



## Bioethics Guiding Principles Report 2007

DuPont is committed to sustainable growth through the application of science to create value for society and our shareholders. We believe the broad field of biotechnology presents important opportunities that should be explored and developed to identify those safe and commercially viable applications that bring significant benefits to society. We believe that ethical discussions concerning the impact of biotechnology must include the benefits and consequences of applying and not applying biotechnology to the world's problems. We believe the good that can be accomplished is only beginning to be realized.

The Bioethics Guiding Principles (the Principles) were established in 2003 to show our commitment to a comprehensive stewardship approach to biotechnology and the use of this science to help build a sustainable future. The Principles are consistent with our core values of safety and health, environmental stewardship, ethical behavior and respect for people, as well as the [Pioneer Long Look](#). The Principles guide us operationally and are further confirmation of our commitment to stakeholders as we pursue the opportunities and resulting benefits biotechnology can offer the world. We apply the Principles to our research, development and commercialization of biotechnology.

The *Bioethics Guiding Principles Report 2007* gives detailed information about some of the work we've done since the 2005 report to successfully create a sustainable future. In this report, you will find:

- The Bioethics Guiding Principles
- A detailed example of how we are accomplishing each principle
- The metrics we established to measure the work accomplished in support of each principle
- Specific examples about some of the work we have done to accomplish each metric

This report is in no way exhaustive of all of the work we've done regarding our Bioethics Guiding Principles; instead, it highlights some of our major accomplishments. We are on an ongoing journey to continually honor and improve our Bioethics Guiding Principles.

We actively initiate partnerships, coalitions and projects to support our Principles. While we have accomplished much, there is still more work that needs to be done. We will continue to seek out new opportunities to help fulfill our commitment to our Principles.

We are committed to continuous learning and improvement, to address emerging issues and to adjust as needed. We will update this report as needed to reflect changes and new evidence supporting our principles.

Additional information about DuPont, biotechnology and our Bioethics Guiding Principles can be found at [www.dupont.com/biotech](http://www.dupont.com/biotech).

## Bioethics Guiding Principles

### 1. Commitment to Food/Feed Safety

DuPont will develop products derived from biotechnology that are at least as safe as their conventionally produced counterparts for both human food and animal feed using the best scientific knowledge.

### 2. Environmental Focus

DuPont will endeavor to apply biotechnology in production systems so there is a net gain for the environment.

### 3. Conserving Biodiversity

DuPont will strive to protect and conserve natural resource biodiversity.

### 4. Transparency of Information

DuPont believes in the individual's right to information regarding product safety. DuPont will apply a strict and transparent standard in determining what product information is proprietary. DuPont will disclose safety information on its products in a clear and accessible manner.

### 5. Engaging Stakeholders

DuPont will routinely engage stakeholders (shareholders, customers, society, and employees) and consider their diverse viewpoints in its decision-making process for products derived from biotechnology.

### 6. Advocating Independent Research

DuPont will seek opportunities to advocate and/or fund biotechnology research important to its business at public institutions, research centers and non-governmental organizations that follow accepted science protocols and peer review standards.

### 7. Contributing to Developing Economies

DuPont will endeavor to be socially and culturally responsible as it shares knowledge and appropriate technology in developing economies to help improve food, nutrition and the quality of life. DuPont will seek to utilize its intellectual property in ways that help alleviate hunger.

### 8. Formalizing Access to Genetic Resources

DuPont will strive to identify the owner(s) of natural biological resources and knowledge selected for research and product development and will develop fair and equitable business arrangements that recognize the contributions of the involved parties. To the extent possible, arrangements will be made public.

## 1. Commitment to Food/Feed Safety

*DuPont will develop products derived from biotechnology that are at least as safe as their conventionally produced counterparts for both human food and animal feed using the best scientific knowledge.*

We are committed to promoting safety and trust in the world's food supply and support smooth trade transactions in the agricultural community. Pioneer provided leadership in the development of, and is participating in the industry-wide Biotechnology Industry Organization Excellence Through Stewardship<sup>SM</sup>: Advancing Best Practices in Agricultural Biotechnology program to enhance regulatory compliance and product quality for consumers. The key components of the program include Principles and Management Practices, a Quality Management Program Guide and a Stewardship Audit Program. The Stewardship Audit Program will be conducted by an independent third-party to verify implementation of the stewardship program and confirm quality management systems and compliance with principles and management practices.



**Metric (1a):** Did we submit products to internal standards and reviews prior to regulatory submission?

- Through quality assurance standards, consultations and audits, Pioneer ensured that its biotech products contained the gene(s) of interest, ensuring the integrity of our products and thus enhancing their safety. We also screened new materials against the allergen database maintained by industry and the University of Nebraska.
- We use a customized best-practice framework called Stages and Gateways to manage the discovery, development and commercialization of regulated biotech seed products. The Stage component includes a formal consultation bringing different disciplines and expertise together to identify key issues. The Gateway component includes a review by the project team, consultants, sponsors and stakeholders where a decision is made regarding the status of the project. Organizational alignment and commitment is confirmed before projects are advanced.

**Metric (1b):** Have we validated no unintended negative consequences?

- We worked with the Agricultural Biotechnology Stewardship Technical Committee and several universities on peer-reviewed, third-party studies examining the effects of biotech grain containing input traits on livestock. Studies comparing the performance of livestock fed biotech commodity grain and non-biotech grain showed no difference in livestock performance. Similarly, the quality of meat, milk or eggs produced from livestock fed biotech grains was the same as animals fed non-biotech grain. Finally, studies showed that the presence of transgenic traits remain nutritionally equivalent to non-biotech grains.
- Third-party studies have shown that corn borer Bt traits reduce fumonisins in hybrid corn grain as well as reduce the risk of aflatoxin and other mycotoxins.

**Metric (1c):** Have we experienced recalls?

- No.

## 2. Environmental Focus

*DuPont will endeavor to apply biotechnology in production systems so there is a net gain for the environment.*

We are committed to delivering new technologies to the growing renewable fuels market, which includes improving biofuels production through improved seed and crop protection products; developing new technologies to allow conversion of cellulose to biofuels; and developing next generation biofuels. We are partnering with Iowa State University (ISU) to create the New Century Farm; the first research effort in the U.S. to focus on producing cellulosic ethanol on the farm, as well as enhancing production, processing and utilization of feedstocks from biofuels and biomaterials. We are also partnering with ISU to create a bio-based products industry center that will focus on economic, business and policy aspects of the emerging bio-economy.



**Metric (2a):** Did we contribute to the DuPont 2015 Sustainability Goal to reduce our footprint and tie business growth to developing safer and environmentally improved new products?

- We created a new category of bio-based materials, DuPont™ Renewably Sourced™ Materials, which are high-performance, bio-based materials and biofuels that are made, in whole or in part, from renewable agricultural feedstocks such as corn, soybeans, sugar cane and wheat, instead of petroleum. In late 2006, the DuPont Tate & Lyle Joint Venture began commercial production of 1,3-propanediol (Bio-PDO™) from corn sugar. A cradle-to-gate Life Cycle Assessment comparing Bio-PDO™ to petroleum-based PDO showed a 40 percent reduction in energy consumption and a 56 percent reduction in greenhouse gas emissions. Through plant breeding and biotechnology, we are also making more efficient biofuels. We are partnering with BP to develop biobutanol, a next generation biofuel. We are also developing a cost-effective integrated technology package to harvest, store and produce cellulosic ethanol from entire corn plants. Find information at: [www.renewable.dupont.com](http://www.renewable.dupont.com).

**Metric (2b):** Did we facilitate a change in production agriculture that positively impacted the environment?

- We actively participate on the Agricultural Biotechnology Stewardship Technical Committee in the U.S. to conserve the utility of Bt crops, delay the onset of target insect resistance and promote grower compliance with insect resistance management. Similar efforts are underway outside of the U.S.

**Metric (2c):** Did we enable our customers to make positive contributions to the environment through the products that we offer?

- We expanded our product offering containing Pioneer® brand corn hybrids with Herculex® RW Rootworm Protection and Herculex® XTRA Insect Protection traits allowing customers to use fewer pesticides, while maximizing their yield potential.
- To facilitate increased utilization of conservation tillage, we implemented a “High Residue Suitability Rating” to assist farmers in hybrid and variety selection for stressful environments.

### 3. Conserving Biodiversity

*DuPont will strive to protect and conserve natural resource biodiversity.*

We are committed to supporting initiatives that ensure the world's ecosystems are preserved for future generations. We committed US \$250,000 to The Nature Conservancy to improve water quality in vital U.S. watersheds and reduce excess nutrient runoff from agricultural fields. The initiative established watershed monitoring and best management practices in the Boone River watershed in Iowa and the Mackinaw River watershed in Illinois. The initiative will improve water quality throughout the Mississippi River watershed and reduce excess nutrient delivery through the Mississippi River to the Gulf of Mexico. These initiatives will support finding new methods of holding soil and nutrients in place and preserving the environment without impacting their land's productivity. DuPont is actively involved in the project providing agricultural expertise and engaging farmers to work in the project.



**Metric (3a):** Did we support the spirit of international biodiversity treaties, such as the CBD?

- We donated US \$1 million to the Global Crop Diversity Trust. The goal of the Trust is to maintain the world's most critical crop genetic diversity collections and build the capacity of under-funded collections, particularly in developing countries. The Trust provided funding to rescue several globally important collections held by the national genebank in the Philippines after the typhoon in September of 2007.

**Metric (3b):** Are we mindful of biodiversity in our business decisions?

- We entered into a US \$1.3 million research, product development and technical support partnership with the International Maize and Wheat Improvement Center (CIMMYT) initially focusing on maize nitrogen utilization to increase and stabilize maize yields with subsequent research projects on drought tolerance, Striga and protein enhancement. This partnership includes participation in a temperate/tropical germplasm enrichment program benefiting resource poor farmers and the Drought Tolerant Maize for Africa project.
- We are participating in the Germplasm Enhancement for Maize (GEM) project to increase the productivity and genetic diversity of maize grown in the U.S.

**Metric (3c):** Did we continue to promote an integrated solutions approach to agriculture?

- Our Agronomy department consistently supports scouting for insects, weeds and diseases; cultural, chemical and biological solutions are promoted based on need. We also provide our customers with up-to-date crop management information via the Pioneer GrowingPoint® website and Walking Your Fields® newsletter.

#### 4. Transparency of Information

*DuPont believes in the individual's right to information regarding product safety. DuPont will apply a strict and transparent standard in determining what product information is proprietary. DuPont will disclose safety information on its products in a clear and accessible manner.*

We make product safety information available to the public on our web site. For example, we made the Pioneer® brand corn hybrids with Herculex® RW Insect Protection trait product overview and safety assessment information publicly available on the DuPont external web site. This is the same information that we provide to the Environmental Protection Agency (EPA), Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) to get approval for the product in the U.S. To view this information, go to the DuPont Biotechnology website at:



[http://www2.dupont.com/Biotechnology/en\\_US/products/plant\\_biotech\\_products/herculex.html](http://www2.dupont.com/Biotechnology/en_US/products/plant_biotech_products/herculex.html)

. We continue to seek improved means of distributing information to a global audience.

**Metric (4a):** Is safety information about the technology publicly available in an easily accessible format?

- We contributed to more than 200 peer-reviewed scientific publications and made more than 200 presentations to external audiences in the past two years regarding our research and technology.
- With the consent of Pioneer, the Korean Food & Drug Administration (KFDA) summary and review results of DAS-59122-7 (Herculex® RW) were published in the Korea Biosafety Clearing House's White Paper on Biosafety as an example to the public, industry and other agencies showing KFDA's safety assessment of data submitted and the conclusions made by KFDA.
- We are an active member of CropLife International, which created and maintains an industry Database of the Benefits and Safety of Biotechnology: <http://croplife.intraspin.com/Biotech/>.

**Metric (4b):** Is our product safety information publicly available in an easily accessible format at the time of commercialization?

- We are working with the Global Industry Coalition to enhance our product information on the global Biosafety Clearing House online database: <http://bch.cbd.int/>.

## 5. Engaging Stakeholders

*DuPont will routinely engage stakeholders (shareholders, customers, society, and employees) and consider their diverse viewpoints in its decision-making process for products derived from biotechnology.*

We are participating in a Keystone Center initiative to ensure that present and future generations approach environmental and scientific dilemmas and disagreements creatively and actively. The goal is to create a single platform that can be used throughout the agricultural supply chain to improve the overall sustainability of production agriculture, rather than any one entity. The initiative includes representatives from the entire value chain, from growers to retailers as well as non-government organizations. The group will identify ways to increase productivity to meet future nutritional needs, while decreasing impacts on the environment, improve human health through access to safe, nutritious food and improve the social and economic well being of agricultural communities.



**Metric (5a):** Did we have a consistent approach to engaging a broad set of stakeholders outside of the company; including social scientists?

- We maintained regular dialogue with leading value-chain stakeholders to gain insight on commercial issues related to biotech product introduction and stewardship.
- We maintained an ongoing dialog with the Interfaith Center on Corporate Responsibility (ICCR), an international coalition of faith-based institutional investors, concerned with the safety of biotechnology.
- We have ongoing dialog with many academic, government, not-for-profit, industry and other private sector organizations.
- We hosted and discussed biotechnology with more than 3,000 non-customer stakeholders at our Pioneer campus in Johnston, Iowa.

**Metric (5b):** Is the dialog taken seriously at senior levels? Or did it impact our thinking?

- In 2003, we established a Health Advisory Board to help us ask the right questions, to provide strategic advice and input to leadership on health and health-related issues, and to support DuPont's efforts in approaching health and health-related issues in a manner that is well informed, scientifically sound and ethical. The members of the Health Advisory Board are internationally regarded leaders in health and medicine, representing a variety of backgrounds and affiliations to promote complete and impartial perspectives. In 2006 and 2007, discussions on biotechnology were held as formal agenda items at Health Advisory Board meetings.
- The DuPont External Biotech Advisory Panel was established in 2000 with independent representatives from around the world with diverse academic, vocational and cultural expertise and backgrounds. The Panel meets regularly with our chairman and senior executives. Their opinions have impacted our decisions in our research pipeline, regulatory strategy, new technology introductions and stewardship practices around the world. Read the 2007 Biotechnology Advisory Panel Report: [http://www2.dupont.com/Biotechnology/en\\_US/assets/images/advisory/BiotechPanelReport\\_2007.pdf](http://www2.dupont.com/Biotechnology/en_US/assets/images/advisory/BiotechPanelReport_2007.pdf).

## 6. Advocating Independent Research

*DuPont will seek opportunities to advocate and/or fund biotechnology research important to its business at public institutions, research centers and non-governmental organizations that follow accepted science protocols and peer review standards.*

We announced a new contribution of US\$2.175 million to support graduate student research and education in plant breeding through university fellowships and a competitive fellowship program. Our commitment goes beyond financial support; each fellowship recipient will be paired with a mentor from Pioneer and receive in-kind support for all research projects. We also support fellowships, international scholarships and grants for scientific conferences. In addition, we offer several three-month and six-month research internships for undergraduate students.



**Metric (6a):** Did we advocate independent research in policy discussions, scientific talks, business meetings, etc.?

- We advocated independent research through support of our industry associations, including the Biotechnology Industry Organization, International Seed Federation, American Seed Trade Association, CropLife International, the U.S. Grains Council and the International Life Sciences Institute.

**Metric (6b):** Did we fund public research programs?

- We supported two Borlaug-Ruan International Internships in conjunction with the World Food Prize. These internships support high school students studying science at research centers in Asia, Africa and Latin America.
- We joined with Africa Harvest on the African Biofortified Sorghum (ABS) Project to improve the nutritional value of sorghum, a staple crop in Africa. This commitment includes hosting African scientists in our labs in Johnston. Four have studied in Johnston, and returned to Africa leading the development of the ABS project.
- We are members of the International Life Sciences Institute and Health and Environmental Sciences Institute Protein Allergenicity Technical Committee that is working to advance the scientific understanding of relevant parameters for characterizing the allergenic potential of novel proteins.
- We support multiple public university programs researching agriculture and science, many of which provide leadership for the development and implementation of major educational and research programs on the sustainability of agricultural practices.
- We contributed \$10,000 to Tufts University for research being conducted in Zimbabwe to determine the vitamin A value of high beta-carotene corn.
- We are a sponsor of the Penn State University undergraduate synthetic biology team (iGEM – International Genetically Engineered Machines), where construction of a genetically engineered system is used to educate students about biotechnology.
- We are a founding sponsor of the Colorado Center for Biorefining and Biofuels Center for Shared Research and Training (C2B2), a consortium of institutions for the advancement of research, education and training in biorefining and biofuels.

## 7. Contributing to Developing Economies

*DuPont will endeavor to be socially and culturally responsible as it shares knowledge and appropriate technology in developing economies to help improve food, nutrition and the quality of life. DuPont will seek to utilize its intellectual property in ways that help alleviate hunger.*

We are committed to improving agricultural productivity throughout the world. We believe that sustainability is not a one-time effort, but is firmly rooted in long-term partnerships. We created the Pioneer Sustainable Agriculture and Development program, which is engaged with numerous partners, including the private sector, farmer associations, public sector, research institutions, and the not-for-profit sector, to deliver sustainable solutions to farmers and their community. We invest in strategic giving and philanthropy



to alleviate immediate needs and build a foundation for community sustainability. We also invest in agricultural development, including strategic partnerships, business and commercial operations to provide a foundation for mutual growth of communities, markets and businesses. We combine advanced agricultural practices and technologies with local knowledge, participation and resources. We also work to understand customers' needs and build relationships to create valued added income for farmers. Learn about the Pioneer Sustainable Agriculture and Development program at: [www.pioneer.com/development](http://www.pioneer.com/development).

**Metric (7a):** Did we make progress on our commitment?

- Pioneer implemented an International Operations Grant Program to invest resources in projects that address social and economic issues and add value to stakeholders and communities. Some of the projects supported are a road and bridge reconstruction project in Indonesia, a workshop and field day on improving profitable maize production in Malawi, and programs in Ethiopia to keep students in school.
- Pioneer provides financial and technical support to the West African Seed Alliance (WASA) and supports a private sector led approach to produce seed. The goal of WASA is to develop a competitive and sustainable seed industry, which will enable and ensure small-scale farmer access to timely and reliable new varieties of high quality seeds and planting material at affordable prices. This project is a critical component of making an African Green Revolution a reality.
- We choose to invest heavily in many developing countries to grow our business and enhance quality of life opportunities in those countries. For example, we created the DuPont Knowledge Center in India, entered into a second joint venture in China and have seed production facilities in Central and Eastern Europe and Asia.
- DuPont is a member of the Africa Harvest Biotech Foundation International that is working on the Gates Foundation African Biofortified Sorghum (ABS) Project to develop a long-term solution to nutritional deficiency by creating a “super sorghum” that grows well in harsh climates and contains increased levels of essential nutrients. The Grand Challenges in Global Health initiative is funding the project through a US\$16.9 million grant over five years. DuPont donated technology valued at US\$4.8 million to the project and is hosting visiting scientists from Africa.

## 8. Formalizing Access to Genetic Resources

*DuPont will strive to identify the owner(s) of natural biological resources and knowledge selected for research and product development and will develop fair and equitable business arrangements that recognize the contributions of the involved parties. To the extent possible, arrangements will be made public.*

We actively support U.S. ratification of the International Treaty on Plant Genetic Resources for Food and Agriculture. A key part of formalizing access is to recognize those that have contributed the resources and provided benefits. The International Treaty provides a multilateral system which acknowledges current and past generations that have contributed to the generation and conservation of genetic resources that are held under the auspices of the International Treaty. Materials are available from the International Treaty via a Material Transfer Agreement that obliges users to pay royalties back into the system when they commercialize a variety that contains International Treaty germplasm, and when it is not available without restriction for further breeding. Breeders that release varieties containing International Treaty germplasm that are freely available for further breeding are encouraged to make a voluntary contribution to the system. The International Treaty provides a global framework to provide for conservation, access, use and benefit sharing from the most important staple food crops.



**Metric (8a):** Did DuPont make reasonable attempts to identify the owners of biological resources?

- We donated US \$1 million to the Global Crop Diversity Trust. The goal of the Trust is to maintain the world's most critical crop genetic diversity collections and build the capacity of under-funded collections, particularly in developing countries. The Trust provided funding to rescue several globally important collections held by the national genebank in the Philippines after the typhoon in September of 2007.
- Pioneer implemented Phased Clearance, a formal process to identify and document the owners of biological resources intended for internal research use.
- On several occasions, we have not accessed genetic material from Asia, South America and Central America because we did not believe we could fulfill the requirements of this principle.

**Metric (8b):** Did DuPont recognize the importance of fair and equitable business arrangements?

- Any organization that provides genetic resources to Pioneer signs an agreement stating that the organization has clear legal right to the resources. When appropriate, the agreement specifically cites compliance with the International Treaty on Plant Genetic Resources for Food and Agriculture, the Convention on Biological Diversity and the principles of Prior Informed Consent and Access and Benefit Sharing.
- We have represented the industry at on-going discussions regarding indigenous knowledge, benefit sharing, and traditional knowledge within the Convention on Biological Diversity, and how to best implement an effective system for Access and Benefit Sharing of genetic resources.

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