

# Organic systems

## Is the food better?

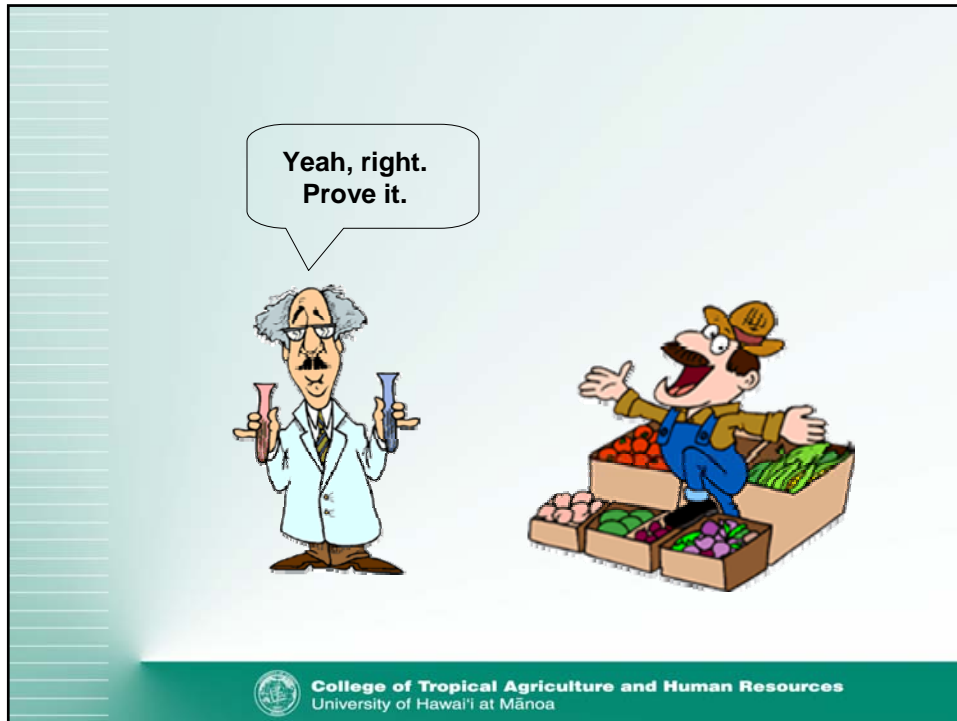
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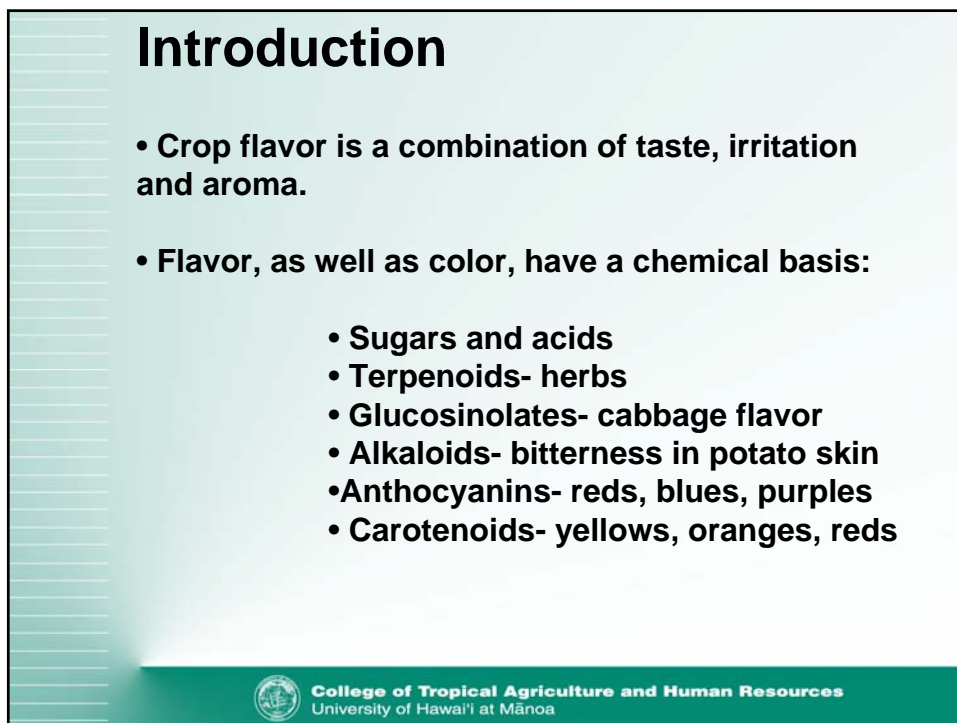


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## Introduction

- Crop flavor is a combination of taste, irritation and aroma.
- Flavor, as well as color, have a chemical basis:
  - Sugars and acids
  - Terpenoids- herbs
  - Glucosinolates- cabbage flavor
  - Alkaloids- bitterness in potato skin
  - Anthocyanins- reds, blues, purples
  - Carotenoids- yellows, oranges, reds



## Introduction

Many of these compounds possess bioactivity important to humans.

Glucosinolates- induce enzyme systems that suppress cancer.

Terpenes- high anti microbial activity.

Carotenoids and Anthocyanins- antioxidant activity.

- Almost all of the controlled studies have been *in vitro* or in animals.
- The relationship between concentrations in produce with bioavailability and bioactivity in humans is still unclear.



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## Introduction

Most of these compounds are involved with plant defence. For example:

- Glucosinolates are thought to protect cabbage family plants against insects and pathogens.

- Anthocyanins protect leaves from high light

These compounds are affected by the crops environment.

Often (but not always) these compounds increase under stressful conditions.



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## **Cabbage as example**

**Planting cabbage so that heads mature in the hottest part of the year produced cabbage that was highest in glucosinolate (GS) concentrations.** HortScience 40:106-110

**In the same study, cabbage high in GS were perceived as more pungent by “taste testers”**

**In a separate study, glucosinolate content was higher and total sugar content lower in heads not irrigated during development.** Journal of the American Society for Horticultural Science 130: 943-949

**The irrigated and un-irrigated cabbage tasted different** Food Quality and Preference 15: 471 476.



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**It makes sense that plants  
grown with different  
management strategies may  
have different levels of  
bioactive compounds.**



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## Relevance to Organic

When studied, there are not always differences between organically grown produce and produce from other systems.

However, a 2001 review of the scientific literature on the subject found that bioactive plant products were generally higher in organic produce Journal of the Science of Food and Agriculture 81: 924-931

Since then, this has been confirmed in organic tomatoes, ketchup, oranges and corn. (see Ted for citations).

Higher bioactivity is not always a good thing:

- Organically fertilized (compost) potatoes had higher skin alkaloid contents and were more bitter than conventionally fertilized plants. Journal of the Science of Food and Agriculture 85:720-726. (2005)



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## Why the difference?

We think maybe:

Relatively low N availability results in lower succulence and more chemical per unit weight in organic produce (reverse dilution).

Higher pest pressure in organic systems results in higher levels of defense compounds.

Biological inputs such as compost tea induce a defense response, increasing levels of these compounds.

Greater use of pest resistant cultivars in organic.

Distance to market sometimes shorter for organic products, resulting in less post-harvest degradation.



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