AspireUS: How to Obtain Root Samples and Measure Brix%

AspireUS estimates root CHO content by assessing measurements of the Brix% of sap squeezed from storage roots sampled from the crop.

Root CHO content is variable within a crop, so at least 20 but not more than 40 root samples are needed on each measurement occasion to obtain a reliable estimate of CHO content.

A. How to collect root samples:

Equipment required:

1. Spade.
2. 20-40 plastic bags (Ziplock sandwich bags are ideal).
3. Ice chest (with ice to keep roots cool if the weather is warm).

Procedure:

1. Obtain samples from 20-40 random locations in the field. The locations should accurately represent the field as a whole. Avoid seedlings, outside rows and ends of rows.
2. Take roots from a typical plant at each sampling location. Use the spade to make a vertical cut about 1 foot deep into the soil, through the roots, about 6 inches from the center of the row. Then make a second vertical cut, parallel to the first one, about 6 to 8 inches further away from the crown.
3. Lift and remove the severed roots from between the two cuts. Discard any hollow asparagus roots or roots from other plants such as weeds. About ten 4 inch root pieces are needed for each sample.
4. Seal the roots in a plastic bag and store in the ice chest.

B. How to prepare the root samples for Brix% measurements:

1. Keep the 20-40 samples separate from each other throughout the procedure.
2. Remove all soil by washing the roots in cold or lukewarm (not hot) water as soon as possible after collection.
3. Drain excess water by laying the roots on paper for a short time.
4. Rinse the plastic bag, and then place the roots back in it.
5. Freeze the roots in the bags. It is difficult to squeeze sap from the roots if they are not frozen first. Sap is released when the cell walls break down as the roots thaw.

C. How to measure Brix%:

Equipment required (Check with Dan Drost for sources of supply):

1. Refractometer (0-32% Brix, preferably temperature-adjusted, e.g. Atago ATC-1).
2. 20-40 small 3 ounce disposable bathroom cups.
3. Heavy-duty garlic press.
4. Teaspoon.
5. Box of tissues.
6. Scissors.
7. Bucket of clean water.
8. Newspaper.

Procedure:

1. Take ten root samples from the freezer and lay them out on newspaper to thaw. They need to be thawed completely and free of surface moisture, but not allowed to dry out excessively. Pat them dry with tissue paper once they are thawed.
2. When the first ten samples have thawed, take the next ten out and allow them to thaw while working on the first batch. If all samples are thawed at once some may dehydrate and give an incorrect result.
3. Check that the refractometer reads zero with a few drops of clean water. If not, give it time to reach room temperature (ideally about 70^{o}F). It may be necessary to adjust it to zero (see the refractometer manual).
4. Cut the roots into about half inch lengths with scissors.
5. Place the root pieces in the garlic press and squeeze the sap into a disposable bathroom cup.
6. Swirl the sap around until it is mixed thoroughly.
7. Use the teaspoon to place about three drops onto the prism surface of the refractometer.
8. Close the cover over the sap, avoiding bubble formation.
9. Read the Brix% on the refractometer scale, record the result, and discard the sap and cup.
10. Wipe the prism surface clean with tissues between samples. The refractometer should not be immersed in water.
11. Dispose of the crushed roots and wipe the garlic press dry with a tissue after each sample. Any water or sap left on the equipment will affect subsequent readings.