

Book reviews

Agricultural Chemicals and the Environment. Issues in Environmental Science and Technology, by R.E. Hester and R.M. Harrison (Eds.), The Royal Society of Chemistry, Information Services, 1996.

The latter half of this century has seen an enormous increase in the number and quantities of chemicals used to improve agricultural productivity. Whilst these improvements have brought clear benefits to society, the demand for affordable quality produce has been matched by a rise in concerns for the environmental implications of chemical use. The use of agricultural pesticides such as DDT undoubtedly had a significant part in the rise of the environmental movement, and the increased demand for 'organically grown' produce reflects public concerns over chemicals used in food production generally. The introduction of European legislation to protect groundwaters from nitrate pollution, and the impact of eutrophication processes on potable and amenity water resources highlight issues surrounding the input of nutrients into our environment. The scientific community has made considerable research efforts into the understanding, monitoring and managing of these environmental impacts. The fifth title in the commendable 'Issues in Environmental Science and Technology' series examines some of the fruits of these efforts.

As part of a series of publications designed to provide up-to-date reviews of topical issues, 'Agricultural Chemicals and the Environment' provides six independently written reviews of the current research activities and findings covering: leaching and atmospheric emissions of agricultural nitrogen; eutrophication of natural waters and cyanobacterial toxins; water quality impacts from pesticides; and use and environmental consequences of drugs and dietary additives in animal production.

'*Agricultural Nitrogen and Emissions to the Atmosphere*' concisely and systematically reviews a great deal of research data and findings on the chemical transformations and gaseous emissions of ammonia, NO and N₂O from agricultural activities. The reader is taken through the sources and chemical and biological processes leading to emissions. The article then compares the various methods used to quantify these emissions at the field scale, and to scale up the data to estimate regional and global values. The environmental significance of emissions, with respect to pollutant transport and contribution to atmospheric chemistry concludes a useful and comprehensive examination of this issue.

To compliment this review, Thomas Addiscott contributes an extremely readable and accessible insight into the issues of '*Fertilizers and Nitrate Leaching*'. The author tries

to put the fertilizer nitrate problem into perspective, correctly including political considerations which draw blame away from the farmer. The perceived health and environmental problems of nitrate pollution are briefly reviewed, and a number of agricultural plot experiments are drawn on to examine fate and environmental partitioning of nitrate. Leaching is examined principally from a source approach, stressing the high efficiency of nitrate uptake by crops from fertilisers (animal and atmospheric contributions are also mentioned). A range of factors are discussed including time of application, crop and soil types, implications of ploughing up grassland and memory effects. Whilst concerns over the potential 'time bomb' of increasing reserves of soil organic nitrogen are mentioned, the review would have benefited from a further discussion of its implications for managing longer term pollution potential.

The environmental consequences of anthropogenic sources of nutrients leaching into water bodies is the subject of '*Eutrophication of Natural Waters and Toxic Algal Blooms*'. Written by workers from the then National Rivers Authority and the Institute for Freshwater Ecology in Cumbria, the article clearly reviews the causal factors, symptoms and management strategies for eutrophication in UK inland waters. Following the establishment of a link between aquatic biomass analogues and increases in agriculture, human settlement and sewage treatment, the observation that increases in lake biomass do not necessarily result in algal blooms is discussed with reference to external and internal nutrient sources, availability and seasonal factors. Physical and biological remediation methods are reviewed together with strategies for point-source nutrient removal and catchment management under the current management framework in the UK.

To continue this theme '*Analysis and Risk Assessment of Cyanobacterial Toxins*' introduces the incidences of algal blooms and the associated clinical symptoms caused by exposure to the toxins they produce. Biological assays and physicochemical methods for screening, identification and quantification of toxins are reviewed and assessed for sensitivity, specificity and ease of use. Risk assessment is discussed in its role in developing recommended limits for potable water in Australia, limits which are below the detection limit of many biological assay techniques. Standard procedures for analysis and risk assessment are still being developed. Therefore, the author advises that the appearance of algal blooms be treated in a precautionary manner.

'*Impact of Agricultural Pesticides on Water Quality*' reviews the North Sea and inland water monitoring data for a range of pesticides. The findings are linked to data on pesticide usage, legislative bans and they are given in the light of continued development of new techniques to detect lower levels and greater numbers of these chemicals. Although this review acknowledges the general lack of scientific data on the longer term effects, chronic toxicity and metabolites of many pesticides in current use, it optimistically discusses the moves to less persistent pesticides and the expected improvement in environmental protection from the use of new modelling tools.

The remaining review, '*Drugs and Dietary Additives, Their Use in Animal Production and Potential Environmental Consequences*', suffers from trying to condense too wide a subject area. The article discusses the advantages and disadvantages of intensive animal husbandry where animals are exposed to a smaller variety of food and more drugs compared to extensively reared animals which, although receiving fewer man-made

drugs, are likely to encounter similar natural compounds. Examples are given of the wide range of chemicals involved, from natural plant toxins, through drugs for disease control and growth promotion, to the recent use of enzymes and biological enhancement of gut microflora to improve nutrient assimilation. A variety of affected environments are discussed, including ruminant gut and excreta flora, fodder cropland, animal populations with respect to chemical resistance, and the atmosphere with respect to methane production. Although this review suffers from trying to cover too much, the author succeeds in illustrating the range of interesting facets to this complex and multidisciplinary topic.

'*Agricultural Chemicals and the Environment*' manages to cover a lot of scientific ground and remain concisely informative. All reviews are presented in a style which makes this publication an interesting and highly readable text. It forms an excellent addition to the series, providing a valuable and detailed overview for those with a vocational or general interest in agriculture and the environment.

Jonathan Knight

Hazardous and Industrial Wastes: Proceedings of the Twenty-Eighth Mid-Atlantic Industrial and Hazardous Waste Conference. Scott A. Weber, (Ed.), Technomic Publishing, Lancaster, PA, 1996, 838 pp., \$125.00, ISBN: 1-56676-479-3.

This book is a compilation of over 110 papers presented at this above-noted conference. The theme for the conference was "From Test Tube to Field". The title was selected by the organizers of the conference to reflect the continuing maturation of technology development required for environmental protection and restoration and the need to take that technology into the field. Accordingly, an appropriate mix of papers was selected for the conference to demonstrate the development status of a variety of processes and technologies related to hazardous and industrial waste treatment and site remediation.

Session titles illustrate the scope of the conference:

- Bioremediation Demonstration in New York State Groundwater
- Groundwater Fate & Recovery
- Separation Processes
- Soil Bioremediation
- Containment
- Advanced Oxidation
- Surfactant Enhanced Remediation
- Groundwater Bioremediation
- Emerging Process Technologies
- Sediment Remediation
- Groundwater Treatment
- Pollution Prevention
- Biodegradation