Andrea M. Liceaga

Appointments

Associate Professor –Department of Food Science, Purdue University (2015-present)
Assistant Professor –Department of Food Science, Purdue University (2009-2014)
Director, Sensory Evaluation Laboratory, Purdue University (2013-present)
Postdoctoral Fellow –Food, Nutrition and Health Department (FNH), UBC (2008)
Faculty Instructor –FNH, UBC and Distance Education and Technology-Open Learning Agency, UBC (1999-2009)
Faculty Instructor –Food Technology Program, School of Health Sciences, British Columbia Institute of Technology (2005-2006)

Professional (Academic) Preparation

The University of British Columbia	Food Science (*Food Chemistry*)	Ph.D.	2006
The University of British Columbia	Food Science (*Food Microbiology*)	M.Sc	1999
ITESM, Guaymas, Mexico	Biochemical Engineering	B.Sc.	1996

Research

Bioactive peptides; entomophagy and insect protein applications; applications of emerging food proteins and peptides; development of value-added products from under-utilized resources; applied sensory evaluation of foods and beverages; vibrational (Raman) spectroscopy and microwave extraction systems.

Select Publications

1. Urbizo-Reyes, U., Aguilar-Toalá, J. E. & Liceaga, A. M. (2021). Hairless canary seeds (*Phalaris canariensis* L.) as a potential source of antioxidant, antihypertensive, antidiabetic, and antiobesity biopeptides. *Food Production, Processing and Nutrition*. doi.10.1186/s43014-020-00050-w.
2. Hall, F. , Reddivari, L., & Liceaga, A. M. (2020). Identification and characterization of edible cricket peptides on hypertensive and glycemic *in vitro* inhibition and their anti-inflammatory activity on RAW 264.7 macrophage cells. *Nutrients*, 12(11), 3588.
3. Hall, F. and Liceaga, A. M. (2020). Effect of microwave-assisted enzymatic hydrolysis of cricket (*Gryllodes sigillatus*) protein on ACE and DPP-IV inhibition and tropomyosin-IgG binding. *Journal of Functional Foods*, 64, 103634. doi. 10.1016/j.jff.2019.103634.64
4. Aguilar-Toalá, J. E. and Liceaga, A. M. (2020). Cellular antioxidant effect of bioactive peptides and molecular mechanisms underlying: Beyond chemical properties. *International Journal of Food Science & Technology*, doi.10.1111/ijfs.14855.
5. Cuevas-González, P. F., Liceaga, A. M., & Aguilar-Toalá, J. E. (2020). Postbiotics and paraprobiotics: From concepts to applications. *Food Research International*, doi.org/10.1016/j.foodres.2020.109502.
6. Castro-López, C., Santiago-Lópeza, L., Vallejo-Cordoba, B., González-Córdova, A.F. Liceaga, A.M., García, H.C., Hernández-Mendoza, A. (2020). An insight to fermented edible insects: A global perspective and prospective. *Food Research International*. doi.org/10.1016/j.foodres.2020.109750.
7. Aguilar-Toalá, J. E. and Liceaga, A. M. (2020). Identification of chia seed (*Salvia hispanica* L.) peptides with enzyme inhibition activity towards skin-aging enzymes. *Amino Acids*, 1-11.
8. Urbizo-Reyes, U., San Martin-González, M. F., Garcia-Bravo, J., and Liceaga, A. M. (2020). Development of chia seed (*Salvia hispanica*) mucilage films plasticized with polyol mixtures: mechanical and barrier properties. *International Journal of Biological Macromolecules*, 163, 854-864.
9. Calzada-Luna, G., San Martin-Gonzalez, F., Mauer, L. J., and Liceaga, A.M. Cricket (*Acheta domesticus*) protein hydrolysates impact on the physicochemical, structural and sensory properties of tortillas and tortilla chips. *Journal of Insects as Food and Feed*. doi.org/10.3920/JIFF2020.0010

10. Hall, F.G. and Liceaga, A.M. (2020). Effect of microwave-assisted enzymatic hydrolysis of cricket protein (*Gryllodes sigillatus*) on ACE and DPP-IV inhibition and tropomyosin-IgG binding. *Journal Functional Foods.* Vol. 64 103634. *doi.org/10.1016/j.jff.2019.103634.*
11. Aguilar-Toalá, J. E., Vallejo-Cordoba, B., González-Córdova, A. F., Hernandez, A., & Liceaga, A. M. (2019). Potential role of natural bioactive peptides for development of cosmeceutical skin products. *Peptides. Vol 122 170170 doi.org/10.1016/j.peptides.2019.170170*
12. Urbizo-Reyes, U., San Martin-González, M. F., Garcia-Bravo, J., Malo, A. L., & Liceaga, A. M. (2019). Physicochemical characteristics of chia seed (*Salvia hispanica*) protein hydrolysates produced using ultrasonication followed by microwave-assisted hydrolysis. *Food Hydrocolloids*, 97 105187.
13. Liceaga, A.M. (2019). Approaches for utilizing cricket protein for human consumption: Effect of enzymatic hydrolysis on protein quality and functionality. *Annals of the Entomological Society of America*, 112(6): 529-532. *doi.10.1093/aesa/saz010.*
14. Kim, H. J., Yang, T., Choi, S., Wang, Y. J., Lin, M. Y., & Liceaga, A. M. (2020). Supplemental intracanopy far-red radiation to red LED light improves fruit quality attributes of greenhouse tomatoes. *Scientia Horticulturae*, *261*, 108985.
15. Liceaga, A. M. (2019). Insects: an emerging source of protein. *Inform Magazine*, a publication of the American Oil Chemists Society. July/August 2019 issue. *doi.10.21748/inform.07.2019.23*.
16. Aguilar-Toalá, J. E., Hall, F. G., Urbizo-Reyes, U. C., Garcia, H. S., Vallejo-Cordoba, B., González-Córdova, A. F., Hernandez, A., & Liceaga, A. M. (2019). *In Silico* Prediction and *In Vitro* Assessment of Multifunctional Properties of Postbiotics Obtained From Two Probiotic Bacteria. *Probiotics and Antimicrobial Proteins*, 1-15.
17. Trindade, M.A., King. J., and Liceaga, A. (2019). Production and evaluation of Mexican-style chorizo sausage using invasive silver carp (*Hypophthalmichthys molitrix)* meat. *Journal of Aquatic Food Products Technology* (in Press). *doi.10.1080/10498850.2019.1604600*.
18. Kim, J.M., Liceaga, A.M., and Yoon, K.Y. (2019). Purification and identification of an antioxidant peptide from perilla seed (*Perilla frutescens*) meal protein hydrolysate. *Food Science & Nutrition*, 7(5), 1645-1655.
19. Aguilar-Toalá, J.E., Estrada-Montoya, M.C., Liceaga, A.M., Garcia, H.S., González-Aguilar, G.A., Vallejo-Cordoba, B., González-Córdova, A.F., Hernández-Mendoza, A. (2019). An insight on antioxidant properties of the intracellular content of *Lactobacillus casei* CRL-431. *LWT - Food Science and Technology*. 102, 58-63.
20. Hall, F. and Liceaga, A.M. (2018). Nutritional, functional and bioactive protein hydrolysates. *In* Encyclopedia of Food Chemistry. doi./10.1016/B978-0-08-100596-5.21776-9.
21. Ketnawa, S., Suwal, S., Huang, J. Y., & Liceaga, A. M. (2018). Selective separation and characterization of dual ACE and DPP-IV inhibitory peptides from rainbow trout (*Oncorhynchus mykiss*) protein hydrolysates. *International Journal of Food Science & Technology.* https://doi.org/10.1111/ijfs.13939
22. Hall, F. G ., Johnson, P., and Liceaga, A.M. (2018). Effect of enzymatic hydrolysis on bioactive properties and allergenicity of cricket (*Gryllodes sigillatus*) protein. *Food Chemistry,* 262: 39-47.
23. Ketnawa, S., Wickramathilaka, M. and Liceaga, A.M. (2018). Changes on antioxidant activity of microwave-treated protein hydrolysates after simulated gastrointestinal digestion: Purification and identification. *Food Chemistry,* 254: 36-46.
24. Santiago-López, L., Aguilar-Toalá, J.E., Hernández-Mendoza, A., Vallejo-Cordoba, B., Liceaga, A., Gonzalez-Cordova, A. (2018). Bioactive compounds produced during cheese ripening and health effects associated with aged cheese consumption. *Journal of Dairy Science, 101*(5):3742-3757.
25. Suwal, S., Ketnawa, S., Liceaga, A.M., Huang, J. (2017). Electro-membrane fractionation of antioxidant peptides from protein hydrolysates of rainbow trout (*Oncorhynchus mykiss*) byproducts. *Innovative Food Science and Emerging Technologies*. 45, 122-131.
11. Nguyen, E., Jones, O., Kim, B., San Martin, F. and Liceaga, A.M. (2017). Impact of enzyme treatment microwave-assisted hydrolysis on functional and antioxidant properties of Rainbow trout (*Oncorhynchus mykiss)* by-products. *Fisheries Science*. 83(2): 317-331.
12. Hall, F., Jones, O., O'Haire, M., and Liceaga, A. (2017). Functional properties of Tropical Banded cricket (*Gryllodes sigillatus*) protein enzymatically hydrolyzed with Alcalase. *Food Chemist*ry. 224, 414-422.

13. Ketnawa, S. and Liceaga, A.M. (2017). Effect of microwave treatment on antioxidant activity and antigenicity of fish frame protein hydrolysates. *Food and Bioprocess Technology*, 10(3): 582-591.
14. Kim, Y.H.B., Meyers, B., Kim, H-W., Liceaga, A., and Lemenager, R.P. (2017). Effects of stepwise dry/wet-aging and fast freezing on meat quality attributes of beef loins. *Meat Science.* 123, 57-63.
15. Jang H.L., Liceaga, A. and Yoon, K.Y. (2017). Isolation and characteristics of anti-inflammatory peptides from enzymatic hydrolysates of sandfish (*Arctoscopus japonicus)* protein. *Journal of Aquatic Food Products Technology*. DOI:10.1080/10498850.2016.1221015.
16. Jang H.L., Liceaga, A. and Yoon, K.Y. (2016). Purification, characterization and stability of an antioxidant peptide derived from sandfish (*Arctoscopus japonicus*) protein hydrolysates. *Journal of Functional Foods*. 20: 433-442.
17. Mueller, J. and Liceaga, A. (2016). Characterization and cryoprotection of invasive silver carp (*Hypophthalmicthys molitrix*) protein hydrolysates. *Journal of Aquatic Food Products Technology*. 25(1):131-143.
18. Thomson, S., Applegate, B., Martyn, R., and Liceaga, A. (2015). Analysis of seed vigor responses in soybean to invasive silver carp protein hydrolysate treatments. *American Journal of Experimental Agriculture*. 5(3):178-191.
19. Ho, K., Ferruzzi, M.G., Liceaga, A., San Martin-Gonzalez, M.F. (2015). Microwave-assisted extraction of all-trans-lycopene in tomato peels and effect of extraction conditions on carotenoid profile. *LWT - Food Science and Technology*. 62(1):160-168.
20. Liceaga, A., Ballard, T. and Estes, L. (2014). Increasing content knowledge and self-efficacy of high school educators through an online course in food science. *Journal of Food Science Education* 13(2):28-32.
21. Cardoso-Ugarte, G.A., Sosa-Morales, M.E., Ballard, T., Liceaga, A. and San Martin-Gonzalez, M. F. (2014). Microwave-Assisted Extraction of betalains from red beet (*Beta vulgaris*). *LWT - Food Science and Technology*. 59(1):276-282.
22. Malaypally, S.P., Kim, K-H., Ferruzzi, M., San Martin, F., Goforth, R., and Liceaga, A. (2015). Influence of Molecular Weight on Intracellular Antioxidant Activity of Invasive Silver Carp (*Hypophthalmichthys molitrix*) Protein Hydrolysates. *Journal of Functional Foods*. 18:1158-1166.
23. Moser, S.E., Liceaga, A., Jones, O. and Ferruzzi, M.G. (2013). The effect of individual milk proteins on bioaccessibility of green tea flavan-3-ols. *Food Res. Int* 66: 297-305.
24. Nelson, L., Keener, K., Kaczay, K. Banerjee, P., Jensen, J., and Liceaga, A. 2013. Comparison of the FryLess 100K Radiant Frying System to oil immersion frying. *LWT - Food Science and Technology*. 53: 473-479.

Patents:

Liceaga, A. and Urbizo-Reyes, U. (2019). Chia seed derived products and the process thereof. Patent #68853-1.

Invited Presentations

- Liceaga, A. Using insects not only as a protein source, but also as a source of biological active peptides. Dept. of Entomology 2019 Seminar Series. (September 26, 2019).
- Liceaga, A. Human perceptions of insect protein. Center for I/UCRC for Insects as Food and Feed. Indianapolis, IN. (September 17-19, 2019).
- Liceaga, A. Considerations in the hydrolysis of insect proteins to improve their bioactivity and decrease allergenicity. ACS- Fall meeting: Symposium honoring Dr. Fidel Toldrá. (August 27, 2019).
- Liceaga, A. Bioactive peptides derived from alternative protein sources. 2nd International Symposium on Bioactive Peptides. Valencia, Spain. (May 22-24, 2019).
- Liceaga, A. The potential for using insect protein as a sustainable protein source. National Week of Science and Technology, CIAD-Hermosillo, Sonora Mexico. (November 26, 2018).
- Liceaga, A. Evaluation of insect protein for functionality and bioactive peptides. 3rd International Conference on Agriculture and Agro-Industry. Mae Fah Luang University, Chiang Rai, Thailand. (November 15-17, 2018).
- Liceaga, A. Insects as sustainable and alternative protein sources. Indiana School of Nutrition Annual Conference. Indianapolis, IN. (November 8, 2018).
- Liceaga, A. (2018). Approaches for utilizing cricket protein for human consumption: Effect of enzymatic hydrolysis on protein quality and functionality. Eating Insects- Athens, University of Georgia. August 13-15, 2018)

- Liceaga, A. Entomophagy in Western cultures. DaVinci Pursuit Fundraising Event & NPR Radio. (June 28, 2018).
- Liceaga, A. Approaches for utilizing invasive Asian carp in the Midwest. Purdue Road Scholar's, Purdue University. (June 14, 2018).
- Liceaga, A. How can we move beyond the 'icky bugs' concept and use insects as a source of protein in Western cultures. Insects as Food and Feed Symposium. Research Development, Office of the Vice Chancellor for Research and BSF Genomics Consortium, IUPUI School of Science. Indianapolis, IN (March 2018).
- Liceaga, A. Entomophagy as potential source for functional and bioactive peptides. 10th Conference of the International Society for Nutraceuticals and Functional Foods. Gusan, South Korea (October 2017).

Conference Presentations

- Hall, F., Johnson, P., and Liceaga, A. (2018). Impact of microwave energy on the structure, allergenicity and bioactivity of cricket protein. 11th Conference of the International Society for Nutraceuticals and Functional Foods. Vancouver, Canada.
- Liceaga, A. (2018). Approaches for utilizing cricket protein for human consumption: Effect of enzymatic hydrolysis on protein quality and functionality. Eating Insects- Athens, University of Georgia.
- Hall, F. and Liceaga, A. (2017). Entomophagy as potential source for functional and bioactive peptides. 10th Conference of the International Society for Nutraceuticals and Functional Foods. Gusan, South Korea.
- Ketnawa, S., Suwal, S., Huang J. and Liceaga, A.M. (2017). Selective fractionation and concentration of multi-bioactive properties peptides from fish frame protein hydrolysates by electrodialysis with ultrafiltration membrane. 10th Conference of the International Society for Nutraceuticals and Functional Foods. Gusan, South Korea.
- Kirkham, A.C. O'Haire, M.E., Liceaga, A.M. and Johnson, B. (2017). Perceptions of edible insects as a protein source: a pilot study. Society for Applied Anthropology. Santa Fe, NM.
- Suwal, S., Ketnawa, S., Liceaga, A.M., Huang, J.-Y. Electro-membrane process for the fractionation of bioactive peptides from rainbow trout by-products (*Oncorhynchus mykiss*) protein hydrolysate. 39th Symposium on Biotechnology for Fuels and Chemicals. San Francisco, USA. May 1–4, 2017.
- Ketnawa, S., Suwal, S., Huang J. and Liceaga, A.M. (2017). Selective fractionation and concentration of antioxidant and antihypertensive peptides from fish frame protein hydrolysates by electro-membrane fractionation. 47th Conference of the West European Fish Technologists' Association. Dublin, Ireland.
- Suwal, S., Ketnawa, S., Liceaga, A.M., Huang, J.-Y. Innovative electro-membrane fractionation technology for fish by-product valorization. Total Food 2017. Norwich, UK. October 31–November 2, 2017.
- Hall, Jones, F.G., O.G., O'Haire, M.E., and Liceaga, A.M. (2016). Functional properties of tropical banded cricket (*Gryllodes sigillatus*) protein hydrolyzed using a commercial protease. Food Factor Conference. Barcelona, Spain.
- Ketnawa, S. and Liceaga, A. (2016). Effect of microwave treatments on antioxidant activity and antigenicity of fish frame protein hydrolysates. International Conference and Exhibition on Nutraceuticals and Functional Foods. Orlando, FL.
- Patois, C. and Liceaga, A. M. (2016). Consumer liking and descriptive analysis of French and American-made camembert and brie cheeses by American panelists. Seventh European Conference on Sensory and Consumer Research, EuroSense. Dijon, France.
- Rivera, S., Jones, O. and Liceaga, A. (2016). Antioxidant properties of whole hemp seed (*Cannabis sativa*) protein hydrolysates. Annual Meeting of the Institute of Food Technologists. Chicago, IL.
- Nguyen, E., Jones, O., Kim, B., San Martin-Gonzalez, F., and Liceaga, A. (2016). Antioxidant activity of microwave-assisted Rainbow trout (*Oncorhynchus mykiss*) by-product hydrolysates. World Fisheries Congress. Busan, Republic of South Korea.
- Nguyen, E., Jones, O., Kim, B., San Martin-Gonzalez, F., and Liceaga, A. (2015). Enhanced functional properties and antioxidant activity of Rainbow trout (*Oncorhynchus mykiss*) by-product hydrolysates derived from microwave-assisted hydrolysis. Trans-Atlantic Fisheries Technology Conference. Nantes, France.
- Nguyen, E., Jones, O., Kim, B., San Martin-Gonzalez, F., and Liceaga, A. (2015). Effect of Microwave-assisted Hydrolysis on Functional Properties of Rainbow Trout (*Oncorhynchus mykiss*) by-product Hydrolysates. Annual Meeting of the Institute of Food Technologists. Chicago, IL.

Press Releases

1. "Bug Appétit: How Purdue is working towards wide-scale adoption of alternative proteins". April 2019. 150 Years of Giant Leaps in Agriculture. https://ag.purdue.edu/stories/bug-appetit/
2. "Bug chef adds 6-legged crunch to Spring Fest". April 6, 2019. The *Journal & Courier.*

3. "Brooklyn Bugs chef, Purdue prof ask: What IF eating insects saved the planet?" Ideas Festival. March 29, 2019. *Agriculture News*. https://www.purdue.edu/newsroom/releases/2019/Q1/brooklyn-bugs-chef,-purdue-prof-ask-what-if-eating-insects-saved-the-planet.html
4. "Eating insects Athens 2018 – a recap of industry growth". Sept. 1, 2018. Bugible e-magazine. https://bugible.com/2018/09/01/eating-insects-athens-2018-a-recap-of-industry-growth/
5. "Using the Unused". April 27, 2018. Envision Magazine. https://ag.purdue.edu/envision/s18-unused/
6. "If you can't beat 'em, eat 'em? Chefs, scientists, others working on ways to make Asian carp land on your plate more than once". September 30, 2011. The *Journal & Courier.*
7. "Carp tortilla not as fishy as you think- Purdue Professor Uses Asian carp as food ingredient" aired March 9, 2011. *WLFI, Ch.18, West Lafayette*.
8. "Number of invasive Asian carp grow in Wabash river" August 30, 2010. *The Exponent.*

Awards and honors received

- Dr. Jack Long Undergraduate Teaching Award in Food Science 2014, 2015, 2018
- Undergraduate Counselor Award, Food Science Department 2014, 2015

TEACHING

Course (credits)	Title
FS 435 (1)	Sensory Science
AGR 493 (1)	Italy Spring Break Study Abroad
FS 443 (3)	Product Development
FS 690 (1)	Sensory Evaluation Techniques