

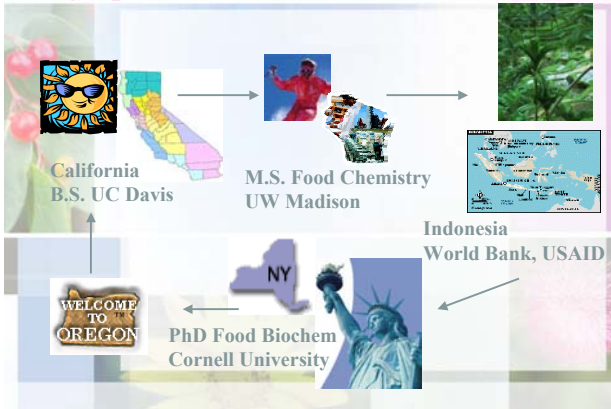
Discovering Marketable Quality Improvements in Processing Tomatoes: Color, Firmness & Phytonutrient Value

Diane M. Barrett, PhD
Fruit & Vegetable Products Specialist
University of California - Davis

Outline of Presentation

- Diane's Bio & UC Davis position
- Processing Tomatoes – Marketable Quality Components
 - Color
 - Texture
 - Flavor
 - Nutrients / Phytonutrients
- Research Activities focused on Improving Quality

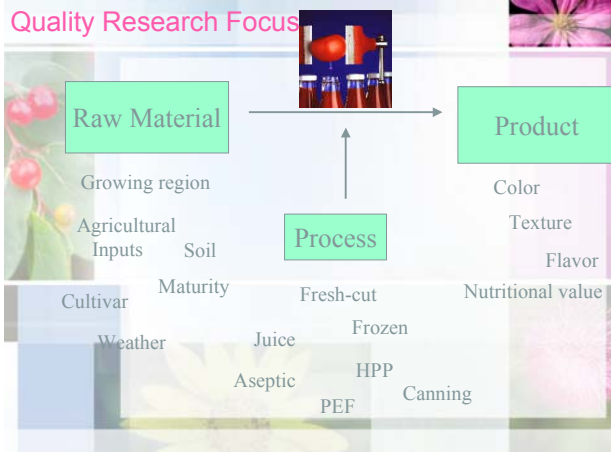
Biographical Sketch



Fruit & Vegetable Products Extension Specialist



Quality Research Focus



Processing Tomato Quality



Tomato Color – Research Activities

- Evaluation of new tomato varieties
 - Annual, CLFP funded
 - New materials from seed companies, 8-9 counties, early & mid season
 - Collaboration w/ farm advisors, CTRI
- USDA validation of new color measuring instruments
 - Hunter Lab (2000), BYK Gardner (2002), Minolta (2006)
 - Soft std generation for processors

Tomato Color – Research Activities

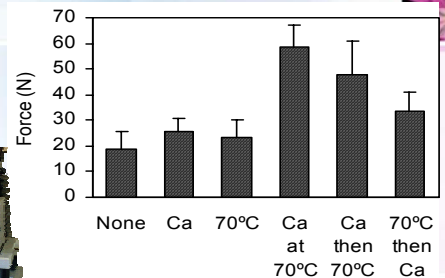
- Standard method for lycopene
 - CLFP funded, 2003-2005
 - Spectrophotometric method
- Lycopene in California tomatoes, correlation with color
 - “Lycopene content in California-grown tomato varieties”, Acta Hort, 2001.
 - “Potential and limitations for determining lycopene in tomatoes by optical methods”, Acta Hort. 2006 (in press)
 - “Assessing lycopene content in California processing tomatoes”, J. Food Proc. & Preserv., 2006

Tomato Firmness – Research Activities

- Evaluation of new tomato varieties
 - Includes Bostwick consistency
- Low temperature blanching and activation of pectin methylesterase
 - “Improved firmness in calcified diced tomatoes by temperature activation of pectin methylesterase”, J. Food Sci. 2005.
 - “Characterization of the temperature activation of pectin methylesterase in green beans and tomatoes” J. Ag. Food Chemistry 2006.

Effects of beta-elimination on pectin size during tomato juice concentration

- PhD project, Jerome V. Diaz

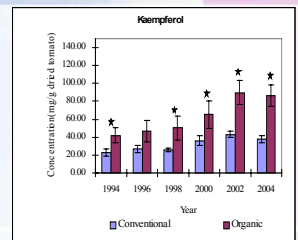
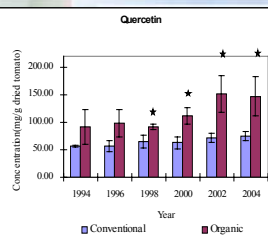


Firmness of tomatoes treated with calcium either at room temperature or at 70°C (158F). Calcium treatments were done either before, during, or after heating to 70°C.

Tomato Research - Phytonutrients

- “Macro” nutrients – vitamins, minerals, fiber
- “Phyto” nutrients – carotenoids, phenolics, glucosinolates, etc.
- Tomato Nutrients – Vit C, lycopene, phenolics
- Lycopene – a key phytonutrient
- Total phenolics
 - may be more important as antioxidants than lycopene
 - Organic agriculture promotes production of phenolics
- Nutritional quality of conventional and organic processing tomatoes
 - Muir Glen supported project, to be submitted March 2006
 - Campbell’s Soup supported project (2006-2009)
 - USDA Proposal submitted Dec. 2005

Phenolics in LTRAS Tomatoes



Changes in tomato fruit quality over time in conventional and organic cropping systems at LTRAS (1994-2004). Mitchell, Barrett et al., (in prep).

Enzyme – catalyzed quality changes

- **Color**
 - Polyphenol oxidase (browning)
 - Lipoxygenase (carotene bleaching)
 - Peroxidase (browning/oxidation)
- **Texture**
 - Polygalacturonase (texture loss)
 - Pectin methyl esterase (firming/loss)
- **Flavor**
 - Lipoxygenase + Hydroperoxide lyase (cold break – fresh tomato flavor)
- **Nutrients**
 - Polyphenol oxidase + Peroxidase (oxidation)
 - Ascorbic acid lyase (oxidation)

Enzyme – catalyzed quality changes

- Anthon, G.E. and D.M. Barrett. 2003. Thermal inactivation of **lipoxygenase** and **hydroperoxytriene lyase** in tomatoes. *Food Chemistry*, 81, 2, 275-279.
- Anthon, G.E., Sekine, Y., Watanabe, N. and Barrett, D.M. 2002. Thermal inactivation of **pectin methylesterase, polygalacturonase and peroxidase** in tomato juice. *J. Agric. Food Chem.*, 50: 6153-6159.
- USDA Proposal to Integrated Organic Program – includes analysis of **polyphenol oxidase and peroxidase** in tomatoes

Tomato Quality - Challenges

- Identifying consumer preferences and translating them into new raw materials & improved processes
 - Center for Excellence in Fruit & Vegetable Quality, Robert Mondavi Institute for Wine & Food Science
- Most challenging quality component:

FLAVOR!



RM
Robert Mondavi Institute
for Wine and Food Science
UC DAVIS

Thanks for your attention!

UC DAVIS
UNIVERSITY OF CALIFORNIA