



# Plant Protein Innovation Center

**COLLABORATIVELY GROWING THE LANDSCAPE OF PLANT-BASED PROTEINS**

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**CFANS**  
COLLEGE OF FOOD, AGRICULTURAL  
AND NATURAL RESOURCE SCIENCES

**FOOD SCIENCE  
AND NUTRITION**



UNIVERSITY OF MINNESOTA

**Driven to Discover®**





# Plant Protein Innovation Center

## Mission

- 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

## Approach

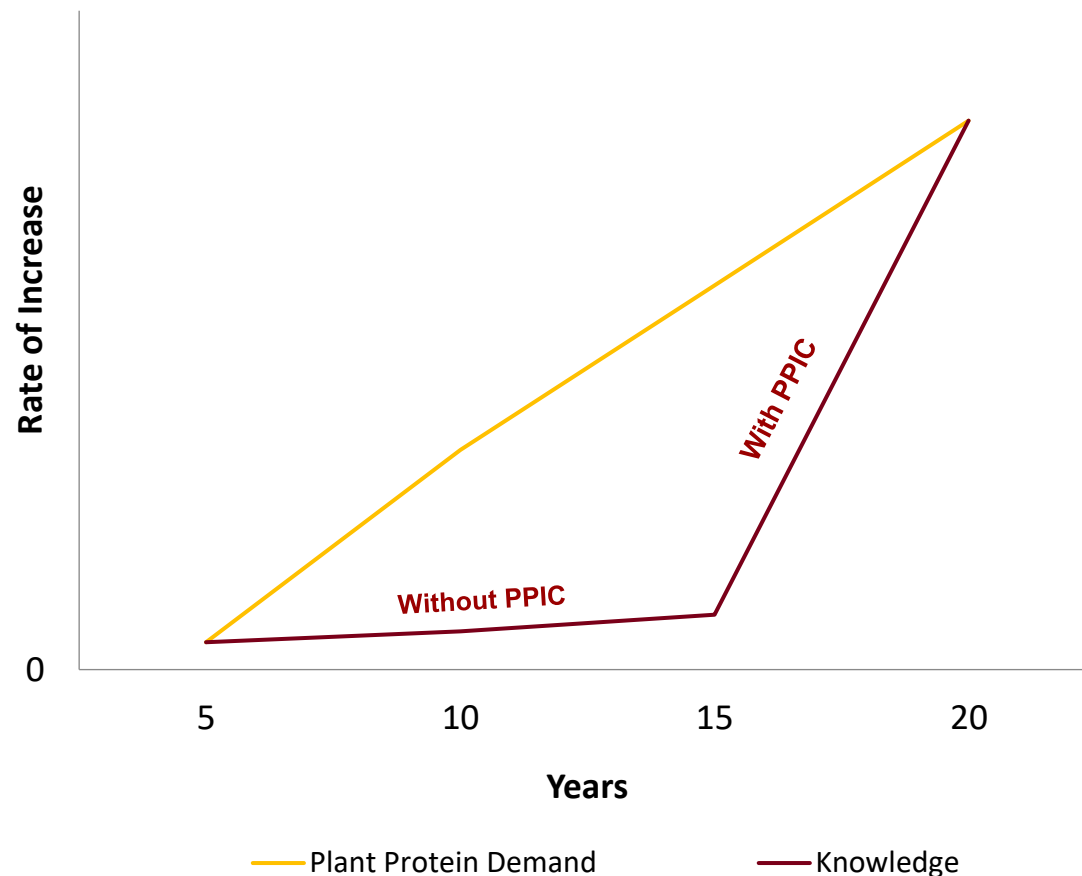
- PPIC addresses industry-identified plant-protein challenges and opportunities to develop a wealth of fundamental science leading to a low emission food industry





# 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.

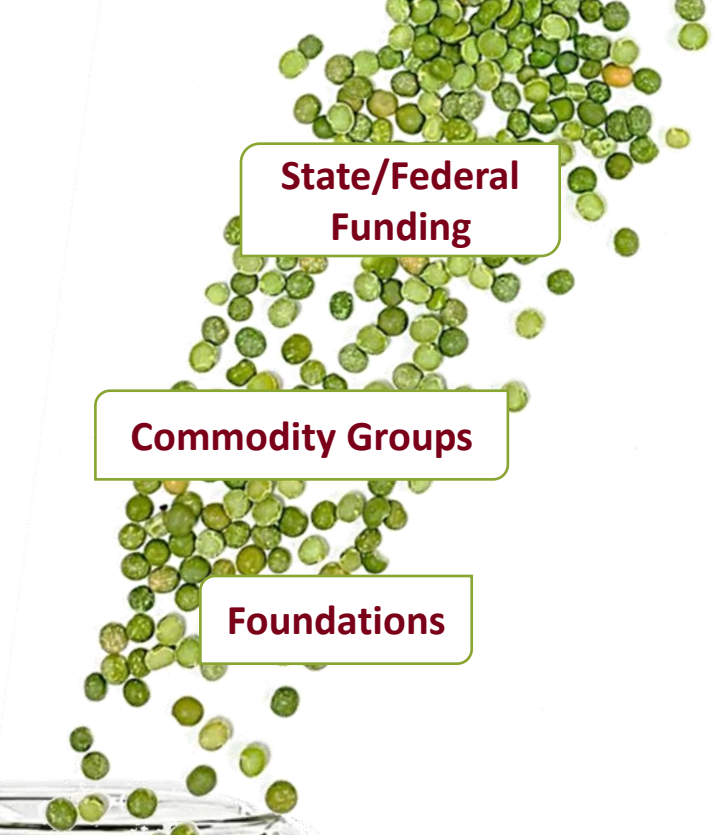






# How? The PPIC Model

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

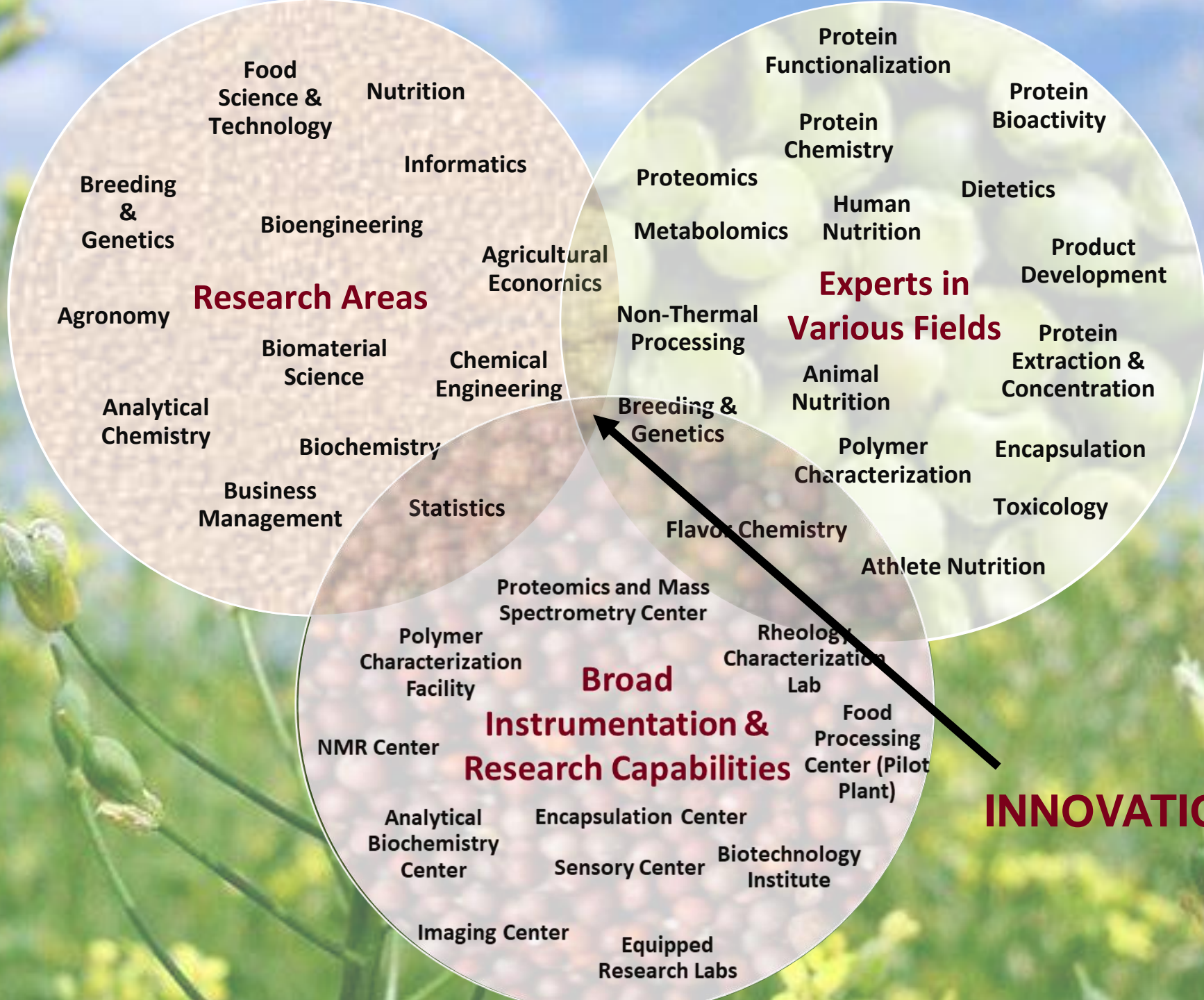




# The PPIC Model: *Coming Together to Grow Research*









# 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**



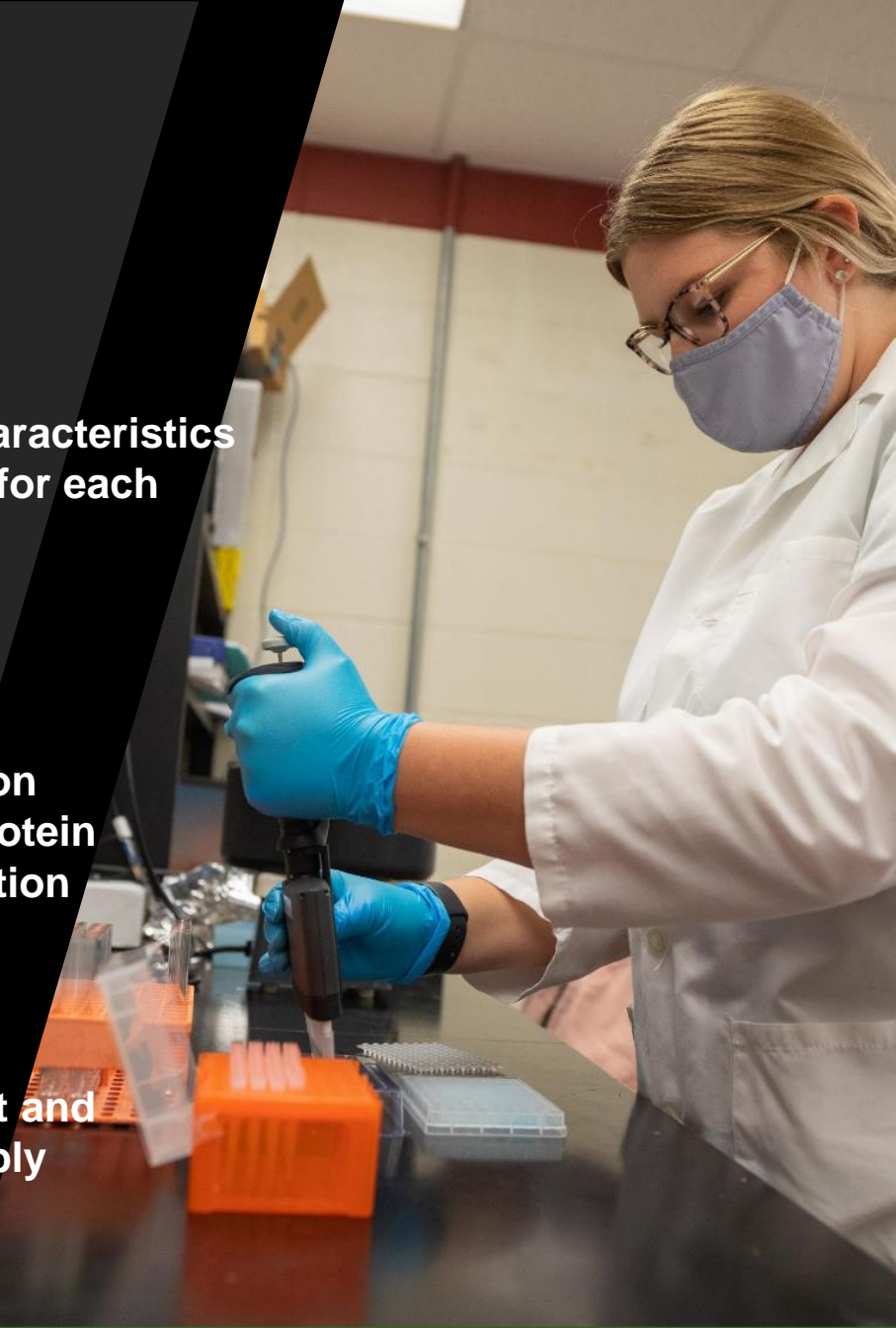
**Unveil unique characteristics and applications for each protein source**



**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*



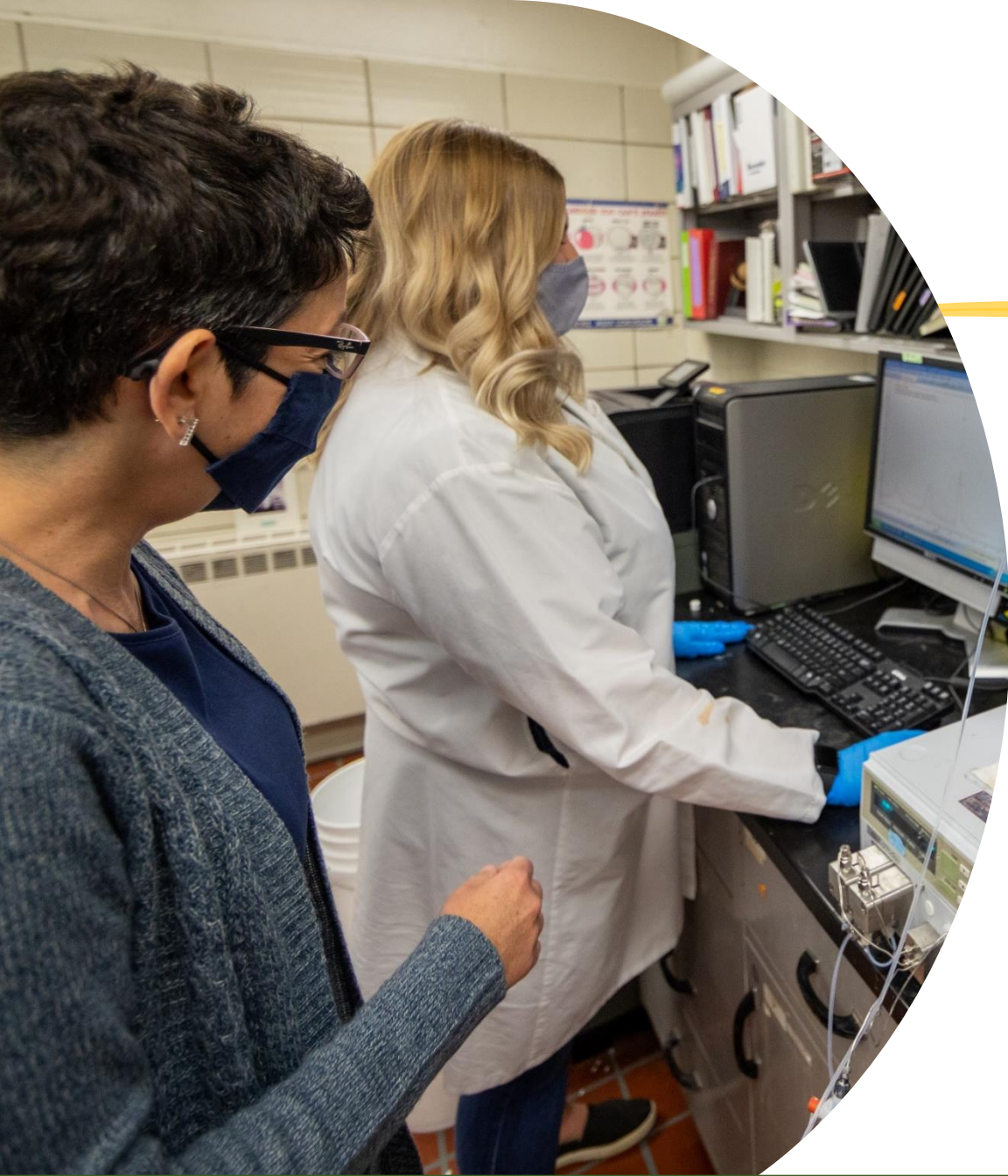
# Research Advances

## PPIC Funded Research

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- Four successful RFPs resulting in nine projects, submitted by PPIC researchers, funded for up to \$50,000 per year
- [Link to research summaries](#)





# Research Advances

## 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**



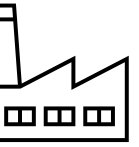




# Who?

## Industry Members

### PPIC Partners

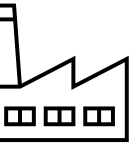




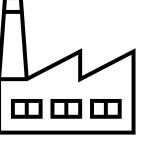
# Who?

## Industry Members

### Associate Members







# Who?

## Industry Members

### Affiliate Members



**EQUINOM**

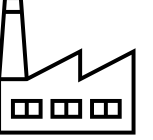
*nobell*

 NuCicer





# Who?



## Supporters & Collaborators







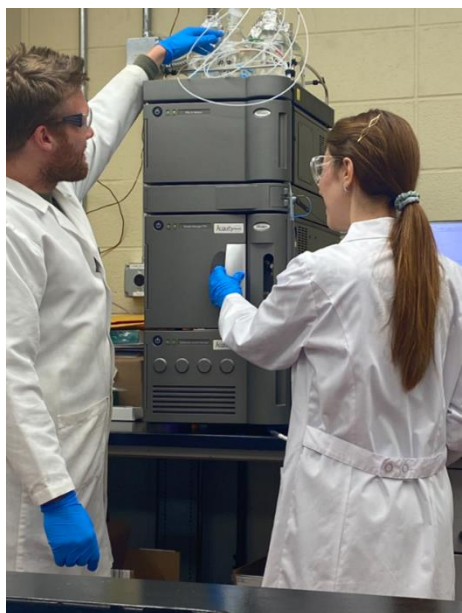
# Who?



## 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](#))

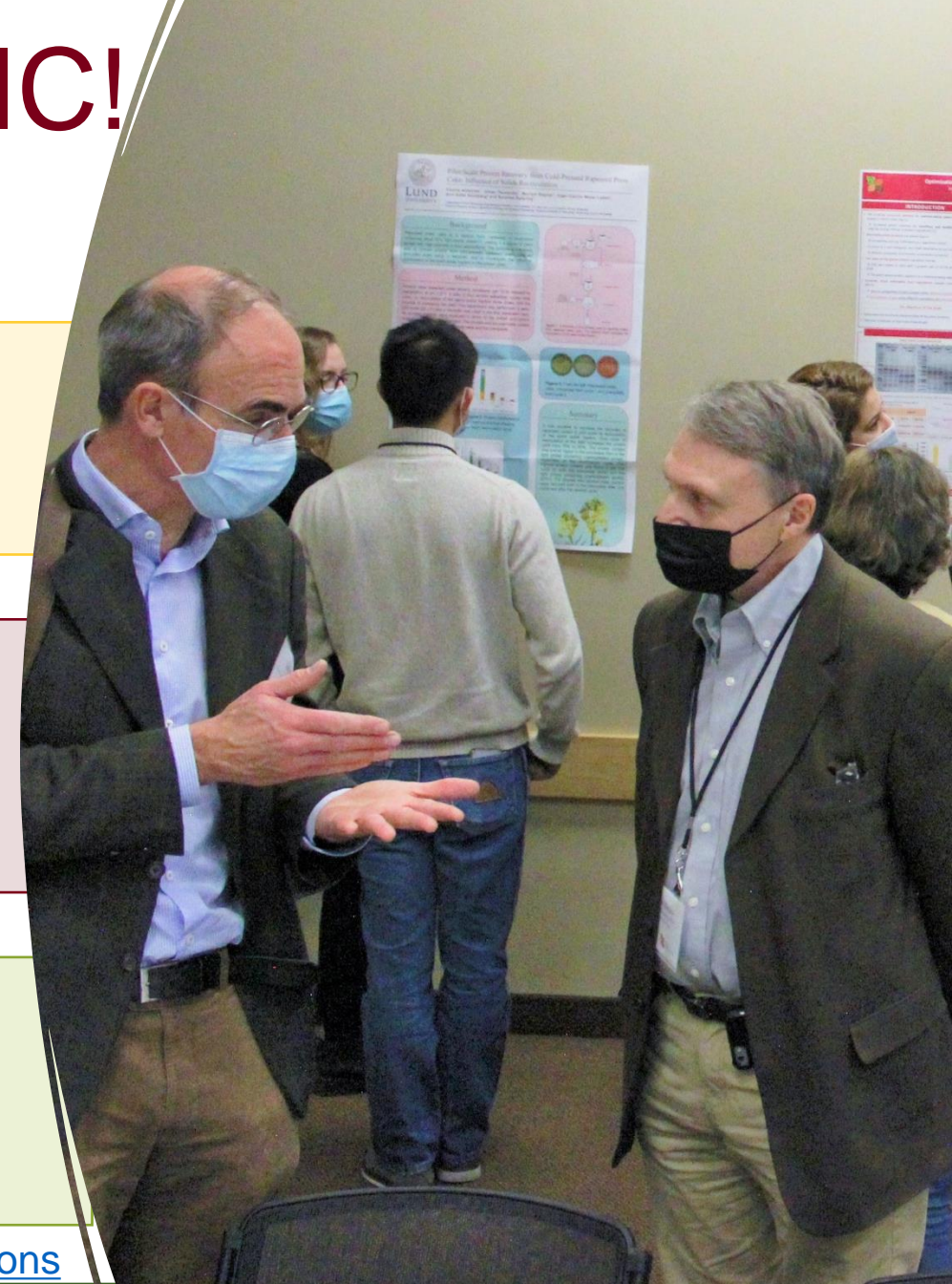
## Associate

- 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



<https://ppic.cfans.umn.edu/members-supporters/membership-benefits>

## 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*





# PPIC Capabilities

Check out our webpage for a full list of capabilities

Sample  
Preparation

Compositional  
Analysis

Protein  
Extraction

Structural &  
Functional  
Characterization

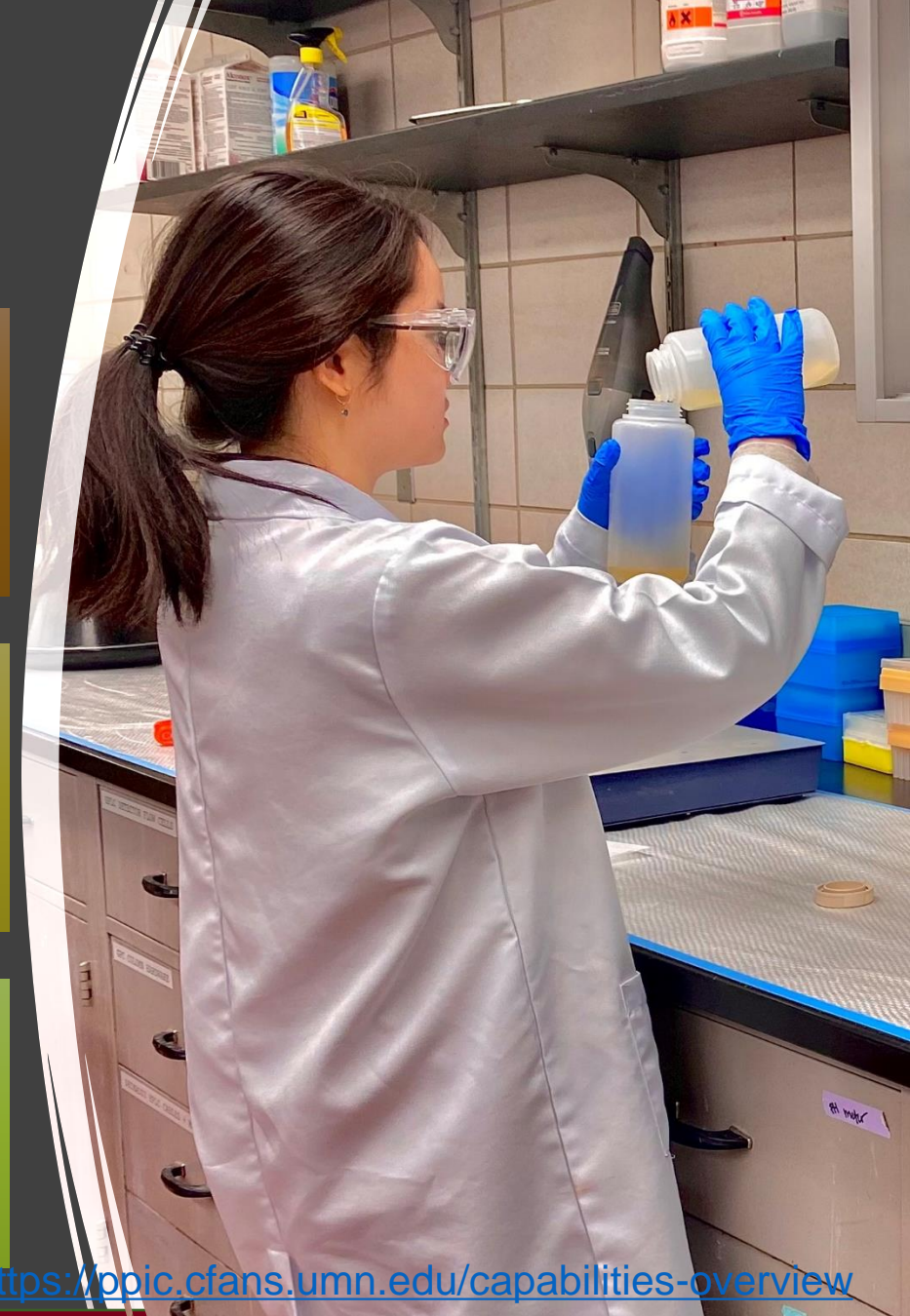
Nutritional  
Analysis

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.**

Schneider A., Bu, F., Ismail, B. 2023. *Current Research in Food Science*, 2023;6:100452-63

- **Investigation of Novel Cold Atmospheric Plasma Sources and their Impact on the Structural and Functional Characteristics of Pea Protein.**

Bu, F., Feyzi, S., Nayak, G., Mao, Q., Kondeti, V.S., Bruggeman, P., Chen, C., Ismail, B. 2022. *Innovative Food Science and Emerging Technologies*, 83, 103248.

- **Structure-Function Guided Extraction and Scale-up of Pea Protein Isolate Production.**

Hansen, L., Bu, F., Ismail, B. 2022. *Foods*, 11, 3773.

- More can be found on our website: <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 30<sup>th</sup> 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



Elizabeth Nguyen  
Senior Scientist  
Alternative Proteins  
Archer Daniels Midland  
Company



Kazuhiro Furukawa  
Business Development  
Amano Enzymes



Chris Fields  
Chief Science Officer  
Applied Food Science



Robert Mitchell  
Senior Process Engineer  
Buhler



Nathan Knutson  
Nutrition Center of  
Expertise & PPD Leader  
for the Americas  
Cargill



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Plant Proteins and  
Handhelds  
Conagra Brands



Jonathan Gray  
Vice President, R&D  
Danone North America



Katie Whalen  
Agritech & Biotech  
Science Manager - Open  
Innovation  
Soremartec S.A., Ferrero



Sara Rosene  
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Nutrition & Technology  
Solutions, Protein Program  
General Mills



Richard van Niekerk  
Technical Commercial  
Manager  
Green Boy Group



Nagul Naguleswaran  
Protein Chemistry Lead  
Global Research  
Ingredion Incorporated



Ranveer Chandra  
CTO Agri-Food, and  
Managing Director,  
Research for Industry  
Microsoft



Mindi McKibbin  
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Innovation  
PureField Ingredients



Jennifer Kimmel  
Head of R&D Americas  
Roquette America, Inc.



Zheng You  
Principal Scientist,  
Health & Wellness R&D  
Tate & Lyle



Jason Lupoi  
Director of Laboratory  
Operations  
Thar Process



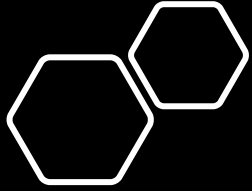
Lolly Occhino  
Senior Food Scientist  
Agricultural Utilization  
Research Institute



Gary Reineccius  
Professor Emeritus,  
Food Science & Nutrition  
Department  
University of Minnesota







# Thank You to Our: Executive Board



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



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IMPROVE (France)*



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Canada*





PPIC

Partner with us today to  
change the landscape of  
plant-based protein  
tomorrow!





# Plant Protein Innovation Center



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