

Curriculum Vitae (CV)

Praveen Kumar Sappati

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Research Interest

- I have strong background and programming skills for the application of numerical methods in food engineering in COMSOL and MATLAB, experimental design and post-harvest physicochemical analysis of processed foods, mathematical modeling of unit operations (MATLAB, C), machine design (AutoCAD, Inventor, Linkage), and statistical analysis (SAS and R).
- I deeply understand the interactions of food components and have expertise in characterizing different food components and structures using chemical methods including Dumas (proteins), soxhlet extraction (fats), acid hydrolysis (carbohydrates), ICP MS (trace minerals, heavy metals), and liquid and gas chromatography (bioactive compounds, pigments, phenols, fatty acids), FTIR spectroscopy (chemical modification), confocal microscopy (emulsion size distribution), zeta potential (emulsion stability), thermogravimetric analysis (DSC) (glass transition, protein denaturation, thermal properties), physical tests (pH, colorimeter, water-holding, oil holding capacity), rheological characteristics (viscometer, texture analyzer) and Invitro digestive enzyme (α -amylase, pepsin, trypsin, and bile) activity assays in Infogest 2.0.
- Apart from research, I am passionate about teaching food engineering/technology topics including energy and mass balance, unit operations, fluid mechanics, thermodynamics, and chemical kinetics.

Professional/ Research Experience

Assistant Professor

Jan 2022 – Ongoing

Indian Institute of Technology (IIT) Kharagpur, India

- Developing and delivering following courses
 - Processing and Preservation of Aquaculture Products (4 credits) (6 Masters students)
 - Food Analysis Laboratory (3 Credits) (21 Masters + 5 Final Year Bachelors Students)
 - Plant Equipment Design (4 Credits) (21 Masters + 5 Final Year Bachelors Students)
 - Engineering Laboratory (3 Credits) (1000 First Year Bachelor Students in 10 Session)
- Co-PI in a unique scheme of Government of India aimed to promote agri-entrepreneurship and agribusiness after assessing, training and nurturing 50 startups through business incubation.
- Setting up laboratory for growing microalgae (spirulina, chlorella), supercritical CO₂ extraction and encapsulation for food and fish feed application.

Post-Doctoral Researcher
Technical University of Denmark, Denmark
Chalmers University of Technology, Sweden

May 2020 – Dec 2021

Seaweed-Bio-Assess Project

Advisor: Susan Løvstad Holdt, National Food Institute, Technical University of Denmark (DTU)
Ingrid Undeland, Chalmers University, Sweden
Sponsor: Swedish Foundation Ekhagastiftelsen Grant

- Measured the bioactivity and heavy metal composition of seaweeds after thermal processing and lactobacillus fermentation.
- Determined the bioaccessibility of the bioactive compounds and heavy metals present in seaweeds using an invitro simulated human digestive system (Infogest 2.0).

Executive Graduate Engineer Trainee, Production Department

June 2013 – July 2014

Godrej Agrovet Limited (Animal Feed Division), India

- Regularly monitored the process parameters of feed during (Grinding, Mixing, Pelleting & Cooling) in SAP entries for calculating Production Variable Overhead (PVOH) & Overall Equipment Efficiency (OEE).
- Well trained in application of Total Productive Maintenance (TPM), 5S, First Aid & Fire safety at industrial level.

Education

University of Maine, Orono, USA

Ph.D., Food Science and Human Nutrition
GPA: 3.97/4

Aug 2020

Indian Institute of Technology (IIT), Kharagpur

M. Tech., Food Process Engineering (Dual Degree)
GPA: 7.70/10

July 2013

Indian Institute of Technology (IIT), Kharagpur

B. Tech., Agricultural and Food Engineering
GPA: 7.70/10

July 2013

Technical Skills

- Engineering Software's: COMSOL, Engineering Equation Solver, AutoCAD, Autodesk Inventor, Linkage
- Statistical Software's: SAS, R
- Programming Languages: MATLAB, C, Python, C++, HTML 5
- Analytical Skills: Proximate analysis (AOAC methods), HPLC (Pigments, Phenols, Amino Acids), GC (Fatty Acids), Differential Scanning Calorimetry (DSC), Antioxidant assays (DPPH) (FRAP) (ABTS) (ORAC), Phenolic compound assays (Folin – Ciocalteu), FTIR, ICP MS (Trace and Heavy Metals), In-Vitro Enzyme Bioaccessibility assays
- Languages spoken: English, Hindi

Research Experience

Graduate Research Assistant (Ph.D.)
University of Maine, US

June 2015 – April 2020

NSF SEANET Maine EPSCoR: The Nexus of Coastal Social-Environmental Systems and Sustainable Ecological Aquaculture

Advisor: Dr. Balunkeswar Nayak, Food Science and Human Nutrition, University of Maine

Dr. G. Peter VanWalsum, Chemical and Biological Engineering, University of Maine

Sponsor: NSF SEANET Maine EPSCoR, University of Maine Research Re-Investment Fund (RRF)

- Assessed the nutritional composition and glass transition of sugar kelp and the effects of processing parameters to produce sustainably dried seaweeds and value-added extracts.
- Designed pilot scale and large-scale (40 x 8 x 8 ft.) hot air convection dryer for seaweed drying using developed mathematical models considering packed bed drying conditions.

Research Assistant
IIT Kharagpur

Aug 2014 – May 2015

Designing of Machinery for Rural Technology

Sponsor: Principal Scientific Advisor, Government of India

- Worked with regional NGO's to design and develop machines for improving the quality of rural life in India.
- Published 3 patented machine design (See publication/patent section)

Master's Thesis
IIT Kharagpur

May 2012 – May 2013

Computational Analysis of Packed Bed Distillation Column for Aroma Recovery used in Food Processing

Advisor: Dr. A.K Datta, Agricultural and Food Engineering, IIT Kharagpur

- Determined diameter of rectifying & stripping column by establishing vapor-liquid equilibrium curve & molar flow rate of the working solute (methyl acetate, ethyl acetate & ethanol).
- Determined mass transfer coefficients in gas & liquid phase and developed a universal model applicable for different packing materials such as raschig rings, ceramic intalox saddles, berl saddles, metal pall rings, flexi-pall rings, and super intalox.

Bachelor's Thesis
IIT Kharagpur

May 2011 – April 2012

Heat & Mass transfer during Cooking of Bengal Gram (Cicer arietinum): Analytical & Numerical Solutions

Advisor: Dr. A.K Datta, Agricultural and Food Engineering, IIT Kharagpur

- Derived Dirichlet and Neumann solutions by solving partial differential equations for estimating the temperature and moisture profile with respect to radial distance & time period in COMSOL.
- Experimentally measured the thermo-physical properties like thermal conductivity, specific heat capacity, porosity & diffusivity during cooking using instrument KD2 pro sensor.

Summer Internship
IIT Kharagpur

May 2010 – July 2010

Designing of Customized Baking Oven fitted with Concave Reflector used for Bread Baking

Advisor: Dr. A.K Datta, Agricultural and Food Engineering, IIT Kharagpur

- Designed a concave reflector to increase the radiative heat transfer.
- Developed an integrative method to compute view factor and computed radiative, convective & conductive heat transfer during bread baking process using MATLAB.

Teaching and Mentoring Experience

Guest Lecturer, Producing new sustainable food ingredients (5 ECTS)

Spring 2021, 22

National Food Institute, Denmark Technical University

- Delivered lecture on separation principles involved in extraction process of the bioactive ingredients present in the food systems. 30 Master level students. Online class.

Bachelor Honors Committee Member (4 x 10 ECTS)

Spring, Fall 2021

National Food Institute, Denmark Technical University

- Guided 4 undergraduate students in conducting experiments related to measurement of proteins and amino acids (free and total) bio-accessibility present in the seaweed Sugar Kelp (*Saccharina latissima*).
- Providing feedback on statistical results interpreting the experimental data and final report writing.

Course Instructor, Introduction to Food Production Chain (10 ECTS)

Fall 2020, 21

National Food Institute, Denmark Technical University

- Delivered 4-hour long class lectures on the topics related to the energy and mass balance, thermodynamics, fluid flow, heat transfer, and unit operations involved in food processing for 55 Master level students/hybrid class.
- Conducted problem-solving classes and graded course assessments mid-semester to ensure regular student participation throughout the course.
- Gave constructive feedback to student reports and also exam cases

Lecturer, Introduction to Food Engineering (3 Credits)

Spring 2020

School of Food and Agriculture, University of Maine

- Prepared class lectures focusing on the analysis of the energy and mass balance, fluid flow, heat transfer, and basic unit operations in food processing for 9 undergraduates and 3 graduate students.
- Conducted problem-solving classes, evaluated and assigned grades to students.

Lecturer, Food Engineering Laboratory (1 Credit)

Spring 2020

School of Food and Agriculture, University of Maine

- Prepared lab experiments focusing on the analysis of energy balance, mass balance, fluid flow and virtual food processing presentation for 9 junior and senior level undergraduates.
- Graded lab reports to ensure students understood the material.

Graduate Summer Mentor, NSF Maine EPSCoR Summer Research Program Summer 2016 - 20

School of Food and Agriculture, University of Maine

- Mentored one undergraduate student each summer in experimental data collection (proximate analysis, rehydration) of seaweeds to understand the physical and chemical properties of dried seaweeds.
- Guided the students in the preparation and presentation of research findings.

Teaching Assistant, Food Engineering Lab (1 Credit)

Spring 2018

School of Food and Agriculture, University of Maine

- Prepared lab experiments focusing on the analysis of energy balance, mass balance and fluid flow for 15 senior-level undergraduates.
- Created and graded course assessments to ensure students understood the material and stayed on track.

Teaching Assistant, Introduction to Food Science (1 Credit)

Fall 2018 - 19

School of Food and Agriculture, University of Maine

- Prepared lab experiments focusing on the analysis of food properties (moisture content, water activity, pH, water phase salt concentration, viscosity, etc.) for 10 sophomore and junior level undergraduates.
- Created and graded course assessments to ensure students understood the material and stayed on track.

Responsible Conduct of Research for Undergraduates Mentor

2018 - 19

University of Maine

- Mentored each year a group of 5 undergraduate students in the responsible and ethical conduct of research.

Bachelor Honors Committee Member

2016 - 17

School of Food and Agriculture, University of Maine

- Guided Ms. Emily Duran-Frontera (senior level undergrad) in finishing her bachelor's thesis titled "Development of a Process Approach for Retaining Seaweed Sugar Kelp (*Saccharina latissima*) Nutrients"
- Trained the student in measuring proximate content and provided feedback on statistical results interpreting the experimental data and thesis writing.

Publications

- Bricknell IR, VanWalsum GP, **Sappati PK et al** (2021). Resilience of Cold Water Aquaculture: A Review of Likely Scenarios as Climate Changes in the Gulf of Maine. *Reviews in Aquaculture*: 13:1 (460-503)
- Patel AS, Nayak B, Lakshmibalasubramaniam S, Kar A, **Sappati PK** (2020). Improved Stability of Phycobiliprotein using Liposome Mediated Polyethylene Glycol Adsorbed Cellulose Nanocrystals. *International Journal of Biological Macromolecules*:163 (209-218)
- **Sappati PK**, Nayak B, VanWalsum GP (2019). "Estimation of thermophysical properties of brown seaweed (*Saccharina latissima*) using artificial neural networks (ANNs) and empirical models." *International Journal of Food Properties*: 22:1(1966-1984)
- **Sappati PK**, Nayak B, VanWalsum GP, Mulrey OT (2019). "Combined effects of seasonal variation and drying methods on the physicochemical properties and antioxidant activity of sugar kelp (*Saccharina latissima*)." *Journal of Applied Phycology*: 1-22.
- **Sappati PK**, Nayak B, VanWalsum GP (2017). "Effect of glass transition on the shrinkage of sugar kelp (*Saccharina latissima*) during hot air convective drying." *Journal of Food Engineering*: 210 (50-61).
- **Sappati PK**, Holdt S, Undeland I, Sloth J (In preparation). Review: Bioaccessibility of nutrients and heavy metals present in macroalgae using an In-Vitro Simulated Gastrointestinal Tract (GIT) Model. Targeted Journal: *Comprehensive Reviews in Food Science & Food Safety*
- **Sappati PK**, Holdt S, Undeland I, Sloth J (In preparation). Bioaccessibility of Bioactive Compounds and Heavy metals of Sugar Kelp (*Saccharina latissima*) in an In-Vitro Simulated Gastrointestinal Tract (GIT) Model. Targeted Journal: *Food and Chemical Toxicology*.

Highlighted Research in Publications/News Articles:

- Praveen Sappati: Norris Charles Clements Graduate Student Award.
<https://nsfa.umaine.edu/blog/2020/05/06/praveen-sappati-norris-charles-clements-graduate-student-award/>
- So Researchers Investigate if it Stands up to the Hype (2019). *UMaine Research News, University of Maine*.
<https://umaine.edu/research/2019/05/06/eating-seaweed-popular-researchers-investigate/>
- Innovation Research Update on Seaweed Drying: Praveen Sappati (2019). *Aquaculture Research Institute, University of Maine*.
<https://umaine.edu/aquaculture/2019/01/05/innovation-research-update-praveen-sappati/>
- Increasing the ‘Maine’ Sources of U.S aquaculture (2016). *Food Technology. Institute of Food Technologist (IFT)*.

Funding, and Other Support

- **Swedish Foundation: Ekhagastiftelsen Grant** **2019**
Worked as Post doc on \$150K grant investigating the health-benefiting bioactive compounds in seaweed and their bioavailability in the human body between the University of Maine (US), Denmark Technical University (DTU) and Chalmers University of Technology (Sweden)
- **Al Bushway Undergraduate Scholarship, University of Maine** **2019**
Received \$750 to hire undergraduate student for conducting research on seaweeds for 3 months
- **Graduate Student Government (GSG) Scholarship, University of Maine** **2018**
\$120 received for Traveling to IFT 2018
- **National Oceanic and Atmospheric Administration (NOAA) Grant** **2017**
Worked as PhD student on \$1M Grant received to build large-scale hot air convection drier for seaweed drying along the coast of Maine, USA
- **University of Maine Research Re-Investment Fund (RRF)** **2016**
Worked as PhD student on \$70K Grant received to build pilot-scale hot air convection drier for seaweed drying
- **Graduate Student Government (GSG) Scholarship, University of Maine** **2016**
\$200 received for Traveling to IFT 2016
- **Center for Undergraduate Research (CUGR) Scholarship, University of Maine** **2016**
Received \$1000 to hire undergraduate student for conducting research on seaweeds for 6 month

Awards & Honors:

- **First Place, Seaweed Quiz (Kahoot format)** **2021**
Cookbook for making seaweed dishes ‘Irish Seaweed’ by Pranie Rhatigan was awarded at Seaweed for Health Virtual Conference.
- **Second Place, Poster Competition, Aquatic Food Products Division** **2020**
Cash prize of \$1000 was awarded by Institute of Food Technologist (IFT), Chicago, US.
- **Norris Charles Clements Graduate Student Award** **2020**
College of Natural Sciences, Forestry, and Agriculture, UMaine presents one \$1500 award annually to recognize an outstanding graduate student in agricultural sciences, whose research has the potential to significantly shape the future of Maine agriculture
- **Food Science and Nutrition Outstanding PhD Student** **2019**
The School of Food and Agriculture, UMaine presents one \$100 award annually
- **First Place, Ocean Spray Product Development Competition** **2018**
Prize money of \$5000 was awarded for developing an innovative food product out of cranberries in a 4-member team of the University of Maine.
- **National Science Foundation (NSF), SEANET, Maine EPSCoR Scholarship** **2015**
2 Scholarships were awarded in the USA to pursue Ph.D in Food Science targeting marine resources in the state of Maine, US

International Conference Oral/Poster Presentation

- **Sappati PK**, Jens J Sloth, Ingrid Undeland, Susan Holdt (2021). Bioaccessibility of Nutrients and Heavy Metals present in Seaweed. *Industrial Seaweed Symposium (online)*, Copenhagen, Denmark
- **Sappati PK**, Jens J Sloth, Ingrid Undeland, Susan Holdt (2020). Investigating the modern-day superfood: Seaweeds. *Seaweed for Health Virtual Conference (online)*, Copenhagen, Denmark
- **Sappati PK**, Nayak B, VanWalsum GP, Patel AS (2020). Seaweeds: Are they modern-day superfood? (Poster). *Institute of Food Technologist (IFT)*, Chicago, USA
- **Sappati PK**, Nayak B, VanWalsum GP (2019). Bioavailability of Bioactive Compounds Found in Sugar Kelp (*Saccharina latissima*). *Northeast Aquaculture Conference (NACE)*, Boston, USA.
- **Sappati PK**, Nayak B, VanWalsum GP (2018). Coupled Multiphysics Simulation of Hot-Air Convective Drying of Brown Seaweed (*Saccharina latisima*) With Predicted Thermophysical Properties Using Artificial Neural Networks (ANNs) (Poster). *Institute of Food Technologist (IFT)*, Chicago, USA

- **Sappati PK**, Nayak B, VanWalsum GP (2017). Effect of Drying Temperature, Humidity and Time on the Physico-Chemical Properties of Sugar Kelp (*Saccharina latissima*). *American Institute of Chemical Engineers (AIChE) Meeting*, Minneapolis, USA
- **Sappati PK**, Nayak B, VanWalsum GP (2017). Effect of Thermal Processing on the Physical, Chemical and Thermal Properties of Sugar Kelp (*Saccharina latissima*). *Northeast Aquaculture Conference (NACE)*, Boston, USA
- **Sappati PK**, Nayak B, VanWalsum GP (2016). Shrinkage during Thermal Processing of Sugar Kelp (*Saccharina latissima*). *Northeast Agricultural and Biological Engineering (NABEC)*, Orono, USA
- **Sappati PK**, Nayak B, VanWalsum GP (2016). Effect of Glass Transition Phenomenon on the Shrinkage of Sugar Kelp (*Saccharina latissima*) During Hot Air Convective Drying. *Institute of Food Technologist (IFT)*, Chicago, USA

USA State of Maine Local Conference Oral/ Poster Presentations:

- **Sappati PK**, Nayak B, VanWalsum GP (2020). Drying of Kelp in Maine: Current Progress. *Maine Aquaculture Research, Development and Education Summit*, Belfast Maine, USA
- **Sappati PK**, Nayak B, VanWalsum GP (2019). Drying of Seaweeds in Maine: Current Progress & Future Needs. *American Association for the Advancement of Science (AAAS) meeting*, Orono, USA. *Oral*
- **Sappati PK**, Nayak B, VanWalsum GP (2019). Thermal Processing of Sugar Kelp (*Saccharina latissima*) in Maine: Current Updates. *All Hands Meeting SEANET meeting*, Orono, USA. *Oral*
- **Sappati PK**, Nayak B, VanWalsum GP (2018). Developing an in-vitro method for analysis the bio accessibility of antioxidants of Sugar Kelp (*Saccharina latissima*). *UMaine Research Symposium*, Bangor, USA. *Poster*
- **Sappati PK**, Nayak B, VanWalsum GP (2018). Sea vegetable value-added products. *Maine Aquaculture Research, Development and Education Summit*, Belfast, Maine, USA. *Oral*
- **Sappati PK**, Nayak B, VanWalsum GP (2018). Analyzing Stickiness during Sugar Kelp (*Saccharina latissima*) Processing. *All Hands Meeting SEANET meeting*, Orono, USA. *Oral*
- **Sappati PK**, Nayak B, VanWalsum GP (2018). Combined Effects of Seasonal Variation and Drying Methods on the Physico-chemical Properties and Antioxidant Activity of Sugar Kelp (*Saccharina latissima*). *UMaine Research Symposium*, Bangor, USA. *Oral*
- **Sappati PK**, Nayak B, VanWalsum GP (2017). Challenges in Processing Sugar Kelp (*Saccharina latissima*) in Maine. *All Hands Meeting SEANET meeting*, Orono, US. *Oral*