COLLABORATIVELY GROWING THE LANDSCAPE OF PLANT-BASED PROTEINS

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The mission of the Plant Protein Innovation Center (PPIC), first of its kind in the nation, is to bring together interdisciplinary researchers and industry partners to deliver to the supply chain new nutritious and functional plant protein ingredients and products, working all the way from breeding and genetics to processing, formulation, and marketing.

PPIC addresses industry-identified plant-protein challenges and opportunities to develop a wealth of fundamental science leading to a low emission food industry.
Why PPIC? Why Now?

The PPIC strives to not only bring economic gain to the industry but to also address the consumer desire for nutritious and healthy food, have a positive impact on the environment by seeking and utilizing sustainable crops, provide additional sources of protein for the growing population, and provide revenue to farmers.
How? The PPIC Model

- Research is mainly **Pre-Competitive** and **Non-Proprietary**
- Research focuses on fundamental science that addresses industry needs and consumers demands

**Total funds acquired:** over $6,000,000
The PPIC Model: Coming Together to Grow Research
Nutrition
Breeding & Genetics
Food Science & Technology
Informatics
Proteomics
Protein Functionalization
Protein Chemisty
Protein Bioactivity
Dietetics
Product Development
Non-Thermal Processing
Animal Nutrition
Metabolomics
Polymer Characterization
Production Development
Chemical Engineering
Human Nutrition
Encapsulation
Bioengineering
Genetics
Agricultural Economics
Agronomy
Biomaterial Science
Analytical Chemistry
Agricultural Economics
Chemical Engineering
Business Management
Analytical Biochemistry Center
Biochemistry
Flavor Chemistry
Statistics
Polymer Characterization Facility
Imaging Center
NMR Center
Proteomics and Mass Spectrometry Center
Rheology Characterization Lab
Food Processing Center (Pilot Plant)
Equipped Research Labs
Biotechnology Institute
Sensory Center
Encapsulation Center
Rheology Characterization Lab
Food Processing Center (Pilot Plant)
Biotechnology Institute
Sensory Center
Encapsulation Center
INNOVATION

Research Areas

Experts in Various Fields

Broad Instrumentation & Research Capabilities
Areas to be Addressed

Understand how novel proteins can replace or be combined with traditional protein ingredients in various food products to deliver optimal nutrition, functionality, and flavor.

Determine viable (cost effective) extraction (wet and dry) and processing technologies for producing functional protein ingredient from novel sources.

Investigate crop diversity and breed for protein quality traits.

Unveil unique characteristics and applications for each protein source.

Develop prediction models to link protein structure to function.

Secure abundant and sustainable supply.
Identified Research Priorities

Production
Primary research focus areas related to breeding, sustainability of the supply, and crop diversity

Processing & Formulation
Primary research focus areas related to extraction methods, unique processing, co-products, food systems, high value end use

Application
Primary research focus areas related to flavor, functionality, and nutrition

https://ppic clans.umn.edu/research/research-priorities
Research Advances

PPIC Funded Research

- Four successful RFPs resulting in nine projects, submitted by PPIC researchers, funded for up to $50,000 per year
- Link to research summaries
Examples of PPIC Grant Proposals
(Over one million dollars)

 Proposal funded through Good Food Institute (GFI) (2020)
  Title: Characterizing and texturizing proteins from pulses to form fibers with textures that mimic chicken
  Three interdisciplinary PPIC researchers
  Funds granted: $250,000

 Proposal funded through Foundation for Food & Agricultural Research (FFAR) (2020)
  Plant Protein Enhancement Project
  Title: Legumes of the future: Developing methodologies and germplasm to enhance the functionality and nutritional quality of pea protein
  Five interdisciplinary researchers
  Funds requested: $800,000
Who? Industry Members

PPIC Partners

- ADM
- AFS Applied Food Sciences
- Amano Enzyme
- Buhler
- Cargill
- Conagra Brands
- Danone
- Ferrero
- General Mills
- Green Group
- Ingredion
- Microsoft
- PureField Ingredients
- Roquette
- Tate & Lyle
- Thar Process
Who?

Industry Members

Associate Members

[Logos of various companies]
Who?

Industry Members

Affiliate Members

[Logos of Catapult, EQUINOM, nobell, and NuCicer]
Who?

Supporters & Collaborators
Who?

Researchers

39 interdisciplinary researchers across the University of Minnesota and from external institutions!

https://ppic.cfans.umn.edu/expertise/researchers

Senior Scientists, Postdocs, and Students
Become a Member of the PPIC!

With investment and collaborative effort between industry and researchers, we can innovate!

### Affiliate
- Start-up companies with an annual revenue of less than $2 million
- A yearly membership fee of $3,000/year for 3 years
- (Sponsorship available through application)

### Associate
- Companies with an annual revenue between $2 and 5 million* and for organizations
- A yearly membership fee of $6,000/year for 3 years
  *A company that makes more than $5 million annual revenue may join at an associate level for a one-year trial period, non-renewable, for $10,000 one-time membership fee.

### Partner
- A yearly membership of $20,000 for 3 years for companies that have $5-100 million annual revenue;
- A yearly membership of $40,000 for 3 years for companies with more than $100 million in annual revenue

https://ppic.cfans.umn.edu/members-supporters/membership-options
Benefits to Members

For All Members PPIC offers:

- Visibility on our website and networking opportunities
- Waived registrations to PPIC events*
- Opportunity to host booths at annual meetings at no additional cost
- Expert advice and support for troubleshooting processing/product development challenges
- Facilitated collaboration with other PPIC member companies

For Associate & Partner members PPIC also offers:

- A Welcome package** that offers a complimentary project custom designed to meet your research needs
- A 20% discount on any subsequent projects to continue reaching research goals
- High-priority project timelines
- Customized hands-on training on various analytical techniques
- Support with setting up new R&D labs for protein research

For Partner members PPIC also offers:

- Having an R&D scientist on the Technical Committee
- Contribution to and development of the center Research Priorities
- Receiving quarterly updates on PPIC Funded projects
- Involvement in decision making to fund research proposals

*Waived Event Registrations
Partners: Three waived registrations to PPIC annual meetings, two waived registrations to PPIC short course; a total value of $5,000 - $7,000/annually;
Associate Members: Two waived registrations to PPIC annual meetings, one waived registration to PPIC short course; a total value of $3,000 – $4,500/annually;
Affiliate Members/ Supporters: Two waived registrations to PPIC annual meetings; a total value of $1,500 - $3,000/annually

**Welcome package
Partners: A welcome package of $8,000 value is offered for a complimentary project;
Associate Members: A welcome package of $4,000 value is offered for a complimentary project

https://ppic.cfans.umn.edu/members-supporters/membership-benefits
PPIC Capabilities
Check out our webpage for a full list of capabilities

- Sample Preparation
- Compositional Analysis
- Protein Extraction
- Structural & Functional Characterization
- Nutritional Analysis
- Flavor Extraction Techniques
- Analytical Measurement of Flavor Compounds
- Application Techniques
- Access to University Facilities

https://ppic.cfans.umn.edu/capabilities-overview
Research Outputs
Since 2021 PPIC has produced:

Several publications from both PPC and externally funded sources

- **Enhancement of Pea Protein Solubility and Thermal Stability for Acidic Beverage Applications via Endogenous Maillard-Induced Glycation and Chromatography Purification.**
- **Investigation of Novel Cold Atmospheric Plasma Sources and their Impact on the Structural and Functional Characteristics of Pea Protein.**
- **Structure-Function Guided Extraction and Scale-up of Pea Protein Isolate Production.**
- More can be found on our website: [https://ppic.cfans.umn.edu/research-outputs](https://ppic.cfans.umn.edu/research-outputs)

A patent on Method for Producing Functional Pea Protein

- Alissa Schneider, B. Pam Ismail, 2020. **Method for Producing Functional Pea Protein.** Provisional Patent Filed Oct 30th 2020, Application number: 63/107,797, developed at the University of Minnesota

Several literature reviews on novel plant protein sources
PPIC Outreach

Annual PPIC events include:

- Research Spotlight Meeting
- Protein short courses and hands on experiences
- Workshops on
  - Commercialization
  - Process Scale Up
  - Abundance of supply challenges

Outreach will allow for the exchange of knowledge between the public and private sphere.
What PPIC Offers the Community

- Networking opportunities during events with companies across the value chain (Ingredient suppliers, processors, and CPG companies)
- Interaction with scientists from various disciplines
- Research advancement and innovation
- Development of new and successful protein ingredients and applications
- Post-farm processing technologies that add value along the entire value chain
- Scaling plant protein from regenerative Agriculture
- Development of environmentally sustainable protein crops
- Securing supply chain
- Training the next generation of plant protein scientists
Thank You to Our: Technical Committee
Thank You to Our: Executive Board

Laurice Pouvreau
Expertise Leader Protein Technology
Wageningen University & Research (The Netherlands)

Denis Chéreau
CEO, IMPROVE (France)

Greg Cuomo
Associate Dean for Research & Graduate Programs, Utah State University

Sergiy Smetana
Head of Food Data Group, German Institute of Food Technologies (DIL e.V.) (Germany)

Julie Simonson
VP R&D Product Innovation, Schwan’s Company

Jason Robinson
Director – Business Development, Food, Agricultural Utilization Research Institute

Christina Connelly
Trade Commissioner, Consulate General of Canada
Partner with us today to change the landscape of plant-based protein tomorrow!