



Improving Agricultural Research Funding, Structure and Collaboration

A Policy Paper by
Global Harvest Initiative

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This is the first of a series of five papers outlining the policy priorities of the Global Harvest Initiative, a partnership united under the common goal of addressing hunger and food insecurity by sustainably closing the global agricultural productivity gap.

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Improving Agricultural Research Funding, Structure and Collaboration

Removing Barriers to Global and Regional Trade in Agriculture

Strengthening and Streamlining Development Assistance Programs

Embracing Science-Based Technologies

Enhancing Private Sector Involvement in Agriculture and Rural Infrastructure Development

In the next 50 years, agriculture will be called upon to produce more food than in the previous 10,000 years combined with little or no increase in the amounts of arable land, water or resources available. The efficiencies and increased productivity necessary to meet these agricultural challenges cannot be achieved without a renewed focus on research.

Enhanced research, including more funding and better managed programs and competitive research funding, is a primary source of the needed innovation and productivity gains to grow more and better food and help alleviate global poverty and hunger. The 2008 global food price spike helped refocus attention on the role of agriculture in the development agenda, and hopefully to a recommitment of support for global agricultural research.

In the following paper, the Global Harvest Initiative outlines the importance of agricultural research and puts forth recommendations to improve funding, structure and collaboration to better leverage the potential of research in increasing global agricultural productivity.

FUNDING

The US Department of Agriculture estimates that every dollar spent on agricultural research generates 20 dollars for the broader US economy.¹ Yet today, support for basic food and agricultural research is woefully inadequate and on the decline. Considering that life revolves around food and how it is grown, the deteriorating state of agriculture research comes at a time when the surging global population coupled with new demands on food crops leaves the global community and policy leaders in a precarious state. Adequately addressing key research priorities will require significantly more resources.

It is with considerable trepidation that one would recommend an increase in public expenditure in today's fiscal climate. However, the US Department of Agriculture's research is the "seed" for the entire industry globally, and all efforts must be made to fully fund these important research programs. Funding today's research programs will result in meeting the food production demands in the coming decades.

For US domestic research expenditures, the relative priorities of public funding for research and development provide an interesting perspective. Today, the National Institute of Health (NIH) invests \$15 to every \$1 invested by the US Department of Agriculture (USDA) for research and development. For competitively awarded, peer-reviewed grants—which many suggest attract the best scientists and the best science—NIH outspends USDA 170 to 1. The situation is similar for the National Science Foundation (NSF).² When considering monies for Federal research, some experts suggest that additional funding for agricultural research could yield larger global benefits than other research areas.

¹ USDA: "Why Science Matters to Agriculture", Dr. Catharine Woteki, PCAST, January 7, 2011. <http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-woteki-1-7-2011.pdf>

² The NIH's budget is over \$31 billion per year. The NSF's budget is over \$7 billion.

USDA's research budget primarily funds two agencies—the Agricultural Research Service (ARS), and the newly formed National Institute for Food and Agriculture (NIFA). NIFA includes funding for State Agriculture Experiment Stations and the State Cooperative Extension System, and the Land Grant Universities and Colleges and other research and education institutions. NIFA also includes the Agriculture and Food Research Initiative (AFRI), which focuses exclusively on competitive grants.³

USDA research and development funding continues to lag significantly behind other federal departments and agencies. As an example, in terms of percent change from current FY 2010 spending levels, the Administration proposed changes for 2012 that would result in research and development investment increases at NIH (3.4 percent), DOE (19.9 percent), NASA (6.0 percent), NSF (16.1 percent), while USDA was decreased by 17.7 percent.⁴ This comes after USDA research was excluded from the American Recovery and Reinvestment Act, which included a massive one-time, \$10 billion stimulus infusion for the National Institutes of Health and its \$30 billion annual budget, and a \$3 billion increase on top of the \$6.8 billion budget for the NSF.⁵

Adequately addressing key research priorities will require significantly more resources. Some analysis suggests that increases on the order of \$700 million beginning for FY 2012 for the AFRI budget, and a doubling of the NIFA budget within five years with the ARS budget (reaching \$2 billion by FY 2015) would be sufficient.

Considering that the USDA received more than \$4 billion in competitive research grant proposals in 2010, there is clearly demand for the \$300 million that AFRI offers annually for competitive grants.

STRUCTURE

Broad research priority areas should be established, such as for more efficient water use, genome mapping of various crops, enhanced nutritional and health benefits of food, and reduction of post-harvest losses.

Preservation of Earth's most precious and highly valued resource—water—is paramount, and production agriculture today utilizes 70 percent of the world's fresh water supplies. To feed the world by 2020, agriculture will need 17 percent more water than the amount currently available. Water will almost certainly be the most constraining natural resource in meeting future food needs. This highlights the importance of genome mapping to develop crops that are drought-tolerant and able to produce higher yields with less water, along with crops with greater disease resistance. Focus will also need to be placed on heat and salinity resistant

³ Funding for ARS is near \$1.2 billion. Funding for NIFA is near \$1.5 billion, of which \$300 million is for AFRI.

⁴ American Association for the Advancement of Science, R&D in the FY 2011 and FY 2012 Budgets By Agency: <http://www.aaas.org/spp/rd/fy2012/currentFundingTable.pdf>

⁵ Even new legislation like the America COMPETES Act, which is due for Congressional reauthorization in 2011, overlooked USDA science when it was signed into law in 2007.

crops, as well as more efficient nutrient use to expand the possibilities for agricultural activity. Today only about 17 percent of arable land is irrigated, yet it provides roughly 40 percent of total output. To obtain higher yields pressure will increase to expand irrigation, and we must develop more efficient irrigation and water use systems, as well as better use of water in processing and distribution.

Expanding food volume output may not be the only promising approach to meeting the challenge. For example, increasing the nutritional value of foods through biofortification could be a significant step towards alleviating nutritional deficiencies in many parts of the world. Another challenge that could be immediately addressed is elimination of the roughly 30 percent of the entire food output that is lost each year to spoilage, waste and contamination. Today, perhaps only about 5 percent of agricultural research funding is directed to addressing such post-harvest losses.

With public input USDA should prioritize research funding to ensure that it is directed to areas that will yield the largest return on investment.

Private sector research is critical and substantial—GHI’s four founding member companies alone collectively spend \$10 million on research every day—yet private sector research investments must be complemented by public sector research investments to spur the necessary innovation and bridge the agricultural productivity gap.⁶ To put US agriculture research and development expenditures in perspective, in 2006 private sector funding was \$2.8 billion, federal funding was \$3 billion, and state and private funding for state experiment stations was \$2 billion.⁷ Public sector investments can serve a critical role in promoting innovation in specific areas where the private sector cannot justify the investment, such as important basic research that may yield benefits only in the longer-term. Dr. Keith Fuglie, Chief of the Resource, Environmental, and Science Policy Branch in the Resource and Rural Economics Division, Economic Research Service, USDA, and co-author of GHI’s Global Agricultural Productivity Report™⁸, noted in a 2004 report by the USDA’s Research, Education and Economic Task Force:

“Briefly, private R&D is commercially oriented. Companies, which must hold down costs, concentrate R&D funds on research that is likely to result in sales and profits, preferably on research that will lead to intellectual property that can be protected by patents. They are little interested in research that will benefit their competitors. For

⁶ CAST Commentary, March 2011: “Although the private sector invests in large amounts of R&D that lead to innovations that help raise agricultural productivity and improve the quality of life, that sector focuses primarily on areas that have significant profit opportunities, meaning a market with strong intellectual property rights and regulatory systems in place. Organized research to sustain increases in agricultural productivity in the United States and elsewhere is a large and complex enterprise, and the private sector faces weak incentives to undertake research in numerous areas.” Click the link below and go to page 9 for a list of examples of why public agricultural research is needed. <http://www.cast-science.org/websiteuploads/File/Ag%20Research%20final%20QTA2011-1%281%29.pdf>

⁷ USDA: <http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-woteki-1-7-2011.pdf>

⁸ The Global Harvest Initiative, “The Global Agricultural Productivity Report™,” October, 2010. <http://www.globalharvestinitiative.org/GAP.htm>

example, more than 40 percent of private agricultural R&D budgets is invested in product development, compared with less than 7 percent in public agricultural research. (AER-735).⁹

Competitive research funding has also proven to provide high societal returns on investment, and a greater focus should be placed on promoting competitive research funding on a global scale.

Governments in developing countries are urged to give greater attention to agricultural research, adaptation of research to their respective local and regional agricultural needs, and extension of the results to their farmers.

Such research agendas must be designed to maximize cost savings by promoting greater coordination and sharing of research results on a geographic basis, which will allow scarce funds to more rapidly address urgent needs in a particular country or region.

COLLABORATION

Steps must be taken to improve global sharing of basic research results.

Great strides can be made towards closing the global productivity gap simply by ensuring that the knowledge, innovation and technologies resulting from research are shared globally.

To meet agricultural research needs, coordinated approaches like the Consultative Group on International Agricultural Research (CGIAR) are beneficial,¹⁰ and estimates suggest that for every \$1 invested in CGIAR research, \$9 worth of additional food is produced in developing countries where it is needed most. CGIAR's partnership of donors includes developing and industrialized countries, international and regional organizations and private foundations. The donations support 15 international centers that work in collaboration with governments, civil society organizations and private foundations worldwide to improve human health and nutrition, reduce poverty and hunger, and increase ecosystem resilience through agricultural research. The new crop varieties, knowledge and other products resulting from CGIAR's research are made widely available to individuals and other organizations working for sustainable agricultural development worldwide.

To further support research collaboration, GHI has worked with the Farm Foundation and Economic Research Service of the USDA to launch the GAP Network, an online community for agricultural professionals and experts to share information with regards to measures that increase the rate of growth in global agricultural productivity.¹¹

CONCLUSION

⁹ National Institute for Food and Agriculture: <http://www.ars.usda.gov/sp2userfiles/place/00000000/national.doc>

¹⁰ CGIAR expenditures amounted to US \$572 million in 2009, the single largest investment made to mobilize science for the benefit of the rural poor worldwide.

¹¹ GAP Network: <http://www.agproductivity.net>

Considering that 50 percent more agricultural output must be available by 2030, there is no time to waste in making research investments. The research process routinely requires more than 10 years from laboratory to field, and then more time is necessary for significant new technologies to be adopted. By ensuring that adequate funding is placed within the research structures that will provide the greatest return on investment, and by facilitating the sharing and collaboration to apply research in the field, notable progress can be made in closing the global agricultural productivity gap.

SELECTED RESOURCES

Food and Agriculture Organization of the United Nations

<http://www.fao.org/>

US Department of Agriculture

<http://www.usda.gov/wps/portal/usda/usdahome>

USDA Economic Research Service

<http://www.ers.usda.gov/>

USDA Agricultural Research Service

<http://www.ars.usda.gov/main/main.htm>

Council for Agricultural Science and Technology

<http://www.cast-science.org/>

CAST Presentation – Dr. George Norton, Importance of Agricultural Research, March 2011

<http://www.cast-science.org/websiteuploads/File/AgResearch%20Norton%27s%20powerpoint.pdf>

USDA: “Why Science Matters to Agriculture”, Dr. Catharine Woteki, PCAST, January 7, 2011.

<http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-woteki-1-7-2011.pdf>

National Institute for Food and Agriculture

<http://www.csrees.usda.gov/>

Global Agricultural Productivity Network

<http://www.agproductivity.net>

The World Food Prize

<http://www.worldfoodprize.org/>

Consultative Group on International Agricultural Research

<http://www.cgiar.org/>

Farm Foundation

<http://www.farmfoundation.org/>

Dr. Jason Clay, World Wildlife Fund, “Agriculture from 2000 to 2050 – The Business as Usual Scenario” <http://www.globalharvestinitiative.org/Documents/Clay%20-%20Agriculture%20from%202000%20to%202050.pdf>

Dr. William C. Motes, Informa Economics, “Modern Agriculture and its Benefits: Trends, Implications and Outlook”, March 2010.

<http://www.globalharvestinitiative.org/Documents/Motes%20-%20Modern%20Agriculture%20and%20Its%20Benefits.pdf>

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<http://www.globalharvestinitiative.org/Documents/Farm%20Foundation%20Issue%20Report%202009.pdf>

The Economist, “Brazilian Agriculture: The miracle of the cerrado”, August 26, 2010.

<http://www.economist.com/node/16886442>

The Economist, “The 9 billion-people question – A special report on feeding the world”, February 26, 2011.

<http://www.economist.com/node/18200618>

The Bill & Melinda Gates Foundation

<http://www.gatesfoundation.org/Pages/home.aspx>

The Chicago Council on Global Affairs, Agriculture and Development Portal

http://www.thechicagocouncil.org/Files/Topics/Agriculture_and_Development/Files/Topics/Agriculture_and_Development.aspx

Field to Market: The Keystone Alliance for Sustainable Agriculture

<http://www.fieldtomarket.org/>

International Food Policy Research Institute

<http://www.ifpri.org/>

USDA Foreign Agricultural Service

<http://www.fas.usda.gov/>

World Economic Forum: The New Vision for Agriculture

https://members.weforum.org/documents/ip/CO/AFB/CO_New_Vision_for_Agriculture_Initiative_Overview.pdf

The Nature Conservancy

<http://www.nature.org/index.htm>

The Congressional Hunger Center

<http://www.hungercenter.org/>

The International Conservation Caucus Foundation (ICCF)

<http://www.iccfoundation.us/index.php>

Conservation International

<http://www.conservation.org/Pages/default.aspx>

"Imagining William Henry Hatch Today," Lecture by William H. Danforth, Chancellor Emeritus and Vice Chairman of the Board of Trustees of Washington University, St. Louis, MO, 2008.

http://www.csrees.usda.gov/about/speeches/08_henry_hatch.html

"Agricultural Research: Changing of the Guard, Guarding the Change", Lecture by Roger N. Beachy, Director, National Institute for Food and Agriculture, Washington DC, June 15, 2010.

<http://www.csrees.usda.gov/about/speeches/pdfs/061510Beachy%5B1%5D.pdf>

National Institute for Food and Agriculture, Report of the Research, Education and Economics Task Force of the United States Department of Agriculture, July 2004.

www.ars.usda.gov/sp2userfiles/place/00000000/national.doc

The World Bank Agriculture and Rural Development Portal

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTARD/0,,menuPK:336688~pagePK:149018~piPK:149093~theSitePK:336682,00.html>

Farm Foundation et al., Agriculture, Food, Nutrition and Natural Resources R&D Round Table Program Highlights, March 15, 2011.

Program Highlights: http://www.farmfoundation.org/news/articlefiles/1733-1pgHighlights_web.pdf

Webcast: <http://www.tvworldwide.com/events/farmfoundation/110315/>