

## Leaf carbon assimilation and molecular phylogeny in *Cattleya* species (Orchidaceae)

V. Andrade-Souza, A.-A.F. Almeida, R.X. Corrêa, M.A. Costa,  
M.S. Mielke and F.P. Gomes

Departamento de Ciências Biológicas, Universidade Estadual de Santa Cruz,  
Ilhéus, BA, Brasil

Corresponding author: A.-A.F. Almeida  
E-mail: alexalan@uesc.br

Genet. Mol. Res. 8 (3): 976-989 (2009)  
Received March 28, 2009  
Accepted June 6, 2009  
Published August 11, 2009

**ABSTRACT.** We examined leaf CO<sub>2</sub> assimilation and how it varied among species within the orchid genus *Cattleya*. Measurements of CO<sub>2</sub> assimilation and maximum quantum yield of PS II (Fv/Fm) were made for mature leaves of nine species using a portable system for photosynthesis measurement and a portable fluorometer. Leaf area was measured with an area meter, and the specific leaf mass was determined. DNA of nine *Cattleya* species and two species of *Hadrolaelia* was extracted using the CTAB protocol. Each sample was amplified and sequenced using primers for the *trnL* gene. The phylogenetic analyses, using neighbor-joining and maximum parsimony methods, retrieved a group that included *Cattleya* and *Hadrolaelia* species, in which the unifoliate species were separated from the bifoliate. The topologies of the two cladograms showed some similarities. However, *C. guttata* (bifoliate) was placed in the unifoliate clade in the neighbor-joining tree, while *C. warneri* (unifoliate) was not placed in this clade in the maximum parsimony tree. Most *Cattleya* species keep the leaf stomata closed from 6 am to 4 pm. We suggest that *C. elongata*, *C. tigrina* and *C. tenuis* have C<sub>3</sub>-crassulacean acid metabolism since they open their stomata around 12 am. The Fv/Fm values remained relatively constant during the measurements of CO<sub>2</sub> assimilation. The same was observed for the specific leaf mass values, although great variations were found in the leaf area values. When the species were grouped using molecular data in the neighbor-joining

analysis, no relation was observed with CO<sub>2</sub> assimilation.

**Key words:** Chloroplast gene; Crassulacean acid metabolism;  
Leaf gas exchange; Maximum quantum yield of PS II