



Foundation for Food and Agriculture Research Convening Event Report

Harvest for Health: Improving Wellbeing through Resilient Agriculture

January 31 – February 1, 2019 | Washington, D.C.

Introduction

In the United States, a number of public health investments target minimally processed foods and consumer education promoting increased fruit, vegetable, and whole food consumption. And while laudable and necessary, there has been limited focus on linking sustainable and resilient agriculture, consumer preferences, and health. Millennials represent a growing and important consumer base, and their food preferences include more nutritious foods produced with minimal environmental impacts, while at the same time preferring foods that are tasty and flavorful, and require minimal preparation. These shifting dietary preferences provide an opportunity to begin rethinking how we produce the foods we eat. Foods requiring minimal preparation and that taste good often, but not always, undergo some form of processing. However, processed foods are often perceived as a cause of health disparities. Given consumer preferences, making processed foods more nutritious could have substantial impacts on the society as a whole. This is an opportune time to build innovative partnerships focused on multiple aspects of connecting food systems (and its environmental impacts) and human health.

As observed in a [report](#) by the United Nations System Standing Committee on Nutrition (2016), “[f]ood systems are not themselves good or bad, healthy or unhealthy. However, they can contribute to more or less desirable outcomes for nutrition (...), health (...), and the environment (...).” Currently, processed foods are produced utilizing agricultural production systems optimized for the large-scale production using ingredients that come from relatively few crops. However, thousands of locally important, potentially useful underutilized crops exist--crops that have been overlooked in the design of our modern agricultural system. Many of these crops may possess unique properties useful not only as food ingredients, but also as more nutritious alternatives to current ingredients, and which, at the same time, are climate resilient and could be more sustainably produced. The shift to produce more nutritious processed foods would not be trivial, as ingredient formulations that take into account consumer preferences are complex, and producing “new” crops requires substantial long-term R&D efforts, which might be cost prohibitive for some companies that may not see near-term results.

Goals of the Convening Event

To begin shifting aspects of our modern agricultural system to producing more nutritious foods that meet the demands of consumers and food companies, on January 31 – February 1, 2019, FFAR held the [Harvest for Health](#) convening event in Washington, D.C., to uncover opportunities for new research that could inform more effective and evidence-based solutions to incorporating underutilized crops within the food system. Specifically, goals of the event were to (1) identify research gaps where FFAR support would have the greatest impact and lead to the inclusion of potentially healthy and resilient underutilized crops as food ingredients, and (2) explore innovative partnerships that would strengthen linkages

between resilient production agriculture, food, and health as part of the Harvest for Health initiative under FFAR’s Challenge Area, the [Health-Agriculture Nexus](#).

The objective of the event was for participants to learn from one another’s experiences and unique perspectives. Bringing diverse stakeholders together to leverage collective knowledge, the event was designed to uncover opportunities for new research that could inform more effective and evidence-based solutions to incorporating underutilized crops within the food system.

The event brought together stakeholders across the food system representing academia, industry, government, and non-profit organizations, who explored opportunities for introducing underutilized crops to large-scale food production systems, and identified knowledge gaps, and high-impact targets for FFAR program development and opportunities for cross-sector collaboration. Leading experts in fields such as human nutrition, agronomy, plant breeding, food technology, and food science, learned from one another’s experiences and unique perspectives. They were given several opportunities during the two breakout group sessions to participate in the conversation, which led to a rich discussion of the challenges in addressing barriers, and potential solutions to overcoming these barriers, when incorporating underutilized crops within the food system.

Given the enormity of this effort, FFAR believes this is an area where a global partnership can reduce the risk of R&D that leads to a more sustainable and healthy food and agricultural system. Through extensive breeding programs and product reformulation, these crops have the potential to improve nutritional security, however, it is evident that much more research is needed to fill the gaps in knowledge that currently exist in connecting production agriculture to human health.

FFAR seeks to launch a global collaborative research effort that will promote the introduction of new crops with specific nutritional qualities of interest to food companies that have the potential to improve diets through the reformulation of existing or introduction of new foods. The connection between food and nutrition presents considerable opportunities to reshape the food system, creating a more sustainable and equitable food production model that could alleviate nutritional insecurity and provide more diversity of nutrient-rich products to currently underserved populations, communities, or regions.

Convening Event Overview

Setting the Stage

More knowledge needs to be gained about crops that are not widely produced before making the leap to connect them to improved nutrition or health. Before selecting most promising plant, the plant needs to be analyzed for several factors, including phenotypic, agronomic, processing, and diet-related characteristics that affect bioavailability of nutrients (e.g., the chemical form of the nutrient in food and/or nature of the food matrix, interactions between nutrients and other organic components, the impact of processing and/or preparation practices). FFAR sees an opportunity to work in this space to explore certain plant varieties or breeds that have a potential to benefit farmers, food producers and consumers.

KEYNOTE ADDRESS

Steven Shafer, PhD, ret.

The Soil Health Institute, USDA, ARS

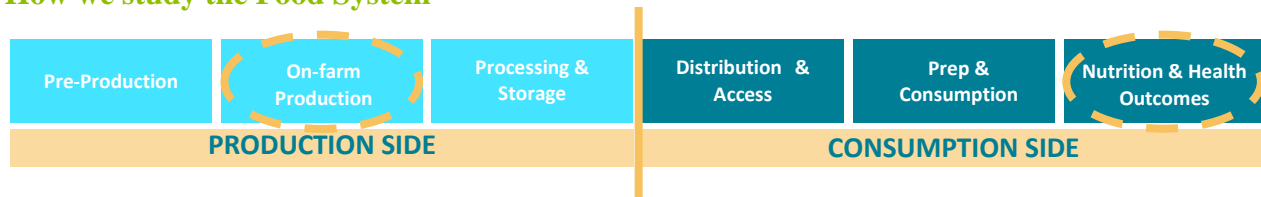
Making Food Systems a Solution to Accommodating Healthy Eating Patterns and Reduced Risk of Diet-Related Illnesses and Human Health Disparities

Setting the Stage

Opening Remarks and Keynote Address

Sally Rockey, PhD, FFAR Executive Director, opened the meeting with a brief overview of the foundation and an introduction of FFAR's new Challenge Area, the [Health-Agriculture Nexus](#). Dr. Rockey noted that identifying, understanding, and addressing issues within this Challenge Area will require a deeper understanding of the entire food system. Dr. Rockey also emphasized that nutrition requires a more holistic approach to health that includes agriculture, for which agriculture is the starting point of food production, and the necessity to connect agricultural production to the consumer. Following Dr. Rockey, **Steven Shafer**, PhD (ret.), former Chief Scientific Officer of the Soil Health Institute and 35-year veteran of the U.S. Department of Agriculture, spoke to participants about the need for interdisciplinary collaboration to support food systems solutions to addressing human health.

How we study the Food System



How we *should* study the Food System



Fig. 1. Diagram from Dr. Sally Rockey's presentation demonstrating how the food system is currently studied and a more holistic approach that connects production to consumption to support research across the Health-Agriculture Nexus (Rockey, S. 2019).

Presentations

Day 1 Presentations

The discussions on the first day were framed around the idea of food system solutions to nutritional security that were framed by Dr. Rockey and Dr. Shafer's opening remarks. Speakers included **Mindy Hermann**, MBA, RDN, and **Maha Tahiri**, PhD, who spoke about nutrition in the context of the development, availability and accessibility of healthful products for consumers. While **Sean Mayes**, PhD, shared opportunities for product reformulation through the diversification of the food system. Presenters **Richard Black**, PhD, and **Mario Ferruzzi**, PhD, examined processing in the context of reformulation and nutrient content of products to the consumer.

The **panel discussion**, moderated by John Reich, PhD, Scientific Program Director at FFAR, featured Maha Tahiri, Sean Mayes, Richard Black and Mario Ferruzzi, addressing the following questions:

- Do underutilized crops have the potential to make foods healthier, and what are some concerns to be aware of if they are utilized in processed foods (breeding out nutritional quality or resilient traits)?
- Do you see real opportunities to use underutilized crops in processed foods?
- How do we begin incorporating underutilized crops into the food system?
- Where do you think the impacts for this will be bigger—environment, health, etc.?
- What are some other options?

Day 2 Presentations

The second day dived into talks from prominent researchers and leaders in the field to share lessons learned from their efforts to incorporate novel crops and biofortified food products within larger commercial markets. **Howarth (Howdy) Bouis**, PhD, recipient of the 2016 World Food Prize, shared important lessons learned from biofortification. Speakers **Sven-Eric Jacobsen**, PhD, and returning speaker Sean Mayes, PhD, revealed their lessons learned from quinoa and Bambara groundnut. Lastly, Richard Black, PhD, and **Kevin Murphy**, PhD, brought the conversation back to consumer and farmer considerations. The second day provided much

DAY 1 PRESENTATIONS

Mindy Hermann, MBA, RDN

Innova Market Insights

Consumer Dietary Trends and Concern, Including Innovations in Development of New Products that Deliver Health and Wellbeing

Maha Tahiri, PhD

Tufts University

Meeting Consumer and Community Health Needs: How to Increase Nutrient Density in Food Supply

Sean Mayes, PhD

University of Nottingham

Addressing Product Reformulation through Crops Diversification: Emerging Nutritious Crops and Their Contribution to Future Agriculture

Richard Black, PhD

Quadrant D Consulting

Addressing Product Reformulation through Crop Diversification: Processor/Manufacturer Considerations

Mario Ferruzzi, PhD

North Carolina State University

Maintaining Bioactive Components throughout Processing

Food System Solutions to Nutritional Security

insight to the third breakout session (details below), where participants were given the opportunity to design a process for incorporating underutilized crops into large scale production systems.

Breakout Group Discussions

Breakout sessions were divided into three groups to brainstorm and discuss current barriers and possible solutions to barriers for the adoption of underutilized crops within the food system. On the second day, the same groups coalesced about creating a process for introducing novel crops into the food system that would address the barriers that were identified on the first day.

Breakout Group Discussion 1: Barriers to the use of underutilized crops as a component of the food system

Of the many barriers identified by individuals participating in the breakout groups, some of the most recognized among participants were:

- 1. Consumer behavior and acceptance** – taste/texture from processing/reformulation; consumer education; consumer trust; consumer pull to engage industry buy-in; influencers or promoters to increase acceptability.
- 2. Farmer considerations** – education to grow new crops; keeping the farmer profitable; yield and yield sustainability; diseases and pests; changing climate (adaptability).
- 3. Processing** – production equipment; product attributes (i.e., texture, flavor, color); post-harvest handling and storage.
- 4. Scalability** – a viable market for novel crops/products; supply chain considerations (consistency of supply, quality, etc.); cost to produce and introduce novel crops to the food system at scale; yield and yield sustainability; regulatory hurdles.

In addition to the above considerations, many individuals commented on the need for greater understanding of these crops and the need to clearly define what qualities should be targeted before making any claims that these crops support better nutrition. The first step in this process would be developing a more well-established definition of the problem that needs to be solved and/or how introducing these crops could benefit consumers, farmers, and industry.

Breakout Group Discussion 2: Solutions to Overcoming Barriers

After identifying barriers to incorporating underutilized crops within large-scale production systems,

DAY 2 PRESENTATIONS

Howarth (Howdy) Bouis, PhD

Harvest Plus
International Food Policy Research Institute

Lessons Learned from Biofortification

Sven-Eric Jacobsen, PhD

University of Copenhagen
Lessons Learned from Quinoa

Sean Mayes, PhD

University of Nottingham
Lessons Learned from Bambara

Richard Black, PhD

Quadrant D Consulting
Meeting Consumer and Community Health Needs: How to Increase Nutrient Density in Food Supply

Kevin Murphy, PhD

Washington State University
Farmer Considerations

Scaling up Agricultural Production of Nutritious and Emerging Crops

participants were asked to brainstorm possible solutions to overcoming these barriers. These ‘solutions’ were grouped into four main categories: communication and messaging, research, regulation, and partnerships.

- 1. Communication & messaging** – inclusive messaging that is trustworthy and transparent; nutrition education; partnering with companies and organizations to effectively use social media/marketing tools to drive consumer awareness/demand; influencer campaigns and ‘champions’ to promote the product –e.g., farmers and chefs as ambassadors.
- 2. Research** – transdisciplinary approaches including collaboration from nutrition, food, agriculture and health sectors; clear focus on defining the problem and potential solutions; identifying who needs to/should benefit from the research; community seed banks; diversity in crops and diet; value-chain research (post-harvest handling, storage, transport, processing); seek market and consumer opinions through focus groups; learn from precedents; link science to markets.
- 3. Regulation** – reducing taxes on ‘healthy’ food products and produce; supporting green technology and production/processing techniques.
- 4. Partnerships** – Collaboration with major companies and organizations (marketing and messaging); partnerships with philanthropic groups, venture capitalists, and other major donors; establishing public-private partnerships to share/dilute investment risk.

Breakout Group Discussion 3: What would the incorporation of underutilized crops into large-scale production look like?

Based on the input from attendees, FFAR’s Scientific Program staff formulated a pipeline for addressing underutilized crops within the food system, from discovery to market (Fig. 2). The initial stage, discovery, would first seek to determine properties of interest to food companies and farmers. In the coming months, FFAR will be continuing outreach to food companies to explore this aspect of the model and inform its efforts to identify crops of interest to industry groups and also have potential long-term benefits to farmers and consumers. At this early stage, it is not clear whether these promising crops will, with any certainty, lead to new products that improve access to nutritional foods, however, FFAR is hopeful that strategic investments in this space could reduce research gaps that currently exist between food production and consumption by creating a more holistic approach to studying food systems that will lead to positive nutritional and health outcomes from farm to fork, as described in Figure 1 .

As part of our continued efforts to support research that benefits farmers, consumers and industry, we encourage you to help us identify key stakeholders (Fig. 3) and/or suggest companies or individuals we should connect with as we continue to develop the Harvest for Health program. As conveners, FFAR hopes to further refine the ‘straw man’ diagrams (Figs. 2 & 3) through informed discussions with various groups spanning the private and public sector to establish a global collaborative in this area. By leveraging the collective knowledge of the various stakeholders, FFAR will continue to build unique public-private partnerships and explore new opportunities for collaboration that de-risks individual investments and maximize the impact of our programs.

HARVEST FOR HEALTH FROM DISCOVERY TO MARKET

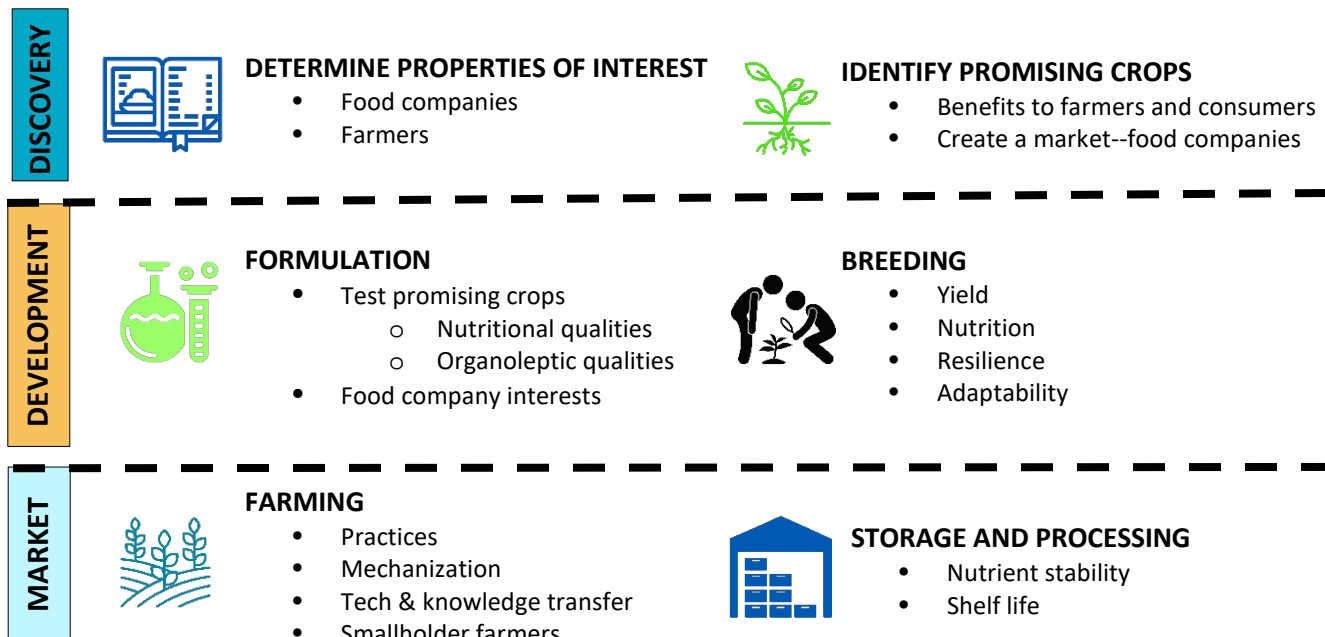


Fig. 2. Proposed 'Discovery to Market' pipeline for FFAR's Harvest for Health initiative.

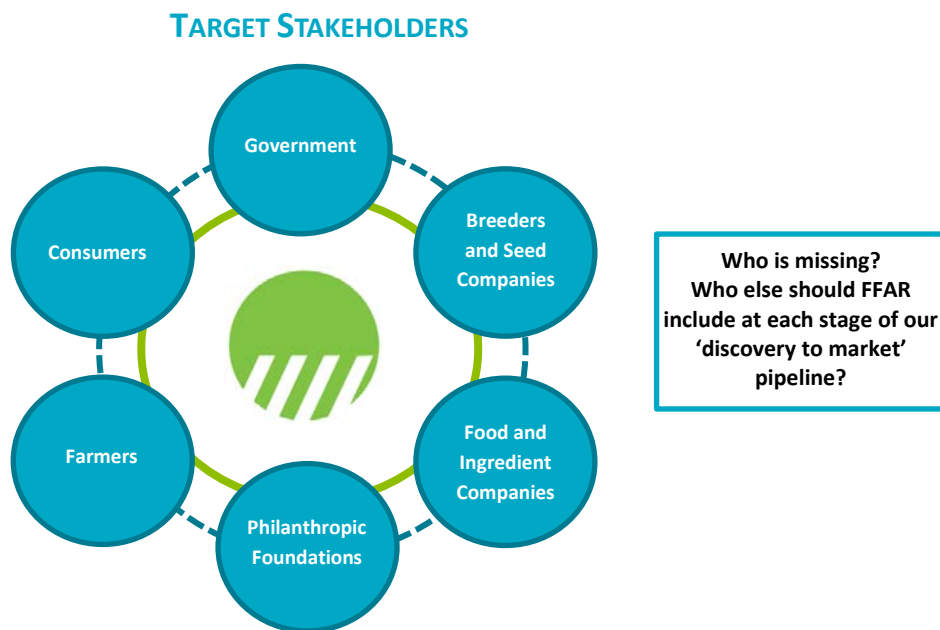


Fig. 3. Target stakeholders for the Harvest for Health initiative.

Next Steps

Recommendations from this convening event will help inform FFAR research priorities in the Health-Agriculture Nexus Challenge Area, including the development of future funding opportunities at FFAR that may take the shape of requests for applications (RFAs), prize competitions, and/or direct-funding to achieve FFAR's research objectives. At this time, FFAR seeks to launch a global collaborative research effort under the Harvest for Health initiative that will promote the introduction of underutilized nutritious crops of interest to food companies that have the potential to improve diets through the reformulation of the existing or introduction of new foods.



Join the Conversation!

FFAR looks forward to continuing to build strong public-private partnerships within the agriculture community and welcomes your input. Please feel free to contact us at science@foundationfar.org to learn how you can engage with FFAR in the Health-Agriculture Nexus Challenge Area.

Submit your comments, questions, and suggestions or tell us about your research [here](#).

To stay up to date on future funding opportunities, please join the Health-Agriculture Nexus mailing list:

<http://bitly.com/ffarnews>

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Many thanks to the Steering Committee members for their hard work and support of this event!

Steering Committee for the Harvest for Health Convening Event

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