

This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the United Nations Environment Programme, the International Labour Organisation, or the World Health Organization

## Environmental Health Criteria 29

# 2,4-DICHLOROPHENOXYACETIC ACID (2,4-D)

Published under the joint sponsorship of the United Nations Environment Programme, the International Labour Organisation, and the World Health Organization



INVENTARIO N. 32

Other titles available in the ENVIRONMENTAL HEALTH CRITERIA series include:

1. Mercury
2. Polychlorinated Biphenyls and Terphenyls
3. Lead
4. Oxides of Nitrogen
5. Nitrates, Nitrites and N-Nitroso Compounds
6. Principles and Methods for Evaluating the Toxicity of Chemicals, Part I
7. Photochemical Oxidants
8. Sulfur Oxides and Suspended Particulate Matter
9. DDT and its Derivatives
10. Carbon Disulfide
11. Mycotoxins
12. Noise
13. Carbon Monoxide
14. Ultraviolet Radiation
15. Tin and Organotin Compounds
16. Radiofrequency and Microwaves
17. Manganese
18. Arsenic
19. Hydrogen Sulfide
20. Selected Petroleum Products
21. Chlorine and Hydrogen Chloride
22. Ultrasound
23. Lasers and Optical Radiation
24. Titanium
25. Selected Radionuclides
26. Styrene
27. Guidelines on Studies in Environmental Epidemiology
28. Acrylonitrile



World Health Organization  
Geneva, 1984

CONTENTS

ENVIRONMENTAL HEALTH CRITERIA FOR 2,4-DICHLOROPHENOXYACETIC ACID

	<u>Page</u>
1. SUMMARY AND RECOMMENDATIONS FOR FURTHER STUDIES . . . . .	11
1.1 Summary . . . . .	11
1.1.1 Analytical methods . . . . .	11
1.1.1.1 2,4-D, 2,4-D alkali metal salts or 2,4-D amine salts and 2,4-D esters . . . . .	11
1.1.1.2 Contaminants in 2,4-D herbicides . . . . .	11
1.1.2 Sources of environmental pollution . . . . .	11
1.1.3 Environmental distribution and transformations . . . . .	11
1.1.4 Environmental exposure levels . . . . .	12
1.1.5 Uptake and fate of 2,4-D in the body . . . . .	12
1.1.6 Effects on animals . . . . .	12
1.1.6.1 Acute toxic effects . . . . .	12
1.1.6.2 Chronic toxic effects . . . . .	13
1.1.6.3 Teratogenic and reproductive effects . . . . .	13
1.1.6.4 Mutagenic effects . . . . .	13
1.1.6.5 Carcinogenic effects . . . . .	13
1.1.7 Effects on human beings . . . . .	13
1.1.7.1 Acute toxic effects . . . . .	13
1.1.7.2 Chronic toxic effects . . . . .	14
1.1.7.3 Teratogenic and reproductive effects . . . . .	14
1.1.7.4 Mutagenic effects . . . . .	14
1.1.7.5 Carcinogenic effects . . . . .	14
1.2 Recommendations for further studies . . . . .	14
1.2.1 Analytical methods . . . . .	14
1.2.2 Environmental exposure levels . . . . .	14
1.2.3 Studies on animals . . . . .	15
1.2.4 Studies on human beings . . . . .	15
2. PROPERTIES AND ANALYTICAL METHODS . . . . .	17
2.1 Physical and chemical properties of 2,4-D . . . . .	17
2.1.1 Introduction . . . . .	17
2.1.2 Synthesis of 2,4-D . . . . .	17
2.1.3 Important chemical reactions of 2,4-D . . . . .	18
2.1.4 Composition of technical 2,4-D materials . . . . .	18
2.1.5 Volatility of 2,4-D derivatives . . . . .	20
2.2 Determination of 2,4-D . . . . .	21
2.2.1 General comments . . . . .	21

The International Programme on Chemical Safety (IPCS) is a joint venture of the United Nations Environment Programme, the International Labour Organisation, and the World Health Organization. The main objective of the IPCS is to carry out and disseminate evaluations of the effects of chemicals on human health and the quality of the environment. Supporting activities include the development of epidemiological, experimental laboratory, and risk assessment methods that could produce internationally comparable results, and the development of manpower in the field of toxicology. Other activities carried out by IPCS include the development of know-how for coping with chemical accidents, coordination of laboratory testing and epidemiological studies, and promotion of research on the mechanisms of the biological action of chemicals.

ISBN 92 4 154089 3

© World Health Organization 1984

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. For rights of reproduction or translation of WHO publications, in part or *in toto*, application should be made to the Office of Publications, World Health Organization, Geneva, Switzerland. The World Health Organization welcomes such applications.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

PRINTED IN FINLAND  
83/5998 - VAMMALA - 5500