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Pesticide residues in food 2010

Joint FAO/WHO Meeting on Pesticide Residues

REPORT 2010

World Health Organization

Food and Agriculture Organization of the United Nations

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Report of the Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group on Pesticide Residues
Rome, Italy, 21–30 September 2010

WORLD HEALTH ORGANIZATION
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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ROME, 21–30 SEPTEMBER 2010

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ABBREVIATIONS

ACN	acetonitrile
ADI	acceptable daily intake
ADME	absorption, distribution, metabolism and excretion
ai	active ingredient
AP	alkaline phosphatase
AR	applied radioactivity
ARfD	acute reference dose
ATG-Ac	*N'*-[amino(2-chlorothiazol-5-ylmethylamino)methylene] acetohydrazide
ATMG-Pyr	*N'*-[(2-chlorothiazol-5-ylmethylamino)(methylamino)methylene]-2-oxopropanohydrazide
AUC	area under the curve for concentration–time
avg	average
BrdU	bromodeoxyuridine
BROD	benzyloxyresorufin *O*-dealkylase
bw	body weight
CAC	Codex Alimentarius Commission
CAR	constitutive androstane receptor
CAS	Chemical Abstracts Service
CCCF	Codex Committee on Contaminants in Foods
CCN	Codex classification number (for compounds or commodities)
CCPR	Codex Committee on Pesticide Residues
COLEACP	Comité de Liaison Europe-Afrique-Caraïbes-Pacifique
COX-2	cyclooxygenase-2
CXL	Codex MRL
CYP	cytochrome P450
DAT	days after treatment
DCGA	3,6-dichlorogentisic acid
DCSA	3,6-dichlorosalicylic acid
DT_{50}	time required for 50% dissipation of the initial concentration
EC_{50}	the concentration of agonist that elicits a response that is 50% of the possible maximum
EFSA	European Food Safety Authority
EROD	ethoxyresorufin *O*-deethylase
EtOAc	ethyl acetate
EU	European Union

F_0	parental generation
F_1	first filial generation
F_2	second filial generation
FAO	Food and Agriculture Organization of the United Nations
FOB	functional observational battery
GAP	good agricultural practice
GC	gas chromatography
GC-FPD	gas chromatography with flame photometric detection
GC-ECD	gas chromatography with electron capture detection
GD	gestation day
GEMS/Food	Global Environment Monitoring System – Food Contamination Monitoring and Assessment Programme
GLP	good laboratory practice
HPLC	high-pressure liquid chromatography
HR	highest residue in the edible portion of a commodity found in trials used to estimate a maximum residue level in the commodity
HR-P	highest residue in a processed commodity calculated by multiplying the HR of the raw commodity by the corresponding processing factor
IC_{50}	concentration required to inhibit activity by 50%
IEDI	international estimated daily intake
ILV	independent laboratory validation
IESTI	international estimate of short-term dietary intake
ISO	International Organization for Standardization
IUPAC	International Union of Pure and Applied Chemistry
JECFA	Joint FAO/WHO Expert Committee on Food Additives
JMPM	Joint FAO/WHO Meeting on Pesticide Management
JMPR	Joint FAO/WHO Meeting on Pesticide Residues
JMPS	Joint FAO/WHO Meeting on Pesticide Specifications
LC	liquid chromatography
LC_{50}	median lethal concentration
LD_{50}	median lethal dose
LOAEL	lowest-observed-adverse-effect level
LOD	limit of detection
LOQ	limit of quantification
MAI	3-methylamino-1H-imidazo[1,5-c]imidazole
MG	methylguanidine
MNG	*N*-methyl-*N'*-nitroguanidine

MRL	maximum residue limit
MS	mass spectrometry
MSD	mass selective detector
MS/MS	tandem mass spectrometry
MTCA	2-methylthiothiazole-5-carboxylic acid
MTD	maximum tolerated dose
NAFTA	North American Free Trade Agreement
NOAEC	no-observed-adverse-effect concentration
NOAEL	no-observed-adverse-effect level
NTG	nitroguanidine
OECD	Organisation for Economic Co-operation and Development
PB	phenobarbital
PBI	plant-back interval
PCR	polymerase chain reaction
PF	processing factor
PFPD	pulse flame photometric detection
PHI	pre-harvest interval
ppm	parts per million
PROD	pentoxyresorufin *O*-dealkylase
RAC	raw agricultural commodity
RTI	re-treatment interval
S9	9000 × *g* rat liver supernatant
SDH	succinate dehydrogenase
SFO	single first order
SPE	solid phase extraction
STMR	supervised trials median residue
STMR-P	supervised trials median residue in a processed commodity calculated by multiplying the STMR of the raw commodity by the corresponding processing factor
T_3	triiodothyronine
T_4	thyroxine
T_{max}	time to reach maximum concentration
TMG	thiazolmethylguanidine
TRR	total radioactive residues
TSH	thyroid stimulating hormone
TZMU	thiazolylmethylurea
TZNG	thiazolylnitroguanidine

UCL	upper confidence limit
UDPGT	uridine diphosphate–glucuronosyltransferase
USA	United States of America
US/CAN	United States and Canada
FDA PAM	US Food and Drug Adminstration Pesticide Analytical Manual
VF	variability factor
WHO	World Health Organization

USE OF JMPR REPORTS AND EVALUATIONS BY REGISTRATION AUTHORITIES

Most of the summaries and evaluations contained in this report are based on unpublished proprietary data submitted for use by JMPR in making its assessments. A registration authority should not grant a registration on the basis of an evaluation unless it has first received authorization for such use from the owner of the data submitted for the JMPR review or has received the data on which the summaries are based, either from the owner of the data or from a second party that has obtained permission from the owner of the data for this purpose.

CONTENTS

D, dietary risk assessment; R, residue and analytical aspects; T, toxicological evaluation.

* New compound

** Evaluated within the periodic review programme of the Codex Committee on Pesticide Residues

PESTICIDE RESIDUES IN FOOD

REPORT OF THE 2010 JOINT FAO/WHO MEETING OF EXPERTS

1. INTRODUCTION

A Joint FAO/WHO Meeting on Pesticide Residues (JMPR) was held at the headquarters of the Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, from 21 to 30 September 2010. The Meeting brought together the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the World Health Organization (WHO) Core Assessment Group on Pesticide Residues.

The Meeting was opened by Dr Peter Kenmore, Principal Officer, Plant Production and Protection Division of FAO, on behalf of the Director-General of FAO and the Director-General of the WHO.

Dr Kenmore welcomed the participants and gratefully acknowledged the contribution of the two Expert groups for their hard work and valuable time in attending the meeting. He also thanked the Experts' national authorities, institutes and organizations for supporting their work with the JMPR.

The JMPR has been operating for nearly 50 years, and its outputs are recognized as both authoritative and invaluable in efforts to produce safe food and to facilitate international trade. The value of JMPR is reflected in the continued support and commitment from governments of member countries to this joint WHO/FAO activity.

At the Twenty-second session of the FAO Committee on Agriculture (COAG) held in June 2010, the members particularly stressed not only the importance of scientific advice from FAO and WHO, but also the programme of capacity building in developing countries to facilitate greater participation in the process of setting international standards.

The growing importance of the work of JMPR is also reflected in the recently adopted FAO Strategic Programme which clearly recognised two Organisational Results that deal with crop production and food safety. One of the FAO strategic objectives is entitled "Sustainable intensification of crop production", which integrates the range of activities required to assist countries to produce more food in a sustainable manner. This includes development of technical guidance, standards and providing assistance to developing countries in implementing the international standards set up by the JMPR, JMPS and JMPM.

Dr Kenmore informed the Meeting that by mid-2009 the numbers of food insecure people had exceeded one billion. By 2050 the world population is projected to exceed 9 billion, creating a long-term challenge in food security. This population would require an estimated 70% more food, and the resulting global demand for food, feed and fibre will require current crop production to double, while conserving the natural resource-base that is the foundation of agricultural production. Increasing crop productivity and quality through scientific sustainable practices is critical to improved resource use efficiency, food security, rural development, livelihoods and environmental quality.

The work of JMPR is an important element in the global effort to improve sustainable crop production intensification and food safety in the world.

Dr Kenmore acknowledged the onerous workload to be accomplished by the present Meeting, also noting the increasing demand for establishment of international MRLs in recent years. He pointed out there are significant challenges facing the JMPR resource, and the issue will be discussed at the next session of the CCPR. The Meeting needs to consider the practicability and implications of new proposals.

Dr Ezzeddine Boutrif, Director of Nutrition and Consumer Protection Division of FAO, addressed the Meeting. He expressed gratitude at the great contribution by the JMPR to the Codex MRLs, and highlighted that such a good collaboration between FAO and WHO in the joint programme of food safety standards is extremely valuable and should be continued.

The Meeting was held as a result of recommendations made by previous Meetings and accepted by the governing bodies of FAO and WHO that studies should be undertaken jointly by experts to evaluate possible hazards to humans arising from the occurrence of residues of pesticides in foods. The reports of previous Meetings (see Annex 5) contain information on acceptable daily intakes (ADIs), acute reference doses (ARfDs), maximum residue levels (MRLs), and the general principles that have been used for evaluating pesticides. The supporting documents (residue and toxicological evaluations) contain detailed monographs on these pesticides and include evaluations of analytical methods.

During the Meeting, the FAO Panel of Experts reviewed the pesticides under consideration, and analysed their residues, including data on their metabolism, fate in the environment, and use patterns. The Panel also estimated the maximum levels of residues that might occur as a result of use of the pesticides according to good agricultural practice. The estimation of MRLs and supervised trials median residues (STMR) values for commodities of animal origin was elaborated.

The WHO Core Assessment Group was responsible for reviewing toxicological and related data in order to establish ADIs, and ARfDs, where necessary.

The Meeting evaluated a total of 23 pesticides, including 8 new compounds and 5 compounds that were re-evaluated within the Code Committee on Pesticide Residues (CCPR) periodic review programme for toxicity or residues, or both. The Meeting established ADIs and ARfDs, estimated MRLs and recommended them for use by the CCPR, and estimated STMR and highest residue (HR) levels as a basis for estimating dietary intakes.

The Meeting also estimated the dietary intakes (both short-term and long-term) of the pesticides reviewed and, on this basis, performed a dietary risk assessment in relation to their ADIs or ARfDs. Cases in which ADIs or ARfDs may be exceeded were clearly indicated in order to facilitate the decision-making process of the CCPR. The rationale for methodologies for long- and short-term dietary risk assessment are described in detail in the FAO Manual on the submission and evaluation of pesticide residue data for the estimation of MRLs in food and feed (2009).

The Meeting considered a number of current issues related to the risk assessment of chemicals, the evaluation of pesticide residues and the procedures used to recommend maximum residue levels.

DECLARATION OF INTERESTS

The Secretariat informed the Committee that all experts participating in the 2010 JMPR had completed declaration-of-interest forms, and that no conflicts had been identified.

2. GENERAL CONSIDERATIONS

2.1 CONSIDERATION REGARDING JMPR CAPACITY AND RESOURCES

The Forty-second Session of the Codex Committee on Pesticide Residues (CCPR) held a discussion about the limited resources of the Joint FAO/WHO Meeting on Pesticide Residues (JMPR), and CCPR agreed that the United States of America (USA), with assistance from Cameroon and CropLife, will prepare a discussion paper on how to address JMPR resource issues for consideration by the next Session of CCPR in 2011. As this is an important subject for JMPR, this topic was discussed at the current meeting to give a view from its perspective.

Requests to JMPR for pesticide assessments for new compounds and for compounds within the periodic review programme of CCPR, as well as requests for assessments for additional maximum residue level recommendations, have increased in recent years. Also, the complexity of questions, the number of data provided per compound and the cost for meetings and publications have increased. In contrast, financial and staff resources for the work of JMPR and for the JMPR Secretariat at FAO and WHO have not increased, but rather have decreased. This has led to some backlog in the requested evaluations.

JMPR is an independent international scientific expert group. It serves as a scientific advisory body to FAO, WHO, FAO and WHO member governments, and the Codex Alimentarius Commission (CAC). Advice to CAC on pesticides is provided via CCPR. The outcome of the JMPR meetings feeds directly into national and international food standard setting, as well as into the development of WHO recommendations and guidelines. The Meeting also plays an important role in the continued improvement of risk assessment principles and methods, taking new scientific developments into account.

Procedures and responsibilities for JMPR (as risk assessors) and CCPR (as risk managers) are laid down in the risk analysis principles applied by CCPR[1].

Current JMPR working procedures

Procedural guidelines for JMPR have been published by WHO[2] and FAO[3]. Key procedural aspects are as follows:

- Preparation of meetings starts approximately 1 year before the meeting date with a public call for data.
- Experts are selected according to FAO and WHO rules for expert meetings (from a standing roster of experts), are invited as independent experts and do not represent their country or organization.
- Tasks are assigned to experts who prepare, in advance of the meeting, draft evaluation monographs, which also undergo an initial review.
- Final conclusions are reached at the meeting, and the final report is adopted before the close of the meeting.
- Conclusions and recommendations are by consensus.

Operational aspects are as follows:

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[1] Codex Alimentarius Commission (2010) Section IV in: Procedural manual, 19th ed. Rome, Food and Agriculture Organization of the United Nations, Joint FAO/WHO Food Standards Programme (ftp://ftp.fao.org/codex/Publications/ProcManuals/Manual_19e.pdf).

[2] http://www.who.int/ipcs/food/jmpr/guidelines/en/index.html

[3] http://www.fao.org/docrep/012/i1216e/i1216e.pdf