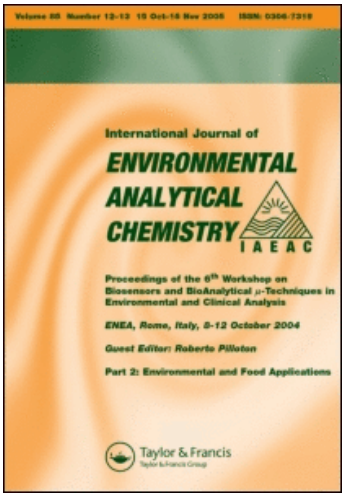

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A Review of: "Biomonitoring Air Pollutants with Plants"

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Book Review

BIOMONITORING AIR POLLUTANTS WITH PLANTS, by William J. Manning and William A. Feder, University of Massachusetts, POLLUTION MONITORING SERIES (1980), 142 pages (including 36 figures, 51 tables and an index of 6 pages), linen, format 228 × 148 mm, ISBN 0-85334-916-9, Applied Science Publishers Ltd., London, £11.

The authors distinguish between bioindicators and biomonitors. Green plants–per unit–are inexpensive, easily reproduced, readily multiplied and capable of several different response modes from which the observer can choose one or more best suited to a particular study. Typical injury symptoms, or the presence of measurable amounts of metabolites or trace metals, indicate that a pollutant, or mixture of pollutants, is present in the ambient air surrounding particular plants. It is discussed, how to find ways to quantify such observations, so that the indicator plant becomes a monitor. The right annual or perannual plant is chosen according to characteristic reactions to specific air pollutants, and may be used in conjunction with mechanical instruments to confirm results and extent monitoring networks. Natural populations, plus a breeding and selection effort targeted to produce pollutant-tolerant and susceptible lines of plants, yield the plant types useful for monitoring air pollutants. Leaf injury can be measured by a photo reference system, utilizing direct comparisons with reference photographs. Quantitative chemical analyses of plant tissues for sulfate, HF and heavy metals are the most reliable reflections of pollutant concentrations and uptakes. Ozone, PAN and ethylene, for instance, do however not accumulate in plant tissues, and different evaluation methods have to be developed.

The authors describe and illustrate the symptoms of air pollution injury on plant, mosses and lichens, which gives a better understanding of the basis for the current state-of-the-art. Six chapters are devoted specifically to developments in biomonitoring photochemical oxidants (ozone, PAN, oxides of nitrogen), sulfur dioxide, hydrogen fluoride, heavy metals and dusts, and ethylene with plants, and future directions and needs. Additionally to the air contamination by natural products, the recent additions from man's technology (stationary combustion sources, mobile combustion sources, industrial pollutant sources) are discussed.

Tobacco plants, beans, grapes, and—in glass houses—tomato and lettuce seem to be good biomonitors for oxidants (O_3, NO_x). Conifers, ferns and lichen are excellent for SO_2. Apricot, peach, conifers, gladioles, lichens are used for HF. Orchids are sensitive for ethylene. Mosses are the best biomonitors for heavy metals, but it is not quite clear whether the accumulation is the result of the deposition on a very large surface, or to what extent the metals measured penetrate into the leaves. Of course there is no relationship of plant responses to human health. Some data about phytotoxicity are given. Each chapter ends with a valuable bibliography which contains mainly literature of the 1960's and the 1970's (up to 1979).

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