VII International Symposium

Applications of Modelling as an Innovative Technology in the Horticultural Supply Chain

(June 11-14, 2023)

ISHS
International Society for Horticultural Science

MODEL-it
2023

ATB

Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Potsdam
Germany

Sponsors

The organizing committee would like to express heartfelt appreciation to the following sponsors for their generous support.

Program Overview

Start Time	Day-1: Monday, 12 June
9:00	**Opening Ceremony**
9:15	**Welcome talk: Potential of digital twins in agri-food supply chain (Prof. Barbara Sturm)**
9:30	**Keynote: Modelling for digital twin in horticulture: How to process live sensor data for real-time prediction (Dr. Reiner Jedermann)**
10:30	Coffee Break + Poster Viewing
11:00	**Oral Session: Models for Postharvest Processes**
13:00	Lunch Break + Poster Viewing
14:00	**Keynote: Multi-scale point cloud applications in the environmental sciences using LiDAR & structure-from-motion (Prof. Bodo Bookhagen)**
14:30	**Oral Session: Sensors & Digital Transition in Horticulture**
16:30	Coffee Break + Poster Viewing
17:00	**Oral Session: Model-based Process Control**
18:00	Get together: Snacks & Drinks (ATB, Potsdam)
	Day-2: Tuesday, 13 June
9:00	**Keynote: Multiscale modelling of postharvest storage processes (Prof. Bart Nicolai)**
9:30	**Oral Session: Modelling & Simulation of Packaging & Storage**
11:15	Coffee Break
11:45	**Oral Session: Non-destructive Assessment - I**
13:00	Lunch Break + Poster Viewing
14:00	**Keynote: Modelling canopy photosynthesis of greenhouse crop (Prof. Tsu Wei Chen)**
14:30	**Oral Session: Non-destructive Assessment - II**
15:30	Coffee Break + Poster Viewing
16:00	**Oral Session: Models for Produce Quality**
17:30	ISHS Business Meeting and Closing
19:00	Gala Dinner on the Boat (Weisse Flotte, Potsdam Harbour)
	Day-3: Wednesday, 14 June
9:00	ATB Guided Tour
12:30	Berlin City Guided Tour

Program Schedule

08:00	Shuttle bus from Luisenplatz (Potsdam) to ATB

Monday, 12th June 2023

09:00	**Opening Ceremony** Pramod Mahajan, ATB Potsdam, Germany
09:10	**ISHS Representative** Giancarlo Colelli, University Foggia, Italy
09:15	**Welcome speech: Potential of digital twins in agri-food supply chain** Barbara Sturm, ATB Potsdam, Germany
09:30	**Keynote speech: Modelling for digital twin in horticulture: how to process live sensor data for real-time prediction** Reiner Jedermann, University of Bremen, Germany
10:00	Digital twins need kinetic modelling: the case of crown rot in the banana chain Rob Schouten, Wageningen University & Research, Netherlands
10:15	A kinetic model for cross-talk between ethylene synthesis and signalling during tomato fruit ripening Maarten Hertog, KU Leuven, Belgium
10:30 – 11:00	Coffee Break & Poster Viewing
Session 1 11:00 - 13:00	**Models for Postharvest Processes** Chair: Maarten Hertog
11:00	Predictive modelling of the ripening of tomatoes Jakub Salagovic, KU Leuven, Belgium
11:15	A reaction-diffusion model for gas exchange in tomato fruit during ripening Hui Xiao, KU Leuven, Belgium
11:30	Modeling redox potential curves for identification of selected bacteria strains Eya Yakdhane, Hungarian University of Agriculture and Life Sciences, Hungary
11:45	Decrease in apple firmness during storage at room temperature – investigating the effect of orchard and harvest date using generic modelling Pawel Konopacki, The National Institute of Horticultural Research, Poland
12:00	Real-time monitoring of heat transfer in horticultural supply chain Tuany Gabriela Hoffmann, ATB Potsdam, Germany
12:15	Effect of atmospheric cold plasma pre-treatment on drying kinetics of 'Tropica' mango Oluwafemi James Caleb, Stellenbosch University, South Africa
12:30	Monte Carlo simulation and sensitivity analysis of Michaëlis-Menten kinetics equation regarding the CO_2 inhibitive response on O_2 consumption George Xanthopoulos, Agricultural University of Athens, Greece
12:45	A parametric sensitivity investigation of ethylene concentrations inside kiwifruit boxes under dynamic conditions Carlos Lopez-Lozano, Massey University, New Zealand
13:00 - 14:00	Lunch Break & Poster Viewing

Session 2 14:00 - 16:30	**Sensors & Digital Transition in Horticulture** Chair: Manuela Zude-Sasse
14:00	**Keynote speech: Modelling canopy photosynthesis of greenhouse crop** Tsu Wei Chen, Humboldt University Berlin, Germany
14:30	Dynamics of weed growth in an apple orchard tree strip Roy McCormick, Kompetenzzentrum Obstbau-Bodensee, Germany
14:45	Modelling Belgian endive growth during forcing for optimum harvest quality Bert Verlinden, KU Leuven, Belgium
15:00	Prediction model for calcium content of apples at harvest Daniel Alexandre Neuwald, Kompetenzzentrum Obstbau-Bodensee, Germany
15:15	Simulating fruit growth and size analysis Rob Schouten, Wageningen University & Research, Netherlands
15:30	Micromechanics of apple and pear tissues for fruit growth modelling Bart Dequeker, KU Leuven, Belgium
15:45	Modelling stomatal responses to high temperatures under a range of different vapour pressure deficits Mehdi Bisbis, Leibniz Institute of Vegetable & Ornamental Crops, Germany
16:00	Creation of an automated pipeline for high-throughput phenotyping of trees in orchards Alexandra Bürgy, Hiphen Agricultural Imaging Solutions, France
16:15	Robustly calibrated non-destructive sensors inform orchard management and harvest planning decisions for optimized peach fruit quality Ioannis Minas, Colorado State University, United States
16:30 - 17:00	Coffee Break & Poster Viewing

Session 3 17:00 - 18:00	**Model-based Process Control** Chair: Oluwafemi James Caleb
17:00	Insights from the participatory development of a crop-growth-model based decision support system for industrial hemp production Alwin Hopf, University of Florida, Gainesville, United States of America
17:15	Comparison of leaf reflectance indices for monitoring the water status in processing tomato Sándor Takács, Hungarian University of Agriculture and Life Sciences, Hungary
17:30	Energy conservation through energy-exergy based thermal analysis and annual available of solar continuous roasting system Muhammad Tayyab, ATB Potsdam, Germany
17:45	Modelling environmental indices during grapes drying as these affect Ochratoxin A development George Xanthopoulos, Agricultural University of Athens, Greece
18:00 - 21:00	Get Together: Snacks & Drinks (ATB, Potsdam)
21:00	Shuttle bus to Luisenplatz, Potsdam

Tuesday, 13th June 2023

8:00	Shuttle bus from Luisenplatz (Potsdam) to ATB
Session 4	**Modelling & Simulation of Packaging & Storage**
09:00 - 11:15	Chair: Martin Geyer
09:00	**Keynote speech: Multiscale modelling of postharvest storage processes** Bart Nicolai, KU Leuven, Belgium
09:30	A model-based approach for simulation of ethylene accumulation inside perforated modified atmospheric packaging Akshay D. Sonawane, ATB Potsdam, Germany
09:45	Comparison of packaging types for thermal preservation of rambutan in the supply chain Saowapa Chaiwong, Mae Fah Luang University, Thailand
10:00	Model-based gas control strategy applied to storage container for broccoli under varying temperatures Yogesh Bhaskar Kalnar, ATB Potsdam, Germany
10:15	Cooling regime impact on the preservation of apple fruit during long-term storage Felix Büchele, Kompetenzzentrum Obstbau-Bodensee, Germany
10:30	Modelling and simulation tools from DanFresh for optimizing fresh produce packaging Kim Berg Jensen, DanFresh, Denmark
10:45	Modelling ethylene scavenging for fresh produce Namrata Pathak, ATB & Hochschule Geisenheim University , Germany
11:00	Using a Monte Carlo approach to understand kiwifruit weight loss in packaging systems Raquel Lozano, School of Food and Advanced Technology, New Zealand
11:15 - 11:45	Coffee Break & Poster Viewing
Session 5	**Non-destructive Assessment - I**
11:45 - 13:00	Chair: Giancarlo Colelli
11:45	Sustaining low-impact practices in horticulture through non-destructive approach to provide more information on fresh produce history and quality Giancarlo Colelli, University Foggia, Italy
12:00	Machine learning techniques to identify relevant colours for quality evaluation and internal parameters estimation in agricultural products Udith Krishnan, CNR- Institute of Intelligent Industrial Systems and Technologies for Advanced Manufacturing, Italy
12:15	Potential application of hyperspectral imaging & FT-NIR spectroscopy for discrimination of soilless tomato according to cultural practices & water use efficiency Maria-Luisa Amodio, University Foggia, Italy
12:30	Computer vision system for non-destructively evaluating quality traits in fresh and packaged rocket leaves Michela Palumbo, CNR-Institute of Sciences of Food Production, Italy
12:45	Effect of Nitrogen fertilization levels on quality attributes of rocket salad over storage: Modelling degradation kinetics Aysha Saleem, University Foggia, Italy
13:00 - 14:00	Lunch Break & Poster Viewing

Session 6	**Non-destructive Assessment - II**
14:00 - 15:30	Chair: Astrid Tempelaere
14:00	**Keynote speech: Multi-scale point cloud application in the environmental sciences using LiDAR & structure-from-motion** Bodo Bookhagen, Geological Remote Sensing, University of Potsdam, Germany
14:30	Monitoring surface changes of fresh green asparagus during storage using Laser Light Backscattering Imaging Zinabu Hailu, Hungarian University of Agriculture and Life Sciences, Hungary
14:45	A hyperspectral field spectroscopy-based method for the detection of 'Ca. Phytoplasma mali' Cameron Cullinan, Laimburg Research Centre, Italy
15:00	Apple size estimation using Fourier analysis: Laboratory and field scale applications Nicolas Tapia Zapata, ATB, Potsdam, Germany
15:15	Device miniaturization and non-contact approach in time domain NIRS for non-destructive assessment of fruit quality Pietro Levoni, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy
15:30 – 16:00	Coffee Break & Poster Viewing

Session 7	**Models for Produce Quality**
16:00 - 17:30	Chair: Saowapa Chaiwong
16:00	AI-based classification models for non-destructive X-ray inspection of apple fruit Astrid Tempelaere, KU Leuven, Belgium
16:15	Analysis of the correlation between cell size distribution and fruit biomechanics of strawberry fruit Xue AN, ATB, Potsdam, Germany
16:30	Artificial intelligence based mobile application (BIPM) on tomato pinworm Pratheepa M, ICAR-NBAIR National Bureau of Agricultural & Insect Resources, India
16:45	Classification of green coffee bean defect types using a gradient boosting-based model Sujitra Arwatchananukul, Mae Fah Luang University, Thailand
17:00	Non-destructive detection of tomato chlorophyll content based on NDVI from multiple wavelength LiDAR point cloud data Kowshik Kumar Saha, ATB, Potsdam, Germany
17:15	Guava damage classification based on image processing and efficient net model Nattapol Aunsri, Mae Fah Luang University, Thailand
17:30	**Closing Ceremony:** Martin Geyer **ISHS Business Meeting:** Giancarlo Colelli
18:30	Shuttle bus to Potsdam Harbour
19:00 – 22:00	Gala Dinner on the Boat (Weisse Flotte, Potsdam Harbour)

Wednesday, 14th June 2023

09:00 – 12:00	**ATB Guided Tour**
12:30	Shuttle bus from Luisenplatz (Potsdam) to Reichstag (Berlin)
13:00 – 16:00	**Berlin City Guided Tour**

If you are interested in any or both of the above tours, then please enter your name and email here: https://terminplaner6.dfn.de/b/3de55689ce6c5b071c48fb171b5b18df-220039

Shuttle bus:

During the duration of Model-It symposium, a shuttle bus will be at your disposal every day. This free shuttle service will help to facilitate transportation between the hotels located near Luisenplatz and ATB. In the event that you happen to miss the shuttle, there is an alternative option of public transport available as well. You can take Bus 692 in the direction of Potsdam Institut für Agrartechnik.

Pick up location at Luisenplatz: https://model-it2023.atb-potsdam.de/en/venue/bus-shuttle

Poster Presentations

P01 Modelling airflow in sugar beet clamps
William English, Morteza Mousavi (Sweden)

P02 Shelf life modeling for strawberries adopted in two layered master packaging system through stagewise supply chain consisting of different temperatures
Dong Sun Lee, Duck Soon An (Korea)

P03 Detection of fruit juice adulteration by laser backscattering imaging
Hoa Xuan Mac, László Baranyai, Thanh Tung Pham, Thi Thanh Nga, Le Phuong Lien Nguyen (Vietnam)

P04 Modeling the ripening time of mature green tomato according to temperature and light conditions
Hyo Gil Choi (Korea)

P05 Assessment of adulteration of fruit juices by water dilution using NIR spectroscopy
Eya Yakdhane, Hoa Xuan Mac, Nga Thanh Thi Ha, Mai Sao Dam, Lien Le Phuong Nguyen, László Baranyai (Hungary)

P06 Modelling of stiffness of 'Gala Irene' apple during storage and shelf-life
Pham Tung Thanh, Thi Thanh Nga Ha, Hoa Xuan Mac, Le Phuong Lien Nguye, Zsuzsanna Horváth-Mez337fi, Zoltán Sasvár, Mónika Göb, Tamás Zsom, Gergo Szabó, Géza Hitka (Hungary)

P07 Evaluation of Coated Green Asparagus (Asparagus officinalis) Freshness using Near-Infrared Spectroscopy
Thanh Tung Pham, Hoa Xuan Mac, Thi Thanh Nga Ha, Hailu Zinabu Syium, Le Phuong Lien Nguyen, Ngoc Han Nguyen Thi, Géza Hitka, Tamás Zsom, László Baranyai (Vietnam)

P08 Carbon dioxide and ethylene production modelling of apricot at three maturity stages
Thi Thanh Nga Ha, Thanh Tung Pham, Xuan Hoa Mac, Gergo Szabó, Le Phuong Lien Nguyen, Zsuzsanna Horváth-Mezofi, Zoltán Sasvár, Mónika Göb, Tamás Zsom, Géza Hitka (Vietnam)

P09 Aquaphotomics and machine learning algorithms reveal falsification of aqueous tomato powders by bulking and coloring agents
Balkis Aouadi, Juan Pablo Aguinaga Bósquez, Mariam Majadi, István Kertesz, Zoltán Kovács (Hungary)

P10 Near-infrared spectroscopy as a tool for predicting superficial scald in cv. 'Granny Smith' apple fruit
Angelo Zanella, Stefan Stürz, Nadja Sadar, Ilaria Folie (Italy)

P11 Developing an electronic model-based control system for temperature-dependent gas modification in a fruit storage container
Ali Jalali, Pramod Mahajan, Manfred Linke, Cornelia Weltzien (Germany)

P12 Relationship between sensory characteristics and optical properties in 'Conference' pears
Maristella Vanoli, Fabio Lovati, Giovanna Cortellino, Marina Buccheri, Rosita Caramanico, Pietro Levoni, Lorenzo Spinelli, Alessandro Torricelli (Italy)

P13 Potential use of Hyperspectral Imaging for Authentication of Rocket Leaves according to Agricultural practices
Aysha Saleem, Mojtaba Nosrati, Hassan Fazayeli, Maria Luisa Amodio, Danial Fatchurrahman, Francesco Serio, Francesco Fabiano Montesano, Giancarlo Colelli (Italy)

P14 Prediction Model for Fruiting Body Yields and Morphological Characteristics of Size, Color, or Hardness of Oyster Mushrooms at Cultivation Temperatures
Hye-sung Park, Eun-Ji Lee, Tai-Moon Ha (Korea)

P15 Drought monitoring and prediction for mango orchard in Tamale, Ghana with earth observation data and SSP climate scenarios
Marius Hobart, Mohamad Zare, Abdul-Halim Abubakari, Gazali Issahaku, Eugene Anin-Adjei, Godwin Badu-Marfo, Michael Schirrmann (Germany)

P16 Temporal traits of apple chlorophyll content in NDVI analysed by means of LiDAR
Nikos Tsoulias, **Kowshik Kumar Saha**, Manuela Zude-Sasse (Germany)

P17 Potential Application of Hyperspectral Imaging for Discrimination of Chilled Tomatoes
Maria Luisa Amodio, Danial Fatchurrahman, Muhammad Mudasi Arif Chaudhry, Giancarlo Colelli (Italy)

P18 Effect of ultraviolet and far-red LED light added to broad spectrum white LED on lettuce production in vertical farm
Zoltán Pék, Lajos Helyes, Balázs Bence, Sándor Takács (Hungary)

P19 Application of vacuum ultraviolet photolysis reactor and loss firmness prediction for stored 'Fuji' apples
Oluwafemi James Caleb, Bongolwethu P. Mabusela, Buntu Godongwana, Zinash Belay (South Africa)

P20 Computational Fluid Dynamics (CFD) Simulation of Gas Transportation Through a Thermoresponsive Membrane for Active Packaging Design
Rattapon Saengrayap, Anucha Seejuntuek, Todsapol Kajornprai, Nitinat Suppakarn, Keerati Sulaksna, **Saowapa Chaiwong**, **Tatiya Trongsatitkul** (Thailand)

P21 Prediction of cultivation system by rapid and no-destructive tool
Palumbo Michela, Bonelli Lucia, Pace Bernardo, Montesano Francesco F., Serio Francesco, Cefola Maria, Colelli Giancarlo (Italy)

P22 The modelling of ethylene scavenger reveals temperature-dependent removal rate while the removal capacity remains constant
Akshay D. Sonawane, Pramod Mahajan (Germany)

P23 Characterization of biodegradable packaging materials
Tilahun Seyoum Workneh, Asavela Notshweleka (South Africa)

P24 Detection of hidden bruises in plums using hyperspectral imaging and a 3D convolutional neural network
Salvador Castillo Girones, Remi Van-Belleghem, Sandra Munera, Alejandro Rodríguez, Cubero Sergio, Juan Gómez-Sanchís, **Blasco Jose**, Saeys Woulter (Spain)

P25 CFD optimization algorithm for a moving boundary problem of isothermal drying
George Xanthopoulos, Andreas G Boudouvis, Vaios T. Karathanos, **Diamanto Lentzou** (Greece)

P26 Development of an innovative evaluation and information platform to increase the sustainability of food packaging solutions along value chains
Namrata Pathak, Kai Sparke, Konstantin Struth,…, Judith Kreyenschmidt (Germany)

P27 Effect of caseinate based edible coating on quality indices of minimally processed pears during storage time
Marika Valentino, Stefania Volpe, Elena Torrieri, **Giacomo Rossi** (Italy)

P28 Mathematical modeling of the production of house crickets for food purposes
Marios Psarianos, **Oliver Schlüter** (Germany)

P29 Definition of virtual profiles of banana texture as an alternative to feature extraction from XTA curves
Eva Cristina Correa, N. Benito, M. Bustelo, B. Diezma, P. Barreiro (Spain)