



HAL
open science

**Vulnerability to ozone in anthropized ecosystems.
Improvement of the threshold for risk assessment
(VULNOZ project)**

Pierre Dizengremel, Yves Jolivet, Didier Le Thiec, Olivier Bethenod,
Jean-François Castell, Benjamin Loubet, Romain Roche, A. Repellin, G.
Noctor, Eric Lamaud

► **To cite this version:**

Pierre Dizengremel, Yves Jolivet, Didier Le Thiec, Olivier Bethenod, Jean-François Castell, et al..
Vulnerability to ozone in anthropized ecosystems. Improvement of the threshold for risk assessment
(VULNOZ project). 1er Colloque national d'Ecologie Scientifique, Sep 2010, Montpellier, France. 1
p. hal-01192222

HAL Id: hal-01192222

<https://hal.science/hal-01192222>

Submitted on 6 Jun 2020

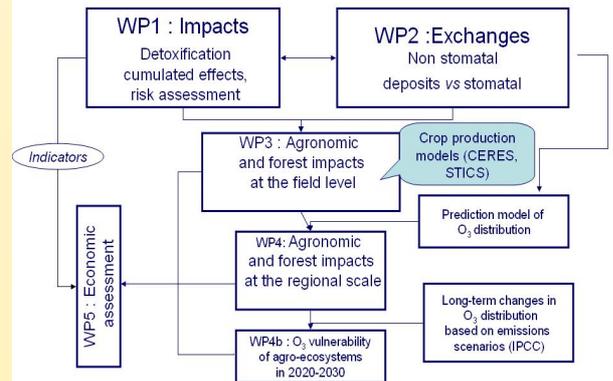
HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

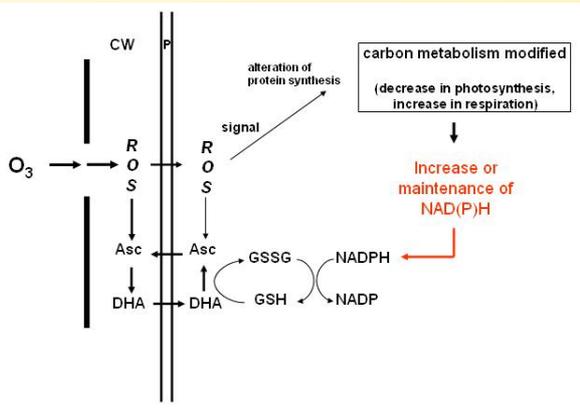
Vulnerability to ozone in anthropized ecosystems. Improvement of the threshold for risk assessment (VULNOZ project)

P. Dizengremel - Y. Jolivet - D. Le Thiec - O. Bethenod - J-F. Castell - B. Loubet - R. Roche
A. Repellin - G. Noctor - E. Lamaud

Context : In industrialized countries, ozone (O₃) is an important gaseous air pollutant with phytotoxic effects due to strong oxidizing properties. Model projections using IPCC scenarii for the 21st century indicate that concentrations of ozone will by far exceed internationally accepted critical levels. An increased vulnerability of agroecosystems could occur. Over the past decades, the risk assessment for O₃ effects on European vegetation has driven the development of policies primarily based on the AOT40 exposure index. There is now accumulating evidence that the responses of vegetation to ozone are better related to the absorbed dose (Cumulative Ozone Uptake CUO) through stomata than to external concentrations, the absorbed dose being defined as the balance between the O₃ taken up and the detoxification capacity. However, until now, the detoxification capacity of plants remains poorly quantified, and detoxification functions to be included in photosynthesis models are needed. Moreover, the O₃ taken up is often assimilated as the canopy O₃ flux, neglecting the non-stomatal flux.



O₃ physiological impact and detoxifying functions



Summary of the detoxifying processes to be tested by biochemical and molecular analyses. After validation, the resulting detoxifying functions will be included in photosynthesis models.

O₃ face system and phytotronic chambers

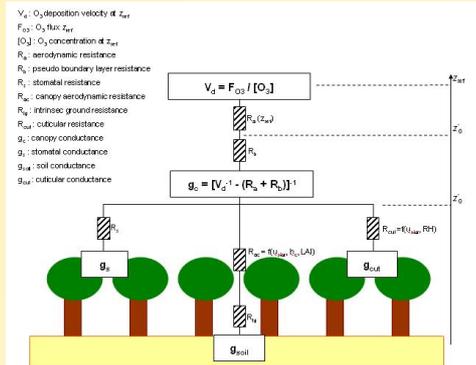


maize

wheat

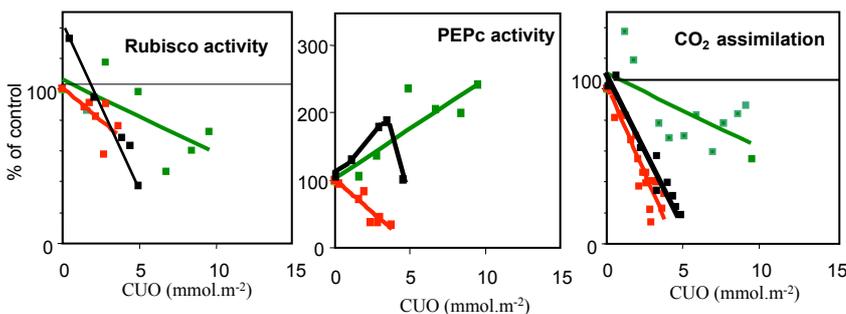
poplar

Partitioning stomatal and non-stomatal fluxes



Schematic description of the model of ozone deposition (according to Lamaud et al. 2009)

The improvement of the parameterisation of ozone deposition requires to quantify O₃ fluxes and stomata conductances over various ecosystems with a unified and comparable experimental method.



Relative to CUO, the Rubisco activity and CO₂ assimilation were decreased. By contrast, higher PEPC activities were shown for C₃ plants (poplar and wheat) not for C₄ plants (maize). Based on this results maize is less resistant species than wheat and poplar.