

Friday 12/10/10

Brix Test

Some farmers and agronomists take a brix reading on their corn sap. Brix is a unit of measure for percent sucrose. A refractometer measures the refractive index of plant sap and the numbers are measured in degree Brix. This measurement ranges from 0 to 32 Brix on most refractometers. Healthy plants have a brix reading above 12.



Refractometers take Brix readings in sap.

During the growing season you can check sucrose levels in the sap. A refractometer is easy to use and available from Spectrum Technology for less than \$100. You squeeze the sap out of the plant and place a couple drops on the refractometer and then point toward any light source, focus the eyepiece and note where the light and dark fields meet and record the Brix measurement.

Brix is equal to percent carbohydrate per 100 pounds of plant sap since this makes up the bulk of the solids. There are also some protein and minerals included. The higher the carbohydrate in the plant juice the higher the Brix number. Sap with a higher refractive index (Brix) has a higher sugar content along with higher protein and mineral content.

For corn, brix reading of 6 or below, 8 to 10 is average, 14 is good and 18 is excellent. But what does it mean practically?

Jeff Littrell with BRT Ag and Turf and HFR Farms in Rochester, Minn. said for conventional corn he has recorded Brix reading of 4, 6 and 8 and he considered the is physiologically in poor health. He explained that the plant doesn't have enough access to nutrients to produce and transport sugar.

He points out that with healthy plants, he will measure Brix readings of 12 and 16. "When we come in with foliar we increase phosphorus, potassium and other nutrient levels, increase photosynthesis and sugar content and the Brix readings. When you get a Brix above 12 and especially above 14 or 16 you are in the sweet spot."

Littrell also points out crops whose sap has a Brix measurement over 12 can better withstand insects.

If you are interested in taking Brix measurements, buy a refractometer, collect some sap and read. However Littrell recommends not to sample after a rain or heavy dew since the sap will be diluted.

Personally, I haven't yet done this but believe it makes sense and might try it next season. By monitoring sap I can tell if the crop is physiologically in its sweet spot and all systems are functioning optimally. But if the Brix reading is low, well I better try to figure out why.

Posted at 4:23PM CST 12/10/10 by Dan Davidson

Comments (2)

Dan The following would be a history lesson; The Balling scale was developed by German chemist Karl Balling. It refers to the concentration of a sucrose solution, as the weight percentage sucrose at 17.5°C. The Brix scale was originally derived by Antoine Brix by recalculating Balling's scale to a reference temperature of 15.5°C. The Brix scale was subsequently recalculated again, and now uses a reference temperature of 20°C. Brix can be approximated as $261.3 \cdot (1 - 1/g)$, where g is the specific gravity of the solution at 20°C. The Plato scale which measures in Plato degrees is also a refinement of the Balling scale. It uses a reference temperature of 17.5°C and a slightly different modulus, with the approximation $260 \cdot (1 - 1/g)$, where g is the specific gravity of the solution at 17.5°C. The three scales are often used interchangeably since the differences are minor. Brix is primarily used in fruit juice, wine making and the sugar industry. Plato is primarily used in brewing. Balling still appears on older saccharimeters, and is still used in the South African wine industry. Brix is used in the food industry for measuring the approximate amount of sugars in fruit juices, wine, soft drinks and in the sugar manufacturing industry. Different countries use the scales in different industries; in the UK brewing is measured with specific gravity X 1000, European brewers use Plato degrees, and US industries use a mix of specific gravity, Brix, degrees Baume and Plato degrees. For fruit juices, one degree Brix is about 1-2% sugar by weight. This usually correlates well with perceived sweetness. Since Brix is related to the concentration of dissolved solids (mostly sucrose) in a fluid it is therefore related to the specific gravity of the liquid. Because the specific gravity of sucrose solutions is well known, it can also be measured by refractometers. When a refractometer is used, it is correct to report the result as "refractometer dried substance" (RDS). One might speak of a liquid as being 20 °Bx RDS. This is a measure of percent by weight of TOTAL dried solids and, although not technically the same as Brix degrees determined through a specific gravity method, renders an accurate measurement of sucrose content since the majority of dried solids are in fact sucrose. When an infrared Brix sensor is used, it measures the vibrational frequency of the sugar molecules, giving a Brix degrees measurement. This will not be the same measurement as Brix degrees using a density measurement because it will specifically measure dissolved sugar concentration instead of all dissolved solids. To learn more go to the following address; Go to <http://www.highbrixgardens.com/highbrix/Refractive%20Index%20of%20Crop%20Juices.pdf> also Dan we will be covering Brix and related on Tuesday through Thursday @ Riverside casino, in Riverside, Iowa info go to www.fhrfarms1.com Thanks Jeff N.A.

Posted by Unknown at 11:45PM CST 12/10/10

Dan, Is there any research as to if the refractometer test could be used to delay or decrease an irrigation application? I would assume the sugar/sap scale would be satisfactory if water availability is adequate.

Posted by Bonnie Dukowitz at 5:37AM CST 12/11/10