

# Brix Levels

Brix is a scale based on the amount that light bends when it passes through a liquid. If one were to place one's hand in a pond and measure the amount it appeared to bend, and then place it in the ocean, it would appear to bend a different amount. That differential light bending is the best tool currently available to consumers to determine the value of crops that are purchased or produced. The brix chart is the scale that anyone can use to determine poor, average, good or excellent in a food.

## **So, what exactly is Brix?**

"Brix" is a technical term to measure and quantify the amount that light is bent passing through a fluid. We have all seen the optical effect of a log sticking out of water. The straight log appears to be bent where it enters the water. This is because water has a different density than air, and so light travels at a different speed in water than in air. Thus, the log seems bent. Actually, it is the light which is bent, not the log at all. It is an optical illusion. This difference between apparent and actual location is caused by this light-bending effect of the different densities of air and water. Other liquids, glass, transparent crystals, many biological molecules, and other more exotic materials also bend a beam of light. This "refraction" is what gives diamonds and other gems their brilliance and sparkle.

## **How does this affect plants juices?**

In the case of plant sap, it is primarily sugars in plant juice that cause refraction. This is because the primary activity of plants is photosynthesis, – using sunshine to combine carbon dioxide and water to form sugars. This sunlight stored in carbon rings is the primary source of energy for most of biology on Earth, including humans - especially our nervous system. Thus, the principal substance carried by plant sap fluids is these energy-rich carbohydrate chemicals: sugars – the sweetness of life.

Normally, the second most abundant refractive substances in plant sap are mineral ions. However, sugars are quite large compared to mineral ions. Each sugar molecule consists of at least two dozen covalent bonds in a molecule composed of twenty to two dozen or more atoms. Thus, sugars tend to affect the index of refraction more than minerals. Thus, Brix is mostly a measure of sugars and minerals dissolved in water. However, many other chemicals may be present and contribute some small factor to the Brix reading.

## **Why Are Plants High in Brix Insect And Disease Resistant?**

Plants in poor health emit an electro-magnetic frequency that insects tune in to and are attracted to. This in effect calls them in for a feast. Plants in good health emit a different frequency that insects do not tune in to. Nature has been designed to use insects to get rid of poor quality plants that are unfit for human consumption. In the same way a poorly balanced soil will produce plants susceptible to disease. Properly balanced soil will produce plants resistant to disease.

Brix measures the percent solids (TSS) in a given weight of plant juice, nothing more, nothing less.

Brix is often expressed as the percentage of sucrose. However, the "sucrose" can vary widely.

Brix is actually a sum of the pounds of sucrose, fructose, vitamins, minerals, amino acids, proteins, hormones, and other solids in one hundred pounds of plant juice.

Brix varies directly with plant quality.

For instance, a poor, sour tasting grape from worn-out land can test 8 or less brix.

On the other hand, a full flavored, delicious grape, grown on rich, fertile soil can test 24 or better brix.

Total dissolved solids (or Brix), measured with the ATC-1e Refractometer.

This number indicates the level of balance of nutrient uptake and complexing into sugars or proteins in the photosynthesis factory – the leaf.

If Brix is low, even after several hours of sunshine, some element(s) are missing in the photosynthesis factory.

Ions, if present, have not been "complexed" into sugars or proteins.

pH, measured with the Cardy pH Twin Meter, indicates elements, which may be out of balance.

For pH<6.4, consider if there is a need for Ca, Mg, K, or Na. For pH>6.4, consider possible need for phosphates or sulfates.

If the proper elements are selected and applied, the Brix reading will increase and the pH will go to the desired area of approximately 6.4. EC, measured with the Cardy Twin EC Meter, indicates the level of simple ion uptake into the plant sap. With low Brix crop, if sap EC is too low, elements are not being made available to the plant. Look at the EC of soil/water extract (or ERGS) and take appropriate steps to correct the condition.

If sap EC is too high, elements or ions are not being "complexed" and ions such as nitrate nitrogen may be at excessive levels.

### **What portion of the plant is used for a Brix reading?**

Whatever part you eat, if it is ripe. If it is not ripe, take the most recent mature leaves that have had at least two hours of full sunlight. Ideally, measurements are taken at the same time of day every day, so you can compare throughout the growing season.

### **What proof shows that a higher brix content means higher quality yields?**

Centuries of wine making and work with other fruits and vegetables always show direct relations between high Brix and high quality, expressed most simply and directly as superior taste. The process is somewhat altered for the gardener or farmer in that they test the leaf of the growing plant much earlier and are therefore afforded the opportunity to correct soil deficiencies before the crop matures. The gardener or farmer also benefits in that they soon learn that any crop with 12 or better leaf Brix will not be bothered by insect pests.

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Final thoughts. The higher the Brix, the happier and healthier the plant!