

## Can Biotechnology Help Slow Global Warming?

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You can't open your eyes without them filling with dust and watering. Your mouth is dry from the heat and wind, with no water in sight. The ground you are standing on is dry and cracking. Are you in the Sahara desert or in Kansas 50 years from today? In an article in Grass and Grain entitled "Agriculture in 50 Years," the writer predicted that the Midwest crops that are being grown in Kansas today would be moved to the north in 50 years because of the near desert-like conditions from global warming. Not everyone will agree with this author's predictions. However, we should be worried about the future with the effects of global warming, not only in Kansas, but in the rest of the world as well.

Global warming has become a major problem. It is caused when more solar energy is trapped in the Earth's atmosphere than can escape into space. Carbon dioxide and methane are the two compounds causing the problem. A high quantity of those compounds is coming from power plants and transportation. The rise of temperatures threatens many dangerous consequences, such as drought, disease, floods, lost ecosystems, sweltering heat, and rising seas. Temperatures have increased by about one degree Fahrenheit over the last century and should rise another three to nine degrees by the end of this century. Heat waves, droughts, and wildfires will occur more often and with much more intensity. Disease carrying mosquitoes will expand their range and species will become extinct.

The temperature changes are becoming drastic. No state in the lower 48 states experienced below average temperatures in 2002. Since 1980, the earth has had 19 of its 20 hottest years on record, with 2002 being the second hottest year ever, and 1998 the hottest.

Scientists are building cleaner cars and are modernizing power plants, but another solution is being studied: biotechnology. Can genetically engineering plants play a role in slowing down global warming? Some think so. A genetically modified organism is one that carries and/or inherits an artificially introduced modification in its genome.

Some people don't believe that biotechnology would be able to help to slow down global warming enough to warrant development of biotech crops. They believe that the concentration should be on the power plants and the transportation industry. Even if the genetic technology gets off the ground, it will be unlikely that there will be any visible benefits for 20 to 50 years and we don't have that kind of time.

Another major concern about biotechnology is that the genes will spread and create "super-weeds", thus contaminating conventional and organic crops. Some worry that biotech trees, which contain genes from bacteria, chickens and even human beings, will provide poor habitats for beneficial animals and insects and will transform biologically diverse woodlands into sterile "Frankenforests." Charles Benbrook, a policy and agricultural technology analyst claims that biotechnology may develop ways to adapt to change, but there isn't going to be any simple technical solution to global warming.

But genetically modified organisms are going to happen, so we might as well put them to good use. GMO's have affected many different areas with many different amazing inventions. In Canada, enhanced fruit trees kill insects on contact, without the use of pesticide sprays. In Israel, poplar trees have been made to grow so fast that they could eliminate a need to log old growth forests, while gobbling enough carbon dioxide to help slow global warming. In North Carolina and Minnesota, trees under experimentation which contain novel woody fibers can be processed into pulp without the tons of toxic chemicals that now poison rivers around paper

mills.

These kinds of inventions are paving the way to make biotechnology a plausible choice to help slow down global warming. An agronomy professor from Kansas State University, Charles Rice, says that farmers could use genetically modified plants that are already being used to help slow global warming, such as plants designed to withstand wind, therefore sequester more carbon into soils. Corn that is engineered to grow thicker, woodier stalks uses more carbon so it can make all the woody lignin and cellulose that makes them thicker and stiffer. Those two elements are slow to decompose in soil, so the more biomass that is produced, the more carbon that is put into the soil. Scientists say that they are finding new ways of farming rice so that it can curb global warming as well as produce higher yields. Fields of rice are among the world's highest producers of methane, about 10 percent of global emissions.

Scientists from the Netherlands, Germany and the Philippines have been devising experiments inside greenhouses. They found that the crucial factor is the number of spikelets a plant contains. A spikelet is a structure which holds a number of flowers, and later, grain. The more spikelets produced, the higher the yields and greater effect on slowing down global warming.

Other possibilities include no-till agriculture, which involves the use of herbicide-resistant genetically modified crops to control weeds instead of tilling the ground. Weed tilling causes tractor fuel to be emitted into the atmosphere. Therefore, no-till crops offer a double benefit. Bacteria and fungi use carbon in nearly every molecule, so if they can be made to take on a little more carbon, it could help add up to more carbon sequestration. Fungus is also being studied to create usable fuels out of agricultural waste. Imagine everyone driving a car with an electric motor and a hydrogen fuel cell power plant that you can fuel from the clippings from

your yard.

These possibilities have created the potential for biotechnology to play a role in slowing down global warming. These efforts of finding biotechnological applications are now becoming premeditated instead of being just afterthoughts as was done in the past. “Audrey,” the giant man-eating Venus Flytrap featured in the 1960’s film, Little Shop of Horrors was a fictional creation. But, if plants could be developed to devour mankind’s pollution, we could turn the tide on the destruction of our planet. The feasibility has been proven with various plant studies. Together, with efforts by manufacturing and transportation, the future of the Earth will be secure. In 2054, we can still enjoy the pure water, clean air, and life-sustaining crops that make our state and country the most efficient food producer in the world.

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