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TEMASEK LIFESCIENCES LABORATORY

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The Auditorium (Level 1)

Hosted by: Dr Ji Liang Hui

Modulation of cell wall modifying enzymes by processing for structural engineering of plant based food products

Dr Netsanet Shiferaw Terefe
CSIRO Agriculture and Food, Australia



Dr. Netsanet Shiferaw Terefe is a senior research scientist at CSIRO Agriculture and Food. Netsanet has a B.Sc. in chemical engineering, a Masters degree in food engineering from the Catholic University of Leuven (KUL), Belgium and a Ph.D. from the same university. Netsanet joined CSIRO as a postdoctoral research fellow in 2006. Since then, she has been leading several fundamental and applied industry funded research projects and project activities dealing with improving food product quality and processing efficiency through the application of innovative food processing technologies such as high pressure and development of value adding technologies to processing waste from meat, poultry and horticultural industries.

The texture and rheological properties of fruit and vegetable based products is primarily related to the structure of the cell wall polymers. One of the cell wall polymers pectin is the main component of the middle lamella and cement cell walls together giving firmness and elasticity to the tissue. During most food processing operations, the structural integrity of the cell is damaged leading to loss of turgor pressure and crispiness. This initial softening process is enhanced by the degradation of pectin in the cell wall and the middle lamella. The cellulose-hemicellulose fraction remains relatively inert while the pectin component is affected both by enzyme catalysed reactions and β-eliminative degradation during thermal processing. The main enzymes which are involved in the biochemical modification of the cell wall are pectin methylesterase (PME), polygalacturonase (PG) and peroxidase (POD). The rational use of physical stressors such as temperature, pressure and ultrasound enables the modulation of the activities of these enzymes and can inhibit or limit the chemical and enzymatic degradation of the cell wall and hence textural change during processing. The same approach can also be used to create novel structured food products. This presentation discusses how the activity of endogenous and exogenously added cell wall modifying enzymes can be modulated by physical stressors for structural engineering of plant based food products. Examples will include processed tomato, carrot, pear and potato products.

Recent Publications:

1. **Terefe, N.S.**, Buckow, R., Versteeg, C. **2015**. Quality related enzymes in plant based products: effects of novel food processing technologies. Part 2: Pulsed electric field processing. Critical Reviews in Food Science and Nutrition 55 (1): 1-15(DOI:10.1080/10408398.2012.701253).
2. Barba, F.J., **Terefe, N.S.**, Buckow, R., Knorr, D., Orlien, V. **2015**. New Opportunities and Perspectives of High Pressure Processing to Improve Health Attributes of Foods. A Review. Food Research International 77: 725-742.
3. Zhou, Lei, Liu, W., Stockmann, R., **Terefe, N.S. 2018**. Effect of citric acid and high pressure thermal processing on enzyme activity and related quality attributes of pear puree. Innovative Food Science and Emerging Technologies 45, 196-207.