

## 5.6 DELTAMETHRIN (135)

### RESIDUE AND ANALYTICAL ASPECTS

Deltamethrin, a non-systemic synthetic pyrethroid insecticide was reviewed by JMPR several times between 1980 and 1992 and full periodic reviews were conducted for toxicology in 2000 and for residues in 2002. Residues from the veterinary uses of deltamethrin were evaluated by JECFA in 1999 and 2003.

The 2000 JMPR established an ADI of 0–0.01 mg/kg bw/day and an acute RfD of 0.05 mg/kg bw for deltamethrin and the residue definition established by the 2002 JMPR for plant and animal commodities, for both compliance with MRLs and for dietary intake assessment is the *sum of deltamethrin and its  $\alpha$ -R- and trans- isomers*. The 2002 JMPR also concluded that the residue is fat soluble but that residues in milk should be measured on whole milk.

Specifications for deltamethrin technical material and relevant formulations have been established by the JMPS, most recently in January 2015, and published on the AGP-FAO Specifications webpage.

Deltamethrin was scheduled by the 47<sup>th</sup> Session of the CCPR for the evaluation of additional uses by the 2016 JMPR. The meeting received new GAP information and residue data on rape seed (canola).

#### *Methods of analysis*

The Meeting received information on the analytical methods (XM-10 and BP/01/88) used for the determination of deltamethrin residues in rape seed. These methods are similar to the those reviewed by the 2002 JMPR, involving hexane or hexane/acetone extraction, clean-up of reduced extracts by gel permeation chromatography (GPC) or GPC plus alumina column and residue determination by gas chromatography with electron capture detection (ECD). The LOQs of these methods in rape seed, oil and meal ranged from 0.01 to 0.05 mg/kg for deltamethrin,  $\alpha$ -R-deltamethrin and trans-deltamethrin.

#### *Stability of pesticide residues in stored analytical samples*

In 2002, JMPR concluded that deltamethrin and its *trans*- and  $\alpha$ -R- isomers are stable in various stored frozen substrates including grain and soya bean seed for at least 9 months, and 13-38 months in cotton seed, with no significant isomerisation occurring during frozen storage. Based on this information, the Meeting concluded that deltamethrin was stable in rape seed samples stored for the periods associated with the supervised field trials (up to 12 months).

#### *Results of supervised residue trials on crops*

The Meeting received information from USA and Canada on supervised field trials involving foliar treatments of deltamethrin to oilseed rape. The Meeting also noted that trials on rape conducted in Europe had been reviewed by the 2002 JMPR.

For estimating maximum residue levels and calculating STMRs and HRs, mean residue values have been used where duplicate samples have been analysed, LOQ values have been used when residues were not detected and the highest values have been used from separate plots with distinguishing characteristics such as different formulations, varieties or treatment schedules.

*Oilseeds**Rape seed*

The critical GAPs for oilseed rape (canola) are in Australia (13.75 g ai/ha, PHI 7 days) and in Canada (10 g ai/ha, PHI 7 days).

In 16 independent field trials on canola conducted in North America, matching the GAP in Canada, deltamethrin residues in rape seed were: <0.05 (4), <0.06 (3), <0.07 (3), <0.09 (4), <0.11 and 0.14 mg/kg.

The Meeting estimated a maximum residue level of 0.2 mg/kg and an STMR of 0.07 mg/kg for deltamethrin in rape seed.

***Fate of residues in processing***

The Meeting noted that the 2002 JMPR had reviewed a processing study for rape seed and had concluded that the lack of significant residues the processed fractions precluded the estimation of processing factors for rape seed meal and refined oil, except to note they are less than 1.

***Residues in animal commodities****Farm animal dietary burden*

The Meeting recalculated the livestock dietary burden using the more recent diets listed in the FAO Manual Appendix IX (OECD Feedstuff Table) for the uses considered by the 2002 JMPR and a conservative estimated STMR-P of 0.07 mg/kg for rape seed meal.

	Animal dietary burden, deltamethrin, ppm of dry matter diet							
	US-Canada		EU		Australia		Japan	
	Max	Mean	Max	Mean	Max	Mean	Max	Mean
Beef cattle	2.68 <sup>A</sup>	2.68 <sup>C</sup>	1.46	1.35	2.21	1.58	1.81	1.81
Dairy cattle	1.44	1.28	1.43	1.27	2.12 <sup>B</sup>	1.61	1.62	1.62 <sup>D</sup>
Poultry – broiler	1.72 <sup>E</sup>	1.72 <sup>F</sup>	1.16	1.16	1.15	1.15	0.9	0.9
Poultry – layer	1.72 <sup>G</sup>	1.72 <sup>H</sup>	1.28	1.17	1.15	1.15	1.35	1.36

<sup>A</sup> Highest maximum beef or dairy cattle dietary burden suitable for MRL estimates for mammalian tissues

<sup>B</sup> Highest maximum dairy cattle dietary burden suitable for MRL estimates for mammalian milk

<sup>C</sup> Highest mean beef or dairy cattle dietary burden suitable for STMR estimates for mammalian tissues

<sup>D</sup> Highest mean dairy cattle dietary burden suitable for STMR estimates for milk

<sup>E</sup> Highest maximum poultry dietary burden suitable for MRL estimates for poultry tissues

<sup>F</sup> Highest mean poultry dietary burden suitable for STMR estimates for poultry tissues

<sup>G</sup> Highest maximum poultry dietary burden suitable for MRL estimates for poultry eggs

<sup>H</sup> Highest mean poultry dietary burden suitable for STMR estimates for poultry eggs

The revised maximum dietary burdens are 2.7 ppm for beef cattle (2002 JMPR = 7.0 ppm) and 2.1 ppm for dairy cattle (2002 JMPR = 6.3 ppm). The mean dietary burdens are 2.7 ppm for beef cattle (2002 JMPR = 5.9 ppm) and 1.6 ppm for dairy cattle ((2002 JMPR = 5.8 ppm).

For poultry, the maximum and mean dietary burdens for broilers and layers are all 1.7 ppm (2002 JMPR = 2.7 ppm).

*Maximum residue levels – animal commodities*

Since the recalculated livestock dietary burdens for cattle and poultry do not exceed those estimated by the 2002 JMPR, the Meeting agreed that the current maximum residue levels for animal commodities accommodate the additional use on rape seed (canola).

**RECOMMENDATIONS**

On the basis of the data from supervised trials the Meeting concluded that the residue levels listed in Annex 1 are suitable for establishing maximum residue limits and for dietary exposure assessments.

Definition of the residue (plant and animal commodities) for compliance with the MRL and for the estimation of dietary intake: *sum of deltamethrin and its  $\alpha$ -R- and trans- isomers*

*The residue is fat soluble.*

**DIETARY RISK ASSESSMENT***Long-term dietary exposure*

The International Estimated Daily Intakes (IEDIs) for deltamethrin were calculated for the food commodities for which STMRs or HRs have been estimated and for which consumption data were available. The results are shown in Annex 3.

The International Estimated Daily Intakes of deltamethrin for the 17 GEMS/Food cluster diets, based on estimated STMRs were 0–50% of the maximum ADI of 0.01 mg/kg bw (Annex 3). The Meeting concluded that the long-term dietary exposure to residues of deltamethrin from uses that have been considered by the JMPR is unlikely to present a public health concern.

*Short-term dietary exposure*

The International Estimated Short-term Intakes (IESTIs) for deltamethrin were calculated for the food commodities for which STMRs or HRs were estimated and for which consumption data were available (Annex 4).

For deltamethrin the IESTI varied from 0–0% of the ARfD (0.05 mg/kg bw) and the Meeting concluded that the short-term dietary exposure to residues of deltamethrin, from uses considered by the Meeting, is unlikely to present a public health concern.

