

LINCOLN—Much of the scientific and technical knowledge needed to address the world's burgeoning food needs already exists. The challenge now is to get it into small farmers' hands in a way they can use it, and to convince governments to change policies to make it more feasible for them to do so.

That's one of the themes emerging as the fifth annual global Water for Food Conference opened at the Cornhusker Marriott Hotel Monday (May 6). The fifth annual conference is hosted by the Robert B. Daugherty Water for Food Institute at the University of Nebraska and the Bill & Melinda Gates Foundation.

Experts opened the conference Monday morning in a panel discussion that focused on their efforts to translate research into action in Asia, Central America and Sub-Saharan Africa, areas where increasing food production is essential to feeding a world population expected to reach 9 billion by 2050. Jeff Raikes, CEO of the Gates foundation and a native Nebraskan, said "smallholder farmers" trying to scratch out a living on 5 to 10 acres represent "a lot of the food production" in the world.

"Helping these farming families increase production in a sustainable way and sell more crops is the most effective way" to deal with the looming challenge, said Raikes, who moderated the opening panel discussion. Raikes said "participatory research" needs to reflect the farmers' concerns rather than simply presenting scientific findings and expecting farmers to adopt recommendations.

Paul Hicks, a water resources specialist with Catholic Relief Services' Global Water Initiative, said, "We need to start where the farmer is and really understand the context they're working in." His organization has worked to bridge the gap between research institutions and these farmers.

Aditi Mukherji, a water and air leader with the Nepal-based International Centre for Integrated Mountain Development, said scientists traditionally have been eager to share their expertise rather than first finding out what farmers really need.

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In that light, Hicks said, it's key that scientists working with farmers accomplish some "early recognizable results," however modest.

"Most of the solutions that are needed are known ...," Hicks said, "but there hasn't been consensus" among farmers or policymakers on how to implement them.

His organization has brought together policymakers, scientists and development specialists to assess the programs implemented by governments and NGOs over the last 15 years to see what's worked and what hasn't, with an eye toward improving future policies.

Mukherji said her organization's experience is encouraging. In her native West Bengal, research findings have influenced government changes in groundwater policy aimed at improving food production. Now, she said, she and others are focused on making sure those policy changes lead to changes in farmers' behavior.

Benedito Braga, president of the World Water Council, also emphasized a need for improved policies. He noted a "silent revolution" has been underway in increased use of groundwater for irrigation, but it's happened without regulation, threatening long-term water security in some regions.

Braga warned that riots in 37 countries in 2007-08 sparked by food shortages and high prices could "be harbingers of a crisis to come."

Improved crop breeding is essential too, said Sally Mackenzie, the Ralph and Alice Raikes Chair of Plant Sciences at University of Nebraska-Lincoln.

Mackenzie's team is studying the previously untapped field of epigenetic modification of crops to make them more productive and less susceptible to hostile environments. Her work leaves the genes themselves unchanged but focuses on how genes express themselves with an eye toward ultimately manipulating those expressions to improve crops.

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Illustrating the significance of epigenetics, she noted that humans and chimps share 98 percent of their genetic information.

“What we’ve learned from that, other than humility, is that what really differentiates us is not our genes but how we express them,” Mackenzie said.

Findings so far, with both nonfood and food crops, are encouraging in producing plants with improved biomass, vigor, stress resistance and seed production—all without changing their genetic structure, she said.

“We have not been capturing all the breeding potential that we can” without an understanding of epigenetics, Mackenzie said.

Mackenzie is part of the National Plant Science Initiative that will send a report soon to the president and Congress that offers advice on how best to meet the food challenges ahead.

The conference, whose theme is “Too Hot, Too Wet, Too Dry: Building Resilient Agroecosystems,” is expected to draw nearly 500 experts from around the world working to overcome the urgent challenge of growing more food with less water. It is sponsored by Monsanto.