

BIOTECH GRASSROOTS TOOLKIT



BENEFITS TO FARMERS

Producing More, With Less

- GMO seeds are overwhelmingly embraced by American farmers. Roughly 90 percent of corn, cotton, and soybeans grown in the U.S. are improved using biotechnology to help farmers manage devastating insects, weeds, and weather conditions. Farmers are also choosing biotechnology to grow crops such as alfalfa, papaya, sugarbeets, squash and canola. Technology allows farmers to produce more food, using less land and few chemicals, while conserving soil, water, and on-farm energy.
- Today's traits are only the first in a pipeline that focus on delivering high yields in tough environmental conditions. Additional GMOs with novel genetic mechanisms for advanced drought tolerance are being developed, as are crops that can tolerate extreme heat, sunlight, and high levels of salt in the soil.

Improved Farm Incomes

- Globally, farmers choosing to grow GMOs have seen net economic benefits at the farm level amounting to \$18.8 billion in 2012 and \$116.6 billion between 1996 and 2012. Of the total farm income benefit, 60 percent has been due to yield gains, with the balance arising from reductions in production costs, such as money saved on fuel and crop production.
- USDA estimates that the adoption of herbicide tolerant seeds is associated with an increase in off-farm household income as more efficient production practices allow farm families to pursue other sources of income.

New Opportunities for Developing-World Farmers

- Farmers in the developing world, just like those in the U.S., use GMO seeds. In 2013, the crops produced by these seeds are being grown in 27 countries (19 of which are developing countries) by more than 18 million farmers. For farmers in developing countries, efficiencies associated with biotechnology increase farm incomes and free up time to pursue education or hold other jobs – a significant benefit for women farmers in Africa.
- According to the Center for Strategic and International Studies (CSIS), food insecurity in sub-Saharan Africa remains a persistent and daunting challenge with 230 million Africans – 20 percent of the continent's population – classified as hungry. CSIS notes that agricultural productivity, including the use of GMOs, is critical to meeting the continent's food security needs, as farmers grapple with climate variability, degradation of soil and water resources, persistent pests and crop diseases, and land constraints.

BENEFITS TO CONSUMERS

Affordable Food

- **GMOs Keep Food Affordable.** They require less water and fewer chemical applications than conventional crops, and they are better able to survive drought, weeds, and insects. With larger, more reliable harvests, studies show that certain food products (corn, soybeans, and derivatives) would cost 6 to 10 percent more if biotechnology was not available.
- **GMO Labeling – A \$500 Hit on Families.** According to a recent study by economists at Cornell University, mandatory GMO labeling will raise food costs for American families by an average of \$500 per year. That is because farmers and food producers would need to build an enormously expensive new supply chain system to track GMO crops from seed to store shelves, incurring costs that would be passed along to American consumers.

A Future of Healthier and More Nutritious Food

- **“Golden Rice” and Provitamin A Enrichment.** Vitamin A deficiency is a leading cause of blindness in the developing world and is particularly prevalent among children. Scientists have fortified rice grains with beta-carotene (provitamin A), which is found naturally in carrots, sweet potatoes, and other fruits and vegetables. Putting it into a staple grain that serves as the primary food of billions of people will greatly improve the nutritional value of their diet. The crop is awaiting approval in the Philippines.
- **A Tool for Fighting Obesity.** Fats and oils are essential parts of our diet. Agricultural biotechnology has been used to develop soybean varieties that have a healthier fatty acid profile. Some contain more oleic acid – a monounsaturated fatty acid found in olive oil. Another has an increased level of omega-3 fatty acids, which are the oils in fish thought to be associated with heart health.
- **Better fruits and vegetables.** Scientists have done work that could, in the future, lead to fruits and vegetables that cost less, offer better nutrition, and maintain post-harvest quality longer, which would be a boon to people in underserved neighborhoods and food deserts.

BENEFITS TO THE U.S. ECONOMY

- U.S. farm revenues from GMO crops were roughly \$76 billion in 2010.
- According to USDA, agriculture is responsible for one out of every 12 jobs in the U.S.
- Agricultural exports reached record sales in 2013 of \$144 billion, resulting in a \$37 billion trade surplus.

BENEFITS TO OUR ENVIRONMENT

Fewer Chemical Applications

- Data show that, since the year 1996, GMO crops have reduced pesticide applications on farms by 8.8%.

Improving Water Quality

- Herbicide tolerant GMO crops allow the widespread use of “no-till” agriculture, which decreases soil erosion in the U.S. by at least one billion tons per year. This, in turn, improves water quality by decreasing sedimentation and runoff of nitrogen and phosphorous.

Reducing Greenhouse Gases

- “No-till” and reduced-till farming practices improve carbon storage, cut on-farm fuel consumption in the U.S. from five gallons per acre to one gallon per acre, and reduce agriculture’s overall greenhouse gas footprint. In 2012, environmental improvements associated with the global use of GMOs were equivalent to removing 11.9 million cars from the road for one year.

BENEFITS FOR U.S. FOOD AND NATIONAL SECURITY POLICY

- Currently, nearly 2 billion people on our planet are malnourished. According to the United Nations, the global population will reach over 9.6 billion in the year 2050, which places an imperative on finding ways to meet daily human caloric needs in an environmentally sustainable way.
- According to many experts, including those with the State Department who are most closely tied to food security, it will be necessary for farmers to produce as much food in the next 50 years as was produced in all previously recorded history. Science, innovation, and precision will be required to produce this amount of food without destroying the environment.
- According to a report by the Wilson Center and USAID, unanticipated food price rises frequently provide a spark for unrest and the conflict among groups competing to control the natural resources needed for food production can catalyze conflict. Social, political, or economic inequities that affect people’s food security can also exacerbate grievances and build momentum toward conflict.
- If we do not embrace agricultural and food science & innovation, what does that mean for U.S. foreign and military policy 10, 50, or 100 years from now?