



# CLIMATE CHANGE

**Climate change is an important risk factor for food production and development. According to the World Bank's *World Development Report 2008*, increasing crop failures and livestock deaths are already imposing high economic losses and undermining food security in parts of Sub-Saharan Africa, and they could get far more severe as global warming continues. The warning that more frequent droughts and increasing water scarcity may devastate large parts of the tropics and undermine irrigation and drinking water in entire communities of already poor and vulnerable people.**

In the face of this pressing need around the globe, the plant science industry can make a positive contribution through the development of technologies and practices that will help to addressing changing weather patterns.

## **Drought Tolerance**

Drought resistance genes have been identified that kick in only when water is limited, and allow plants to survive with less water. These traits are being added to crops such as rice to decrease demands for irrigation and increase productivity in dry conditions.



## **Nitrogen Fixing**

Creating plants that use nitrogen more efficiently can reduce the need for added fertilizer, reducing the greenhouse gas emissions from agriculture.

## **Heat Tolerance**

Increasing the ability of a plant to handle the stress of high temperatures will improve yields in some regions.

## **Salinity Tolerance**

Saline soils are generally unproductive for crops. Salt-tolerant crops will allow land that has been stressed by climate change to be more productive.

## **Soil Conservation**

Conservation agriculture techniques such as low or no-till agriculture, made possible through the use of herbicides, prevents wind and water erosion and loss of ground moisture, improves

soil biodiversity, increases soil fertility, and reduces carbon emissions. In fact, herbicides used in combination with conservation tillage have reduced soil erosion by 50 to 98%.

### **Reducing Emissions**

In 2005, fuel savings associated with the switch to no-till/reduced tillage farming systems, and less frequent pesticide applications made possible by biotech crops, has saved about 962 million kg of carbon dioxide – equivalent to removing nearly 0.43 million cars from the road. The combined effect since 1996 is equal to taking over 2 million cars off the road for one year.

### **Green Power**

Biofuels offer a cleaner source of power. Increasing starch content, utility of stalks leaves and other plant parts, along with greater productivity is important to the sustainability of biofuels.



### **Maximising Outputs**

New technologies, crop protection products, hybrid seeds and biotech crops have allowed maize crop yields in developing countries to rise more than 160% and almost 130% in developed countries; also rice yields to climb by almost 95% in the developed world and around 27% in developing regions.

### **Protecting Against Losses**

Some 20-40% of the world's potential crop production is lost annually because of the effects of weeds, pests and diseases alone; however, crop losses would be doubled if existing pesticide uses were abandoned.

### **New Products**

Crop-derived materials are sustainable, biodegradable and varied. Using plant materials to make car parts means a remarkable weight reduction of about 20% in

some models, helping reduce fuel consumption. Using corn sugar instead of petroleum-based feedstocks to create polymers for textiles and detergents consumes 40% less energy and reduces greenhouse gas emissions by 20%.

Plant science plays a critical role in providing solutions for an agriculture sector facing climate change. This is particularly important in developing countries where agriculture holds great promise for furthering sustainable development and poverty reduction. Continued investment in research and development of these technologies and tools will help provide a path to a green world - with space for forests and fields – that feeds, clothes and fuels; using resources responsibly so that growth continues.