Phytonutrient Crop Production in High Tunnels

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As consumer awareness and demand for produce offering additional health benefits increases, growers will be faced with both opportunities and challenges. As scientific evidence continues to emerge and strengthen the idea that food contributes to disease prevention, understanding the impact that environment (ie. production systems) has on phytonutrient concentration will be critical.

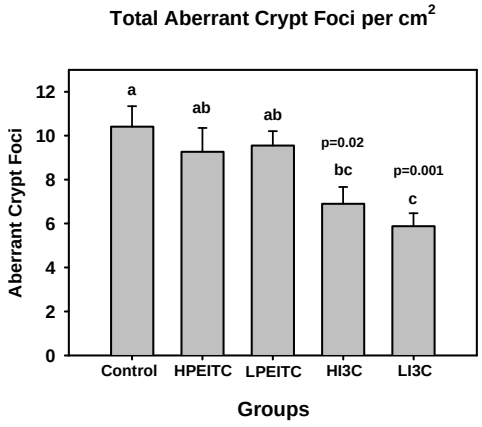
Definitions

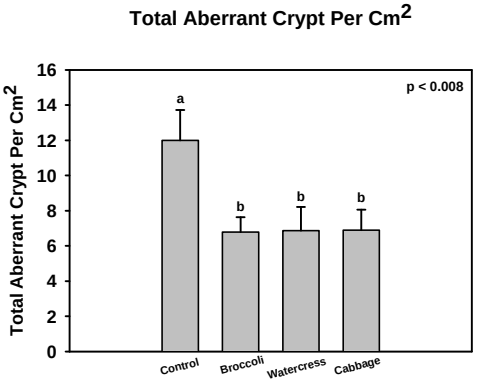
Functional Food: A food that provides the body with the required amount of vitamins, fats, proteins, carbohydrates, etc. needed for its healthy survival.

Nutraceutical: A functional food that aids in the prevention and or treatment of disease(s) and/or disorders.

Phytonutrients: Naturally occurring plant based compounds that have an added health benefit beyond basic human nutrition.

Below are two graphs that show how purified phytonutrients (on left) and how these compounds when delivered through whole food (on right), reduce the number of precancerous lesions (aberrant crypts) in the colon of mice after being exposed to some powerful tobacco carcinogens. It is clear that chemopreventive activity from these phytonutrients are enhanced when delivered through the whole food matrix.

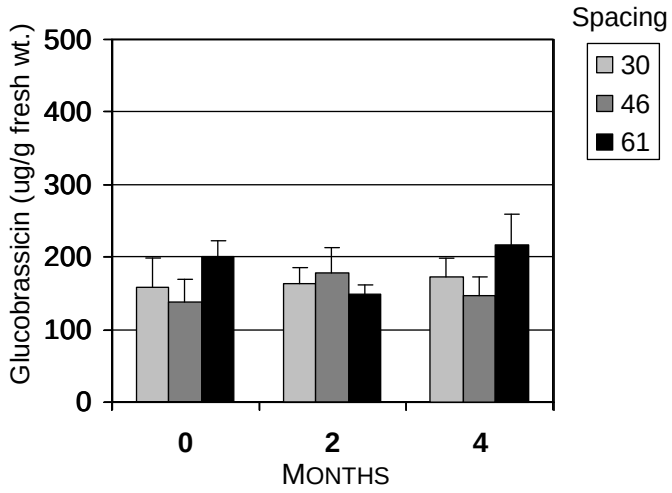


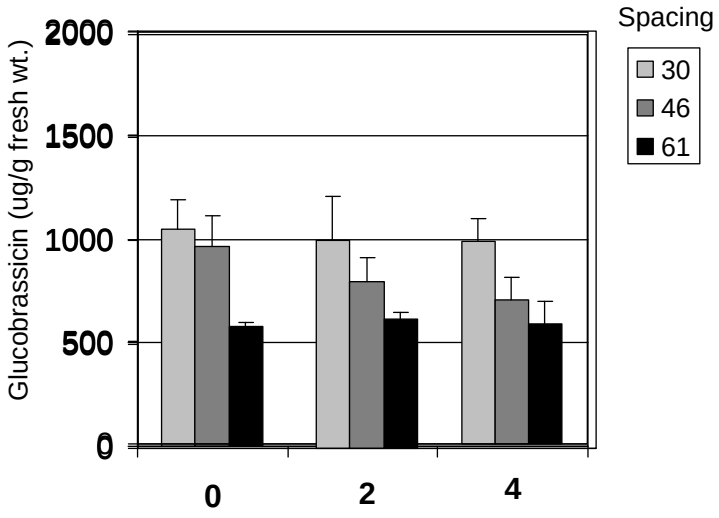


Potential Strategies that May Impact Phytonutrient Concentration

Variety Choice
Population Density
Nitrogen and Sulfur Fertility
Light Manipulation
Biotic Stress Inducers (Insects and Disease)
Seasonal Variation
Seasonal Extension
Temperature
Maturity Indexing
Postharvest Storage

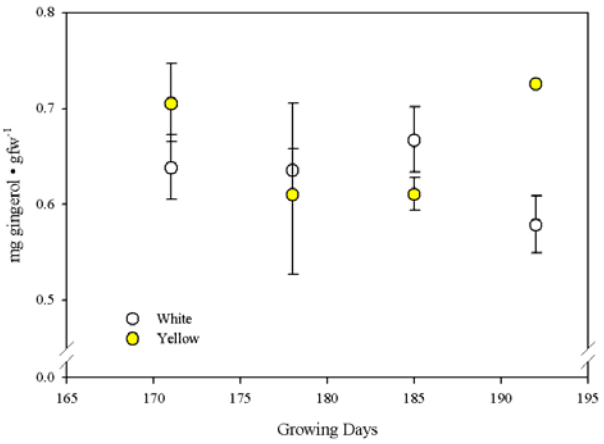
Examples of Production Affecting Phytonutrient Concentration in Heading Cabbage (top: Quisto / bottom: Vorox)

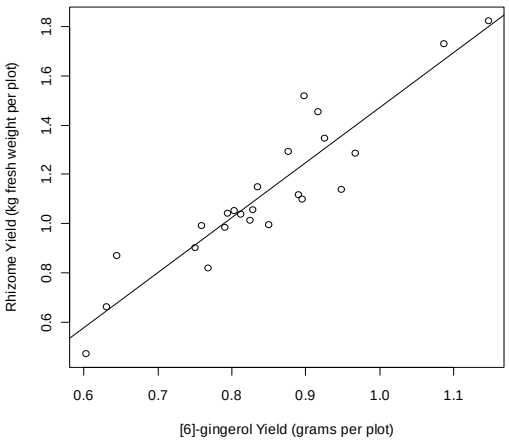




High Tunnels are potentially great tools because we can more easily manage environmental conditions to assess their effect on phytonutrients. In addition, it gives us opportunities to explore alternative crops that require seasonal extension (ie. edible ginger).

Below, time of harvest can have a big impact on biomass and phytonutrient concentration:





Future Needs in the Development of Phytonutrient Crops

1. A production system has to deliver a consistent product

2. Phytonutrient enhanced crops need to meet sensory acceptance by the consumer

3. A system that can quantify / certify phytonutrient concentrations preharvest is needed.

4. In the end, you have to deliver REAL, not just PERCEIVED value.