American Society of Plant Biologists

Cultivating a better future through plant biology research.

REVISED POSITION STATEMENT ON PLANT GENETIC ENGINEERING

Advances in agriculture are cumulative and build on the integration of new approaches with established breeding techniques and farming practices. The Food and Agricultural Organization anticipates the need for a 70% increase in agricultural productivity to meet the food, feed, fiber and fuel needs of an ever-growing world population, without further degrading the environment (Food and Agricultural Organization, 2009).

The American Society of Plant Biologists (ASPB) supports the continued responsible use of genetic engineering (hereafter referred to as GE) as an effective tool for advancing food security and reducing the negative environmental impacts of agriculture. ASPB also supports the continued use and further development of appropriate, science-based procedures and regulations to assess the risks and benefits of all new agricultural technologies and products, including those developed using GE.

The use of GE to modify plants represents an important advance in plant science and agriculture that builds on centuries of human involvement in the genetic modification of crop species. GE allows for the transfer into a plant of well-characterized genes. The precision of this technology, coupled with the knowledge of the specific nature of the manipulated genetic information, makes the risks of unintended consequences of this type of gene transfer comparable to or less than the random mixing of genes that occurs during classical breeding (National Research Council, 2004).

GE crops were first introduced into the US market in 1996 and have been adopted rapidly (Center for Agricultural Science and Technology, 2012). As of 2013, GE varieties were being grown in 28 countries, including 20 developing countries. In the US, GE cultivars account for over 90% of the corn, soy, canola, sugar beet and cotton acreage. A recent comprehensive report by the National Research Council (2010) reviewed scientific studies on the impact of GE crops on farm sustainability and found that GE crops can provide substantial net environmental and economic benefits compared to non-GE crops. Such benefits include reduced soil erosion due to adoption of no-till (conservation) agricultural practices made possible by herbicide-resistant GE crops (Cerdeira and Duke, 2010; Duke et al., 2012) and reductions in the amount and toxicity of insecticides applied to GE crops. For example insecticide usage on corn decreased 10-fold in the 15 years since introduction of GE insect-resistant corn (Fernandez-Cornejo et al., 2014).

GE herbicide or insect resistance traits are subject to the same selection pressures as non-GE traits, potentially giving rise to pest populations able to overcome the trait (Heap, 2014). Just as overreliance on individual non-GE traits or practices can limit their effectiveness, as demonstrated with overuse of certain pesticides, overreliance on individual GE traits will similarly lead to loss of efficacy in the field (Tabashnik et al., 2013; National Research Council, 2010; Center for Agricultural Science and Technology, 2012). GE traits should therefore be utilized judiciously as one of many components of integrated agricultural management systems in order to maximize their efficacy and longevity.

GE crops can provide major health benefits to people throughout the world, especially in developing countries where food insecurity and malnutrition are still prevalent. Examples include enhancing the vitamin and mineral content of staple foods (Fitzpatrick et al., 2012) and developing crops with enhanced water and nitrogen efficiency or tolerance to environmental stresses such as drought, which disproportionately impacts the world's poorest farmers (Fedoroff et al., 2010), but that are also of value in industrialized countries. In many cases, conventional breeding cannot achieve these needed improvements because the genetic diversity in such traits does not presently exist in available compatible germplasm. Worldwide, GE plants could also be increasingly useful in nonfood applications. These applications include cleaning up toxic environmental pollutants and creating compounds presently made using nonrenewable resources, such as industrial oils, fuels, and chemicals, or compounds that require sophisticated biochemical processes, e.g., vaccines and pharmaceuticals.

Concerns raised about the use of GE and its products in agriculture include food and environmental safety issues, as well as socioeconomic and ethical matters (Lemaux 2008, 2009). To the extent that scientific data can be gathered to address these concerns, the ASPB supports and encourages such investigations. When GE crops were first introduced, regulatory agencies, namely the US Department of Agriculture, the Food and Drug Administration and the Environmental Protection Agency, exercising an excess of precaution, demanded extensive safety testing of new GE food products. In contrast, conventional and organic crops created by classical breeding undergo no safety testing. Since the commercial introduction of GE crops in 1996, there has not been a single documented instance of harm to human health. Furthermore, thousands of scientific studies from the academic, government, and private sectors have been performed on various aspects of GE crops. These data have been comprehensively assessed in multiple National Research Council reports: Genetically Modified Pest-Protected Plants (2000), Environmental Effects of Transgenic Plants (2002), Safety of Genetically Engineered Foods: Approaches to Assessing Unintended Health Effects (2004) and Impact of Genetically Engineered Crops on Farm Sustainability in the United States (2010).

Because the current regulatory framework was put in place in the 1990s, ASPB recommends that the federal regulatory agencies responsible for oversight of GE crops review and potentially revise the current regulatory framework to reflect these data and National Research Council reports. Specifically, regulatory scrutiny should focus on the potential for new risks, irrespective of the method of introduction of the trait, taking into account existing familiarity with the crop species and the trait being introduced.

ASPB endorses continued responsible development and science-based oversight of GE and other food production technologies and practices. Additionally, ASPB encourages federal funding to support generation of the science-based information needed for the government, the private sector, NGOs, consumers, educators and other stakeholders to make informed choices about the products resulting from GE technologies. ASPB believes that GE products will continue to bring many significant health and environmental benefits to the world and its people.

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