Knowledge grows

Issue N 1
2018

Potato Peel

Your potato newsletter

Uh Oh... Sugar end

Sugar end, jelly end, glassy end, translucent end—it's all the same, and it's not good. This malady is the result of in-season accumulation of reducing sugars instead of starches in the tuber. These sugars react with amino acids during frying and result in an unsatisfactory dark end product. Unfortunately, we don't know there's a problem until it is too late.

How Did This Happen?

Potato leaves make carbohydrates in the form of sucrose during photosynthesis. Some of the sucrose is used for respiration, but most of it is translocated to the tuber where it is converted to starch for storage. This conversion from simple sugar to starch is a reversible reaction. In optimal growing temperatures (75^0-80^0 F or 24^0-27^0 C) the tuber produces starch. Hot, dry conditions cause starch formation to be suppressed and carbohydrates remain as sucrose which then is converted to the reducing sugars glucose and fructose. Also, these conditions can lead to the conversion of starches in the tuber to glucose and fructose. Unfortunately, sugar end formation is ultimately not reversible and the damage is not noticed until the potatoes are taken out of storage and processed.

What to Do?

Climate, which is out of our control, is the main contributing factor to sugar end, but there are ways to mitigate the stress caused by excess heat and dry conditions. First, if possible, try to choose a variety that is less prone to sugar end. One of the most effective measures is to manage the crop for quick row closure. This will help keep the soil temperature below the critical temperature (near 72^0 F or 22^{0}C) where sucrose to starch conversion is interrupted. We must also make sure that the crop's root system is adequate to support the canopy growth. Also, any measures that can help alleviate early crop senescence such as good pest management and optimal crop nutrition aid in the reduction of sugar end.

Calcium & heat stress

Biotron studies from Wisconsin University show that:

- Plants with Ca produced 1.0 kg of tubers / plant
- Plants without Ca were heat stressed and produced 0.7 kg of tubers / plant
- A yield reduction of 30%

How Does Optimal Crop Nutrition Play a Role?

Yara's **toppotato**™ crop solution for potatoes can help alleviate some of the factors that can lead to sugar end. Good early-season nitrogen management with YaraLiva® Calcium Nitrate products can help the crop achieve early row closure, as well as contribute to the development of a robust root system. Also, keeping the calcium status of potatoes high is important as calcium is not only vital in cell division and reducing the incidence of bruise, but calcium also plays a huge role in signaling drought and heat stress to the plant which helps the plant regulate water loss during stress conditions. Utilizing Yara's Megalab™ analysis and interpretation system, a foliar nutrition program including applications of YaraVita® HYDROMAG, HYDROPHOS and BORTRAC keep the plant functioning at high efficiency which helps alleviate potential early dying that contributes to sugar end. YaraVita AGRIPOTASH applied late in tuber bulking can also aid in reducing stress that contributes to sugar end.

Remember, sugar ends are an interaction of growing conditions and nutrient management and it only makes good sense to manage crop nutrients to minimize the potential for sugar ends.