Speaker Biographies/Abstracts

Eric Bishop von-Wettberg *Asst. Professor, Dept. of Plant and Soil Science, University of Vermont*

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Breeding for diversity: examples from the USAID chickpea climate resilience laboratory

For approximately 15% of the world population, chickpea is the primary source of dietary protein. Although it is primarily known in the U.S. and much of the West as the course of hummus or a cooked legume added to salads, its global significance is far greater. In South Asia and East Africa chickpea is a critical dietary staple, rich not only in a full range of essential amino acids but also rich in carotenoids, vitamins, and minerals. Chickpea can be used in a large number of ways beyond hummus, as a flour with an excellent glycemic index, as a basis of dahl and other stews and curries, and as a fresh green vegetable and sprout.

Chickpea production, particularly in the developing world, is limited in part by low genetic tolerance to climatic extremes (drought, heat, cold) and to pathogens such as fungal diseases. The limited genetic tolerance can be improved by systematically utilizing wild chickpeas from mountainous regions of southeastern Turkey as a source of genetic potential for an improved crop. This approach requires only crosses that can occur naturally. University of Vermont faculty member Dr. Eric von Wettberg is a member of the USAID Feed the Future Chickpea Innovation Lab, which aims to develop the framework to utilize expanded plant genetic resources for chickpea in the improvement of climate resilience in East Africa and South Asia. With support from the U.S. National Science Foundation and partners in Australia and Canada, von Wettberg and colleagues have initiated a 10-fold increase in the size of the wild chickpea germplasm collection. Although this effort in large part targets needs in some of the most food-insecure and climatically unstable parts of the developing world, expanded chickpea germplasm creates opportunities globally. This germplasm can be harnessed in the future by making traditional crosses among wild chickpea and cultivated lines. Furthermore, the approaches being developed in chickpea can be applied to a range of other crops, such as the key legumes lentil, mungbean, peas, and adzuki bean. New projects are beginning to examine these other legumes in collaboration with researchers in Canada, Russia, Taiwan, Japan, India, the UK, and Ethiopia.

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Sarzana Houssain

UBC Biology Co-op

Sarzana is a UBC Undergraduate Biology student. She is interested in how endogenous microbes protect plants from opportunistic pathogens.

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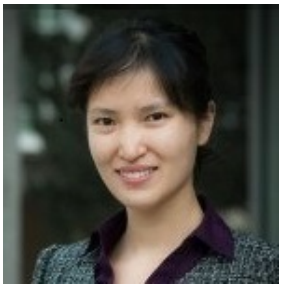
Cara Haney, PhD

Asst. professor, Dept. of Microbiology and Immunology, *University of British Columbia*

Utilizing the plant microbiome to protect sprouts from human pathogens

Plants normally associate with a complex community of microbes (their "microbiome") that assist with nutrient uptake and can protect them from plant pathogens. Removing microbes from seeds and soil results in increased plant vulnerability to stochastic colonization by environmental microbes that are poorly adapted to plants. We have found that removing the native microbes by sanitizing sprouting seeds leaves them vulnerable to invasion by poorly-adapted microbes including Salmonella. We have identified individual members of the endogenous plant microbiome that have direct antimicrobial activity against Salmonella. Our ongoing work is focused on developing a defined community of beneficial microbes that can protect plants from human pathogens to be used in sprout and greenhouse production.

Dr. Cara Haney is an Assistant Professor in the department of Microbiology and Immunology and Michael Smith Labs at the University of British Columbia. Dr. Haney's research focuses on interactions between beneficial plant-associated microbes (the "microbiome") and plant growth and disease resistance. She received her B.S. in Plant Science from Cornell University and her Ph.D. in Cell and Molecular Biology from Stanford. She worked at Harvard as a postdoc developing a model system to study plant-microbiome interactions prior to joining the UBC faculty in 2016. Dr. Haney holds the Canada Research Chair in plant-microbiome interactions.



Siyun Wang, Assistant Professor of Food Safety Engineering at UBC

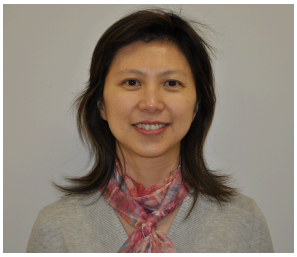
Dr. Wang is an Assistant Professor of Food Safety Engineering at UBC. Her career on food safety started at the Institute for Food Safety and Health at Illinois Institute of Technology in Chicago, where she was a PhD student. Prior to joining UBC in 2013, she was a postdoctoral associate at the Department of Food Science in

Seed disinfection strategies for the organic production of sprouted vegetables

Sprouted vegetables have been linked to many outbreaks of foodborne illness caused by *Salmonella enterica*, toxigenic *Escherichia coli* and *Listeria monocytogenes*. A critical factor for the reduction of risks associated with such pathogens is seed disinfection. Compliance with organic standards is currently not met by the current treatments sanctioned by regulatory agencies. These current treatments also use very high concentrations of hypochlorites and peroxides and pose an occupational exposure risk. Thus, the purpose of our research has been to develop an effective seed disinfection strategy compliant with organic production principles that does not impair seed germination and yield.

Our research determined that foodborne pathogens such as *Salmonella*, *Escherichia coli*O157:H7 and *Listeria monocytogenes* were effectively eliminated on mung bean, alfalfa seed and radish seed after mild heat treatments (hot tap water temperatures) in combination with soaks in low concentrations of sanitizers compliant with organic standards (hydrogen peroxide & acetic acid). A follow-up metabolomics study showed that chlorine treatment diminished the levels of nearly 50% of metabolites respectively on sprouting seed, possibly via oxidative destruction; while the organic treatment diminished or increased roughly equivalent amounts, approximately 30%, of metabolites.

Future research based on incorporating multi-hurdle interventions across the sprouts production process may provide new insights into more targeted interventions for the production of pathogen-free sprouted vegetables using organic practices, with specific treatments for each seed type optimizing germination and yield.



Kaiping Deng, PhD *Research Asst. Professor*
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Kinetic Hydroponics: A Novel Sustainable Engineering Solution for Safe Sprouting at Laboratory and Industrial Scales

Fouad Teymour, Chemical and Biological Engineering, and Kaiping Deng, Mehdi Azizinia, and Kathiravan Krishnamurthy, Food Science and Nutrition, Illinois Institute of Technology

Our group has conceptualized and developed a novel technology for sprouting, termed Kinetic Hydroponics, that uses a full-immersion analog of hydroponic technology for the production of sprouts from seeds, grains, and beans. The development of more efficient and safer processes for sprouting at all scales remains of heightened interest because of the severe shortage of food and the spread of malnutrition in many areas around the world, the current emphasis of public interest on healthy nutrition, and the public scare of pathogenic food safety problems.

Typically, hydroponic methods focus on providing a moist, nutrient-rich, environment to the roots of the growing sprout while keeping the leaves in an atmospheric air environment that provides carbon dioxide and oxygen.

On the contrary, "Kinetic Hydroponics" is a technique in which the entire plant, from the time it is a seed to when it becomes a harvestable sprout, is fully immersed in the aqueous medium. Kinetic Hydroponics uses airlift technology to grow the sprouts in transparent vessels containing water that is continuously aerated using an air distributor connected to an air pump. The distributor is designed to deliver a mix of large and fine air bubbles to achieve good mixing as well as efficient gas exchange. Sprouts remain suspended in a three-phase aqueous mixture of air, water, and plant solids that is fluidized under the action of continuous aeration.

This technique not only provides efficient, controlled and simple ways for providing nutrition, carbon dioxide and sunlight to the growing sprouts, but also offers additional advantages including the ability to implement a controllable process for continuous disinfection and prevention of pathogenic activity, simplicity of operation, minimal need for supervision and, most importantly for the industrial scale, the minimization of the spatial footprint of the process.

The presentation will discuss laboratory scale results obtained in 64-oz devices to explore various design and productivity aspects of Kinetic Hydroponics including sprout yield, sprout characteristics, and microbial CFU counts measured at various points in time. A strategy for scale-up to modular industrial installations will also be discussed.

Kaiping Deng is a Research Assistant Professor at Department of Food Science and Nutrition, Institute for Food Safety and Health (IFSH) of Illinois Institute of Technology (IIT). She has been working on food microbiology and food safety research since 2009. Her research is focused on food safety of fresh produce and sanitation validation of food production environment. Dr. Deng is also a Co-Lead and Coordinator of the Sprout Safety Alliance (SSA), which develops a curriculum and training programs, and provides educational and technical assistance to the sprout industry.

Karden Rabin

ConverTsations: The Art of Talking About What You Love, So Others Will Love It Too

If you don't like talking about what you do, you should listen to this lecture. If you don't like "sales" you should listen to this lecture. If you want to sell more sprouts, you should listen to this lecture.

Throughout his numerous ventures as a wellness expert, artisanal pie baker, real estate developer, and more, he succeeds because of his passion and skill at selling his products and services to his customers. In addition to building his brands, Karden regularly consults with other businesses and professionals to help them share and sell what they love. Karden lives in the Berkshires of Western Massachusetts with his wife and extremely handsome cat, Cheshire.

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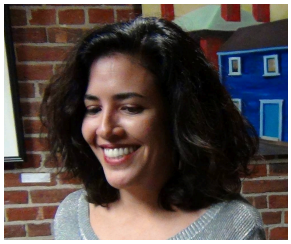

Janie Solomon

Studio 1011
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Be social - Steps to optimize your brand for social media and digital marketing

A business owner, designer and marketer, Janie works with small to mid-size companies to establish their brand and to deliver consistent messaging over its lifetime. Her experience managing web development projects of all sizes and from a variety of industries has shaped her interest in guiding small businesses towards efficient online marketing.

Topics will include brand differentiation with tips on how to capitalize on those unique factors; the brand as a gateway for information or entertainment, an opportunity to educate; how to make social media outlets effective solutions for small business. Outside of Studio1011, Janie is a food and lifestyle blogger, currently obsessed with Instagram.

Britt Sperber *Skinny Pancake,*

Burlington, VT

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From the perspective of a local food buyer

How does the local food movement relate to sprouts?

Sprouts are a crop whose distribution and consumption should be encouraged on a local level due to the nature of its shelf life. They have 10-12 days of life once grown, but are also grown rapidly from seed to sprout and so vendors and growers can respond quickly to market demand.

Sprouts demonstrate a nutritionally dense, easy to grow food that falls in line with values of the local food movement. The local food movement aims to encourage production and purchasing of food that harnessing natural soil microbiology-in other words, encouraging healthy soils that make healthy food - with as little inputs as possible.

What does a purchaser look for in a vendor or a product?

A purchaser looking for a new crop would look first at regulations/credentials in the market (this is more typical with meat) as well as price, diversity of use, shelf life, and opportunities for preservation. If a new restaurant chose to purchase sprouts, they would want to try the product first (sample) and have a trial period where they had a small amount commitment and could make an informed decision.

Generally, purchasers like to make as few phone calls as possible when placing orders. It is ideal growers sell through a distributor that is widely used and familiar to purchasers. In many cases, however, the distributor imposes fees that make a produce more costly to a buyer and return less to the grower.

Labels for organic, humanely certified, non-GMO, etc are becoming increasingly important to purveyors. Anything marketable in a menu is helpful as it educates consumers of the quality and can help justify pricing.

Where does a purchaser start their research?

In Vermont, the native buying list provided by BRP - the major local produce distributor in the state - is an incredibly helpful tool. Large institution and most chefs receive this weekly email that highlights what is currently local, what is below market average price, and what is available in high volumes. If a grower self distributes, ease of communication is very important to busy chefs and restaurants. Digital communication via text and email is great, phone calls as well if the grower answers consistently and is quick on the draw.

Other outlets include similar networks, such as NOFA which provides a yearly booklet that lists all farms and the products they offer. A resource like this would be used by chefs who would cold call a farmer or look up their website to see their offerings.

Why do some growers stand out over others?

Quality of communication in terms speed and readiness, and reliability, are key. Willingness to negotiate price - especially when buying in bulk. Openness to trying new seeds and varieties.

I have been working in the food industry for more than 10 years. In 2013, I received a Bachelor of Arts in Environmental Studies from the University of Vermont. As an undergraduate, Sustainable Agriculture, Access to Food and Hunger were the prime focus of my studies. I have continued this work at the Skinny Pancake, a Farm to Table restaurant group based in Burlington VT, where I have worked the past 6 years. I began my career as a cook and have since became a manager, a local food sourcing specialist, and community outreach coordinator. I have developed skills deep and wide within our business, and have become what we like to call a swiss army knife of the food industry.