

Nutrient Requirements for Tomorrow's Genetic Innovations

Kristin Schneider

Corn Technology Strategy Operations & Quality Lead
Monsanto Company

Food production and agriculture are major issues challenging today's society. According to the U.S. Census Bureau, global population will reach 8.9 billion by 2040 and 9.4 billion by 2050 before stabilizing around 9.7 billion later in the century¹. Population growth and rising incomes are expected to double the quantity of food demanded by 2050². In fact, participants at a recent United Nations forum on food demand predicted agriculture will be called upon to produce more food over the next 50 years than has been produced in the past 10,000 years combined³.

In order for agriculture to be sustainable, we must meet our present needs – providing affordable food, fiber and energy for 6.6 billion people – while simultaneously developing the technology to meet the needs of more than 9 billion people by 2050. Global experts agree that increasing agricultural productivity is a practical imperative that must be at the center of strategies to reduce hunger and poverty in order to improve the social well-being of resource-poor farmers. “Take any place on the planet that was once extremely poor and is now either developed or on its way to being a developed economy and you will almost inevitably find an agricultural revolution at the start of that – a big rise in productivity, in the amount of food grown per hectare of land,” says Dr. Jeffrey Sachs, Director of the Earth Institute at Columbia University⁴

Today, approximately 40 percent of our global food supply is drawn from the 18 percent of the agriculture area that is irrigated. Accessing more water and providing it to crops has been an essential and productive tool of the Green Revolution. Agriculture currently makes 70 percent of the freshwater withdrawals on a global basis, with up to 90 percent in some regions of the world³. The World Water Council suggests we will need 17 percent more water than is available if we are going to feed the world in 2020. “Continued improvement in efficient land use will be critical if we're going to meet ever growing demand for food and fiber without putting more pressure on our environmental resources,” says Dr. Jason Clay of World Wildlife Fund. Agriculture is already the predominant user of all habitable land, yet grain producing land per capita in 2030 is projected to be just 0.08 hectares, or one-third of what was available in 1950⁵. Topsoil is the living ecosystem upon which all of humanity is most utterly dependent, yet 40 percent of all existing agricultural lands are considered seriously degraded. While topsoil can be renewed, it takes 200 to 1,000 years to create 2.5 centimeters of rich topsoil³. Initiatives to realize this impressive increase in food production cannot ignore agriculture's impact to the environment and must include efforts to preserve or even improve the environment.

For agriculture to be sustainable, we must: (1) meet the needs of everybody while, (2) protecting and even improving the environment, and (3) providing opportunity for the social well-being of one billion farmers. To address this challenge, Monsanto has made a commitment to:

- (1) double yield in our four core crops of corn, soybeans, cotton and canola by 2030, compared to a base year of 2000.
 - We have contributed \$10 million to a fund⁶ which seeks to improve production in rice and wheat by identifying and supporting students interested in pursuing a Ph.D. in rice and wheat plant breeding;
- (2) develop seeds that will reduce by one-third the amount of key resources required to grow crops by the year 2030.
 - We will also join with others to address habitat loss and water quality in agriculturally important areas; and
- (3) to help improve the lives of farmers, including an additional five million people in resource-poor farm families by 2030.

Realizing these commitments requires a comprehensive approach to research and development, including biotechnology, agronomic practice improvements and plant breeding.

Advanced breeding and biotechnology are two of the pillars that Monsanto employs to improve seeds. Both are critical to maximize yields. Now, more than ever, our development of improved crops through breeding and biotechnology represents a critical approach to addressing our world's growing food, feed, fuel and fiber needs. Agronomic practice improvements – the third pillar – are also key to increasing crop yields. These practices include precision agriculture, conservation tillage, seed treatments, planting patterns and many other tools, that when combined with our industry-leading varieties and hybrids, can help improve on-farm productivity. When all three pillars are fully integrated, crop yields have and will continue to increase.

The combination of these technologies has already increased the rate of gain in crop yields, and they are projected to contribute to double corn, soy and cotton yields in the U.S. by the year 2030 (based on average yields in 2000) while helping to reduce the amount of arable land and natural resources required for production.

¹ [US Census Bureau International Data Base \(IDB\)](#)

² [Global Food Demand to Double by 2050, Research Key](#) – Experts. 2007. http://www.flex-news-food.com/pages/11603/global_food_demand_double_2050_research_key___experts_dj.html

³ [Feeding a World of 9 Billion – PeopleandPlanet.net](#). 2007. <http://www.peopleandplanet.net/doc.php?id=341§ion=3>

⁴ [Interview with Dr. Jeffrey Sachs, 2006](#). 2006. <http://www.monsanto.com/biotech-gmo/asp/experts.asp?id=JeffreySachs#mid>

⁵ [State of World Population 2001, UNFPA](#). 2001. <http://www.unfpa.org/swp/2001/english/ch02.html>

⁶ [Monsanto's Beachell-Borlaug International Scholars Program](#). 2010. http://www.monsanto.com/responsibility/sustainable-ag/produce_more/beachell_borlaug/goals.asp