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CARBON SEQUESTRATION  
IN SOILS AND COMMERCIAL PRODUCTS

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## Abstract

ORNL, through The Consortium for Research on Enhancing Carbon Sequestration in Terrestrial Ecosystems (CSiTE), collaborated with The Village Botanica, Inc. (VB) on a project investigating carbon sequestration in soils and commercial products from a new sustainable crop developed from perennial *Hibiscus* spp. Over 500 pre-treated samples were analyzed for soil carbon content. ORNL helped design a sampling scheme for soils during the planting phase of the project. Samples were collected and prepared by VB and analyzed for carbon content by ORNL. The project did not progress to a Phase II proposal because VB declined to prepare the required proposal.

## Objective

A basic premise of CSiTE is that carbon sequestration in terrestrial ecosystems can be best accomplished through prudent use of land management tools in forests, croplands, grasslands and wetlands. The challenge is to optimize management practices and species selection and hybridization programs to enhance carbon storage without economic or environmental damage. Native perennial Hibiscus hybrids developed at The Village Botanica, Inc., appear to be suitable for carbon sequestration, sustainable agriculture, and zero-runoff crop-management practices, as well as co-production of wetland trees, shrubs, and perennials. ORNL personnel were to quantify soil carbon concentrations from samples provided by VB and provide advice as to how to determine soil carbon content measurements and comparisons with other data.

## Benefits to the DOE Funding Office's Mission

The focus of CSiTE is on approaches to sequestering significant amounts of carbon in terrestrial ecosystems during the next 20-50 years as a means of buying time for the development and implementation of direct solutions to the large CO<sub>2</sub> releases from human activities. A strain of Hibiscus developed at The Village Botanica, Inc. looked very promising as a means to sequester carbon in one commercial niche.

## Technical Discussion of Work Performed by All Parties

Gary Jacobs and Chuck Garten of ORNL traveled to The Village Botanica, Inc. to plan the establishment of transects and collection of 'pre-treatment' samples. Over 500 coded samples were sent by VB to ORNL for analysis of carbon concentrations using a LECO CN-2000 elemental analyzer.

Personnel at VB calculated the soil carbon contents based on other data, and ORNL provided advice on how to do this. VB separated some of the soil samples into different fractions to measure biomass carbon content by transect lines, as well as some rudimentary correlation statistics between transects and different sets of Hibiscus species, which included a statistical normalization so that VB could demonstrate a comparison of the machine-cored data to the Hibiscus field hand-cored data. All three hibiscus clusters had higher carbon and nitrogen contents than other transects after normalization, even

though the field had been disked and plowed before the hibiscus were installed in the field. Without doing the normalization, the real correlation between the other habitats and the hibiscus production field would never have been seen.

To make the statistical comparisons even more difficult, the machine cores intervals we sampled were divided into 2-5cm intervals, 2-10cm intervals and one 30cm interval. In order to compare the machine core intervals versus the hibiscus cores, VB had to convert the %N & %C data (from the analyzer data dump) into grams of N & C/segment, calculate the total gm of each within a 30 cm segment, normalize the samples for the difference in core diameters, and then compare them statistically. (Due to time constraints, VB completed this process for only one set of comparisons [Transect A versus three hibiscus clusters in the Hibiscus field]). The data are all presented in VB's Final report to SBIR.

#### Inventions

None.

#### Commercialization Possibilities

None.

#### Plans for Future Collaboration

None.

#### Conclusions

No conclusions can be reached. The data were preliminary and incomplete. In addition, changes in soil carbon would need to be observed over several years, and VB is not in the position to continue this research effort.