Leaf Fluctuating Asymmetry in a Mediterranean Shrub

Reference

Kaligaric, M., Tognetti, R., Janzekovic, F. and Raschi, A. 2008. Leaf fluctuating asymmetry of *Myrtus communis* L., affected by increases in atmospheric CO_2 concentration: Evidence from a natural CO_2 spring. *Polish Journal of Environmental Studies* **17**: 503-508.

Background

The authors write that *fluctuating asymmetry* (FA) in plant and animal morphological traits "describes the magnitude of random deviations from perfect symmetry," and that it "offers a unique tool for comparative studies of developmental stability (Moller and Swaddle, 1997)." In plants, for example, they say that FA has been proposed to be "an indicator of genetic and environmental stress (Martel *et al*., 1999; Cornelissen and Stiling, 2004)."

What was done

Kaligaric *et al*. measured the degree of FA in "undamaged (not grazed, not visibly attacked by herbivores or pathogens) fully developed leaves" of the Mediterranean shrub *Myrtus communis* L. growing along an atmospheric CO_2 gradient (570, 530, 490, 450, 410 and 370 ppm) moving away from a natural CO_2 spring "I Borboi" near Lajatico (Pisa, Tuscany, Italy) at distances of 2, 18, 34, 50, 66 and 82 m, respectively, from the CO_2 source.

What was learned

The four researchers report they found "a significant and negative correlation between CO_2 concentration and leaf FA," such that "with increased CO_2 concentration the leaf FA decreased," which result, in their words, "confirms what was obtained by Cornelissen *et al*. (2004) on *Quercus myrtifolia* and *Quercus geminata* (in a short-term experiment)." In addition, they note that "*Myrtus communis*, grown under elevated CO_2 concentration at 'I Borboi,' showed a reduction in xylem embolism and an increase in hydraulic efficiency (Tognetti *et al*., 2001)," stating that "improved water relations could represent a good explanation for the observed reduction in leaf FA [as the air's CO_2 content increased]."

What it means

In discussing their findings, Kaligaric *et al*. say that "adaptation and selection could explain the tendency towards decreased leaf FA in plants from the CO_2 spring relative to ambient conditions," since "the more symmetrical leaves under long-term elevated CO_2 concentration were more developmentally stable in these conditions."

References

Cornelissen, T. and Stiling, P. 2004. Perfect is best: how leaf fluctuating asymmetry reduces herbivory by leaf miners. *Oecologia* **142**: 46-56.

Cornelissen, T., Stiling, P. and Drake, B. 2004. Elevated CO_2 decreases leaf fluctuating asymmetry and herbivory by leaf miners on two oak species. *Global Change Biology* **10**: 27-36.

Martel, J., Lempa, K. and Haukioja, E. 1999. Effects of stress and rapid growth on fluctuating asymmetry and insect damage in birch leaves. *Oikos* **86**: 208-.

Moller, A. and Swaddle, J.P. 1997. *Asymmetry, Developmental Stability and Evolution*. Oxford University Press, Oxford, UK.

Tognetti, R., Longobucco, A., Raschi, A. and Jones, M.B. 2001. Stem hydraulic properties and xylem vulnerability to embolism in three co-occurring Mediterranean shrubs at a natural CO_2 spring. *Australian Journal of Plant Physiology* **28**: 257-268.

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