Leaf Fluctuating Asymmetry in a Mediterranean Shrub

Reference

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 CO₂ gradient (570, 530, 490, 450, 410 and 370 ppm) moving away from a natural CO₂ spring "I Borboi" near Lajatico (Pisa, Tuscany, Italy) at distances of 2, 18, 34, 50, 66 and 82 m, respectively, from the CO₂ source.

What was learned
The four researchers report they found "a significant and negative correlation between CO₂ concentration and leaf FA," such that "with increased CO₂ 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 CO₂ 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 CO₂ 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 CO₂ spring relative to ambient conditions," since "the more symmetrical leaves under long-term elevated CO₂ concentration were more developmentally stable in these conditions."

References


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-


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