Available online at www.sciencedirect.com

ScienceDirect

Procedia Environmental Sciences 29 (2015) 206 – 207

Procedia Environmental Sciences

Agriculture and Climate Change - Adapting Crops to Increased Uncertainty (AGRI 2015)

Elevated atmospheric carbon dioxide concentration increases *Eucalyptus* plantlets growth and reduces diseases severity

Raquel Ghini[a]*, Rodrigo E. O. MacLeod[b], Michelli S. Santos[b], Carlos E. O. Silva[b]

[a]*Embrapa Environment, C. P. 69, CEP 13820-000 Jaguariúna, SP, Brazil*
[b]*UNESP/FCA, C. P. 237, CEP 18610-307, Botucatu, SP, Brazil*

Abstract

The impacts from elevated atmospheric carbon dioxide (CO_2) concentrations on forest systems have to be evaluated in order to develop adaptation strategies. The objective of this study was to evaluate the effects of high CO_2 concentration on eucalypt plantlets growth and on the severity of eucalypt rust (*Puccinia psidii*), Ceratocystis wilt (*Ceratocystis fimbriata*) and leaf-spot (*Cylindrocladium candelabrum*). The experiments for each pathogen were performed in open-top chambers (OTC) and closed chambers (CC). Two clones with different levels of rust resistance were studied in the experiments with rust and Ceratocystis wilt: a *Eucalyptus urophylla* x *E. camaldulensis* hybrid and an *E. urophylla*. For leaf-spot, seedling of *E. urophylla* were tested. The experiments were repeated twice. The plantlets were cultivated under ambient and high CO_2 concentrations (ranging from 520 to 1,147 ppm) for at least 30 days before the inoculation of the pathogens. High CO_2 concentrations resulted in a decrease in diseases severity. Plant growth was stimulated by up to 23% in height and 26% in stem diameter in OTCs. Leaf area, dry matter mass and carbon content of the plants was greater at higher CO_2 concentrations. In this study, increased concentrations of atmospheric CO_2 favourably affected eucalypt growth and reduced diseases severity. This effect could potentially compensate for negative impacts from other environmental variables that are affected by climate change and should be considered in the development of adaptation strategies to address climate change.

© 2015 The Authors. Published by Elsevier B.V This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Peer-review under responsibility of the organizing committee of the Agriculture and Climate Change - Adapting Crops to Increased Uncertainty (AGRI 2015)

Keywords: Puccinia psidii; Ceratocystis fimbriata; Cylindrocladium candelabrum

* Corresponding author. Tel.: 55-19-33112664; fax: 55-19-33112640.
E-mail address: raquel.ghini@embrapa.br

1878-0296 © 2015 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Peer-review under responsibility of the organizing committee of the Agriculture and Climate Change - Adapting Crops to Increased Uncertainty (AGRI 2015)
doi:10.1016/j.proenv.2015.07.264

References

1. Santos MS, Ghini R, Fernandes BV, Silva CA. Increased carbon dioxide concentration in the air reduces the severity of *Ceratocystis* wilt in *Eucalyptus* clonal plantlets. *Australas Plant Path* 2013;**42**:595-9.
2. Silva CEO, Ghini R. Plant growth and leaf-spot severity on eucalypt at different CO_2 concentrations in the air. *Pesqui Agropecu Bras* 2014;**49**, 232-5.
3. Ghini R, MacLeod REO, Torre-Neto A, Cardoso DC, Bettiol W, Morais LAS, Vique B. Increased atmospheric carbon dioxide concentration: effects on eucalypt rust (*Puccinia psidii*), C:N ratio and essential oils in eucalypt clonal plantlets. *Forest Pathol* 2014;**44**, 409-16.