



The International Cooperative Programme on Effects of Air Pollution on Natural Vegetation and Crops
& ARCHES-Conseils
& International Union of Forest Research Organizations - Research Group 7.01

present the

International Conference on Ozone and Plant Ecosystems

21-25 May, 2018

SANT'APOLLONIA AUDITORIUM
FLORENCE, ITALY



*Ozone & Plants conference
Florence, 21-25 May 2018*

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1. Rationale of the Conference

Ozone pollution continues to be a serious issue for terrestrial ecosystems and plant health. This conference allows all experts in the interactions between ozone and plant ecosystems to meet and discuss the state-of-the-art and the future strategies for decision-makers.

The main subjects of the conference are:

1. Monitoring, modelling and assessing the risk of ozone damage to plant ecosystems

Proofs of the impacts of ambient ozone on plant ecosystems are still elusive. New monitoring approaches and epidemiological studies are developing. Modelling of ozone is becoming more and more sophisticated at high resolution. Risk assessment is evaluating many different metrics for plant protection, with a focus on stomatal ozone flux. All these developments, with focus on the most modern techniques, are discussed in this session.

2. How plant ecosystems affect ozone concentration in the atmosphere

Ozone deposition is strongly affected by the type of vegetation. Exchanges of biogenic volatile organic compounds is known to contribute to ozone chemistry in the atmosphere. This session addresses mechanisms, seasonality, responses to ozone singly and in combination with other environmental factors, as well as selection of appropriate green infrastructure for urban greening.

3. How plant ecosystems respond to ozone exposure

This session includes food security and effects on forests and grasslands. A main aim is to evaluate strategies for maximizing yield, productivity and other environmental services of plant ecosystems under ozone stress.



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2. Opening Addresses

Elena Paoletti, IUFRO RG7.01 Coordinator

As coordinator of the IUFRO (International Union of Forest Research Organizations) Research Group 7.01 'Impacts of Air Pollution and Climate Change on Forest Ecosystems', I am pleased to welcome in Florence around a hundred international experts from 29 countries distributed in four continents. This is an index of the global significance of the ozone and plants subject. IUFRO is the largest network of forest research in the world, and works for strengthening the forest science community worldwide. Within Division 7 'Forest Health', RG 7.01 is a major forum for discussing the topical issues of climate and pollution impacts on forests. This conference, in particular, is supported by the IUFRO Working Parties 7.01.09 'Ground-level ozone', 7.01.02 'Genetic, biochemical and physiological processes' and 7.01.05 'Modelling and risk assessment', because assessing ozone risk to plant ecosystems requires an holistic approach. We are glad to host this second conference on ozone and plant ecosystems in Italy, which traditionally is a hot spot of ozone pollution. Control measures, however, are becoming effective and improvements are coming. We are also very glad to collaborate with ICP Vegetation in expanding our focus from forests to grasslands and crops. We hope that the results of this conference, with 51 talks and 47 poster presentations, will help improving our understanding on the relationships between ozone and plants, and expanding this knowledge worldwide. I would like to express my sincere appreciation to the members of the local organization and wish all participants all the best for a very fruitful conference.

Harry Harmens, Chair of ICP Vegetation

As Chair of the ICP Vegetation I would like to welcome you to the second 'Ozone & Plants' conference. The ICP Vegetation is an International Cooperative Programme (ICP) that reports on the effects of air pollutants on natural vegetation and crops. The ICP Vegetation is a subsidiary body of the Working Group on Effects (WGE) of the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP). In particular, the ICP Vegetation focuses on the following air pollution problems: i) Quantifying the risks to vegetation posed by ozone pollution and collating field-based evidence of ozone impacts; ii) The atmospheric deposition of heavy metals, nitrogen and persistent organic pollutants (POPs) to vegetation. Field-based evidence and assessments of current and future risks of impacts on vegetation are used to guide air pollution abatement policies developed within the LRTAP Convention, for ozone in particular with respect to the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (amended in 2012). The ICP Vegetation also encourages outreach activities to other regions such as Asia, Africa and South America and has recently established an ICP Vegetation-Asia network. Ground-level has been shown to have negative impacts on crop yield (both quality and quantity), tree growth (above- and below-ground) and growth/flower number/seed number of other ozone-sensitive plant species. Hence, ozone adversely affects food production, terrestrial ecosystems and the services they provide. Although peak episodes of ozone pollution have declined in recent decades in many parts of the USA and Europe, peak concentrations have risen in developing regions, in particular in South-East Asia. This has contributed to rising background ozone concentrations elsewhere, hence, air pollution abatement measures are needed globally to combat ozone pollution impacts worldwide. I wish you all a successful meeting and I am looking forward to enhance the evidence and knowledge base of ozone impacts and its mechanisms on vegetation.

3. Schedule and Programme

Programme in short

TIME	Monday, 21	Tuesday, 22	Wednesday, 22	Thursday, 23	Friday, 25
08.00		Registration			Move to Sesto Fiorentino
08.30			Session 2 Chair: Z. Feng	Session 2 Chair: A. Giovannelli	
09.00		Opening remarks			
09.30		Session 1 Chair: Pierre Sicard	Conference Picture		Visiting the Ozone-Face
10.00		Coffee break	Coffee break and Poster session	Coffee break and Poster session	
10.30					
11.00		Session 1 Chair: P. Sicard	Session 2 Chair: E. Paoletti	Session 2 Chair: E. Agathokleus	Move to Verrazzano
11.30					Visiting the winery
12.00					Wine tasting and Lunch
12.30		Lunch	Lunch	Lunch	
13.00					
13.30					
14.00		Session 1 Chair: A. De Marco	Session 2 Chair: L. Zhang	Session 2 Chair: M. Domingos	Move to Siena
14.30					
15.00		Coffee break		Coffee break	
15.30					
16.00		Session 1 Chair: H. Harmens	Coffee break	Session 3 Chair: Y. Hoshika	Free time to visit Siena
16.30					
17.00			Session 2 Chair: E. Carrari	Round table Chair: H. Harmens	
17.30				Closing remark by E. Paoletti	Back to Florence
18.00		Wine tasting and Poster session (18.10-20.00)			
18.30			Free time		
19.00	Welcome cocktail and registration (19.00-20.30)				
19.30					
20.00			Conference Dinner (20.00-23.00)		
20.30					
21.00					
23.00					

11:40	Ane Vollsnes (Norway). Ozone stress on sub-Arctic tundra vegetation: ozone exposure experiments with daylength manipulation	S2.05
12:00	Tsetan Dolker (India). Grassland community response to elevated ozone exposure by assessment of soil dynamics, plant diversity and total biomass	S2.06
12.20	Lunch	
Session 2 “How plant ecosystems respond to ozone exposure” Chairs: Lu Zhang		
13:40	Keynote speaker - Hakan Pleijel (Sweden). Ozone impacts on crop yield and food security	S2.07
14:10	Katrina Sharps (UK). Global food security modelling: quantifying the threat to crop production from ozone pollution	S2.08
14.30	Shashi B. Agrawal (India). Understanding the ozone response in Indian crop plants	S2.09
14.50	Elina Oksanen (Finland). Sensitivity of Indian crop plants to ozone	S2.010
15:10	Michael Frei (Germany). Breeding of ozone tolerant cereal crops: progress and prospects	S2.011
15.30	Felicity Hayes (UK). Impact of ozone on physiology and yield of African crops	S2.012
15.50	Juliette Leymarie (France). Responses of crops to ozone exposure: study of physiological parameters	S2.013
16:10	Daniel B. Ward (Portugal). Assessing the risk of tropospheric ozone phytotoxic effect on Southern European Mediterranean environments: a review with emphasis on vineyards	S2.014
16.30	Coffee break	
Session 2 “How plant ecosystems respond to ozone exposure” Chair: Elisa Carrari		
17:00	Laurence Dalstein-Richier (France). Monitoring ozone, foliar deficit and ozone-specific foliar damage on national forest plots in France over several years	S2.015
17:20	Sheng Xu (China). Physiological responses of turf-type <i>Festuca arundinacea</i> to elevated O ₃	S2.016
17:40	Anthony Gandin (France). Multi-level responses to ozone in Euramerican poplars	S2.017
18:00	Tetsuto Sugai (Japan). Non-linear responses of two larch species exposed to four ozone levels	S2.018
18:20	Maamar Benchohra (Algeria). Effects of short term ozone fumigation on young trees of poplar <i>Populus nigra</i>	S2.019
20:00	Conference dinner (Palazzo Budini-Gattai Via De Servi 51, see the map at chapter 6)	

Assessing the risk of tropospheric ozone phytotoxic effect on Southern European Mediterranean environments: a review with emphasis on vineyards

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Tropospheric ozone in Southern Europe has an increasing tendency in association with a greater incidence of warm summers and heatwaves. As there is already much evidence of the negative effects that current ambient ozone has on vegetation, there is a need for consistent risk assessment methods. Ozone plant exposure-based parameters have been used extensively to support decision-making. However, these parameters have been also criticised, as they do not relate with the actual dose of ozone entering the plant. Moreover, in Mediterranean environments, they often overestimate the risk as thresholds are exceeded without corresponding evidence of damaging effects. To overcome these limitations, dose-based approaches were developed. These approaches have a stronger biological basis as they are based on estimates of the amount of ozone molecules that diffuse into the leaf cells through the stomata. However, they have also limitations, as detoxification processes or non-stomatal uptake are not often taken into consideration. This work presents a review regarding ambient ozone effects on vegetation and the indices used to assess phytotoxic risk in southern European Mediterranean plant communities and crops. Emphasis is given to the grapevine as three southern European countries (Spain, Italy and Portugal) are major wine producers concentrating more than 20% of the area under grapevines globally. These countries hold a long winemaking tradition associated to renowned denominations of origin (DOs). Therefore, there is concern regarding climate change as a potential threat to wine typicity in these areas, most of the work focusing on atmospheric variables, bioclimatic and climate change indices only. Results from the DOUROZONE project are presented with the aim to analyse the implications climate change can have in a significant Portuguese wine region such as the Douro Demarcated Region (DDR) including ozone-related indices as a novelty among other more frequently used bioclimatic and climate change indices.

Keywords: tropospheric ozone, climate change, grapevine, phytotoxic risk assessment, Portuguese Douro Demarcated Region

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