

Green Potatoes

Attracting the attention of consumers to displayed potatoes is important in selling the product. You don't want to attract the wrong kind of attention, however. The potatoes need to be in an attractive display, but the more visible the tuber, the greater potential for greening to occur. This is one of the "Catch-22s" of the potato post-harvest marketing world.

When a potato tuber is exposed to sunlight or artificial light, the amyloplasts (the starch storage organelles in a cell) are transformed into chloroplasts. Chloroplasts produce chlorophyll and subsequently the visible green color on the tuber. It is advised that we do not eat green potatoes, so we cull these potatoes out or trim off the green areas. Actually the green part itself is not harmful, but the increase in glycoalkaloids that also occurs when tubers are exposed to light is the real concern. Consumption of high levels of glycoalkaloids poses a health risk to humans and animals due to the toxic nature of the compounds. So what can be done to minimize greening?

First of all, greening and the production of chlorophyll is a cumulative process. This means that each time the tuber is exposed to light for a period of time, some amount of chlorophyll will be produced. The levels do not decrease when the potatoes are put back in the dark. Reducing exposure to light in the cellar can help reduce visible greening in the marketplace. Using incandescent lights inside and putting light blockers or shade hoods on louvers will decrease the chances of greening in storage.

The longer the potato is exposed to light and the greater the light intensity, the greater the extent of greening. Sunlight has the greatest light intensity and therefore, the greatest potential to cause greening. Not only is it the quantity and intensity of light, but also the quality of light. Artificial lights to avoid are pink, blue and daylight fluorescent. Lights that have less of an impact on greening development are green, gold, warm fluorescent and incandescent. Of course, having green lights on potatoes in a retail situation would not be as appealing to consumers. Low light levels from indirect incandescent lights and minimal sunlight exposure is best for bulk potatoes. What about the bagged potatoes? A common question asked is if there is a color polyethylene bag

that can minimize greening. In general, most research has shown a limited decrease in greening or chlorophyll content due to colored bags. Most commonly, research has shown some decrease in chlorophyll accumulation with a yellow-orange colored translucent bag. This bag color may not always be appropriate for product visibility and cultivar or color identification.

What other novel means do we have to reduce greening in the marketplace? Researchers have looked at modified atmosphere bags. A European company has found these modified atmosphere bags with elevated carbon dioxide and lower oxygen concentrations, minimized greening in several cultivars. This bag type can also be a clear transparent film for consumer appeal and easy product recognition. Other research has evaluated products applied to the surface of the potato that may inhibit greening. Some products were effective in inhibiting greening but detrimental quality factors, such as blackheart and rot, accompanied the application.

Cultivars vary in their greening response to light exposure. Some cultivars, especially white-skinned ones like White Rose or Shepody, are more susceptible to visible greening compared to red or russet-skin cultivars. Cultivars will also vary in chlorophyll and glycoalkaloid accumulation upon exposure to light. Red LaSoda showed 50% less chlorophyll concentration compared to Russet Burbank when exposed to the same light conditions. Certain cultivars may need different types of packaging, unique placement consideration in the marketplace, or more frequent rotation from box to display and back to box again. Temperature will also affect how fast a tuber will green. At warmer temperatures, such as 70°F seen in grocery stores, tubers will green faster than at lower temperatures.

What is too green and how long does it take to get to that point? Dr. Rick Knowles and graduate student Laura Grunenfelder of Washington State University have engaged in a valuable study on greening in the marketplace. How quickly greening occurs and cultivar differences can be seen in their recent identification of greening indices for several fresh market potatoes. These scales can be viewed at www.wsu.edu/~fullern/greening/Greening.htm. Depending upon cultivar, light level and what a person considers “green”, some cultivars can exhibit greening in 1 to 6 days.

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