

# **Pesticide residues in food—1998**

WHO/PCS/99.18

## **Toxicological evaluations**

**Sponsored jointly by FAO and WHO  
with the support of the International Programme  
on Chemical Safety (IPCS)**

**Joint meeting of the  
FAO Panel of Experts on Pesticide Residues  
in Food and the Environment  
and the  
WHO Core Assessment Group**

**Rome, 21–30 September 1998**



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The preparatory work for the toxicological evaluations of pesticide residues carried out by the WHO Expert Group on Pesticide Residues for consideration by the FAO/WHO Joint Meeting on Pesticide Residues in Food and the Environment is actively supported by the International Programme on Chemical Safety (IPCS) within the framework of the Inter-Organization Programme for the Sound Management of Chemicals.

**The International Programme on Chemical Safety (IPCS)**, established in 1980, is a joint venture of the United Nations Environment Programme (UNEP), the International Labour Organisation (ILO), and the World Health Organization (WHO). The overall objectives of the IPCS are to establish the scientific basis for assessing the risk to human health and the environment from exposure to chemicals, through international peer-review processes as a prerequisite for the promotion of chemical safety, and to provide technical assistance in strengthening national capacities for the sound management of chemicals.

**The Inter-Organization Programme for the Sound Management of Chemicals (IOMC)** was established in 1995 by UNEP, ILO, the Food and Agriculture Organization of the United Nations, WHO, the United Nations Industrial Development Organization, and the Organisation for Economic Co-operation and Development (Participating Organizations), following recommendations made by the 1992 United Nations Conference on the Environment and Development to strengthen cooperation and increase coordination in the field of chemical safety. The purpose of the IOMC is to promote coordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

IPCS gratefully acknowledges the assistance of Mrs E. Heseltine, St Léon-sur-Vézère, France, for editing these monographs.

Health & Environment International Ltd, by agreement with WHO, performed independent literature searches on some of the substances on which data are summarized in this document in order to ensure that all relevant toxicological and related information was reviewed.

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\* First full evaluation

**1998 Joint Meeting of the FAO Panel of Experts on  
Pesticide Residues in Food and the Environment  
and the WHO Core Assessment Group**

**Rome, 21–30 September 1998**

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## Abbreviations used

ADI	acceptable daily intake
ALAT	alanine aminotransferase
AP	alkaline phosphatase
ASAT	aspartate aminotransferase
BrdU	5-bromo-2'-deoxyuridine
bw	body weight
CCPR	Codex Committee on Pesticide Residues
CMC	carboxymethyl cellulose
CYP	cytochrome P450
DMSO	dimethyl sulfoxide
DNHCP	methyl heptyl isomer of dinocap
F	female
F <sub>0</sub>	parental generation
F <sub>1</sub>	first filial generation
F <sub>2</sub>	second filial generation
GABA	γ-aminobutyric acid
GGT	γ-glutamyl transferase
GLP	good laboratory practice
GST-P	placental form of glutathione S-transferase
γ-GT	γ-glutamyl transpeptidase
H&E	haematoxylin and eosin
HID	highest ineffective dose
HPLC	high-performance liquid chromatography
<i>hprt</i>	hypoxanthine-guanine phosphoribosyl transferase gene
Ig	immunoglobulin
ip	intraperitoneally
IPCS	International Programme on Chemical Safety
JMPR	Joint FAO/WHO Meeting on Pesticide Residues
LED	lowest effective dose
LC <sub>50</sub>	median lethal concentration
LD <sub>50</sub>	median lethal dose
LOAEL	lowest-observed-adverse-effect level
M	male
MRL	maximum residue limit
NOAEL	no-observed-adverse-effect level
NOEC	no-observed-effect concentration
NR	not reported
po	orally
ppm	parts per million
S9	9000 x g supernatant fraction of rodent liver
SPF	specific pathogen-free
w/w	weight per weight



## Introduction

The toxicological monographs and monograph addenda contained in this volume were prepared by a WHO Core Assessment Group that met with the FAO Panel of Experts on Pesticide Residues in Food and the Environment in a Joint Meeting on Pesticide Residues (JMPR) in Rome, Italy, on 21–30 September 1998.

One of the substances evaluated by the Core Assessment Group at this Meeting, kresoxim-methyl, was evaluated for the first time. The other substances had been evaluated at earlier meetings. For five of these, bentazone, dinocap, diphenylamine, phosmet, and thiophanate-methyl, only information received since the previous evaluations is summarized, in 'monograph addenda'. The appropriate earlier documents should be consulted in order to obtain full toxicological profiles of these chemicals. Toxicological monographs were prepared on amitraz, bitertanol, dicloran, endosulfan, ethoxyquin, kresoxim-methyl, and methiocarb, summarizing new data and, where relevant, incorporating information from previous monographs and addenda. Reports and other documents resulting from previous Joint Meetings on Pesticide Residues are listed in Annex 1.

The report of the Joint Meeting has been published by the FAO as *FAO Plant Production and Protection Paper* 148. That report contains brief comments on the compounds considered, acceptable daily intakes established by the WHO Core Assessment Group, and maximum residue limits or guideline levels established by the FAO Panel of Experts. Monographs on residues prepared by the FAO Panel of Experts are published as a companion volume, as *Evaluations 1998, Part I, Residues*, in the FAO Plant Production and Protection Paper series.

The toxicological monographs and addenda contained in this volume are based on working papers that were prepared by temporary advisers before the 1998 Joint Meeting. A special acknowledgement is made to those advisers. The monographs were edited by Mrs E. Heseltine, St Léon-sur-Vézère, France.

The preparation and editing of this volume were made possible by the technical and financial contributions of the lead institutions of the International Programme on Chemical Safety (IPCS), which supports the activities of the JMPR. 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 Central Unit of the IPCS concerning the legal status of any country, territory, city or area or of its authorities, nor 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 IPCS in preference to others of a similar nature that are not mentioned.

Any comments or new information on the biology or toxicology of the compounds included in this volume should be addressed to: Joint WHO Secretary of the Joint FAO/WHO Meeting on Pesticide Residues, International Programme on Chemical Safety, World Health Organization, Avenue Appia, 1211 Geneva 27, Switzerland.

**TOXICOLOGICAL MONOGRAPHS  
AND MONOGRAPH ADDENDA**