

DUPONT ADVISORY COMMITTEE ON

# AGRICULTURAL INNOVATION & PRODUCTIVITY FOR THE 21ST CENTURY

REPORT AND RECOMMENDATIONS



DUPONT



# SUMMARY

The world is faced with the vast challenge of meeting ever-increasing food demands placed on the agriculture sector due to a rapidly growing population. In fact, the world population has been increasing by an estimated 78 million each year, about the size of the population of Germany.<sup>1</sup> Challenges around food security – ensuring there is enough food to meet demand – will be exacerbated when the population surpasses 9 billion by 2050 and 10 billion by the turn of the century.<sup>2</sup> Global food production must be 70 percent greater than today's level to close the deficit between supply and demand, commonly referred to as the productivity gap.<sup>3</sup> And, it must be done without using substantially more land. With current grain stocks at historically low levels and food demand increasing at rates higher than production, the challenge is not decades into the future, but is here today.

Populations continue to migrate from rural to urban areas at high rates; by 2050, approximately 70 percent of the world's population will live in cities and large towns (up from 49 percent today).<sup>4</sup> This means that the majority of the population will not live near where food is grown. Consumer preferences will also change as per capita incomes in developing countries rise, which will cause diets to gradually move away from staples towards increased consumption of meats and processed foods.<sup>5</sup> These demands become more complex when coupled with a scarcity of key resources, such as water and arable land, as well as climate change and other environmental challenges. In addition, as populations grow and age, there is a greater need for more nutritious food to ensure health and wellness.

This unique set of variables creates one of the most challenging issues the world has ever faced, and one that threatens the political and economic stability of nations around the world. The urgency of this challenge demands concerted efforts from all stakeholders, beginning now. The challenge is three-fold:

- **Produce more food and increase the nutritional value of food;**
- **Make food accessible and affordable for everyone; and**

• **Address the challenge in a continuously more sustainable and comprehensive way.**

To address these needs, a multi-faceted, innovative approach is required. Existing knowledge and practices, as well as new science and technology, must be disseminated to enable all farmers around the world to be successful. The challenge requires new types of investments, policy and regulatory structures, and creative collaborations among a variety of global and local partners, and between the public and private sectors.

The DuPont Advisory Committee on Agricultural Innovation & Productivity for the 21st Century (the "Committee") was established to address these issues and to prepare a report including recommendations for DuPont and global leaders in agriculture, policymakers and business leaders (the "Report"). DuPont is committed to addressing the food productivity gap and will evaluate the recommendations and respond with commitments that align with its key competency in using science to deliver innovation and its longstanding belief that collaboration is key to addressing the world's important challenges.

<sup>1</sup> United Nations Population Fund, *Fact Sheet: Population Growth and Poverty* (August 2009) available at <http://www.unfpa.org/public/home/factsheets/pid/3856>.

<sup>2</sup> Gillis, J. and Dugger, C. W., *U.N. Forecasts 10.1 Billion People by Century's End*, *N.Y. Times*, (May 3, 2011) available at <http://www.nytimes.com/2011/05/04/world/04population.html>; United Nations Press Release, *World Population to Reach 10 Billion by 2100 if Fertility in All Countries Converges to Replacement Level*, (May 3, 2011) available at <http://esa.un.org/unpd/wpp/index.htm>.

<sup>3</sup> Organization for Economic Co-Operation and Development (OECD) – Food and Agricultural Organization of the United Nations (FAO), *OECD-FAO Agricultural Outlook 2010-2019 – Highlights* (June 15, 2010) available at [http://www.oecd.org/document/10/0,3746,en\\_36774715\\_36775671\\_42852746\\_1\\_1\\_1\\_1,00&en-USS\\_01DBC.html](http://www.oecd.org/document/10/0,3746,en_36774715_36775671_42852746_1_1_1_1,00&en-USS_01DBC.html).

<sup>4</sup> *FAO, 2050: A Third More Mouths to Feed: Food Production Will Have to Increase by 70 percent - FAO Convenes High-Level Expert Forum* available at <http://www.fao.org/news/story/en/item/35571/>.

<sup>5</sup> OECD – FAO, *OECD-FAO Agricultural Outlook 2010-2019 – Highlights* (June 15, 2010) available at [http://www.oecd.org/document/10/0,3746,en\\_36774715\\_36775671\\_42852746\\_1\\_1\\_1\\_1,00&en-USS\\_01DBC.html](http://www.oecd.org/document/10/0,3746,en_36774715_36775671_42852746_1_1_1_1,00&en-USS_01DBC.html).

# BACKGROUND

## DUPONT ADVISORY COMMITTEE ON AGRICULTURAL INNOVATION & PRODUCTIVITY FOR THE 21ST CENTURY.

In 2010, DuPont responded to the global food security challenge by convening a group of experts in global agriculture, development, science, policy and economics to form the Committee. Over the course of a year, the Committee met several times, beginning with a listening tour with farmers in Iowa, and including a week-long meeting in Africa with a diverse group including farmers, non-governmental organizations (NGOs) and government leaders, among others. The Committee explored complex issues around meeting global food demand to provide recommendations on potential solutions, including how DuPont can play a unique and catalytic role in addressing the challenge ahead.

The Committee explored the issues through the lens of both the developed and developing world, with farmers as its focus. Specifically, the Committee examined issues of farmer productivity, including technology and innovation; capacity building; infrastructure needs; education; policy and regulatory challenges relating to markets and trade; intellectual property (IP); and environmental, economic and social sustainability.

The Committee commends the leadership, engagement and support of DuPont and its team during this process and looks forward to the company's more specific responses to these recommendations. Set forth below in this Report is a summary of the key issues and findings of the Committee, and its recommendations for the agricultural community.







# COMMITTEE ASSESSMENT

## FARMERS ARE CENTRAL

First and foremost, farmers should be at the center of creating sustainable food solutions. Large commercial farmers and smallholder farmers alike will be critical in providing global food security, although their contributions are likely to differ.

There are approximately 500 million smallholder farmers worldwide who are responsible for the livelihoods of more than 2 billion people and who produce an estimated 80 percent of the food consumed in Asia and Sub-Saharan Africa.<sup>6</sup> There is nearly a tenfold difference in cereal production between North America and Europe compared to Africa.<sup>7</sup> Consequently, even small improvements in productivity (from 1 to 3 tons/ha) can turn poor and struggling farmers into entrepreneurs, allowing them to better support their families, while also contributing to an increased food supply. At the same time, medium to large scale, mechanized farms will play an ever more important role in closing the food gap and ensuring that food and agricultural products can move from places where they can be optimally produced to places where consumption needs cannot be met through local production.

While there is no single solution to meeting global food challenges, farmers everywhere share a basic value that underpins economic and social growth – a desire to be productive and profitable in a sustainable way that accommodates the welfare of future generations. To that end, encouraging greater smallholder productivity requires a conducive environment, ranging from improved access to finance, markets, and agricultural inputs, to more secure land rights, modernized infrastructure, and stronger farmers' organizations. Farm-

ers will benefit from having access to, and making use of, tools and technologies that are best suited to their unique needs. All different types of farmers will be a vital part of the solution, and organizations, governments and companies should consider and enable creative business models that address the needs of all.

## A COMPREHENSIVE AND COLLABORATIVE APPROACH IS NECESSARY

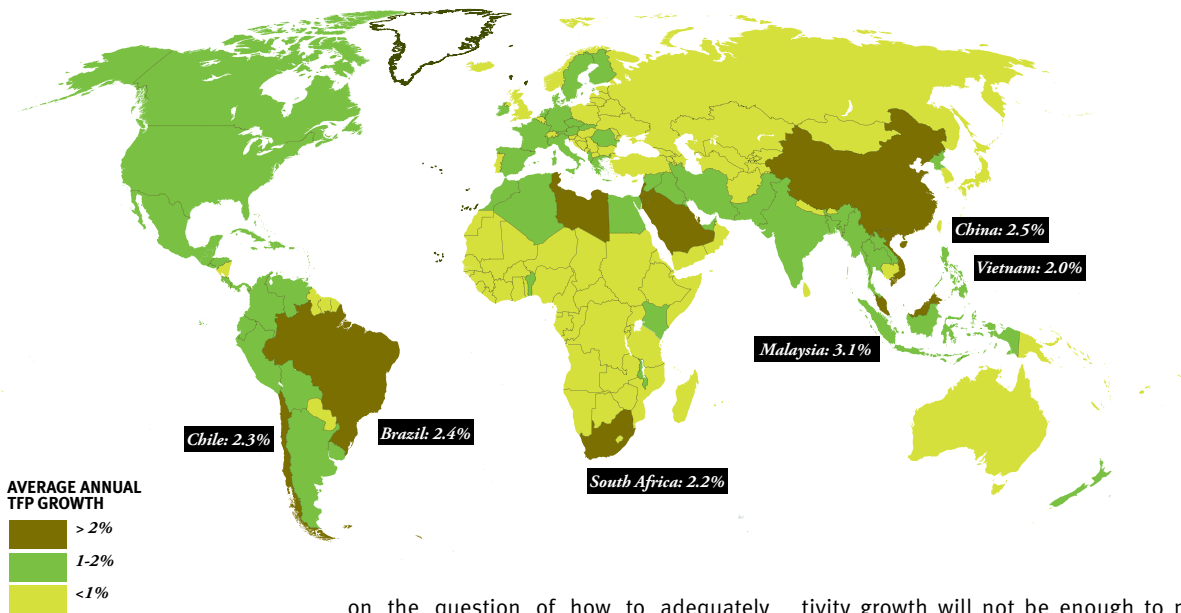
The global food challenge will require systemic improvement in science and innovation, education and collaboration, capacity and infrastructure, and policy and regulation. A comprehensive and collaborative approach to food security that improves seed and boosts yields, uses fertilizer wisely, addresses postharvest loss, increases nutrition, reduces waste, provides financing and credit, ensures access to markets, and improves infrastructure will be an absolute necessity. While this Committee is focused on crop productivity and innovation, it is also important to view food security more broadly to examine agriculture's other dimensions, including livestock, aquaculture, tree crops, and renewable energy. Anything less than a comprehensive approach simply will not meet the challenge.

A problem of this magnitude also requires an unprecedented level of cooperation between and leadership from private companies, governments, research entities, educational institutions, NGOs both inside and outside of the agriculture industry, and farmers around the world. Stakeholders can no longer work in what have become overly fragmented "silos." Keeping in mind there is no single solution, the Committee advises that stakeholders remain focused

<sup>6</sup> International Fund for Agricultural Development (IFAD), *Viewpoint: Smallholders Can Feed the World*.

<sup>7</sup> FAO, *Crop Prospects and Food Situation*, No. 2 (May 2010).

FIGURE 1. AVERAGE ANNUAL AGRICULTURAL TFP GROWTH RATES BY COUNTRY, 1970-2007



on the question of how to adequately raise productivity to meet the world's food needs, rather than get distracted by historic disputes, such as biotechnology versus traditional crop breeding, organic farming versus conventional farming, or food versus fuel production. In fact, the creation of non-traditional partnerships in the industry may yield the most innovative solutions. Similarly, efforts to support productivity abroad should not be perceived as weakening U.S. competitiveness.

### A THREE-PRONGED CHALLENGE Unleash Innovation to Produce More and Nutritionally Better Food

The increased demands placed on the agriculture sector make agricultural productivity growth a key priority. This requires closing the yield gap that currently exists among different regions, as well as moving the actual yield curve through innovative practices and technologies. According to the Global Harvest Initiative (GHI),<sup>8</sup> global agricultural productivity has grown at an average total factor productivity (TFP) of 1.4 percent per year between 2000 and 2007, with considerable variation in rates of productivity around the world (Figure 1).<sup>9</sup>

Global food demand will require that farmers everywhere have access to existing tools, knowledge and technology to be productive, but further innovations will also be crucial. Current rates of produc-

tivity growth will not be enough to meet the needs of a growing population in the coming decades, as gains in productivity growth have decreased in the last decade. To close the productivity gap and achieve food security, the current productivity rate will need to grow 25 percent faster than current trends over the next 40 years and even faster over the next two decades.<sup>10</sup> While technological advances of the past triggered impressive yield increases, which will be critical to meeting the productivity challenge, industry must proactively ensure that we achieve benefits from agriculture practices without unintended impacts on our environment and natural resources.

An exclusive focus on productivity is nevertheless not sufficient because increasing rates of malnutrition require not only more calories, but more nutritious food. The World Bank reports that roughly 3.5 million children under 5 years old die each year from causes related to undernutrition in developing countries.<sup>11</sup> And two-thirds of the undernourished live in seven countries – Bangladesh, China, the Democratic Republic of the Congo, Ethiopia, India, Indonesia and Pakistan – with over 40 percent in China and India alone.<sup>12</sup> Meanwhile, approximately 30 percent of Africa's almost 840 million people are undernourished.<sup>13</sup> As a result, finding solutions to improve the nutritional value of food will be as important as increasing productivity.

<sup>8</sup> The Global Harvest Initiative (GHI) is a partnership established in 2008 between the Archer Daniels Midland Company (ADM), DuPont, John Deere, and Monsanto whose mission is to eliminate the global productivity gap by doubling agricultural output in a sustainable manner.

<sup>9</sup> GHI, *The Global Harvest Initiative's 2010 GAP Report: Measuring Global Agricultural Productivity (2010)* available at <http://www.globalharvestinitiative.org/GAP.htm>.

<sup>10</sup> *Id.*

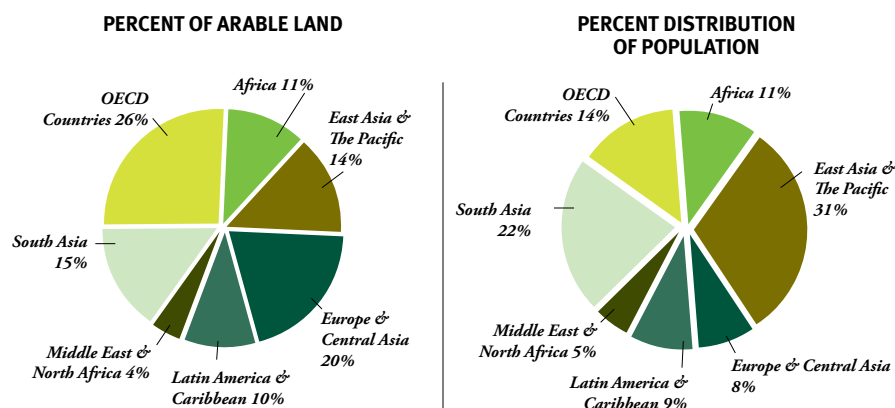
<sup>11</sup> *The World Bank, Food Security Fears Rise Along with Prices* (April 1, 2001) available at <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:22876592~pagePK:64257043~piPK:437376~theSitePK:4607,00.html>.

<sup>12</sup> *Id.*





FIGURE 2. DISTRIBUTION OF ARABLE LAND COMPARED TO DISTRIBUTION OF POPULATION



**Ensuring Access to Food** – In addition to concerted efforts to increase productivity and improve nutrition, we must ensure that food reaches all markets and all people. The U.N. predicts the population in Africa alone could more than triple in this century – from 1 billion to 3.6 billion.<sup>14</sup> Poverty is a key cause of insufficient access to food and must be addressed through economic development efforts and improved social safety nets. The world’s population is also distributed very differently than its arable land, which requires that food and agriculture products be able to move from places of surplus to places of deficit (Figure 2).<sup>15</sup> This requires efficient supply chains and a sound, rules-based international trading system. Farmers need improved access to local, regional and international markets. The supply chain of food and agricultural products requires improved infrastructure, storage, processing and distribution systems.

**All Efforts Should Improve Sustainability** – The challenge is not only to produce more and better food and to ensure that food reaches those who need it, but to also do so in a sustainable way. Finite resources and environmental concerns will mandate that investments be made in solutions that address ecosystem needs to arrest land degradation, reduce water consumption and eliminate deforestation. Any solutions that are proposed to address food security must also be socially and economically sustain-

able. As such, they must address unique local needs, such as property rights, education, extension services, and leadership training. Given that women play an important role as farmers in certain regions of the world, socially sustainable solutions will also require gender equality. Economically sustainable solutions must stand the test of time and spur private sector entrepreneurship. The private sector, working closely with government and civil society, has an important role in providing solutions.

### RISING TO THE CHALLENGE

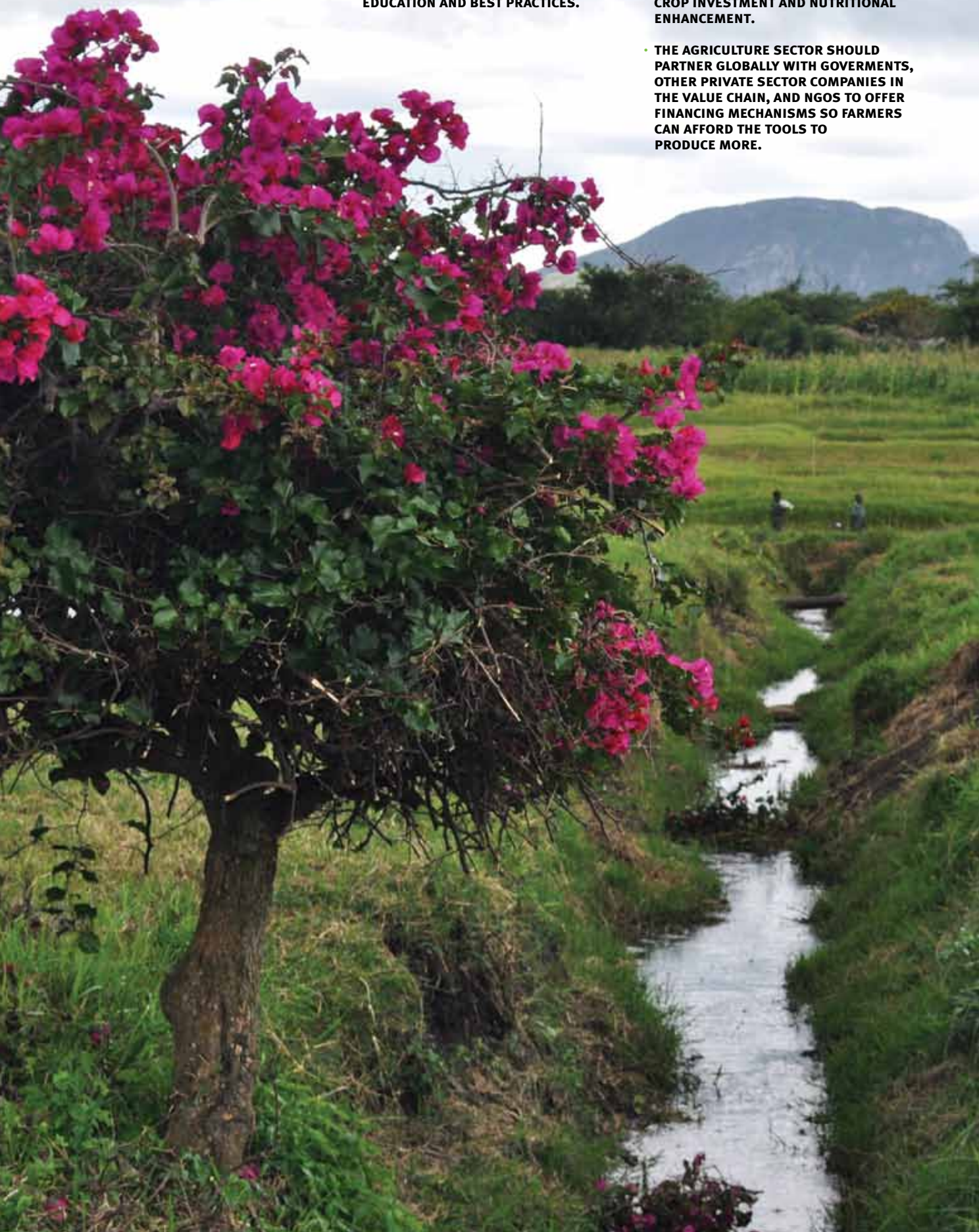
Farmers around the world, in partnership with all key stakeholders, can innovate to meet the world’s food needs. We must take an all-inclusive and collaborative approach that recognizes the benefits of existing technologies and practices, and supports new and innovative practices and technologies. Innovation will come not just from science and technology, but from creative synergies of technology and best practices, from nontraditional partnerships to develop new business models in emerging markets, and from solutions catalyzed by effectively balancing collaboration and competition.

<sup>13</sup> *Id.*

<sup>14</sup> Gillis, J. and Dugger, C. W., *U.N. Forecasts 10.1 Billion People by Century’s End*, *N. Y. Times*, (May 3, 2011) available at <http://www.nytimes.com/2011/05/04/world/04population.html>; United Nations Press Release, *World Population to Reach 10 Billion by 2100 if Fertility in All Countries Converges to Replacement Level*, (May 3, 2011) available at <http://esa.un.org/unpd/wpp/index.htm>.

<sup>15</sup> Data compiled from World Bank, *World Development Indicators* (2010).

- **ENABLE FARMERS EVERYWHERE TO BE MORE PRODUCTIVE.**
- **IMPROVE PRODUCTIVITY THROUGH INVESTMENT IN EXTENSION, EDUCATION AND BEST PRACTICES.**
- **INCREASE PUBLIC RESEARCH AND DEVELOPMENT FUNDING.**
- **PROMOTE PUBLIC AND PRIVATE COLLABORATION ON INDIGENOUS CROP INVESTMENT AND NUTRITIONAL ENHANCEMENT.**
- **THE AGRICULTURE SECTOR SHOULD PARTNER GLOBALLY WITH GOVERNMENTS, OTHER PRIVATE SECTOR COMPANIES IN THE VALUE CHAIN, AND NGOS TO OFFER FINANCING MECHANISMS SO FARMERS CAN AFFORD THE TOOLS TO PRODUCE MORE.**



- ENSURE THAT INTELLECTUAL PROPERTY RIGHTS, COMPETITION AND FARMER BENEFITS FROM INNOVATION GO HAND-IN-HAND.
- GOVERNMENTS SHOULD STRENGTHEN SOCIAL SAFETY NET PROGRAMS TO ENSURE THE MOST VULNERABLE HAVE ACCESS TO FOOD.
- GLOBAL INFRASTRUCTURE INVESTMENTS ARE NEEDED TO ENSURE MOVEMENT OF FOOD FROM AREAS OF SURPLUS TO AREAS OF DEFICIT. INVESTMENTS MUST ALSO BE MADE IN PROCESSING AND STORAGE FACILITIES TO PREVENT POSTHARVEST LOSS.
- INCREASES IN PRODUCTIVITY MUST BE COUPLED WITH ACCESS TO MARKETS, PARTICULARLY FOR SMALLHOLDER FARMERS. STAKEHOLDERS SHOULD FACILITATE AND INVEST IN MODELS THAT BETTER LINK SMALLHOLDERS TO THE GLOBAL VALUE CHAIN.
- THE PRIVATE SECTOR MUST WORK WITH GOVERNMENTS TO FOSTER A MORE OPEN AND EQUITABLE TRADING SYSTEM FOR FOOD AND AGRICULTURAL PRODUCTS.
- GOVERNMENTS AND POLICYMAKERS SHOULD RECONSIDER POLICIES ON SUBSIDIES AND EXAMINE ALTERNATIVE SAFETY NET POLICIES.
- ENSURE SCIENCE-BASED REGULATORY FRAMEWORKS AND REMOVE REGULATORY BARRIERS TO ACHIEVING FOOD SECURITY.
- ENVIRONMENTAL – INVESTMENT MUST BE MADE IN TECHNOLOGY AND BEST PRACTICES FOR CONTINUOUS IMPROVEMENT OF AGRICULTURE SUSTAINABILITY AND RESOURCE EFFICIENCY.
- SOCIAL - BOTH THE PUBLIC AND PRIVATE SECTOR SHOULD INVEST IN EDUCATION AND YOUTH DEVELOPMENT EFFORTS.
- ECONOMIC – GOVERNMENTS SHOULD TAKE STEPS TO REDUCE RISK AND CREATE INCENTIVES FOR PRIVATE SECTOR INVESTMENTS. COMPANIES SHOULD CONSIDER INCREASING LONG-TERM INVESTMENTS IN EMERGING MARKETS.





# COMMITTEE RECOMMENDATIONS

## UNLEASH INNOVATION TO PRODUCE MORE AND NUTRITIONALLY BETTER FOOD

Feeding the world by 2050 will require increasing agricultural output by 70 percent.<sup>16</sup> To achieve this, agricultural productivity will need to grow at an annual average rate of at least 1.75 percent from a relatively fixed bundle of agricultural resources given growing regional scarcities of water and arable land (Figure 3).<sup>17</sup> As noted earlier, over the past seven years, that rate has averaged 1.4 percent.<sup>18</sup>

### Enable farmers everywhere to be more productive.

Farmers will require a range of solutions that allow them to close the yield gap, including existing technologies and practices that will improve their productivity.

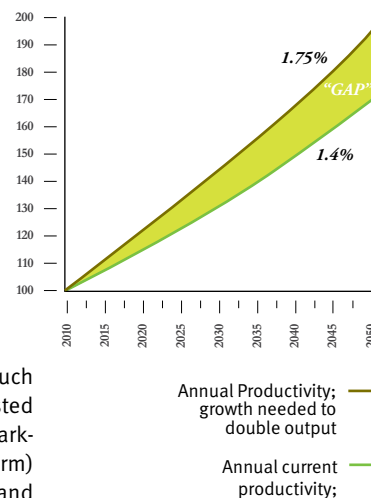
Smallholders in emerging economies may require a substantially different set of tools, compared to large-scale farmers, to enhance their productivity. Industry, governments and other organizations should partner to create solutions specifically targeted at helping smallholders play a critical role in feeding the world. Hybrid seeds and improved varieties can help subsistence farmers make a dramatic improvement in productivity, as does increased fertilizer use. Cost constraints that keep smallholders from accessing much needed inputs must be addressed expeditiously. DuPont and others in the industry should further explore creative partnerships, new business models, and varied pricing arrangements to address this problem.

Leading-edge technology (e.g., molecular markers) can also be used to accelerate traditional breeding methods to improve the seeds available to smallholder farmers.

The “new” tools of biotechnology – such as genome definition and marker-assisted selection (genetic code variations or markers that help tell how genes will perform) – enable breeders to more efficiently and effectively identify, track and evaluate the impact that specific genes (and combinations of genes) have on plant performance. This combination of conventional breeding (gaining intimate knowledge of traits by physically growing them and observing the results) with the new tools of molecular breeding permits faster and better ways to improve crop performance. Additionally, crops with transgenic traits can provide significant positive impacts to farmers, such as pest resistance and drought tolerance. Furthermore, new solutions that protect crops and seeds in the developing world from abiotic stresses and disease will also be vital.

However, while biotechnology and genetically modified seeds will play an important role in addressing productivity, environmental and nutrition challenges, they are only one segment of a broad set of tools that must be available to farmers. Organic farming will also play a role in feeding some segments of the population. All forms of technology, including traditional farming practices and organic farming, need to be available to farmers. The transfer of knowledge and the benefits of the latest technology and science to local farmers is critical. All solutions should build on local and regional successes and the needs of the farmers being served, with the goal of advancing smallholder regions from deficit regions to surplus regions, and further improving the productivity of larger farming operations.

FIGURE 3. THE GLOBAL AGRICULTURAL PRODUCTIVITY GAP



<sup>16</sup> OECD – FAO, *OECD-FAO Agricultural Outlook 2010-2019 – Highlights* (June 15, 2010) available at [http://www.oecd.org/document/10/0,3746,en\\_36774715\\_36775671\\_42852746\\_1\\_1\\_1\\_1,00&en-USS\\_01DBC.html](http://www.oecd.org/document/10/0,3746,en_36774715_36775671_42852746_1_1_1_1,00&en-USS_01DBC.html).

<sup>17</sup> GHI, *The Global Harvest Initiative's 2010 GAP Report: Measuring Global Agricultural Productivity* (2010) available at <http://www.globalharvestinitiative.org/GAP.htm>.

<sup>18</sup> *Id.*

### AFRICAN BIOFORTIFIED SORGHUM PROJECT (the “ABS PROJECT”) – WORKING TO IMPROVE AN INDIGENOUS CROP IN AFRICA

The ABS Consortium, of which African institutions are the majority, has partnered with the private sector to develop improved varieties of sorghum, which is an affordable African staple for more than 300 million people in Africa, many of whom reside in drier and more vulnerable areas. The ABS Project seeks to improve nutrition and overall health across the African continent by using science and technology to enhance sorghum's nutritional content, particularly in terms of protein digestibility, iron and zinc bioavailability and Provitamin A. In addition, the ABS Project is developing mutually beneficial science partnerships and local research capacity in key sub-regions of Africa.

Pioneer Hi-Bred (“Pioneer”)<sup>23</sup> donated \$4.5 million for the initial technology and has provided capacity building opportunities for institutions and scientists involved in the research, and has hosted 13 African scientists at Pioneer's Johnston research labs. Phase I was funded by the Bill and Melinda Gates Foundation under the Grand Challenges in Global Health initiative at a value of over \$21 million. Recently, the Donald Danforth Plant Science Center and DuPont announced a \$4 million grant from the Howard G. Buffett Foundation, which will help fund the completion of the development of biofortified sorghum. The introduction of biofortified sorghum is expected to have a major impact on the health and life of targeted communities in Africa and will be distributed to underserved communities in multiple African countries, royalty free.

<sup>19</sup> CAST Commentary, Investing in a Better Future through Public Agricultural Research (March 2011).

<sup>20</sup> World Health Organization, Guidelines on Food Fortification with Micronutrients (2006) available at <http://www.who.int/nutrition/publications/micronutrients/9241594012/en/index.html>.

### Improve productivity through investment in extension, education and best practices.

Technology alone is not enough to sufficiently increase productivity. It must be paired with extension services and education that inform best practices for continuous improvement. Agricultural extension is generally recognized as a mechanism to help farmers identify and analyze their production problems, and become aware of the opportunities for improvement and how to best take advantage of those opportunities. Private sector investment in extension services is critical to empower farmers to become successful entrepreneurs. There are innovative examples of new models of extension services that leverage mobile technology, linking farmers with real time information on prices, weather, and other best practices, including traditional agro-ecologically sound practices, improved local practices, as well as modern farming approaches that should be emulated more broadly.

### Increase public research and development funding.

Over the last several years, the growth rate of agricultural output has outpaced the growth rate for public agricultural research funding. In fact, in the U.S., expenditures for public agricultural research grew during two decades leading up to 1980 by an average of 3.2% per year (adjusted for inflation), but no net growth occurred during 1980–1990, and net growth averaged only 0.6% per year during 1990–2009.<sup>19</sup> Stakeholders must come together to renew their investments in agriculture research. Public agricultural research is critical to spurring research and technology development, and is key to meeting our food challenge.

### Promote public and private collaboration on indigenous crop investment and nutritional enhancement.

Meeting the challenge of food security re-

quires not just a focus on increasing productivity and output in staple crops, but also on the nutritional content and quality of all crops. Malnutrition, in the form of both undernutrition and overnutrition, affects billions of people today. For developing countries, in particular, increasing the nutritional content of crops is just as vital as increasing crop yields and calories. The three most common forms of micronutrient malnutrition - iron, vitamin A, and iodine deficiencies - affect at least one-third of the world's population, although primarily in developing countries.<sup>20</sup> These deficiencies must be addressed in order to effectively accomplish food security worldwide. Nutritional improvements can be accomplished through crop diversification, biofortification of crops, and supplementation.

Indigenous crops (so called “neglected” crops), such as yams and cassava, which provide a great deal of sustenance in many developing countries, but are infrequently traded on a global scale, have not had substantial public and private research efforts devoted to their improvement when compared to the more widely-traded commodities. Finding innovative solutions for these neglected crops to yield more, withstand harsh conditions, and have greater digestibility and nutritional value could be a significant step toward addressing countries' local food needs. Stakeholders will, therefore, need to collaborate on research and development efforts, because unlike some commodities that offer a business model that incentivizes private sector investment and competition, many indigenous crops in developing markets do not offer the same business incentives.

Finally, the world needs to think in terms of total nutrition per hectare rather than simply in terms of bushels per hectare. Governments, private sector, and civil society should collaborate on a more coordinated approach to research and development to improve indigenous crops. There are cur-

*Promote* **PUBLIC AND PRIVATE**  
*collaboration on indigenous*  
*crop investment and nutritional*  
*enhancement.*

rent examples of successful collaborations resulting in work on important indigenous crops, such as the African Biofortified Sorghum Project (the “ABS Project”). Efforts like these should be scaled and new collaborative public-private partnerships pursued. Now that such tools are available, DuPont and other private sector leaders should collaborate with public international and national research institutions to increase protein content and digestibility, iron and zinc bioavailability, and Provitamin A content of other indigenous and largely neglected food crops.<sup>21</sup> The industry should also consider nitrogen fixing trees and shrubs for faster growth.<sup>22</sup> The industry could form a “Biofortification Consortium” composed of CGIAR Centers, national research institutes, private entities and the nutrition community.

**The agriculture sector should partner globally with governments, other private sector companies in the value chain, and NGOs to offer financing mechanisms so farmers can afford the tools to produce more.**

One of the most significant impediments to the use of science and technology in the developing world is access and financing. In emerging economies, a lack of financing is often one of the most significant constraints to improving productivity and the success of farmers. The innovative solutions in which the private sector invests should be accessible to smallholder farmers. Global partners should find ways to create access to financing for smallholders, and the private sector should explore creative business models that focus on longer-term market development in emerging markets. It is imperative to explore novel ways to address this constraint, including partnering to spread risk to providing loans and financing for improved seed, fertilizer and crop protection solutions. Another way may be to have governments recognize grain certificates as a formalized loan mechanism to purchase inputs, thereby providing access to capital without rely-

ing on banks.<sup>24</sup> These solutions must occur today without delay if the world is to be prepared to meet increasing food demand.

**Ensure that intellectual property rights, competition and farmer benefits from innovation go hand-in-hand.**

Intellectual property (IP) rights represent the societal compact that seeks to incentivize investment and innovation by inventors, while ensuring those very innovations enter the public domain after an established period of time. This will continue to be of the utmost importance as the world seeks to increase agricultural productivity and promote global food security. For example, the private sector is often reluctant to invest resources in countries where there is no mechanism in place to protect IP rights. The protection of IP around the world, in all its various forms, will encourage more research and development, lead to better products, and facilitate much needed trade. Innovations flourish in countries that offer strong IP rights. A lack of enforceable IP regimes in developing nations will also prevent their farmers from obtaining the best, new products, such as biotechnology traits that improve the nutritional quality of plants or advances in traditional breeding that can help create drought-resistant plants. Consequently, global leaders in IP and biotechnology, as well as policymakers and NGOs, should foster consensus on the most appropriate balance between strong IP rights that encourage and facilitate investment and innovation while spreading the benefits of new technologies to farmers around the globe.

There are also a number of issues that industry and regulators must address as the first biotechnology trait is due to come off patent in 2014, with others to follow. There is a pressing need to more clearly define the transition to generic biotechnology products and associated issues pertaining to registration, stewardship and the ap-

<sup>21</sup> These crops could include cereals like pearl millet, finger millet, and teff; soy beans for direct food consumption, as well as beans, peanuts, pigeon pea and chick pea grain legumes; cassava, potato, sweet potato, indigenous and other yams, taro and arrowroot; indigenous African leafy vegetable species; and fruits extensively consumed such as matoke bananas, mangos, avocados and passion fruit.

<sup>22</sup> Particularly *Faidherbia albida*, and to enhance nitrogen fixation in some species of the genera *Sesbania*, *Tephrosia*, *Gliricidia*, *Crotalaria*, and *Mucuna*.

<sup>23</sup> Pioneer Hi-Bred is a DuPont business.

<sup>24</sup> Under this scheme, farmers can sign agreements with input providers entitling the provider to a certain amount of bushels of their product to pay for the input. Governments can ensure penalties for defaulting.

## ADM PARTNERS WITH THE UNIVERSITY OF ILLINOIS

*Earlier this year, the Archer Daniels Midland Company (ADM) founded the ADM Institute for the Prevention of Postharvest Loss (the "Institute") with a grant of \$10 million to the University of Illinois at Urbana-Champaign.<sup>25</sup> The Institute will work with smallholder farmers in developing countries to curb postharvest loss due to pests, disease, mishandling and other factors. According to ADM, their educational, research, and outreach functions will include, among other things: developing courses to provide training on best practices and technologies for minimizing postharvest losses; and promoting technology advancements and improved supply-chain and information systems.*

appropriate use of and access to data created to satisfy regulatory requirements. There is currently no mechanism in the U.S. legislative or regulatory system that ensures the ability to build new innovations from inventions in this area that are moving off patent. Questions pertaining to how best to foster ongoing innovation by creating a pathway to competition that uses generic inputs must be addressed. Solutions that allow for the use of regulatory data for the production and dissemination of post-patent generic seeds, as well as for research purposes in the development of new biotechnology traits, are required. Both the U.S. regulatory treatment of IP issues for pharmaceutical and crop protection products provides useful guidance on these issues. We encourage DuPont and other biotechnology companies to work with policymakers and other stakeholders to outline a framework to address these issues.

## ENSURING ACCESS TO FOOD

**Governments should strengthen social safety net programs to ensure the most vulnerable have access to food.**

Poverty remains a key cause of hunger and malnutrition. Long-term investment in economic development in rural and urban areas to ensure private sector growth and job creation is necessary to achieve food security and ensure that food is accessible. Investment in agriculture is by far the best way to substantially reduce poverty in rural areas, where the world's poorest reside. In addition, with the expected population growth in many developing countries, even substantial increases in agricultural productivity locally will not be enough to meet the growing food needs. Economic development, led by agricultural development in those countries, will be critical to enable them to afford to import food.

Strong safety net programs will also be important to ensure that food is accessible to

the most vulnerable. Food assistance programs should be targeted to ensure that food aid reaches those who need it the most – those who are suffering acute hunger due to war or natural disasters and cannot grow their own food – and assistance delivery should be commensurate with the urgency of those needs. Still, there are about 20 percent of households in African villages that are too poor to grow their own food, because of a lack of land, illness (particularly HIV/AIDS), and advanced age. The safety net is sometimes provided by their communities, but also by food aid.

In the U.S., food aid has typically consisted of in-kind donations whereby domestically produced commodities have been physically delivered to areas of need, but this approach may cost more than helping farmers help themselves.<sup>25</sup> Still, this type of emergency assistance will remain important, but a greater focus should also be given to the ability to engage in local and regional purchases, which may improve responsiveness and have additional development benefits by providing a market for smallholder farmers. We applaud the efforts of the World Food Program, the Bill & Melinda Gates Foundation, and the Howard G. Buffett Foundation in finding ways to purchase maize and staples locally.

**Global infrastructure investments are needed to ensure movement of food from areas of surplus to areas of deficit. Investments must also be made in processing and storage facilities to prevent postharvest loss.**

A lack of the most basic infrastructure in some developing markets, including roads and bridges, severely impedes agriculture productivity and causes substantial waste. According to the Food and Agriculture Organization of the United Nations (FAO), the postharvest waste in Africa largely explains why many smallholders are net purchasers of food despite growing enough for their families to eat.<sup>26</sup> Waste also oc-

<sup>25</sup> Sanchez, P. A., A Smarter Way to Combat Hunger, *Nature* 458:148 (2009) (It costs about six times more to deliver a ton of maize as U.S. food aid to a distribution point in Africa, than it does to provide farmers with enough fertilizer and hybrid maize seed (at unsubsidized prices) needed to produce an extra ton of maize on smallholder farms).



curs in developed countries. In fact, both in rich and poor countries, an astounding 30-50% of all food produced rots or goes uneaten. In developing countries, approximately two-thirds of the waste occurs from production to retail sites and in developed countries approximately two-thirds of the waste occurs at retail, foodservice, and consumer sites.<sup>27</sup> Consequently, merely addressing our food waste and postharvest loss will make substantial headway in meeting food demand. Governments and the private sector should invest in storage and infrastructure; educate farmers about available technology options that can be incorporated into grain handling and storage practices; and enable transportation and distribution more efficiently. Maintaining and improving infrastructure in developed markets, such as roads, ports, barges, elevators and rail, is also critical to move huge amounts of grain.

Every effort must be made in the developed and developing world to reduce waste through the whole supply chain, by investing in research, technology, and infrastructure to reduce waste resulting from insects, weeds, and postharvest loss. Currently, only 5 percent of agriculture research funding is dedicated to the study of postharvest loss prevention, yet an estimated \$14 billion in food went to waste worldwide in 2007.<sup>28</sup> Recent partnerships, such as the establishment of a new research institute dedicated to reducing waste and postharvest loss, are promising and should be replicated.

**Increases in productivity must be coupled with access to markets, particularly for smallholder farmers. Stakeholders should facilitate and invest in models that better link smallholders to the global value chain.**

Ensuring food security in the coming decades will require that all farmers increase their productivity. However, productivity increases are meaningless if farmers are

not connected to commerce. In order to move from subsistence to surplus, farmers must have the ability to sell in an open marketplace and be a part of the global value chain to fully succeed in moving from net importers to net exporters. Smallholders will benefit from greater integration into local and regional markets and governments, and agriculture sector partners should also make efforts to link smallholders to global value chains.

There are varying public and private sector mechanisms that can enhance market access for farmers, such as farmer organizations and cooperatives. Agribusiness should collaborate with partners across the value chain to incorporate smallholders to improve stability and predictability, and increase the likelihood of smallholders' willingness to invest in enhanced technology to improve output.

**The private sector must work with governments to foster a more open and equitable trading system for food and agricultural products.**

It is vitally important for countries to increase food and agricultural productivity, particularly since today some 85 percent of food never crosses international borders.<sup>30</sup> Yet food security should not be equated with self-sufficiency. Considering that the world's population and arable land are not evenly distributed, and that some 70 percent of the global population will reside in cities by 2050, the unrestricted movement of food and agricultural products already is and will become increasingly important. Moreover, an open and non-distorting trade system facilitates development, creates economies of scale that attracts investment, spurs innovation and efficiencies, and provides more affordable and reliable access to agricultural inputs and food at more stable prices.

<sup>26</sup> The Economist, *A Special Report on Feeding the World: Waste Not, Want Not - Far Too Much Food Never Reaches the Plate* (Feb. 24, 2011) available at <http://www.economist.com/node/18200694/print>.

<sup>27</sup> GHI Symposium, *Capturing Full Value of the Supply Chain: Reducing Postharvest Waste* (Sept. 22, 2009).

<sup>28</sup> See ADM, *ADM Gives U.S. \$10 Million to Found Institute to Reduce Global Postharvest Loss of Grains and Oilseeds* (Jan. 19, 2011) available at [http://www.adm.com/en-US/news/\\_layouts/PressReleaseDetail.aspx?ID=286](http://www.adm.com/en-US/news/_layouts/PressReleaseDetail.aspx?ID=286).

<sup>29</sup> *Id.*

<sup>30</sup> DuPont, News Release, *Agriculture is a Key Driver to Meet UN Millenium Development Goals*, (Sept. 27, 2010) available at [http://www2.dupont.com/Production\\_Agriculture/en\\_US/news\\_events/cp\\_releases/2010-09-27.html](http://www2.dupont.com/Production_Agriculture/en_US/news_events/cp_releases/2010-09-27.html).

A multilateral framework, which provides for global rules, mechanisms for monitoring and an effective dispute settlement process, has long been considered optimal for agricultural trade liberalization efforts. Efforts to strengthen it must be sustained and brought to fruition. Whereas the Organization for Economic Cooperation and Development (OECD) countries must continue on a reform path to level the playing field in international food and agricultural trade, developing countries should also more proactively address trade barriers and promote greater trade facilitation between themselves, especially in light of the increasing amount of trade among them. Countries also are well-advised to pursue trade reform on their own, as benefits reaped from such reforms can be greater than those that accrue from trade reform by other countries. Bilateral and regional trade agreements are likely to continue to be negotiated, and care must be taken to ensure that they encompass the agricultural sector in the broadest sense. The private sector needs to engage in the development of trade agreements that will ensure food can move freely across borders.

**Governments and policymakers should reconsider policies on subsidies and examine alternative safety net policies.**

A non-distorted trade system must also effectively deal with the question of subsidies. Agricultural subsidies have been in place for several decades, and some have had very useful impacts on productivity, the environment, rural development, and research and development efforts. Subsidies that are tied to production and prices, however, have contributed to surplus production, which has served to lower global prices to the detriment of developing country producers, and has also contributed to the low level of investment in the agricultural sectors of poorer countries. Countries are not likely to eliminate subsidies entirely, but should consider phasing out

production or price-linked subsidies that have served to distort the international food and agricultural system. We note that in the present environment of high prices, price-linked subsidy outlays have been substantially lower, and that in a sustained higher price environment, it should be more feasible to reduce these, particularly if such reductions lead to increased access to other markets.

Phasing out trade-distorting subsidies does not mean that governments stop providing “safety net” policies for their farmers – there are non-trade distorting tools such as crop insurance and revenue insurance programs that help farmers cope with unforeseen crop failures or market disruptions. Furthermore, since subsidies are notoriously hard to remove once implemented and can become a serious drain on public coffers, policymakers should ensure that when introduced, they are clearly delineated in nature and scope, established for clearly defined timeframes, and accompanied by an “exit strategy” that paves the transition to market-based approaches.

For poor countries in Africa where crop yields can be as low as one-tenth of those produced in the U.S., targeted, smart subsidies for fertilizer and hybrid maize seed are one tool that has been used to increase productivity. Smallholder farmers often cannot afford to pay for fertilizer and improved seed and it is almost impossible to access credit because they lack collateral. In some cases, smart, well-targeted subsidies kick start productivity to help farmers out of poverty. For example, facing a 45 percent deficit in maize production, the President of Malawi instituted a somewhat controversial voucher program for farmers to buy two bags of fertilizer and 3-5 kg of improved hybrid seeds at a 75 percent discount, enough to plant one acre of land. The country rapidly doubled maize yields and became a maize exporter to neighboring Zimbabwe, as well as a food aid do-



nor to Lesotho and Swaziland. However, greater crop diversification is necessary in order to improve high malnutrition rates. Moreover, as this country's population is expected to grow from approximately 13 million (in 2008) to over 40 million by 2040,<sup>31</sup> these subsidies will likely not be sustainable over the long-term, and should be gradually phased out as yields reach higher levels. Efforts must be undertaken to move towards an effective market-based strategy to replace this subsidy scheme.

**Ensure science-based regulatory frameworks and remove regulatory barriers to achieving food security.**

Sound regulatory standards to protect human, animal and plant health and to ensure food safety are critically important. Yet, when standards are not based on science, are insufficiently consistent and not transparent, they not only cause serious disruptions to markets, but also stifle much needed innovation. The urgent need to increase productivity to meet global food demand makes it imperative to get the best technology and practices into the hands of farmers rapidly, while maintaining strong safety and environmental standards. Regulatory frameworks must be efficient: scientifically unjustified delays and barriers that slow down approval processes and delay the adoption of tools for enhancing productivity of farmers need to be addressed so that innovative products can enter the market more expeditiously and at lower cost. Currently, it takes almost ten years and over \$250 million to bring crop protection products to market. For seeds, it can take as many as fifteen years and an estimated \$150 million from discovery to commercialization of a biotechnology trait.

Governments rightly insist on establishing and implementing their own regulatory frameworks given local needs and conditions, but widely divergent regulatory systems, and the lack of functioning systems

altogether in some countries, serve to slow down the adoption of new technologies, at a time when innovative solutions are more necessary than ever. Such divergences also negatively impact international trade. Farmers and consumers around the world will benefit from efforts by governments to streamline national regulations by more effectively sharing data and encouraging collaboration in scientific risk assessment. Such efforts will be important to avoid overly divergent approval processes and timelines that not only lead to delays, but also trigger additional obstacles and costs in the supply chain and in international trade.

Countries should move to science-based international harmonization for plant biotechnology. Science-based local needs and conditions (e.g., differences in insect species populations and their resistance) can be successfully built into international harmonization regulations. Harmonized data packages and synchronized reviews would significantly speed the transition of much needed innovation into improved global crop yields and nutrition without compromising science-based safety assessments. Agriculture industry partners, including the private sector, NGOs and nonprofits should establish a framework and lead these efforts to improve regulatory processes. Furthermore, innovators have a role to play in sharing information and educating consumers to build confidence in the safety and efficacy of products. Countries with strong regulatory frameworks can enhance confidence in consuming countries by sharing findings and information to ensure safety, particularly when developing countries lack the sophisticated platforms and resources necessary to confirm safety and efficacy.

**ALL EFFORTS SHOULD IMPROVE SUSTAINABILITY**

Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs.

**GLOBAL JOINT REVIEW**

*Under the Organization for Economic Cooperation and Development (OECD) Workshare or Global Joint Review (GJR), participating regulatory authorities distribute the work amongst participating countries and each country reviews a portion of the data dossier (e.g., the U.S. would review toxicology, while the United Kingdom reviews ecotoxicology). After reviewing their assigned sections, the regulatory authorities conduct a collaborative peer review of the evaluations and agree on the end points used in the risk assessment process. At this point, each country individually assesses the evaluations and recommended risk assessment end points to decide whether their country will grant registration of the product.*

*This process results in major resource savings for each participating country; as well as additional benefits for regulators, growers and crop protection product manufacturers. The GJR provided expedited approvals for DuPont Rynaxypyr®<sup>32</sup> around the world, allowing growers accelerated access to this technology and increasing confidence in the quality of the regulatory approval process.*

<sup>31</sup> The Malawi Ministry of Development Planning and Cooperation, RAPID: Population and Development (2010).

<sup>32</sup> Rynaxypyr® is the first insecticide in its class (anthranilic diamides).

## INVESTING IN YOUTH DEVELOPMENT

*Researchers in the U.S. and around the world have demonstrated that 4-H positive youth development programs promote science literacy and increase incomes for rural youth. In Tanzania, 4-H clubs use positive youth development strategies to reach 34,000 boys and girls with agricultural science and entrepreneurship training. In 2010, young Tanzanian 4-H agri-business people reported more than \$82,000 USD in profit. Long-term investments in basic education and strategies, such as 4-H, will be essential to mobilize young people to lead technology transfer and adoption of innovation.*

Therefore, stewardship of natural and human resources is critical. The three main components of sustainability are environmental, social and economic.

**Environmental – Investment must be made in technology and best practices for continuous improvement of agriculture sustainability and resource efficiency.**

By 2030, the world will consume renewable resources equivalent to two planet earths to sustain human needs.<sup>33</sup> To meet future demand, arable land in developing countries would have to expand by about 120 million hectares.<sup>34</sup> However, due to increasing land degradation caused by climate change, certain developing countries are expected to see 9-20 percent of arable land becoming much less suitable for agriculture.<sup>35</sup> Furthermore, FAO estimates that water scarcity may reduce crop yields by up to 12 percent.<sup>36</sup> Consequently, productivity and efficiency will be critical, as will continued investment in crops that have greater yield per acre (in quantity and nutritional value) while addressing ecosystem issues such as using less water and fuel, and using the right amount of fertilizers to protect the quality of water and biodiversity.

The private sector should continue to invest in technology that improves agriculture sustainability and resource efficiency. Addressing food shortages with efficient sources of protein, such as soy, can boost nutrition while using fewer natural resources. Continuing to identify technologies that can reduce tillage and field work, and therefore reduce soil loss, will also enhance sustainability. Efforts to reclaim degraded land should also be redoubled.

However, more efficient and sustainable technology must be coupled with education and extension services focused on sustainable best practices. Stakeholders must continue to identify best practices and put them into the hands of farmers,

who can utilize the practices that work most effectively with their growing conditions, soils and crops. Implementing practices that address ecosystem issues, such as reducing water use and controlling field runoff, will be important. Product stewardship with farmers is critical.

Continuously improving the sustainability of agriculture will require increased investment and collaboration from all stakeholders in the industry. Governments should create policy environments conducive to private sector investment, as well as devote resources to sustainability research. The industry should take increasingly proactive steps on stewardship to ensure that we achieve the benefits of agriculture technology and practices without unintended consequences. Finally, new partnerships between industry and environmental groups must be forged, and ongoing dialogue is and will be critical to solving this challenge.

**Social - Both the public and private sector should invest in education and youth development efforts.**

The ability of the agricultural sector to meet global food demands will depend on solutions that are socially sustainable. Facilitating human capacity development through training and education of the next generation of farmers and consumers is critical. The farmer who will feed the world in 2025 is 13 years old today. Indeed, children and adolescents represent 65 percent of total agricultural employment in Sub-Saharan Africa. These young people can lead the next “Green Revolution,” but only if science-powered innovations in agriculture are integrated with social science research in fields such as positive youth development, learning, community development and technology transfer. In particular, education focused on women and girls will be vital. School feeding programs are also effective tools, as food is often provided by villagers, and attracts the poorest youth to go to school, particularly

<sup>33</sup> World Wildlife Fund (WWF), *Futures for Our Planet* available at [http://wwf.panda.org/about\\_our\\_earth/all\\_publications/living\\_planet\\_report/me\\_and\\_my\\_planet/footprint\\_scenarios/](http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/me_and_my_planet/footprint_scenarios/).

<sup>34</sup> FAO, *World Agriculture: Towards 2015/2030: An FAO Perspective - Crop Production and Natural Resource Use* available at [http://www.fao.org/docrep/005/y4252e/y4252e06.htm#P4\\_3](http://www.fao.org/docrep/005/y4252e/y4252e06.htm#P4_3).

<sup>35</sup> FAO, *Africa's Changing Landscape: Securing Land Access for the Rural Poor* (April 2010).

<sup>36</sup> FAO, *Food Security and Agricultural Mitigation in Developing Countries: Options for Capturing Synergies* available at <http://www.fao.org/docrep/012/i1318e/i1318e00.pdf>.

## SOCIAL - *Both the public and private sector should invest in education and youth development efforts.*

girls that would otherwise stay at home. Reinforcing the importance of agricultural contributions and its value to society, and promoting the merits of a career in agriculture are also essential to recruiting tomorrow's farmers and innovators. DuPont and other private sector companies with an interest in developing markets should also create comprehensive strategies for community investment and philanthropy. Finally, solutions will be most sustainable when stakeholders partner with local organizations that know best the cultural norms and needs.

**Economic – Governments should take steps to reduce risk and create incentives for private sector investments. Companies should consider increasing long-term investments in emerging markets.**

Governments and the private sector must collaborate to enable farmers to be successful. Addressing the productivity gap requires a significant investment that can only be accomplished effectively through investments from private donors. According to the GHI, the overall developing country investment gap approaches \$90 billion annually – a very conservative estimate that nevertheless is almost twice the \$48 billion in agricultural support that was available from international sources in 2008.<sup>37</sup> To close this investment gap, governments must enable private sector investment by dedicating a substantial percentage of their budget over the long-term to investments in agriculture and infrastructure development and by creating long-term plans coupled with dedicated leadership and funding streams.

Governments should also facilitate greater private sector investment by ensuring strong governance and stability through rule of law, anti-corruption, IP rights, regulatory systems, land rights, and open dialogue with private sector partners. Additionally, governments should increase

efforts to address trade barriers with neighboring countries in order to create larger economies of scale, also crucial for attracting private sector investment. Donor governments also have an important role of emphasizing the importance of a policy environment required for attracting greater private sector assessment and use development assistance in order to more effectively leverage private sector investments. Public-private partnerships between private sector companies, governments and other organizations can be very effective and efforts should be made to improve and increase these types of collaborations, and we encourage a sustained dialogue to accomplish this.

### GOVERNMENT INCENTIVES FOR PRIVATE SECTOR INVESTMENT


*Brazil and Thailand became leading global suppliers of soybeans and cassava among other agricultural exports. This was largely due to policies that enabled private sector investment, including permissive land policies, improved public infrastructure and business development services, a supportive policy environment, and liberalized markets.*

<sup>37</sup> GHI, *Enhanced Private Sector Involvement in Agriculture and Rural Infrastructure Development* (Paper prepared by William C. Motes) (March 16, 2011).



## CONCLUSION

The confluence of changing demographics and consumer food preferences, substantial increases in population, scarcity of resources, and climate change presents the human race with one of its most substantial challenges to date – how to feed a world with more than 9 billion people. Global food demand will require that farmers everywhere have access to the tools, education and technology to be productive. Increasing rates of malnutrition will not just require more calories, but more nutritious food. A problem of this enormity requires an unprecedented level of cooperation and leadership among private companies, governments, universities and research institutions, NGOs and farmers around the world. Those within and outside of the agricultural community will need to come together to develop innovative solutions to ensure a food secure world by 2050. DuPont is committed to providing a leadership role in addressing the global challenge of providing more and better food for a growing population.



# ABOUT THE COMMITTEE



## Senator Thomas A. Daschle

is Chairman of the Committee and a Senior Policy Advisor at the law firm of DLA Piper where he provides clients with strategic advice

on issues such as climate change, energy, health care, trade, financial services, agriculture and food, foreign affairs, and telecommunications. Senator Daschle is one of the longest serving Senate Democratic Leaders in history and the only one to serve twice as both Majority and Minority Leader. In 1986, he was elected to the U.S. Senate and eight years later became its Democratic Leader. During his tenure, Senator Daschle navigated the Senate through some of its most historic eco-

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“Addressing the food productivity gap may be the defining issue for mankind for the next century. We need to consider not only producing more food, but also ensuring we can meet the nutritional needs of the growing population.”

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omic and national security challenges. He also served in the U.S. House of Representatives for eight years beginning in 1978. He is the author of several books, a co-founder of the Bipartisan Policy Center, a board member at the Center for American Progress, a Vice Chair at the National Democratic Institute, and is a member of the Council of Foreign Relations as well as many other boards and councils.



## Charlotte Hebebrand

has served as Chief Executive of the International Food & Agricultural Trade Policy Council (IPC) since February 2006.

The IPC is committed to promoting a more open and equitable global food system and is composed of a diverse mix of distinguished international agricultural trade experts from around the world. Charlotte came to IPC from the Eu-

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“An ongoing focus on improving agricultural productivity must be accompanied by efforts to improve access to food. A more open and equitable trading system for food and agricultural products will not only ensure that food gets to people who need it, but can also contribute to income growth in rural areas, where the majority of the world’s poorest people reside.”

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ropean Commission’s (EC’s) Washington Delegation, where she served as Special Advisor, respectively, on international development, trade, agriculture and food safety issues. Prior to her time with the EC, Charlotte worked at the Brookings Institution’s Foreign Policy Division.





### J.B. Penn

is Chief Economist for Deere & Co. Before joining the company in August 2006, he served as Under Secretary for Farm and Foreign Agricultural Services

in the United States Department of Agriculture (USDA) for more than five years. He began his career with USDA where he held several increasingly responsible positions including Deputy Administrator for Economics in the Economics and Statistics Service. He also served as Senior Staff Economist in the President's Council of Economic Advisors. Following his work in the federal government, Dr. Penn moved to the private sector where he was the principal founder and president of Economics Perspectives, Inc., and later

**“Closing the food productivity gap will require significant capital investment in developing countries, most of which ultimately must come from the private sector. The private sector must now work with these governments around the world to help create conducive market environments that will provide the much needed incentives for that investment.”**

served as Senior Vice President and head of the Washington office of Sparks Companies, Inc. from 1988 until 2001. Penn is also a member of many boards including the Farm Foundation Board and is also a recipient of the Order of Australia.



### Pedro Sanchez

is the Director of the Tropical Agricultural and the Rural Environment Program, Senior Research Scholar, and Director of the Millennium Villages Project at

the Earth Institute at Columbia University. He also directs AFSIS, the African Soils Information Service, developing digital soils

**“Creative ingenuity exists in all corners of the earth. The people in many of the developing markets simply have not had a chance to succeed. If we provide the opportunity, they will rise to the challenge and in doing so we will be helping the world to feed itself.”**

map of the world. Sanchez was Director General of the World Agroforestry Center (ICRAF) headquartered in Nairobi, Kenya from 1991-2001, and served as Co-chair of the UN Millennium Project Hunger Task Force. He is also Professor Emeritus of Soil Science and Forestry at North Carolina State University. He has written two successful books on soil science and hunger, serves on many boards, has received honorary degrees and decorations from universities and governments. Sanchez is also the 2002 World Food Prize laureate and 2004 MacArthur Fellow.



### Jo Luck

is President of Heifer International, having served as the organization's President and Chief Executive Officer (CEO) from 1992 to 2010, and as Director of Interna-

tional Programs from 1989 to 1992. She is the co-recipient of the 2010 World Food Prize for her work through Heifer to ensure availability and sustainability of food to people in need around the world. During the years Jo Luck served as President and CEO, Heifer International - a global organization working to end poverty and hunger and care for the Earth - grew a \$7 million budget to more than \$130 million, and helped expand programs and projects into numerous countries worldwide. Prior to joining Heifer, Jo Luck served as Executive Director of the Arkansas Department of Parks and Tourism for more than a decade as then Gov. Bill Clinton's first cabinet appointee in January 1979. Jo Luck serves on the USAID's Board for International Food and Agriculture Development and is a member of The Chicago Council's

**“Listen to the farmer. The answer lies with her or him. Partnership with local farmers to help them succeed will yield results far beyond what any of us can imagine.”**

“Global Agriculture Development Initiative.” She has been awarded many honorary doctorates, is a former chair of the InterAction Board, and is a founding member of Women Executives in State Government (WESG), the Arkansas Forum of the International Women's Forum (IWF), and the Arkansas Women's Leadership Forum.





## OVERVIEW OF DUPONT

DuPont is a science company with a 200-year legacy of innovation in a broad range of market spaces. Its vision is to create sustainable solutions essential to a better, safer, healthier life for people everywhere. Operating in approximately 90 countries, DuPont makes a difference by bringing science-powered innovations to the world aimed at tackling big challenges, including how the world will be fed, reducing dependence on fossil fuels, and keeping people and the environment safe.

Ensuring that enough healthy, nutritious food is available for people everywhere is one of the most critical challenges facing humanity and a key focus for DuPont. The company commits 60 percent of its R&D dollars to ensuring that the world's population has enough food. From working with farmers and growers around the world to help them increase crop yields, to developing a wide range of packaging materials that enable food to be transported without spoilage, to developing more nutritious food options and ensuring food safety, DuPont is working every day to get food to people who need it. No one organization can solve a problem this big. As such, DuPont continuously seeks counsel and partnership opportunities with others to do together, what no one can do alone.



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