



Welcome to Ground Work

Understanding Sap pH

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Recently, Ground Work talked about Brix and what the refractometer can tell you about plant health and nutrients. Another indicator we often check at the same time is the sap pH.

If the pH of the sap is in the proper range, the plant has a good balance of nutrients. If the pH is too low or too high, this indicates a shortage of either cations or anions. Here's how it works:

Sap pH Interpretation

Over 6.6 Anion shortage (nitrogen, phosphorous, sulfur, boron)

6.0-6.6 Desired range – good balance of anions and cations

Under 6.0 Cation shortage (calcium, magnesium, potassium, sodium)

pH measures the concentration of hydrogen ions in the sap. The lower the pH, the greater the percentage of hydrogen present in the sap.

At a desirable pH of 6.4, the plant sap contains about 12% hydrogen and 88% other cations (calcium, magnesium, potassium, sodium). At 6.0, the sap contains only 80% of these other cations; and every additional 0.1 down further reduces the other cation percentages and greatly increases the hydrogen. So if the sap pH is too low, then there is too much hydrogen and not enough nutrients like calcium and potassium.

On the flip side, if sap pH is over 7.0, then there is a very high ratio of the cations (calcium, magnesium, potassium, sodium), but not enough of the anions like nitrate nitrogen, phosphorus, or sulfur to maintain the proper balance.

How does this relate to insects? It has been documented that insects are attracted by either excess nitrogen in the plant, or a shortage of potassium. These are two of the most common imbalances we see in crops. In these situations the sap pH will be too low, usually in the 5.4-5.8 range.

Several years ago, Reggie Destree and Gary Campbell did a comparison of several soybean fields in the thumb of Michigan. In each case, the lower the sap pH, the greater the count of aphids found in the soybeans. This correlates with a University of Wisconsin study that found higher aphid levels where potassium was low. The two aphid studies appear to confirm that the shortage of a cation such as potassium results in a low sap pH.

By monitoring the crop's sap pH and tissue analysis, and then following with the appropriate foliar, it is possible to keep pH in the desired range and reduce the crop's attractiveness to insects.

By maintaining the proper balance of nutrients in the plants, the potential for health, quality, and yield will follow.