

## The Impact of Wet Weather on Plant Nutrients

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Some producers wonder what happens to their soil nutrients in growing seasons that have higher than typical precipitation. The physical loss or downward movement of nutrients is not as dramatic as some would think, however, plant availability and uptake does vary across the scope of nutrients depending on how dry or saturated a soil is at any given time. Obviously, the movement of soluble nutrients in water solution will vary with soil texture; however, they will not move deeper than the wetting depth for the amount of net infiltration per rain or irrigation event. The following is a summary as to how each nutrient is impacted by soil moisture.

**Nitrogen** – The plant available form nitrate is commonly known to be readily leachable, however most losses are during early spring and late fall. It is thought that during periods of rapid plant growth and nitrate uptake, leaching losses of nitrate are minimal. It is also during the growing season where warmth and moisture contribute to the mineralization of nitrogen into nitrate-nitrogen, so that under the optimal circumstances there is an on-going supply being produced.

**Phosphorus** – Losses due to leaching are almost negligible, since the concentration of phosphorus in the soil solution is quite low, and the compounds it forms when reacting with other elements are low in water solubility. Phosphorus is less plant available when soils are dry, as it is more difficult to move by diffusion. Adequate moisture and warm temperatures also act to mineralize available phosphorus from decomposing organic matter.

The greatest concern in phosphorus loss is with the physical movement of soil. Erosion due to wind and water that removes soil from the field takes the adsorbed phosphorus with it.

**Potassium** – This nutrient is more readily impacted by moisture. As clay soils swell with moisture, potassium becomes more readily available to the soil solution. However, in waterlogged conditions, the poor aeration decreases plant uptake. As clay soils dry, potassium becomes more tightly fixed to clay particles.

Leaching can occur, especially on sandy soils low in clay and organic matter as they have fewer exchange sites (lower CEC) to adsorb potassium cations.

On heavier soils, it may be possible for potassium to leach lower in the soil profile, but not necessarily out of the reach of plant roots.

**Calcium** – Although calcium can leach, especially in sandy soils, this nutrient is usually in adequate supply for most crops when the pH is maintained between 6.1 and 7.5.

**Magnesium** – This nutrient can leach more readily than calcium, but is often being made slowly available from clay particles and feldspar minerals. In soils where magnesium is in higher levels than calcium, such as serpentine soils in Eastern Ontario, drainage suffers as they have poor structure and the magnesium tends to swell while saturated.

**Zinc** – Since it is fairly immobile, leaching of zinc is not a concern.

**Manganese** – Plant available manganese is relatively low compared to the total amount of manganese in the soil. It exists in many forms, and although it is fairly soluble leaching is not a large concern. Soluble manganese actually increases during saturated anaerobic conditions.

**Iron** – Very low solubility, and rarely deficient in Ontario.

**Boron** – Soil boron is in very small quantities and not a concern with leaching. Boron is less available in dry soils.

