down under cold wet soils, so Phosphorus uptake is limited by plants. This may create a temporary deficiency.

**Potassium:**

Potassium's availability increases, as soil moisture increases. However, air is needed for the nutrient's uptake. Consequently, soils reaching the point of saturation also have less potassium available, till the soil is no longer at the saturation point. Like with phosphate, actively growing roots can supply the plant with adequate potassium. In cold, wet conditions, root respiration and growth slow down which in turn, may cause a potassium deficiency.

**Summary:**

Cold, wet conditions may cause a temporary nutrient deficiency in corn. Most importantly, soil temperature and moisture play an integral role in the crop's root growth. This environment may also have a snowballing effect from the lack of root growth, causing more nutrient deficiencies, not just those listed above. Warm conditions however, provide the environment for root respiration, plant growth, and adequate nutrient uptake. If you have encountered cold wet conditions at planting time, or shortly after the crop emerged, you may have encountered a nutrient shortage and not even see it. When the soils warm up, the roots grow quickly to correct any previous nutrient shortage.

**References and additional information**

1. <http://mgofmc.org/docs/nutrientdeficiency.pdf>
2. <http://www.extension.umn.edu/agriculture/nutrient-management/potassium/potassium-for-crop-production/>

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