

# ENVIRONMENTAL POLLUTION

and  
**PLANT  
RESPONSES**

Suranaree University of Technology



31051000576107

edited by

Shashi Bhushan Agrawal  
Madhoolika Agrawal

## **Contents**

### **Chapter 1**

- Global Climate Change and Crop Responses: Uncertainties Associated with the Current Methodologies ..... 1  
**Sagar V. Krupa and J. V. Groth**

### **Chapter 2**

- The Effects of Climate Change on the Behavior of Woody Perennials ..... 19  
**Christopher J. Atkinson**

### **Chapter 3**

- CO<sub>2</sub> Enrichment of the Atmosphere and the Water Economy of Plants ..... 33  
**James Heath and Terry A. Mansfield**

### **Chapter 4**

- Plant Responses to Elevated CO<sub>2</sub>: A Perspective from Natural CO<sub>2</sub> Springs ..... 45  
**Maurizio Badiani, Antonio Raschi, Anna Rita Paolacci, and Franco Miglietta**

### **Chapter 5**

- UV-Effects on Plants ..... 83  
**Manfred Tevini**

### **Chapter 6**

- Field Studies on Impacts of Air Pollution on Agricultural Crops ..... 99  
**J. N. B. Bell and F. M. Marshall**

### **Chapter 7**

- Air Pollution and Vegetation Damage in South America:  
State of Knowledge and Perspectives ..... 111  
**Andreas Klumpp, Marisa Domingos, and Maria Luisa Pignata**

### **Chapter 8**

- Effects of Air Pollution on Plant Diversity ..... 137  
**Madhoolika Agrawal and S. B. Agrawal**

### **Chapter 9**

- Effects of Tropospheric Ozone on Woody Plants ..... 153  
**Katrien Bortier, Reinert Ceulemans, and Ludwig de Temmerman**

### **Chapter 10**

- Extracellular Antioxidants: A Protective Screen Against Ozone? ..... 183  
**Tom Lyons, Matthias Plöchl, Enikő Turcsányi, and Jeremy Barnes**

### **Chapter 11**

- Early Detection, Mechanisms of Tolerance, and Amelioration  
of Ozone Stress in Crop Plants ..... 203  
**Edward H. Lee**

Chapter 12	
Defense Strategies against Ozone in Trees: The Role of Nutrition.....	223
<b>Andrea Polle, Rainer Matyssek, Madeleine S. Günthardt-Goerg, and Stefan Maurer</b>	
Chapter 13	
Use of Protective Chemicals to Assess the Effects of Ambient Ozone on Plants .....	247
<b>William J. Manning</b>	
Chapter 14	
Sources, Atmospheric Transport, and Sinks of Tropospheric	
Nitrous and Nitric Acids.....	259
<b>Ralf Zimmerling and Ulrich Dämmgen</b>	
Chapter 15	
Effects of Sulfur Dioxide and Acid Deposition on Chinese Crops.....	295
<b>Cao Hongfa, Jianmin Shu, Yingwa Shen, Yingxin Gao, Jixi Gao, and Linbo Zhang</b>	
Chapter 16	
The Use of Calibrated Passive Monitors to Assess Crop Loss	
Due to Ozone in Rural Locations.....	307
<b>Victor C. Runbeckles and Patricia A. Bowen</b>	
Chapter 17	
Wild Plant and Crop Plant Species for <i>In Situ</i> Microspore	
Analysis of a Polluted Environment .....	317
<b>G. Murín and K. Miéita</b>	
Chapter 18	
Phytomonitoring in Industrial Areas.....	329
<b>Sharad B. Chaphekar</b>	
Chapter 19	
Statistical Baseline Values for Chemical Elements in the	
Lichen <i>Hypogymnia physodes</i> .....	343
<b>James P. Bennett</b>	
Chapter 20	
Monitoring Air Pollutant Deposition in the Arctic with a Lichen by Means	
of Microscopy and Energy-Dispersive X-ray Microanalysis: A Case Study.....	355
<b>Richard F. E. Crang</b>	
Chapter 21	
Phytochelatins and Metal Tolerance .....	367
<b>Rajesh K. Mehra and Rudra D. Tripathi</b>	
<b>Index .....</b>	383