J-WAFS Abdul Latif Jameel World Water and Food Security Lab

J-WAFS Food & Water News

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J-WAFS Project Update

Notes from a research trip

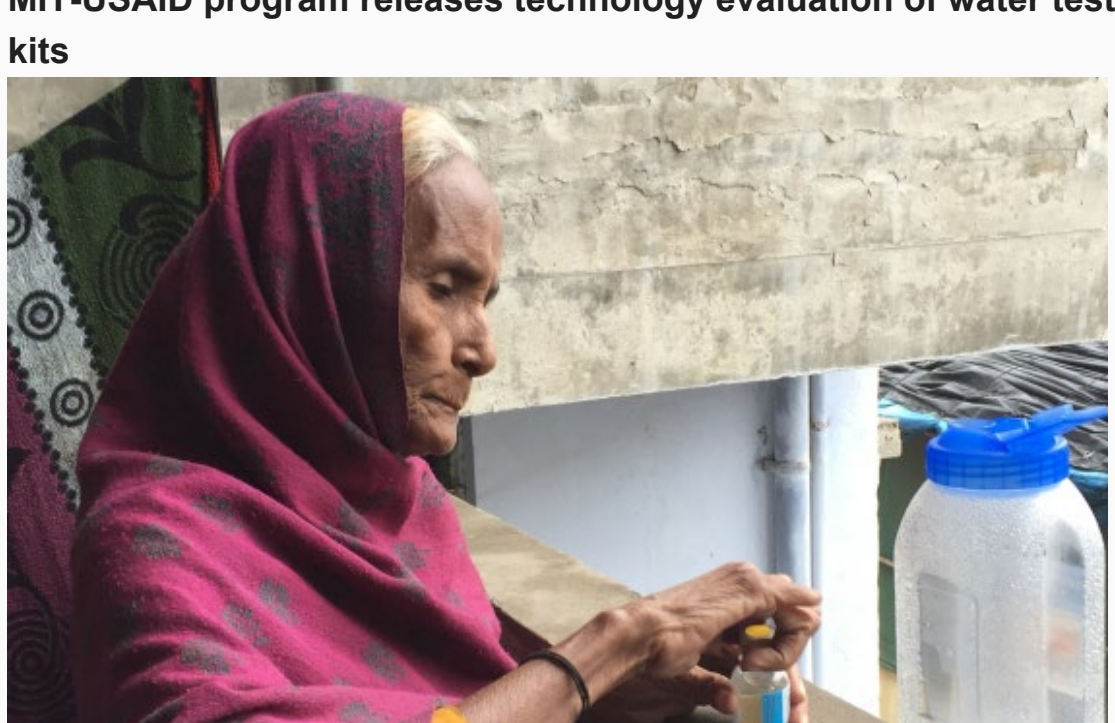
The J-WAFS-funded research project "Leverage Points: Opportunities for Increasing Food Production in Developing Countries," supervised by Dennis McLaughlin, H.M. King Bhumibol Professor in the Department of Civil and Environmental Engineering, and Erica James, associate professor of anthropology, has recently connected with the International Crops Research Institute for Semi-Arid Tropics (ICRISAT), as part of its investigation into how to close agricultural yield gaps. Though this connection, hydrological researcher Anjuli Jain Figueroa had the opportunity to travel to ICRISAT's headquarters in Hyderabad, India, and learn, firsthand, about the challenges and successes that ICRISAT (and India more generally) has had in closing agricultural yield gaps.

Figueroa visited the farming villages of Bhanur and Kothapally, where she spoke with farmers, hydrologists, soil scientists, crop modelers, crop breeders, and economists, all of whom elucidated the issues surrounding low crop yield and presented solutions for improving them. For example, despite being water intensive and less nutritious than other grains, rice is increasingly being grown in India. According to Figueroa, this is due to the crop's lower labor intensity and its place in the culture–biryani, a mixed rice dish, is a popular delicacy.

A full report of the research visit will be available on the J-WAFS website next week.

News

MIT-USAID program releases technology evaluation of water test kits



The Comprehensive Initiative on Technology Evaluation (CITE) has recently issued a new report, "Streamlining a Methodology for Product Evaluation: Water Test Kits in India," evaluating water test kits in Ahmedabad, India, where water-testing technologies are widely used by local governments and nonprofits, but are not yet available at the household level. Key findings of the report concluded that participants who saw a demo of recommended use were nearly 70% more likely to use the test correctly than those who were just read the instructions, and that the cost of the test was acceptable to low-income survey participants. While these test kits are not currently available in retail outlets, the CITE study indicates the viability of a consumer-targeted version of the technology. For the full story, read the MIT News article.

Upcoming MIT Events

J-WAFS/CEE Water and Food Security Seminar Series

Presented by Chandra A. Madramootoo (visiting professor, Department of Civil and Environmental Engineering (CEE), and visiting scholar, J-WAFS), the purpose of this seminar series is to provide senior undergraduate and graduate students in CEE, as well as other MIT graduate students, with a background on some of the challenges of global food security, particularly in relation to issues around water management engineering and agro-ecologic conditions. The seminars will be held from noon-1pm, with a concluding student research symposium and reception on Thursday afternoon, Nov. 17. An overview of each seminar is below, and full information including times and rooms can be found here.

- **Thursday, Sept 8:** Water Management for Food Security: Objectives of Water Management in Agriculture
  - Topics to be covered include: global food security status, agro-climatic variations, food production systems, land productivity, managing water surplus and deficits, water management engineering in agriculture.
- **Monday, Sept 12:** Improving Water Productivity in Irrigated Agriculture
  - Topics to be covered include: soil water management, crop water productivity, productivity of irrigated basins, irrigation systems and networks, challenges to on-farm water management, water conservation technologies, precision irrigation.
- **Tuesday, Sept. 13:** Drainage Water Management
  - Topics to be covered include: drainage and flood control, subsurface drainage, water table management and sub-irrigation, drainage water quality, salinity, drainage water reuse.
- **Wednesday, Oct. 5:** Water and Food Production Challenges in the Semi-arid Tropics ("SAT")
  - Topics to be covered include: environmental and socio-economic conditions of the SAT, limitations to water and food production, impacts of climate change, managing soil and water in the SAT, dryland cropping systems.
- **Friday, Oct. 7:** Strengthening Value Chains in Irrigated Agriculture
  - Topics to be covered include: inclusive market-oriented development, cold chains, digital agriculture, seed technology, financial inclusiveness.
- **Thursday, Nov. 17:** CEE/J-WAFS Water and Food Security Student Symposium
  - Graduate students from various programs at MIT will present their research in water and food security, and the audience will have an opportunity to ask questions and provide inputs to enhancing the water and food security research agenda at MIT. A reception will follow.

MITWATER
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MIT Water Club End-of-Summer BBQ

When: Sept. 22, 4:00-6:00pm
Where: Kresge BBQ Pits - Located between Kresge Auditorium (W16) and Amherst Street

The annual MIT Water Club End-of-Summer BBQ brings the MIT and Boston water communities together to network, meet new friends and colleagues, and enjoy tasty grillables in close proximity to our own Charles River. This will serve as a kick-off event to introduce the club and its activities to new undergraduates and graduates!

Legatum Center Open House

When: Sept. 13, 4:00-7:00pm
Where: Legatum Center - 1 Broadway, 12th Floor, Cambridge, MA 02142

The Legatum Center for Development and Entrepreneurship is coordinating an open house for MIT students to learn more about campus resources that support opportunities for engagin in entrepreneurship throughout the world. This event is part of the week long "t=0," MIT's campus-wide celebration of entrepreneurship and innovation. J-WAFS, the MIT Water Club, and the MIT Food and Agriculture Club will have representatives at the September 13 open house hosted by the Legatum Center.

MIT IDEAS Generator Dinner

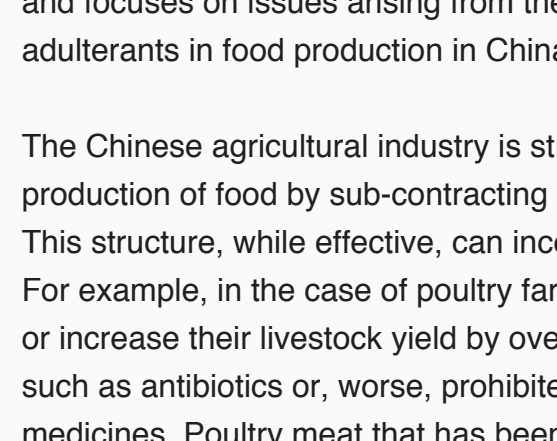
When: Oct. 6, 6:45-9:00pm
Where: Morss Hall, Walker Memorial - 142 Memorial Drive, Cambridge, MA 02142

Each fall, the Generator Dinner is a space for students who are interested in innovation, social entrepreneurship, international development, and local public service to come together to brainstorm projects, network, and recruit team members. The first 45 minutes of the dinner will consist of an information fair about additional relevant resources across campus that might support students' projects. Networking tables will be available for the following thematic areas: Health/Medical; Education; Energy & Environment; Entrepreneurship & Finance; Water & Sanitation; Agriculture & Food; Housing & Transportation; Emergency/Disaster Relief; Mobile & Communications; plus more. RSVP and event details are available on Eventbrite.

J-WAFS Highlight

Food Safety

The Center for Disease Control (CDC) estimates that, annually, one in six Americans, approximately 53.3 million people suffer sickness due to a food-borne illness. Of that number, more than 300,000 are hospitalized for food-related illnesses, and more than 5,000 of those hospitalized people die. And that rate is for a well-developed nation; food safety risk is substantially greater in many other parts of the world. Poor sanitation, contamination from environmental pollution (e.g., mercury in rice in China), chemical exposures from agricultural practices such as pesticide application or antibiotics-treated livestock, allergens, and intentional, economically-motivated adulteration (e.g., intentionally adulterating milk with melamine) all are situations that increase the risk of food-borne illness. And due to the globalization of commerce, the increased risk of food safety in less developed and regulated countries affects even well developed, highly regulated countries such as the US.



Consequently, food safety has emerged as an important research area. Numerous researchers and laboratories affiliated with various departments at MIT are working on projects to minimize these risks and their hazardous effects, and this is emerging as an important focus for J-WAFS. One J-WAFS-funded project in particular is "A Bioassay-Based Approach to Food Safety In China," led by Anthony Sinskey, professor of microbiology and health science & technology and Stacy Springs, director of the MIT Center for Biomedical Innovation. Their project considers food safety as an element of food security and focuses on issues arising from the deliberate misuse and abuse of adulterants in food production in China.

The Chinese agricultural industry is structured in a way that achieves mass production of food by sub-contracting to small farms and aggregating the yield. This structure, while effective, can incentivize certain farmers to behave riskily. For example, in the case of poultry farming farmers may be inclined to ensure or increase their livestock yield by overusing or misusing veterinary drugs such as antibiotics or, worse, prohibited substances like Chinese traditional medicines. Poultry meat that has been inappropriately treated with such substances may then be toxic, particularly from random and inappropriate combinations of such substances. Such was the case in 2014 with certain Chinese-made chicken jerky dog treats, whose consumption was linked to 5,000 cases of severe illness in pets, including renal failure and death. Due to weak regulatory oversight of these small-farmer supply chains, such risky practices and other cases of food fraud go unpunished and unprevented.

The Sinskey-Springs team intends to change that, though. The researchers are developing a robust bioassay for toxicity related to likely impurities in meat. Dr. Springs says that testing for adulterants can be difficult because "How do you know when something is contaminated, especially when you don't always know what you're looking for?" Working with Vishal Vaidya, associate professor at the Harvard Medical School, they are developing a bioassay approach based on evidence of toxicity rather than the current approach of testing for the presence of specific toxins. This novel approach would fundamentally transform our ability to identify harmful foods by measuring the biological effects of tainted foods rather than testing for one or a few likely toxicants at a time.

The aim is to improve food quality control in insufficiently regulated areas such as the Chinese poultry industry. Indeed, the research team believes that this work could serve as the basis for a new holistic regulatory approach that accounts for the polypharmacy that is frequently used in livestock farming. And such an improvement to food safety would mean a drastic reduction in hospitalizations for food-borne illness.

Professor Sinskey is also collaborating with Michael Strano, Carbon P. Dubbs Professor of Chemical Engineering, on another J-WAFS-funded technology project, a multiplexed contaminant detection platform (MCDP). Employing a portable, carbon nanotube-based sensor, the technology that they are developing would be capable of detecting a wide range of pathogens, antibiotics, and other contaminants. Charley Swofford, postdoctoral associate in the Sinskey Lab, explains that samples taken from, say, poultry would be placed on the MCDP's chip and, if contaminated, will react to the chip and produce an observable fluorescent shift. The impressive thing about the MCDP, Swofford adds, is that "this happens in a matter of minutes versus days," which reduces the risk of contaminated food moving along the supply chain and possibly harming people or animals. The project, "A Multiplex, Nanosensor Platform for the Real Time Monitoring of Food and Water-Borne Contaminants," is funded by a commercialization grant from the J-WAFS Solutions program.

In the October J-WAFS newsletter, look for a highlight of another J-WAFS-funded food safety project!

Funding and Other Opportunities

Dupont Summit 2016

The annual call for papers for this year's Dupont Summit on Science, Technology, and Environmental Policy is currently open. The goal of the Dupont Summit is to promote multidisciplinary conversation and networking across the social and political spectrum about pressing issues related to science, technology, and the environment. In order to submit a paper for consideration, please send a 1-2 page abstract to PSO Executive Director Daniel Gutierrez at dgutierrezs@ipsonet.org, or call (202) 349-9282. The early consideration deadline is September 15. Proposals submitted by the early deadline will be given priority.

BIG Pitch Collegiate Innovation Competition

BIG Pitch Collegiate Innovation Competition, presented by Ocean Exchange, will award a $10,000 cash prize to undergraduate and graduate innovations that improve economies, health, and the environment, fitting under the theme of sustainability. Ocean Exchange is an international platform for accelerating sustainable solutions. The deadline for final registration is September 30. For more info and to apply, visit OceanExchange.org.

The Lemelson-MIT Student Prize

The Lemelson-MIT Student Prize, a nationwide search for the most inventive students, is seeking applicants for 2017. The invention competition is open to teams of undergraduate students and individual graduate students nationwide across four categories, including "Eat it!", for students with food and agriculture inventions. Winners will receive $15,000 to each winning graduate student, $10,000 to each winning undergraduate team, national media exposure, and access to investment and business communities. For details on how to apply, visit Lemelson.MIT.edu. Applications are due September 30.

The Securing Water for Food: A Grand Challenge for Development

Launched in 2013, Securing Water for Food aims to increase access to innovations that help farmers enhance water storage, produce more food with less water, and improve the use of saline water and soils to produce food. The Challenge also seeks innovations that prioritize the engagement of women and encourages high quality applications, especially from women-owned/women-led enterprises and developing country entrepreneurs. Awardees will receive between $100,000 and $2 million in funding and acceleration support to bring their innovations to scale. To learn more about the round 4 Securing Water for Food call for innovations and to apply, visit www.securingwaterforfood.org/apply. The application deadline is October 10.

BARD Funding Opportunities

The US-Israel Binational Agricultural Research and Development Fund is offering a few agriculture-related funding opportunities The individual opportunities are detailed below. More information and the application guidelines can be found at Bard-isus.com.

- **BARD Research Grant Program Award** *Duration: 3 years. Submission date: Sept. 14.*
  - Funds projects conducted cooperatively by US and Israeli scientists. Covers all phases of agricultural R&D including strategic or applied research.
- **Postdoctoral Fellowship Program Award** *Duration: 1-2 years. Submission date: Jan. 16.*
  - Funds postdoctoral fellowships for US citizens to perform agricultural research with established Israeli scientists. Recipients travel to Israel to carry out their research.
- **Senior Research Fellowship Program Award** *Duration: 2-12 months. Submission date: Jan. 16.*
  - The program promotes joint agricultural research between established scientists from the US and their Israeli hosts.
- **Graduate Fellowship Student Program Award** *Duration: 3-6 months. Submission date: Jan. 16.*
  - The program enables PhD students in one country (US or Israel) to travel to the other country to acquire new skills and techniques in their field of study.
- **Workshop Award** *Submission date: Jan 16.*
  - Funds workshops whose purpose is to indentify research needs and to promote increased contact between scientists throughout the world in areas related to the binational and agricultural interests of the US and Israel.

The Advanced Environmental Solutions Prize

The Eni Award Scientific Secretariat announces the Advanced Environmental Solutions Prize. The purpose of the Advanced Environmental Solutions Prize is to promote technological innovation for pollution prevention and action against air, water and land pollution, as well as for rehabilitation and reuse of industrial sites. The Prize–a specially struck gold medal of the Italian State Mint in the indivisible sum of €200,000–is awarded to the researcher or group of scientists that achieves internationally significant research and development results in the field of environmental protection and recovery. (There are also prizes in a few energy categories.) The awards are due on November 25, with the last day to register for an account with the Scientific Secretariat on November 11. For more information, click here.

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