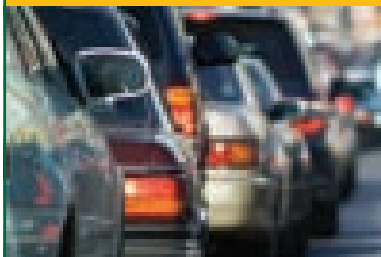


*In 2008, the production and use of 9 billion gallons of ethanol in the U.S. reduced carbon dioxide-equivalent greenhouse gas emissions by approximately 14 million tons, the equivalent of removing more than 2.1 million cars from America's roadways.*



## PROVIDING RENEWABLE ENERGY WHILE REDUCING CARBON EMISSIONS

Biotechnology has boosted the amount of grain produced per acre. This is important because farmable land is limited, yet the demand for grain for both food and fuel is growing dramatically. If biotechnology had not been used from 1996–2007, farmers would have had to plant 106 million additional acres to produce the same amount of food, fuel, and fiber as was actually produced in the past 12 years (Brookes and Barfoot, 2009, forthcoming).

### Did you know?

- In 2007, the combined savings of carbon emissions from biotech crops was equivalent to removing 6.3 million cars from the road. This savings resulted from reduced plowing of fields resulting in better containment of carbon in the soil (sequestration) and less fuel needed for the tractor tilling the land (Brookes and Barfoot, 2009, forthcoming).
- In 2008, the production and use of 9 billion gallons of ethanol in the U.S. reduced carbon dioxide-equivalent greenhouse gas emissions by approximately 14 million tons, the equivalent of removing more than 2.1 million cars from America's roadways (Renewable Fuels Association).
- From 1996–2007, the cumulative reduction of pesticide applications due to biotech crops is estimated to be 359,000 metric tons (Brookes and Barfoot, 2009, forthcoming). Reduced pesticide applications also mean farmers use less fuel.

### HELPING TODAY AND POISED TO GROW FOR TOMORROW

Our energy needs are growing. Agricultural biotechnology is playing a role to meet this growing demand today and is poised to do so tomorrow. Here are the two main types of biofuels currently produced:

- **Ethanol** is derived from corn, sugarcane and other crops. Using ethanol in place of gasoline helps to reduce carbon dioxide emissions by up to 29% given today's technology (Renewable Fuels Association).
- **Biodiesel** is made from soybeans and other oilseed crops. It is increasingly having an impact today through its use to power farm equipment, trucks and buses. It is estimated that in 2008 approximately 8.5 million acres of biotech soybeans produced approximately 500 million gallons of biodiesel (ISAAA, 2008).



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*These new crops are being developed to more efficiently be processed into biofuels to lower costs, further boost yields, and enhance biofuels production to meet rising demand.*



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### **Boosting crop yields while helping reduce greenhouse gas emissions –**

From 1996-2007 biotechnology helped increase global crop production by 141 million tons (Brookes and Barfoot, 2009, forthcoming). Biofuels produced from biotech-enhanced plants can be grown with no-till farming practices, which facilitates carbon sequestration because farmers reduce or eliminate the need to burn fuel tilling their crops, and allow carbon to remain in the ground (Brookes and Barfoot, 2009, forthcoming).

## **BIOTECHNOLOGY AND BIOFUELS: WHAT'S IN STORE FOR THE FUTURE?**

Public and private sector scientists are working in a number of areas to extend the benefits of biotechnology to new generations of biofuels:

- **The next generation of biotech crops** – These new crops are being developed to more efficiently be processed into biofuels to lower costs, further boost yields, and enhance biofuels production to meet rising demand. Scientists are also developing plants that fare better in the face of environmental stresses, such as drought, to help maximize yields.
- **Researchers are developing biocatalysts** – Enzymes, yeasts and bacteria produced using biotechnology will make it possible to produce cellulosic ethanol from just about any organic matter. This could expand the raw material for producing biofuels to include a variety of plants, or even agricultural byproducts (such as cornstalks), which would maximize the use of byproducts in agriculture and put crop or plant residue to better use.
- **Researchers are developing new, improved biofuels** – Biotechnology is being used to produce new, improved biofuels that perform more like gasoline than ethanol and provide better fuel economy.

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National Corn Growers Association Ethanol and Your Vehicle, 2008. <http://www.ncga.com/node/87>

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#### **ABOUT THE COUNCIL FOR BIOTECHNOLOGY INFORMATION**

The Council for Biotechnology Information communicates science-based information about the benefits and safety of agricultural and food biotechnology to sustainable development. Sustainable development seeks to balance and integrate immediate and long-term community needs. It helps enhance our quality of life today, as well as to protect, preserve, and fulfill our needs in the future. Sustainable agriculture is a key component of sustainable development, particularly because it allows for economically and environmentally sustainable agricultural practices. In the United States agricultural biotechnology is contributing today to sustainable agricultural practices, and it has the potential to make even greater contributions in the future through production of biofuels to help meet energy needs; development of drought-tolerant plants to better preserve and manage water resources; and increased crop production to feed our nation and the world's growing population. CBI members are the leading agricultural biotechnology companies.