



Food and Agriculture  
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World Health  
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FAO  
PLANT  
PRODUCTION  
AND PROTECTION  
PAPER

**233**

# **Pesticide residues in food 2017**

**Joint FAO/WHO Meeting  
on Pesticide Residues**

**EVALUATIONS**

**2017**

**PART I - RESIDUES**



# **Pesticide residues in food 2017**

## **Evaluations Part I - Residues**

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PLANT  
PRODUCTION  
AND PROTECTION  
PAPER**

**233**

**Sponsored jointly by FAO and WHO**

Joint meeting of the  
FAO Panel of Experts on Pesticide Residues  
in food and the Environment  
and the  
WHO Core Assessment Group  
Geneva, Switzerland 12-21 September 2017

**WORLD HEALTH ORGANIZATION  
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
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## ABBREVIATIONS

ACN	acetonitrile
ADI	acceptable daily intake
ae	acid equivalent
ai	active ingredient
AR	applied radioactivity
ARfD	acute reference dose
as	as received
asp gr fn	aspirated grain fraction
AU	Australia
BAM	2,6-dichlorobenzamide
BBCH	<b>B</b> iologischen Bundesanstalt, <b>B</b> undessortenamt und <b>C</b> hemische Industrie
bw	body weight
CA	Chemical Abstracts
CAC	Codex Alimentarius Commission
CAS	Chemical Abstracts Service
CCN	Codex classification number (for compounds or commodities)
CCPR	Codex Committee on Pesticide Residues
cGAP	Critical GAP
CXL	Codex MRL
DAA	Days after application
DALA	days after last application
DAP	days after planting
DAT	days after treatment
DM	dry matter
DT <sub>50</sub>	time required for 50% dissipation of the initial concentration
DT <sub>90</sub>	time required for 90% dissipation of the initial concentration
dw	dry weight
ECD	electron capture detector
EFSA	European Food Safety Authority
equiv	equivalent
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
fw	fresh weight
GAP	good agricultural practice
GC	gas chromatography
GC-ECD	gas chromatography with electron capture detection

**Abbreviations**

GC-FTD	gas chromatography with flame thermionic detection
GC-N-FID	gas chromatography with nitrogen selective flame ionization detection
GC/MS	gas chromatography/mass spectrometry
GC/MSD	gas chromatography/mass selective detector
GC-NPD	gas chromatography coupled with nitrogen-phosphorus detector
GEMS/Food	Global Environment Monitoring System – Food Contamination Monitoring and Assessment Programme
GLC	gas liquid chromatography
GLP	good laboratory practice
GPC	gel permeation chromatography
HPLC	high performance liquid chromatography
HPLC-DAD	high performance liquid chromatography with diode array detection
HPLC-UV	high performance liquid chromatography with UV detector
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
IEDI	international estimated daily intake
IESTI	international estimate of short-term dietary intake
ISO	International Organization for Standardization
IUPAC	International Union of Pure and Applied Chemistry
JMPR	Joint FAO/WHO Meeting on Pesticide Residues
JP	Japan
LC	liquid chromatography
LC-MS	Liquid chromatography with mass spectrometry
LC-UV	Liquid chromatography with UV detection
LOD	limit of detection
log P <sub>ow</sub>	octanol-water partition coefficient
LOQ	limit of quantification
LSC	liquid scintillation counting
MOA	mode of action
MRL	maximum residue limit
MS	mass spectrometry
MS/MS	tandem mass spectrometry
m/z	mass to charge ratio (mass unit for mass spectrometry)
ND	non-detect - below limit of detection
OECD	Organisation for Economic Co-operation and Development
OP	organophosphorus compound

PBI	plant back interval
PES	post extraction solids
Pf	processing factor
PH	pre-harvest
PHI	pre-harvest interval
ppm	parts per million
QuEChERS	Quick, Easy, Cheap, Effective, Rugged, and Safe—Multiresidue pesticide analysis
RAC	raw agricultural commodity
RSD	relative standard deviation
RTI	re-treatment interval
SC	suspension concentrate
SL	soluble liquid
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
TAR	total administered radioactivity
TF	transfer factor
TLC	thin-layer chromatography
TRR	total radioactive residues
UK	United Kingdom
USA	United States of America
US/CAN	United States and Canada
USEPA	United States Environmental Protection Agency
WG	wettable granule
WHO	World Health Organization
WP	wettable powder



**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.



## INTRODUCTION

A Joint Meeting of the Food and Agriculture Organization of the United Nations (FAO) Panel of Experts on Pesticide Residues in Food and the Environment and the World Health Organization (WHO) Core Assessment Group on Pesticide Residues (JMPR) was held at FAO Head-quarters, Rome (Italy), from 12 to 22 September 2017. The FAO Panel Members met in preparatory sessions from 7–11 September.

Dr Kazuaki Miyagishima, Director, Department of Food Safety and Zoonoses – World Health Organization, WHO, warmly greeted the JMPR Meeting on behalf of WHO and FAO, and thanked FAO and WHO experts for their contributions to the 2017 JMPR.

Dr Miyagishima emphasized the need to increase public understanding of the work of JMPR and to make better known its contribution to food safety and security worldwide.

Dr Miyagishima recalled recent actions taken by WHO and FAO and in other international fora on antimicrobial resistance. To support a global action plan on antimicrobial resistance adopted in 2015, international agencies are joining forces to address issues of antibiotic use in plants, animals and humans and manage their impact on public health. Expectations are high on the ongoing work of JMPR in this regard.

During the meeting, the FAO Panel of Experts on Pesticide Residues in Food was responsible for reviewing residue and analytical aspects of the pesticides under consideration, including data on their metabolism, fate in the environment and use patterns, and for estimating the maximum levels of residues that might occur as a result of use of the pesticides according to good agricultural practice. The WHO Core Assessment Group on Pesticide Residues was responsible for reviewing toxicological and related data in order to establish acceptable daily intakes (ADIs) and acute reference doses (ARfDs), where necessary and possible.

The Meeting evaluated 39 pesticides, including nine new compounds and five compounds that were re-evaluated for toxicity or residues, or both, within the periodic review programme of the Codex Committee on Pesticide Residues (CCPR). The Meeting established ADIs and ARfDs, estimated maximum residue levels and recommended them for use by CCPR, and estimated supervised trials median residue (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 by CCPR.

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







The annual 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 was held in Geneva, Switzerland, from 12 to 21 September 2016. The FAO Panel of Experts had met in preparatory sessions from 07 to 11 September 2016. The Meeting was held in pursuance 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 pesticide residues in foods. During the meeting the FAO Panel of Experts was responsible for reviewing pesticide use patterns (use of good agricultural practices), data on the chemistry and composition of the pesticides and methods of analysis for pesticide residues and for estimating the maximum residue levels that might occur as a result of the use of the pesticides according to good agricultural use practices. The WHO Core Assessment Group was responsible for reviewing toxicological and related data and for estimating, where possible and appropriate, acceptable daily intakes (ADIs) and acute reference doses (ARfDs) of the pesticides for humans. This report contains information on ADIs, ARfDs, maximum residue levels, and general principles for the evaluation of pesticides. The recommendations of the Joint Meeting, including further research and information, are proposed for use by Member governments of the respective agencies and other interested parties.

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