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Type 1 or 2?

Using diabetic test kits to assess sugar concentration in potatoes

PROCESS GROWERS ARE ACUTELY aware of how important sugar content, especially glucose, is to final fry or chip color. Typically, fresh potatoes are stored at cooler temperatures compared to process potatoes—cooler temperatures in storage and transport tend to promote glucose formation. The more glucose in the potato, the darker the fry color.

But how do you know when the potatoes are ready to produce acceptably colored fries? At the University of Idaho Kimberly Potato Storage Facility, preliminary research was recently conducted to look at the use of two different diabetic glucose test strips and meters on multiple potato varieties, stored at various temperatures and compared to glucose results on the same tuber using a laboratory standard YSI sugar analyzer. These simple diabetic test kits are the latest models used by millions of people who suffer from diabetes to track their blood glucose levels over the course of a day.

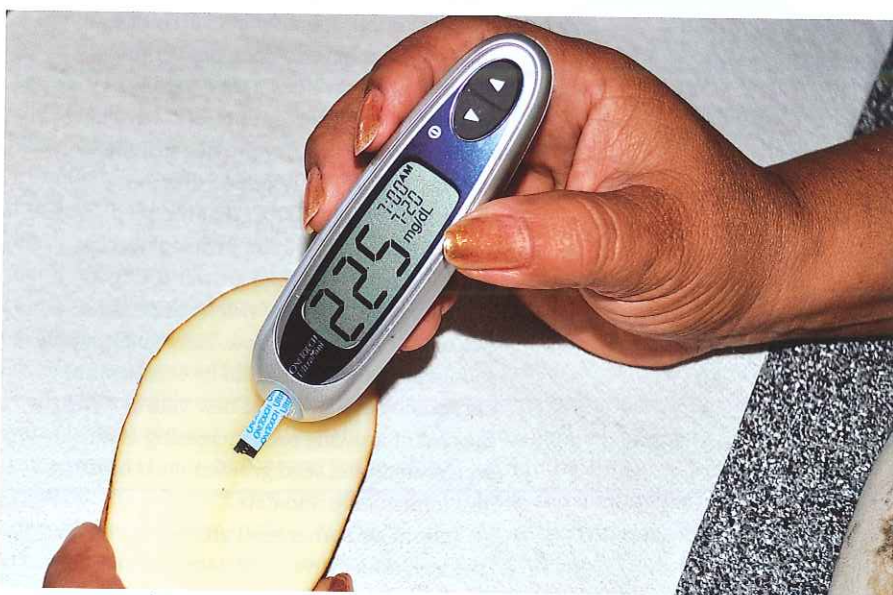
The use of diabetic glucose monitoring test kits to analyze potato glucose levels is not a new concept. Researchers Coleman and Pritchard in the 1990s showed a strong relationship between diabetic test kit values and actual glucose values and fry and/or chip color. Technology has since advanced and modern diabetic glucose meters have become extremely easy to operate and now provides results within five to 10 seconds. You no longer need to read test strips that change color and coordinate the color to a glucose level. Current meters are used in conjunction with disposable test strips that provide an actual number value displayed on the meter. The cost of the meter is around \$20 and individual test strips range from \$0.50 to \$1.50 per strip. Each strip can only be used once.

To use the diabetic kit to test a potato, the disposable test strip is simply inserted into the meter, gently pressed against a slightly macerated tissue portion of a cut tuber, and allowed to come in contact with the juice of the macerated tissue. Photo shows a photograph of the easy method we used to measure glucose with these test strips. We used a knife to macerate the tissue, but any utensil would work. Just

ensure that enough liquid is developed for the meter to read a value. The meter will alert you of an error if insufficient liquid is not present. The meter provides a displayed value and the latest models of meters will store the last several historical numbers. In the U.S., newer meters give results in mg/dL. Test near the center of the potato since glucose concentration may vary in different parts of the tuber and test several tubers for an average glucose level in a given lot of potatoes.

test meter, strongly related to the real value given by the YSI meter.

In this research, diabetic test meter values of about 130 to 140 mg/dL equated to 0.1 percent fwt glucose in the tuber and was consistent over multiple potato varieties, including Russet Norkotah, Russet Burbank, Ranger Russet, Alturas and others. Values less than 75 mg/dL equated to 0.05 percent fwt glucose level and values of 270 mg/dL equated to 0.20 percent fwt glucose. Although there is a



A LITTLE PIN PRICK. Example of using a diabetic test-strip kit on a cut potato. Note the slightly macerated tissue producing potato juice to use for the test kit.

Typically for 'Russet Burbank,' glucose levels of 0.1 percent on a fresh weight (fwt) basis (1.0 mg/g fwt) or higher may cause unacceptable fry color. Some restaurants may be even more stringent in requiring 0.05 percent fwt, whereas some fresh-cut fry restaurants may prefer darker fries allowing for greater glucose levels.

In our preliminary look at the diabetic test kits, we evaluated two test kits widely available in local supermarkets, Accu-chek Active and OneTouch Ultra-Mini, although there are many types and brand names of test kits available to use. Both test kits gave correlation coefficient values of approximately 0.9, meaning that the predicted value, provided by the diabetic

strong correlation between actual glucose values and the values obtained using a diabetic test kit, it is advisable to use these strips for gross measurements only. They are ideally suited to indicate if a potato has low, medium or high levels of glucose present.

There is value in utilizing these diabetic test strips, whether to follow the general level of glucose levels in your stored potatoes or after transport, or for retail markets to assess whether the potatoes are acceptable for fresh-cut fries. Additional research needs to continue to establish correlations between test kits, true glucose values and fry or chip color. **PG**