ABSTRACT

As carbon dioxide increases on Earth atmosphere, the rise in average temperatures may provoke changes in the environment that could damage civilisation as we know it. As a result, the need to sequester carbon becomes urgent, and one of the options we have is to use the potential of the forests to do it by enhancing assimilation of CO$_2$ through photosynthesis. However, if we consider the use of plants to increase carbon sequestration, a problem that looms is that species often acclimate and actually reduce CO$_2$ assimilation through feedback mechanisms of the sugars that are the product. In the present article, we propose that some biochemical pathways, such as those in control of photosynthesis, carbohydrate metabolism and assimilation, and cellulose and polysaccharide synthesis, that might be targeted so that C sequestration, could be increased. Genetic control of metabolic pathways is now among the technologies available. Although genetic modification of native plants is controversial, according to the forecasts the concentration of atmospheric CO$_2$ will double in just 50 years, and, therefore, we may have few options short of greatly reducing output. Fortunately, we already know a few candidate genes to be targets for genetic manipulation, and in this short article we discuss some environmentally friendly approaches to the problem.

Keywords: Global change, Carbon Sequestration, Photosynthesis, Rain Forest, Sugar Sensing, Cellulose synthesis, Gene therapy

Full text available only in PDF format.

Texto completo disponível apenas em PDF.
Acknowledgements

The authors thank the colleagues Marilia Gaspar, Marco Tine and Miguel Minhoto for the critical reading of this article and also Nick Carputa and Carlos Labate for the useful discussions about the basic ideas involved in the argument.

References


Date Received: March, 26, 2002
Accepted: April, 04, 2002

1. Carbon Management and Sequestration Center School of Environment and Natural ResourcesThe Ohio State UniversityColumbusUSA. Chapter. First Online: 13 October 2009. However, harvest of forest residues must not result in the depletion of the soil organic carbon (SOC) pool due to decrease in C input and decrease in net primary production (NPP) associated with nutrient export. Judicious soil management is essential to sustainable productivity in short-rotation woody plantations dedicated to bioenergy production. Furthermore, negative impacts of large-scale plantations on the hydrological cycle must be minimized through conservation of water resources. Carbon sequestration, biological diversity, and sustainable development: integrated forest management. Environ Manag 18: 13-22.CrossRefGoogle Scholar. Clason T.R. and Sharrow S.H. 2000. Carbon sequestration and trace gas emissions in slash-and-burn and alternative land-uses in the humid tropics. Final Report, Alternatives to Slash and Burn (ASB) Climate Change Working Group, Phase II. ICRAF, Nairobi, Kenya.Google Scholar. Parrish J., Reitsma R. and Greensberg R. 2003. References. Carbon Sequestration Potential of Silvopastoral and Other Land Use Systems in the Chilean Patagonia. Introduction. Materials and Methods. parklands, forest farming, homegardens, and woodlots, and other similar land use patterns have thus raised considerable expectations as a C sequestration strategy in both industrialized and developing countries. Estimates of aboveground C sequestration potential (CSP) for AFS vary consid-erably. As can be expected, the CSP values are a direct manifestation of the ecologi-cal production potential of the system, depending on a number of factors including site characteristics, land use types, species involved, stand age, and management practices.