

Surname: Yang
First Name: Baoru
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Date of CV: November 12, 2024



Academic education

- **1983.9 – 1987.7:** Beijing Agricultural University, Beijing, P. R. China
Major: Plant Science
Degree: Bachelor of Science in Agronomy
- **1987.9– 1990.7:** Beijing Agricultural University, Beijing, P. R. China
Major: Plant Virology
Degree: Master of Science in Agronomy
- **1996.4 – 2000.9:** Department of Biochemistry and Food Chemistry, University of Turku, Finland
Major: Molecular Biology and Biotechnology
Degree: Master of Science
- **1996.4– 2002.2:** Department of Biochemistry and Food Chemistry, University of Turku, Finland
Major: Food Chemistry
Degree: Doctor of Philosophy

Current employment and positions

- June 1, 2015-, Permanent position as Professor of Food Chemistry and Food Development
- **June 1, 2015-, Chair and Head of the Food Science Unit, Department of Life Technologies, University of Turku, Finland**
- **January 1, 2020-, Vice Dean (Research), Faculty of Technology, University of Turku**
- Stage of Academic Research Career: IV
- 9.11.2004-, Docent in Bioactive Lipids, University of Turku, Finland
- 2008-, Visiting Professor, Department of Food Science, Jinan University, Guangzhou, China
- **May, 2023-, Member of the Finnish Academy of Science and Letters**

Previous work experience and appointments

- 1.9.2017-31.12.2020 Vice Dean, Faculty of Science and Engineering, University of Turku, Finland
- 1.1.2013-31.5.2015, Professor in Food Development, University of Turku, Finland
- 1.1.2012-31.12.2013, Visiting Professor at the Faculty of Public Health, Peking University, China
- 1.6.2009-31.12.2014, Senior Lecturer of Food Chemistry, University of Turku
- 1.8.2002-31.5.2009, Research and Development Director, Aromtech Ltd, Finland
- 1.4.1993-31.3.1996, R&D Director, Shanxi Aixun Biotechnological Development Center, China
- 8.1.1990-31.3.1993, Research Scientist, Shanxi Academy of Agricultural Science, China

Career breaks

- 1.4.1991-31.1.1992: maternal leave.

Research focuses, outputs, and impacts

Prof. Baoru Yang has long experience in research on composition, quality, and health effects of foods with strong focus on the impact of genetic factors, environment, and technologies. In the applied research, she emphasizes sustainable utilization and value-addition of food resources in development of bioactive food ingredients and health products. She adopts state-of-art targeted and non-targeted metabolomics and green processing technologies in her research.

The research of Prof. Yang covers the following topics: 1) Chemistry and Biochemistry of Lipids; 2) Secondary Metabolites in Foods; 3) Foodomics; 4) Green Processing and Food Development Research; 5) Bioactivities and Health Effects of Food.

In lipid research, the focus is on developing green technologies for extracting fats and oils from natural resources, analysing the composition of lipid molecules, as well as studying the stability, digestion, absorption and health effects of food lipids. The research is aimed to obtain in-depth knowledge on composition of fats and oils. Using modern chromatographic methods coupled with tandem mass spectrometry, the research tackles the most challenging tasks of lipid analysis revealing the regio- and stereospecific structures of lipid molecules in natural fats and oils. The knowledge is crucial for understanding the technological properties, oxidative stability, bioavailability, and metabolic impacts of fats and oils. Fats and oils of animal, plant and marine sources such as fish oil, algae oil, human milk, and cow milk are of special interest.

In research on secondary metabolites, Prof. Yang and her team investigate the content and compositional profile of metabolites that are important for the safety, nutritional and sensory qualities, and health effects of foods of plant origin. She has long experience in investigating the impact of genetic and environmental/climate factors on food composition such as natural colours, aroma and flavour compounds, and bioactive components in fruits and berries, cereals, oil crops, potatoes, herbs and spices. With close to two decades of real-time field study at different latitudes combined with compositional and multivariate analysis, the research has a strong relevance to improve the understanding on the quality of food resources as well as the impact of climate conditions and climate change on the crop quality and food production. The research also emphasizes the characterization and compositional profiling of genetic resources of sustainable bioresources for food and nutrients.

The *foodomics research* combines the state-of-the-art methods of targeted and nontargeted metabolomics as powerful tools for producing new breakthrough in the understanding of chemistry, biochemistry and functions of metabolites in food. The methods are based on chromatography coupled with mass spectrometry as well as nuclear magnetic resonance spectroscopy (NMR). Examples of our metabolomics/multi-omics research include differentiation of foods of different origins, detection of impact of gene-environment interaction and food processing on metabolites in food, and pinpoint the association between metabolite profiles with physiological status and response to intervention with food and diet. With increase in understanding the metabolic impact of food and diet, the research will explore the potential of multi-omics tools in developing personalized nutrition.

The *food development research* focuses product development based on sustainable food resources from wild and cultivated crops (e.g. legumes, cereals, root crops, berries, oil seeds, spices) as well as marine sources such as fish and macroalgae. The aim is to improve the value addition and resource efficiency of existing food resources as well as exploration of new alternative sources of proteins, fibres and bioactive components for food and feed. It is crucial to understand the association between composition and quality of food and the impact of food processing on safety, quality, and bioactivities of food. The

research explores the potential of green technologies for enriching beneficial components and remove harmful compounds to improve the quality, stability and health benefits of food. The special interest is to explore the potential of bioprocessing using enzymes and fermentation technologies. There is also increasing incorporation digital tools in improve the efficiency of food value chain. The aim is to create new knowledge and technological breakthrough, which regenerates science and supports the research and development of food companies.

To study the health effects of food, Prof. Yang's research focuses on the potential of food products and ingredients as part of a healthy diet in supporting health and well-being via regulating the metabolism pathways of sugar and lipids as well as the function of the gut and the immune systems. Our special interest is in the health promoting properties of the plant and marine food resources with special reference to polyphenols, lipids, and fibres. The fast-increasing trend in sustainable food production and consumption, there is a rapid increase in the share of food and nutrients from plants and other sustainable sources in the diet. Our research aims to improve the current understanding the metabolic and health effects of shifting from animal-protein based diet towards more diversified dietary pattern containing proteins and nutrients from plants and various other alternative sources. Our major approach is human intervention studies supplemented with *in vivo* and *in vitro* experimental models. The multi-omics tools are increasingly applied to study the metabolic impact of food and diet.

Professor Yang has published 281 peer-reviewed SCI original publications and about 200 other publications such as book chapters, conference proceedings, thesis books, professional publications abstracts, oral presentations and posters

- Four patents and patent applications
- > 14600 citations; h-index: 69 (google scholar:
<https://scholar.google.fi/citations?hl=en&user=AXXCN1MAAAAJ>)
- Full list of publication: <https://orcid.org/0000-0001-5561-514X>

Research funding and grants

Prof. Baoru Yang (B.Y.) is the principal investigator of a number of large internationally research projects funded by EU, Academy of Finland, Ministry of Agriculture and Forestry Finland, Business Finland, the Norwegian Research Council, Finnish Cultural Foundation, and companies. As the PI, she has acquired > 8 million euros research funding; In addition, BY is also a partner of projects with external funding of 5 million euros.

- 1.5.2024-31.12.2026. Quality of frozen fish and control of PFAS, the Finnish operation programme of the European Fishery Funds/Ministry of Agriculture and Forestry of Finland, 50000 euros, B.Y. is the PI at UTU.
- 1.8.2023-31.12.2026, the Finnish operation programme of the European Fishery Funds/Ministry of Agriculture and Forestry of Finland, 148000 euros, Blue Products 3.0, B.Y. is the PI. at UTU
- 1.9.2023-31.8.2027, the Research Council of Finland, 546258 euros (Total Budget, 780376 euros), “Structure and Functions of Chiral Lipids: A Stereospecific and Multi-Omics Approach”, B.Y. is the PI.
- 1.8.2023-31.7.2025, Business Finland (From Research to Business), Total budget, 699 996 euros, “FATanalyser: Decoding Molecular Structures of Fats and Oils”, B.Y. is the PI.
- 1.1.2022-31.12.2024, Academy of Finland, 507350 euros (total budget, 724785 euros, of which University of Turku's own funding is 217435 euros) “FOODNUTRI-Climate Smart Food and

Nutrition Research Infrastructure” Infrastructure for green and digital transition, funding by the Academy of Finland,

B.Y. is the PI at the University of Turku and Leader of Platform 2. FOOD CHARACTERIZATION of the FOODNUTRI infrastructure network.

- 1.1.2021-31.12.2024, Strategic Funding from the Ministry of Education and Culture of Finland, 1.6 million euros for the University of Turku, “Finland-China Network in Food and Health”. B.Y. is the Academic PI, responsible for the leading the network activities including 21 Finnish Universities and universities of applied sciences as well as a number of Chinese universities and research institutes.
- 1.7.2020-31.11.2021, Academy of Finland, 360315 euros, (total budget, 514735 euros, of which University of Turku’s funding is 154 420,5 euros) “FOODNUTRI-Climate Smart Food and Nutrition Research Infrastructure” (FIRI 2020: Research infrastructures as collaborative platforms), B.Y. is the PI, at the University of Turku and Leader of Platform 2. FOOD CHARACTERIZATION of the FOODNUTRI infrastructure network.
- 1.1.2020-31.12.2024, the Raisio Foundation, 500 000 euros, “Establishing Professorship in Nordic Food at the Food Chemistry and Food Development Unit, University of Turku”, B.Y. is the person responsible for the donation process, and definition of the professorship at University of Turku.
- 1.9.2017-31.12.2022, Academy of Finland, 526 945 euros, “Chiral lipids in chiral nature: a novel strategy for regio- and stereospecific research of human milk and omega-3 lipids”, B.Y. is the PI, leading funding acquisition and research.
- 1.10.2012-31.10.2025, China Scholarship Council, 450 000 euros, grant for seven doctoral students working chemistry, technology, and health effects of Nordic foods. B.Y. is the PI and principle supervisor of these doctoral theses research, responsible for research plan and supervision of the research.
- 1.1.2019-30.8.2021, Interreg Baltic Sea Region, 160 345,30 euros, “Growing Algae Sustainably in the Baltic Sea”, B.Y. is the PI of University of Turku, leading funding acquisition and research.
- 1.1.2019-31.12.2021, funded by the Finnish Cultural Foundation, 60000 €, “Green solutions for high quality fish oil for human consumption from Baltic herring”, B.Y. is the PI, funding acquisition and research.
- 1.4.2017-31.12.2022, the Finnish Programme of EU Marine and Fishery Funds. “Blue Welfare Network - Blue Products”, 650 000 euros, B.Y. is the PI, leading funding acquisition and research.
- 1.10.2018-31.3. 2021, EU FACCE SURPLUS, 184000 euros for UTU, “Biorefinement of proteins and fibres from food processing side streams”, B.Y. is the PI, funding acquisition and research.
- WILDBERRY-Norwegian wild berries – increased predictability and value creation (2019-2022), funded by the Norwegian Research Council, 80000 €, B. Y. as PI of University of Turku.
- 1.1.2016-30.06.2018, TEKES (currently as Business Finland) and food companies, 671 664 euros, “Innovative Food Concepts and Technologies for Global Nutrition and Business”, B.Y. is the PI, funding acquisition and research.

- 1.1.2016-31.12.2018, TEKES (currently as Business Finland), EU regional development funds, Food companies, 395000 euro, “Innovative Technologies and Concepts for business growth based on Finnish Mushrooms”; B.Y. is the PI, funding acquisition and research.
- 1.9.2011-31.8.2015, “Analysis of Chiral Lipids for Improved Human Nutrition” (funded by Academy of Finland), Total Budget 940 000 euro (B. Y. a key member in the core team)
- 1.1.2011-31.12.2013, “Blackcurrant as raw material for functional foods: new processes and innovations” (funded by TEKES (currently as Business Finland), University of Turku, and Food companies, total budget, 654,000 euro) (B. Y. as the coordinator responsible for planning and execution of the project)
- 2013-2014, “Finnish and Indian Ingredients for Improved Food Safety and Health” (funded by TEKES (currently as Business Finland), University of Turku, and Food companies, total budget, 428,572 euro) (B. Y. as PI)
- 2011-2014, “Effects of sea buckthorn berries on sugar and lipid metabolism”, funded by the Ministry of Water Resources (China), Peking University (China), (total funding, 100,000 euro. (B.Y. and Professor Yumei Zhang are Co-PIs of the Research)
- 2015-2018, Effects of sea buckthorn and sea buckthorn metabolites on hyperlipidemia: A human intervention study (UTU and Peking University). The joint project received positive funding decision from China Natural Science Foundation (NSFC) (Funding: 850.000 CNY). B.Y. as the co-PIs of the project

Supervision and mentoring

An important task of Prof. Yang is to supervise and train young researchers to perform high quality research and to write publications, to provide young researchers with the resources and platforms and opportunities to gain experience in applying research grants, and to support their career development.

- Prof. Yang has supervised and co-supervised a large number of Master’s theses in Food Chemistry and Food Development
- Twenty-three doctoral theses have been completed under the supervision of Baoru Yang, including PhD in Food Chemistry, eight Doctor of Science (Tech.) in Food Development. In addition, she is currently supervisor of eight on-going doctoral theses and acting as research director of twenty doctoral researchers in the Food Sciences Unit.
- Prof. Yang has supervised seventeen postdoc researchers.
- Prof. Yang has acted as the mentor of tenure-track professors.

Leadership in research and academic community

Baoru Yang completed one-year training in leadership for leading research groups, and one-year mentoring course on academic leadership organized by the University of Turku. Professor Baoru Yang has a number of leading positions within the University of Turku.

- **Leading the research of Faculty of Science and Engineering, and the Faculty of Technology**

As the Vice Dean of Research, Prof. Yang is responsible for developing the research of the faculty. The experience of seven years in two different faculties covers developing doctoral education, cross-disciplinary research, cooperation with industry, and international collaboration. The responsibilities also cover the doctoral education, leading the activities of defining the code of conduct for doctoral

education, recruiting doctoral students, designing the curriculum structure, developing and monitoring supervision, evaluating doctoral theses, and granting doctoral degrees.

- **Leading the research of the Food Chemistry and Food Development Disciplines.**

As the Chair Professor of Food Sciences and the Head of the Food Science Unit, a key task has been building and developing the research programme in the food sciences. She plays the leading role in defining the strategic directions of the research in Food Sciences at the University of Turku. Her activities have led to a rapid increase in the number of externally funded projects, rapid expansion of the team and research outputs such as peer reviewed publications in top level peer-reviewed international journals in the field of food science and nutrition.

- **Leading and developing the education programmes in Food Sciences and Technology.**

The position is responsible for development of education in Master of Science in Food Chemistry Discipline, and Master of Science in Technology in Food Development. The Food Development Programme (MSc.-Tech) is an international programme, and both majors of Master's degree have double degree agreement with Jiangnan University China. As of Autumn 2024, new degree programmes in Food Technology (TkK and DI) have been established as part of the higher education in Food Science and Technology at the University of Turku.

- **Leading research profiling in Food Sciences** as part of the strategic profile of Biofuture (2017-2020), Biodiversity and Sustainable Development (2021-2024).

Prof. Yang is leading the profiling of food research at University of Turku, Funded in the fourth round of the Research Profiling (PROFI4) from the academy of Finland. As the PI of the Food Innovation measure of PROFI4, Yang is leading the strategic planning, resources allocation, recruiting and execution of the profiled research in food sciences at the University of Turku. Yang is Director of NordicFOOD profiling area of PROFI8 profiling proposal of UTU.

- **Leading the FOOD CHARACTERIZATION platform of the national FOODNUTRI infrastructure**

The **FOODNUTRI** Climate Smart Food and Nutrition Infrastructure Network (2021-2030) is a national wide infrastructure in Finland, funded by the Academy of Finland. Prof. Yang is the leader of the FOOD CHARACTERIZATION platform. The FOODNUTRI infrastructure network has received funding of over 6 million euros in 2020 and 2021, about 4.5 million euros from the Academy of Finland, and the rest from the partner organizations. Yang is the UTU's PI in the consortium application of FOODNUTRI application for the national infrastructure Roadmap status of the Research Council of Finland.

- **Building and upgrading food research infrastructure**

Baoru Yang has successfully led the upgrading the premises of laboratory and offices of the Food Science Division at the University of Turku. Professor Yang has acquired significant amount of funding of the Academy of Finland and the University of Turku to upgrade the research infrastructure (instrumentations and softwares) to the level of the most up-to-date state-of-art, which provides excellent tools for high quality research. As a result, the instrumentation and other infrastructures have been significantly upgraded during the past five years. The current infrastructure of the food science is part of the UTU's infrastructure roadmap. The cross-disciplinary infrastructure covers departments and research groups of several faculties of UTU. As the PI at UTU and Platform Leader, Prof. Yang has

received two major grants from the Academy of Finland for the FOODNUTRI infrastructure network (total budget for University of Turku is 1.25 million euros) in 2020 and 2021.

- **As a member of the Research Council of the University**, Prof. Yang actively participates in and contribute to strategic discussions and decision making for developing the research and research infrastructure at the University level.
- **As the Member of the Steering Group for Doctoral Education**, University of Turku, Prof Yang plays an active role in management, developing, and guiding the doctoral education at the University of Turku.
- **As a member of the Steering Group of the Strategic Profiling Theme** of the University of Turku, “Biodiversity and Sustainable Development”, the duties are to develop the collaboration among different groups within the theme and cross-disciplinary collaboration among different profiling themes.
- **As the Academic Leader (Chair) of the Finland-China Network in Food and Health**, a pilot in the global programme of the Ministry of Culture and Education, Finland (2021-2024), Coordinated by the University of Turku. Twenty-three higher education institutes from Finland and a number of top Chinese universities in the field of Food and Health. The network also includes industrial partners from both countries, aiming to strengthen the innovation and business partnership between the two countries.

National and international collaboration

Within Finland, Prof. Yang work closely with other universities, research institutes (VTT, Luke, SYKE) and companies.

Prof. Baoru Yang has strong international network of collaboration with researchers from Europe, China, US, Canada, India, and Peru. Prof. has been in frequent collaboration with Chinese colleagues. Recently, she has been appointed as the Leader for the Finland-China Network in Food and Health, as a pilot in the global programme funded by the Ministry of Culture and Education, Finland (2021-2024), which covers twenty-one Finnish universities and universities of applied sciences and research teams of food sciences from a number of top universities in China.

Industrial experience and collaboration with food companies

Prof. Yang has worked over ten years in leading the research and development in food companies, both in Finland and China, which has proven to be a valuable experience for her current work, giving her excellent skills in putting the research into the context of relevance to real-life problems and understanding the needs and focus of companies. All these strongly support the designing and development of applied research and collaboration with food companies. Prof. Yang has cooperated extensively with food companies in various projects financed jointly by public-private funding sources as well as proving exclusive research service for companies.

Teaching merits

- Training of basic module of 25 study credits in University Pedagogy
- Teaching courses and supervising BSc and MSc theses, leading the education in Food Chemistry and Food Development, University of Turku
- International cooperation in teaching with Chinese universities and Peruvian university

Other academic activities

- Acting as pre-examiner of the licentiate theses, doctoral theses, and academic positions
- Acting as an opponent at the doctoral thesis defense at different universities in Finland and abroad
- Frequent reviewer of manuscripts for international journals and grant proposals
- Regular participation and chairing sessions in international scientific conferences
- Editorial Board in peer-reviewed scientific journals
 - *J Agric Food Chem*
 - *Foods*
- Associate Editor in peer-reviewed scientific journals
 - *Food Bioscience*
 - *Food Innovation and Advances*
- Member of the Institute of Food Technologists
- Member of the Euro Fed Lipid and the Nordic Lipid Forum
- Member of American Oil Chemists' Society
- Country representative and member of the Board of the Food Chemistry Division, the European Chemical Society
- Chair of the Scientific Committee of the International Sea Buckthorn Association

Other activities with scientific and societal impact

- Task force leader of *Food Research and Innovation Strategy for Finland 2021-2035*.
- Consortium Leader for the Finland-China Network in Food and Health, as a pilot in the global programme funded by the Ministry of Culture and Education, Finland (2021-2024)
- Member of the International Forum, the Ministry of Culture and Education, Finland
- Member of the Board, International Sea Buckthorn Association
- Chairman of the Scientific Committee of International Sea Buckthorn Association
- Deputy Member of the Board of Pyhäjärvi-Institute Foundation
- Deputy Chair of the Scientific Advisory Board of the Finnish Food and Drink Industries' Federation.
- Ten years as R&D leader in food companies in Finland and in China, Long experience and active collaboration with industry

Interaction skills

Prof. Yang is leading a research group of researchers from multiple countries with different culture background. In addition, she has multiple tasks of leading and management within the University as well as in societal interaction activities. The current tasks of Prof. Yang require exceptionally strong skills for interaction with teaching and research personnel as well as administration within the university, and especially with partners and stakeholders outside the university, both national and international. In addition to collaboration with academic partners, interaction and communication with industrial partner is of critical importance.