

Pesticide residues in food - 1988

FAO
PLANT
PRODUCTION
AND PROTECTION
PAPER

93/1

Sponsored jointly by FAO and WHO

EVALUATIONS

1988

PART I — RESIDUES



FOOD
AND
AGRICULTURE
ORGANIZATION
OF THE
UNITED NATIONS

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Evaluations Part I - Residues

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Joint meeting of the
FAO Panel of Experts on Pesticide Residues
in Food and the Environment
and the
WHO Expert Group on Pesticide Residues
Rome, Italy, 19-28 September 1988



FOOD
AND
AGRICULTURE
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1988 JOINT MEETING OF THE FAO PANEL OF EXPERTS ON PESTICIDE RESIDUES
IN FOOD AND THE ENVIRONMENT AND THE WHO EXPERT GROUP ON
PESTICIDE RESIDUES

Rome, 19-28 September 1988

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ABBREVIATIONS WHICH MAY BE USED IN THIS REPORT

(n.b.: chemical elements and pesticides are not included in this list)

ACH _E	acetylcholinesterase
ADI	Acceptable Daily Intake
TADI	Temporary Acceptable Daily Intake
ai	active ingredient
approx.	approximate
at. wt.	atomic weight
b.p.	boiling point
bw	body weight
c	centi - ($\times 10^{-2}$)
°C	degree Celsius (centigrade)
CCPR	Codex Committee on Pesticide Residues
cm	centimetre
CNS	central nervous system
cu	cubic
<u>DL</u>	racemic (optical configuration, a mixture of dextro- and laevo-; preceding a chemical name)
EC	emulsion concentrate
ERL	extraneous residue limit
F ₁	filial generation, first
F ₂	filial generation, second
f.p.	freezing point
FAO	Food and Agriculture Organization of the United Nations
g	gram
μg	microgram
GAP	good agricultural practice
G.I.	gastro-intestinal
GPC	gel-permeation chromatography
GLC	gas-liquid chromatography
h	hour(s)
ha	hectare
Hb	haemoglobin
i.m.	intramuscular
i.p.	intraperitoneal
IR	infrared
i.v.	intravenous
JMPR	Joint Meeting on Pesticide Residues (Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Expert Group on Pesticide Residues)
k	kilo- ($\times 10^3$)
kg	kilogram
l	litre
LC ₅₀	lethal concentration, 50%

LD	lethal dose
LD ₅₀	lethal dose, median
m	metre
mg	milligram
μm	micrometre (micron)
min	minute (s)
ml	millilitre
MLD	minimum lethal dose
mm	millimetre
M	molar
mo	month(s)
m.p.	melting point
MRL	Maximum Residue Limit (This term replaces "tolerance")
TMRL	Temporary Maximum Residue Limit
N	normal (concentration)
no.	number
NOEL	no-observed-effect level
NOAEL	no-observed-adverse-effect level
o	ortho (indicating position in a chemical name)
p	para (indicating position in a chemical name)
PHI	pre-harvest interval
ppm	parts per million (Used only with reference to the concentration of a pesticide in an experimental diet. In all other contexts the terms mg/kg or mg/l are used.)
s.c.	subcutaneous
SD	standard deviation
SE	standard error
sp./spp.	species (only after a generic name)
sp gr	specific gravity
sq	square
t	tonne (metric ton)
TADI	Temporary Acceptable Daily Intake
tert	tertiary (in a chemical name)
THS	thyroid-stimulating hormone
TLC	thin-layer chromatography
TMRL	Temporary Maximum Residue Limit
UV	ultraviolet
v/v	volume ratio (volume per volume)
WHO	World Health Organization
wk	week
WP	wettable powder
wt	weight
wt/vol	weight per volume
w/w	weight per weight
yr	year
<	less than
≤	less than or equal to
>	greater than
≥	greater than or equal to
*	at or about the limit of determination

INTRODUCTION

The report of the Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Expert Group on Pesticide Residues, held in Rome 19-28 September 1988, contains a summary of the evaluations of residues in foods of the various pesticides considered at the session as well as information on the general principles followed by the meeting. The present document contains summaries of the residues data considered, together with the recommendations made.

The Evaluations are issued in two parts:

- Part I: Residues (by FAO)
- Part II: Toxicology (by WHO)

For those interested in both aspects of pesticide evaluation, not only both parts but also the reports containing summaries of residues and toxicological considerations will be available. Special attention is drawn to Annex I containing up-dated ADIs, MRLs and temporary MRLs, which also appears in full as part of the report of the meeting.

Some of the compounds considered at this meeting have been previously evaluated and reported on in earlier publications. Only new information is summarized in the relevant monographs and reference is made to previously published evaluations, which should also be consulted. Compounds with first full evaluation are indicated by an asterisk (*) in the Table of Contents.

The name of the compound appearing as the title of each monograph is followed by its Codex Classification Number in parentheses.

References to previous Reports and Evaluations of Joint Meetings are listed in Annex II.

Acknowledgements

The monographs in these Evaluations were prepared by the following participants in the 1988 JMPR for the FAO Panel of Experts on Pesticide Residues in Food and the Environment: Mr J.A.R. Bates, Professor Dr A.F.H. Besemer, Dr Roy Greenhalgh, Mr D.J. Hamilton, Mr A.F. Machin, Dr E.D. Magallona and Mr K. Voldum-Clausen.

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ALDICARB (117)

EXPLANATION

At the 19th (1987) Session of the CCPR, several countries proposed an MRL of 0.3 mg/kg instead of 0.2 mg/kg for citrus fruits. Countries were requested to submit residue data to the JMPR. Discussions also took place on expressing the MRL in maize forage on the dry weight, rather than on the green forage as proposed by the 1985 JMPR. Governments were requested to provide information to the JMPR on residues in dry forage and other relevant information.

APPRAISAL

No new data were made available to the 1988 JMPR on residues in maize forage or fodder or any other forage crop, or on citrus fruits. Hence no action could be taken.

*** ALDICARB 1 JMPR 1988**

BENALAXYL (155)**EXPLANATION**

At the 20th (1988) Session of the CCPR, the JMPR was asked to re-evaluate the maximum residue level for benalaxyl in grapes. No new data have been received by the meeting.

APPRAISAL

All the data submitted to the 1986 JMPR, including those received from Australia, had been taken into consideration in estimating the original maximum residue level recommended as an MRL.

BENOMYL (069)**EXPLANATION**

Benomyl was reviewed by the JMPR in 1973, 1975, 1978 and 1983. In 1983 the meeting estimated an ADI for man of 0-0.02 mg/kg bw. The 1978 meeting recommended that the residue guideline levels for benomyl and carbendazim should be replaced by a single list of guideline levels for carbendazim residues that occur as metabolic products of benomyl or thiophanate-methyl or from the use of carbendazim itself (i.e. carbendazim from any source).

In 1984 the CCPR asked the JMPR to review MRLs for thiophanate-methyl in the light of the analytical method used to determine the residues following the use of thiophanate-methyl and existing MRLs for carbendazim.

At the 1986 CCPR it was agreed that information on current registered uses, residues data and national MRLs for benomyl, carbendazim and thiophanate-methyl should be requested and reviewed at the same time by the JMPR.

Considerable information was made available to the meeting on the registered uses of benomyl, the fate of benomyl in cows and hens, residue data in some crops, and the fate of residues in several crops and during food processing.

USE PATTERNS

Labels presenting the registered uses of benomyl formulations in the United States, Canada, the Philippines, Australia, Japan, Mexico, Central America, Belgium, Italy, Norway and Portugal were available to the meeting, as well as a full account of the use pattern in The Netherlands (Table 1). The information in these labels is too voluminous to list in this monograph but the recommended rates of applications do not differ much from the list given in Table 1 in the 1983 evaluations.

Table 1. Use pattern of benomyl in The Netherlands

Crop or situation	Kind of pest controlled	Application rate, ai		Formulation*/Treatment	PHI (days)
		g/100 l	kg/ha		
Apples, Pears	Scab (Venturia spp.)	25	0.25-0.375	pre-blossom curative spraying up to 60 hrs after beginning of the infection	-
	Gloeösporium fruit-rot and other fruit-rot diseases	25	0.25-0.375	2 applications 6 and 2 weeks before harvest	-
	idem	50	-	post-harvest "shower" application on the fruit	2 months
	Canker (Nectria)	30	0.3-0.45	2 spray applications during leaf-fall (after harvest)	-

* Formulation = WP 50% + 75%, unless otherwise indicated.

Table 1 (cont'd)

Crop or situation	Kind of pest controlled	Application rate, ai		Formulation*/ Treatment	PHI (days)
		g/100 l	kg/ha		
Cherries, Plums	Fruit rot (<i>Monilia fructigena</i> , <i>Monilia laxa</i>)	25	0.25-0.375	applications before fruit-setting	-
Strawberries (outdoors)	Botrytis-rot and mildew	30/ 37.5	0.30/0.375 0.45/0.57	spraying with intervals of 7 days (30 g) or 10-14 days (37.5 g)	14
	idem	30	0.30-0.45	repeated sprayings after harvest	-
(glasshouse)	idem	37.5	0.375	sprayings at 10-14 day intervals; not more than 2 applications after the beginning of blossoming	14
Gherkins, Cucumbers, Melons, Zucchettis, Sweet peppers, Egg plant	Botrytis and/or <i>Sclerotinia</i>	25	0.625 (0.25-1.25)	spraying with 10-14 day intervals after beginning of the infection	3
Gherkins (glasshouse)	idem	50	0.25 g/plant	2 soil drenches with an interval of 4 weeks	3
Melons (glasshouse)	<i>Fusarium</i> wilt	50	0.25 g/plant	soil drench	3
Tomatoes (glasshouse)	Botrytis on stems and fruits, <i>Cladosporium</i> leaf spot	20	0.6-1	spraying at regular intervals	3
Scorzonera	Mildew	25	0.25	sprayings at 10-14 day intervals after beginning of the infection	14
Peas	<i>Ascochyta</i>	-	2 g/kg seed	seed dressing (in combination with thiram)	-
Dwarf	Botrytis and <i>Sclerotinia</i>		1	2 applications during blossom period	14
Brussels sprouts, Cauliflower, Headed cabbage	Ring spot (<i>Mycosphaerella bassicocola</i>)		0.5	one spraying as infection is visible	21
Swedes (rutabagas)	Botrytis		0.5	one spraying 4 weeks before harvest	28

Table 1 (cont'd)

Crop or situation	Kind of pest controlled	Application rate, ai		Formulation*/ Treatment	PHI (days)
		g/100 l	kg/ha		
Onions	Botrytis, top, bottom & root rot (Botrytis allii)		1 g/kg seed	seed dressing (in combination with thiram)	-
	Leaf spot (Botrytis squamosa) and Botrytis allii rot		0.25	additional sprayings (not and more than 2) mixed with maneb/zineb 2 kg/ha	28
Shallots	Top-rot (Botrytis allii)	100	-	dipping of young plants, shortly before planting	-
	Top-rot (Botrytis allii) and Leaf spot (Botrytis squamosa)		0.25	<u>1/</u> additional sprayings (not more than 2), mixed with zineb/maneb - 2 kg/ha	28
Plant-onions	Top-rot (Botrytis allii)	100	-	dipping shortly before planting	-
Leek	Leaf spot (Fusarium culmorum)	100		dipping before planting	-
Asparagus	Foot rot	100	-	dipping of roots before planting	-
Celeriac	Leaf spot (Septoria apiicola)		0.3	spraying at 10-14 day intervals as soon as infection is visible	28
Dwarf beans	Phoma		0.5 g/kg seed	<u>2/</u> seed dressing (in addition to the dressing with thiram)	-
Broad beans	Ascochyta		2 g/kg	seed dressing, mixed with 2.5 g thiram/kg	-
Mushrooms	Dry bubble (Verticillium spp.) and Wet bubble (Mycogone perniciosa)	75	7.5	soil drench after casing	5
Mushrooms (mechanically harvested)	Trichoderma spp. cobweb disease (Hypomyces rosellus)	25	2.5	spray treatment following harvest of 1st and 2nd flush	5
Wheat	Ripening diseases		0.25	one spraying together with 2 kg/ha maneb when ears are formed	35
	Eye-spot disease (Cercospora)		0.25	one spraying early May; plant height of 25 cm (F4-6)	35

1/ Formulation = WP 50% + 85%2/ Formulation = WP 50%

* BENOMYL 5-15 JMPR 1988