Smart Farming

How is pH related to nutrient uptake?

Precision agriculture describes a set of technologies that allow farmers to be more efficient in their farming practices. It includes, but is not limited to:

- soil testing across ½ acre to 2½ acre grid squares on the field
- auto steering on tractors to allow for optimum use of field area
- planters that can plant different varieties of a crop in different parts of the field, depending on productivity of the soil
- sprayers that can adjust fertilizer and pesticide levels to areas that need targeted
- harvesters that collect yield data that can be mapped in relation to a particular area in the field
- and more

Soil tests show the pH, and nutrient amounts in a field. Soil chemistry determines the amount of root growth, the amount of nutrients that can be held in the soil and the ability of plants to take in and use those nutrients. But why is pH important and what are the consequences of different levels of pH?

The measurement of pH is measured on a scale of 1–14, where the lower numbers represent acids (have more hydrogen ions H+) and the higher numbers represent bases (have more hydroxide ions OH–). A measure of 7 is neutral. The scale is logarithmic, meaning that the difference between a pH of 5 is 10 times more acidic than a measure of 6, a measure of 9 is 10 times more basic than a measure of 8.

Most plants need a pH between 6.5 and 7.5 to grow and thrive, or yield seed. In Ohio, the top seeds that are grown by farmers are soybeans, corn and wheat. If a field has a wide variability of pH, a farmer may have to apply a product to adjust pH. This product most commonly applied is lime (crushed limestone) that helps to adjust the pH to more basic or higher pH.

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Graph the pH data

In box and whisker plots, graph the pH data to the right from the four farm fields below to determine the differences between the fields. Box and whisker plots can give an idea about the amount of variability in a data set. These plots use the **median** and **quartiles** along with the maximum and minimum values in a data set to show the spread of the amounts.

Field 11 pH	Field 8A pH	Field 12B pH	Field 6 pH
5.7	5.5	5.8	6.3
5.8	5.6	6	6.5
5.9	5.7	6.1	6.6
6.0	5.8	6.2	6.6
6.1	5.9	6.3	6.7
6.4	6.0	6.3	6.8
6.4	6.1	6.4	6.9
6.4	6.1	6.5	7.0
6.4	6.4	6.6	7.0
6.4	6.4	6.6	7.0
6.4	6.5	6.6	7.0
6.4	6.6	6.6	7.0
6.6	6.7	6.6	7.0
6.7	6.7	6.7	7.0
6.7	6.7	6.7	7.0
6.7	6.8	6.7	7.0
6.9	6.9	7.0	7.0
7.0	6.9	7.1	7.0
7.0	7.2	7.2	7.0
7.2	7.3	7.2	7.1
7.3	7.4	7.5	7.1
7.6	7.4	7.5	7.1
7.6	7.4	7.6	7.1
7.6	7.6	7.6	7.1
7.7	7.6	7.6	7.3