

Project: Bioenergy Production and Carbon Sequestration

Amount requested: \$1,000,000

Recipient: University of Tennessee Agriculture Institute

Address: 114 Morgan Hall, 2621 Morgan Circle Drive, Knoxville, Tennessee 37996-4500

Project description: Foreign oil dependency can be reduced through the production of biofuels. The University of Tennessee has an exceptional bioenergy research program in the production and use of energy plants, particularly switch grass, for cellulosic conversion to energy, particularly ethanol. Moreover, a pilot scale biorefinery is under construction; it is a cooperative venture between DuPont/Danisco Cellulosic Ethanol and the University of Tennessee. The elevation of CO₂ and global warming caused largely by burning of fossil fuels and clearing of forests, worldwide, has been documented. This warming trend has caused an increasing amount of ice to melt at the polar caps. Many global models predict weather changes caused by the warming trend and rising water resulting in more frequent, violent storms. Moreover, elevated CO₂ levels coinciding with warming will result in significant shifts in the makeup of plant and animal populations.

Some plant species are more efficient in the conversion of CO₂ levels with increased yield of plant biomass, i.e., carbon, by boosting photosynthetic and water use efficiency. Determining how and where carbon is stored in plants, e.g., roots, can improve plant biomass production for energy while retaining maximum carbon levels in the soil. Achieving these goals requires a full understanding of the physiological processes for conversion of atmospheric CO₂ into plant sequestered carbon and determining how and where carbon is stored in the plants. This more complete understanding will permit genetic modification of plants to maximize the joint beneficial characteristics of carbon sequestration and energy production through plant breeding and biotechnology.