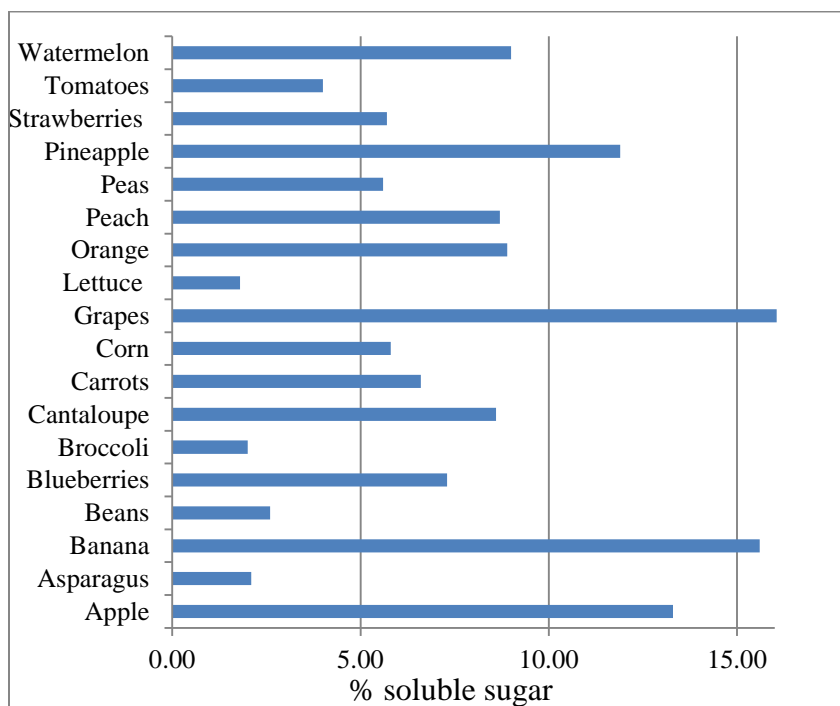


How to Use a Refractometer

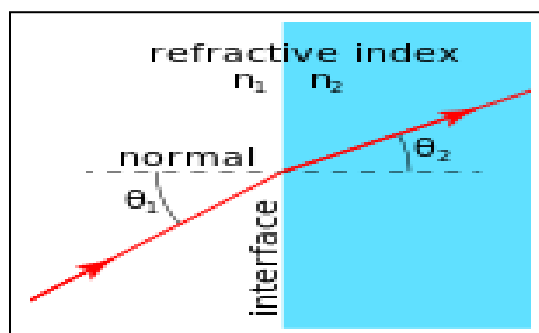
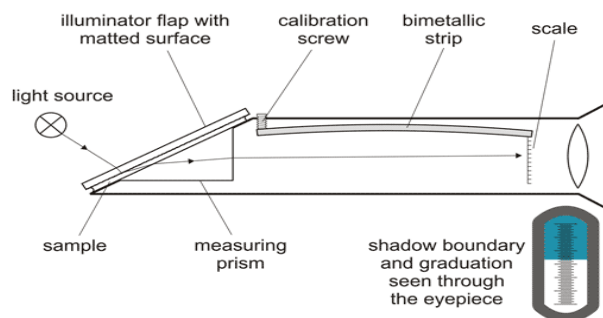
Introduction

- Soluble (dissolved) sugar (or solids) content (SSC or °Brix) is a measure of sweetness.
- In fruits, the typical range of soluble sugar content is 5-15%, while in vegetables it is typically 5% or below. See examples in figure below (Matthews et al., USDA 1987).
- % soluble sugar is measured using a refractometer, either analog (below) or digital.



Key Concepts:

- Measurement of % sugar in fruit and vegetables provides information on quality and may be used as an indicator of harvest time, market value or use as a fresh or preserved product.
- Refractometers are composed of a glass measuring prism where the sample is placed, which is covered by an illuminator flap or cover. When light passes through a sample containing dissolved solids (such as sugars), it is interrupted, slows down and is bent or 'refracted'.
- Scientists have correlated the change in the refractive index, or bend of light, to % sugar.
- Temperature affects the reading (increases 0.5% SSC for every 5°C or 10°F). The reading is only correct if done between 20-30°C (68-86°F). Otherwise use a correction table.



How to Use a Refractometer

How To

- With small fruits or vegetables, use the whole fruit, but with larger ones, cut a representative wedge from the stem end to the blossom end and to the center of the fruit.
- Crush using a blender, mortar and pestle or garlic press, or squeeze through cheesecloth.
- Remove pulp or seeds by filtering through a small piece of cheesecloth or filter paper.
- Measurement Steps
 - Open the plastic cover and make sure the glass prism is clean and not scratched.
 - If not clean, put a few drops of distilled water on the glass, shake the water off, and touch the edge of the glass with a soft clean cloth to wick the remaining water off.
 - Place few drops of sample on glass measuring surface using plastic pipette or spoon.
 - Replace cover. If trapped air exists, gently press down on cover.
 - Look through the eyepiece while holding the refractometer up to a natural light or incandescent light source. Adjust the focus by twisting the eyepiece.
 - There is a scale inside showing % sugar.
 - Read where the shadow boundary or contrast line (difference between blue and white areas) crosses the scale. Record the % SSC or Brix value.
- Clean between each reading with distilled water, which should be 0% SSC at 20°C or 68°F.
- Calibration
 - Calibrate to 0% SSC using distilled water at the beginning of use, and depending on how many samples are measured, periodically throughout measurements.
 - Contrast line should cross the scale at zero. If not, the scale needs adjustment.
 - Refer to specific manufacturer instructions, but there is a calibration screw to adjust.

Materials Required:

- Refractometer
- Blender, mortar and pestle or garlic press
- Distilled water
- Plastic pipette or spoon to put sample on glass measuring surface.



References:

- Kitinoja, Lisa and Hussein, Awad. February 2005. Postharvest tools and supplies kit. Utilization, calibration and maintenance manual. University of California, Davis.
- Matthews, Ruth H., Pehrsson, Pamela, R. and Farhat-Sabet, Mojgan. Sugar content of selected foods. United States Department of Agriculture Home Economics Research Report 48. September 1987, 41pp.
- Refractometer image. <http://www.refractometer.pl/hand-held-refractometer>.
- Ulfund. Refraction at interface. Own work. Licensed CC0 via Wikimedia Commons - https://commons.wikimedia.org/wiki/File:Refraction_at_interface.svg#/media/File:Refraction_at_interface.svg
- Vasquez, Steve and Mueller, Shannon. Refractometer calibration, use and maintenance. University of California Cooperative Extension.