

## 5.20 FLUTOLANIL (205)

### RESIDUE AND ANALYTICAL ASPECTS

Flutolanil was evaluated by JMPR in 2002 for the first time toxicologically and for residues. The 2002 JMPR allocated an ADI of 0–0.09 mg/kg bw and ARfD unnecessary. It also determined that the definition of residues should be flutolanil for plant commodities (for compliance with MRLs and for estimation of dietary intake) and flutolanil and transformation products containing the 2-trifluoromethylbenzoic acid moiety, expressed as flutolanil for animal commodities (for compliance with MRLs and for estimation of dietary intake) and recommended a maximum residue level for rice, husked; rice, polished; rice bran, unprocessed; rice straw and fodder, dry; tissues of cattle, goats, pigs, sheep and poultry; milks; and eggs.

The current Meeting received information on analytical methods, storage stability, use patterns and supervised trials to support estimation of maximum residue levels for broccoli, cabbage and mustard greens.

#### *Methods of analysis*

The Meeting received information on the analytical method used for the determination of flutolanil. Flutolanil in broccoli or mustard green was extracted with acetone and flutolanil in cabbage was extracted with methanol:water (1:1, v/v). Acetone extract or methanol extract was partitioned with ethyl acetate:dichloromethane (1:9) and the top layer was dried down and reconstituted in acetone. Following clean up on a Florisil column, eluates were dried down, reconstituted in mobile phase. The analysis is carried out using LC-MS/MS (electro-spray ionization mode; molecular ion of 324 (m+H<sup>+</sup>) m/z and product ion of 282 m/z).

This method was found to be suitable for the determination of residues of flutolanil in broccoli, cabbage and mustard greens with recoveries of 83–110%, 97–106% and 83–110%, respectively, for these matrices at fortification levels 0.05–5 mg/kg.

The LOQ was 0.05 mg/kg for broccoli, cabbage and mustard green.

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

Storage stability studies were conducted on broccoli in conjunction with supervised trials.

Flutolanil in the frozen condition was stable up to 569 days at -22 to -4 °C (102–114% remaining) in broccoli, 297 days at -29 - -10°C (95–101% remaining) in cabbage and 519 days at -22 to -4 °C (107–114% remaining) in mustard green.

In the supervised residue trial studies, samples were stored frozen for periods shorter than the respective periods tested for the storage stability studies.

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

The Meeting considered residue data from supervised field trials conducted in the USA on broccoli, cabbage and mustard green with a flutolanil WP formulation (700 g ai/kg nominal concentration).

#### *Brassica vegetables*

The approved use of flutolanil in the USA on the crop group Brassica leafy vegetables (including Brassica vegetables) consists of one application at a rate of 0.863 kg ai/ha either as an in-furrow or directed spray (minimum of 28 L/ha) or as soil drench at planting (PHI of 45 days), or, when transplanted, as a banded application directed at plant bases immediately after transplanting (281–468 L/ha).

According to the review of information on environmental fate by the 2002 JMPR, flutolanil is strongly adsorbed to most soils and is classified as low mobility through soil.

*Broccoli*

A total of eleven field trials were conducted across the USA. At all the trials, a single ground application directed in a narrow band at the base of the transplants or over the seed furrow was made at the time of seeding or immediately after transplanting. The commercially mature broccoli heads (including stems, and jacket leaves) were harvested 56–106 days after the application.

Residues of flutolanil in broccoli from trials in accordance with US GAP were all < 0.05 mg/kg (9). The Meeting estimated a maximum residue level of 0.05 \* mg/kg. As flutolanil is applied at the time of planting or immediately after transplanting and flutolanil is unlikely to be taken up from soil by crops, the Meeting estimated an STMR of 0 mg/kg.

*Cabbages, Head*

A total of nine field trials were conducted across the USA. At all the trials, a single ground application directed in a narrow band at the base of the plant or over the seed furrow was made at the time of transplanting or seeding. The commercially mature cabbage heads were harvested 62–138 days after the application.

Residues of flutolanil in head cabbages from trials in matching US GAP were all < 0.05 mg/kg (9). The Meeting estimated a maximum residue level of 0.05\* mg/kg. Applying the same rational as for broccoli on soil uptake, the Meeting estimated an STMR of 0 mg/kg. The Meeting also estimated a highest residue of 0 mg/kg for the purpose of calculating livestock dietary burdens.

*Leafy vegetables*

*Mustard greens*

A total of ten field trials were conducted across the USA. At all the trials, a single ground application directed in a narrow band over the seed furrow was made at the time of seeding. The commercially mature mustard greens mustard were harvested 31–63 days after the application.

Residues of flutolanil in mustard greens from trials matching US GAP were < 0.05 (7) and 0.055 mg/kg. The Meeting estimated a maximum residue level of 0.07 mg/kg. The Meeting estimated an STMR of 0.05 mg/kg.

*Brassica (cole or cabbage) vegetables, Head cabbages, Flowerhead Brassicas; and Brassica leafy vegetables*

The GAP in the USA covers the crop group Brassica leafy vegetables, including head and stem Brassica, Brassica leafy vegetables and turnip greens. As this GAP involves one application at planting or immediately after transplanting, residues in commodities in this group harvested at their maturity are expected to be very low, as was observed in the trials on broccoli, cabbage and mustard greens.

Consequently, the Meeting decided to extend the recommendations for maximum residue levels of 0.05\* mg/kg and STMRs of 0 mg/kg for broccoli and head cabbage to the group Brassica (cole or cabbage) vegetables, Head cabbages, Flowerhead Brassicas (VB 0040); and the recommended maximum residue level of 0.07 mg/kg and STMRs of 0.05 mg/kg for mustard greens to Brassica leafy vegetables (VL 0054).

### Residues in animal commodities

#### Estimation of dietary burdens

The Meeting noted that in addition to rice grain, rice bran, rice hulls and rice straw from which dietary burdens were calculated by the 2002 JMPR, cabbages can also be fed to beef and dairy cattle and laying hens. Although both the STMR and highest residue of head cabbages were estimated to be 0 mg/kg and therefore not impacting on animal dietary burden, as the OECD Animal Feeding Table had been revised since the last evaluation, the maximum and mean dietary burdens were re-calculated using the highest residue and STMR/median residue of the above-mentioned commodities on a basis of the updated OECD Animal Feeding Table. The summary of calculated dietary burdens is shown in the following table.

#### Summary of livestock dietary burdens (ppm of dry matter diet)

	US-Canada		EU		Australia		Japan	
	max	Mean	max	Mean	max	mean	Max	mean
Beef cattle	0.372	0.372	0.822	0.411	5.83 <sup>a</sup>	3.37 <sup>b</sup>	4.90	2.64
Dairy cattle	0.372	0.372	0.789	0.584	2.78 <sup>c</sup>	1.96 <sup>d</sup>	2.24	1.22
Broiler	0.278	0.278	0.189	0.189	0.599	0.599	0.094	0.094
Layer	0.278	0.278	0.094	0.094	0.599 <sup>e</sup>	0.599 <sup>f</sup>	0.378	0.378

<sup>a</sup> Suitable for estimating maximum residue levels for meat, fat and edible offal of cattle.

<sup>b</sup> Suitable for estimating STMRs for meat, fat and edible offal of cattle.

<sup>c</sup> Suitable for estimating maximum residue level for milk of cattle.

<sup>d</sup> Suitable for estimating STMR for milk of cattle.

<sup>e</sup> Suitable for estimating maximum residue levels for meat, fat, edible offal of poultry.

<sup>f</sup> Suitable for estimating STMRs for meat, fat, edible offal of poultry.

#### Residues in milk and mammalian tissues

The 2002 JMPR reviewed a cattle feeding study conducted at levels equivalent to 39, 116 and 388 ppm in the feed.

The maximum and mean dietary burdens in cattle were 2.78 and 1.96 ppm of dry matter diet respectively for estimating a maximum residue level and STMR for milk; and 5.83 and 3.37 ppm respectively for estimating maximum residue levels and STMRs for tissues. The maximum residue levels, STMRs and highest residues for relevant commodities of animal origin were estimated using the residue levels in tissues and milk at 39 ppm feeding group.

	Feed level (ppm) for milk residues	Flutolanil* (mg/kg) in milk	Feed level (ppm) for tissue residues	Flutolanil * (mg/kg) in			
				Muscle	Liver	Kidney	Fat
<b>Maximum residue level beef or dairy cattle</b>							
Feeding study <sup>a</sup>	39	< 0.05	39	< 0.05	2.0	0.79	0.06
Dietary burden and highest residue	2.78	< 0.004	5.83	< 0.007	0.299	0.118	0.009
<b>STMR beef or dairy cattle</b>							
Feeding study <sup>b</sup>	39	< 0.05	39	< 0.05	1.7	0.42	0.05
Dietary burden and mean residue	1.96	< 0.003	3.37	< 0.004	0.147	0.036	0.004

<sup>a</sup> highest residues for tissues and mean residue for milk

<sup>b</sup> mean residues for tissues and mean residue for milk

\* From the common moiety method

The Meeting estimated STMRs of 0.147 and 0.036 mg/kg for liver and kidney respectively. As the residues in meat were < 0.05 mg/kg in any of feeding groups, the Meeting confirmed the existing STMR for meat at 0 mg/kg. Since the calculated STMR for milk was less than one tenth of the LOQ, the Meeting decided to use the existing STMR of 0 mg/kg.

The Meeting confirmed the previous maximum residue level recommendations of 0.05\* and 0.05\* mg/kg for milks and meat (from mammals other than marine mammals), and estimated a maximum residue level of 0.5 mg/kg for edible offal (mammalian) and withdrew the previous recommendations for liver and kidney.

#### *Residues in eggs and poultry tissues*

The 2002 JMPR reviewed a chicken feeding study conducted at levels equivalent to 0.78, 2.4 and 7.8 ppm in the feed. The maximum of calculated poultry dietary burden was 0.60 ppm.

At the lowest feeding level in the feeding study, residues from the common moiety method were all < 0.05 mg/kg in the eggs and all tissues tested. As a result the Meeting confirmed the existing maximum residue levels for eggs, poultry meat and poultry, edible offal of 0.05 \* mg/kg.

At all feeding levels, residues did not exceed the LOQ of 0.05 mg/kg in eggs, muscle, fat or skin. The Meeting therefore confirmed the previously estimated STMRs of 0 mg/kg for these commodities.

Residues in the liver were below 0.05 mg/kg in the lowest and middle feeding groups but were detected at 0.08, 0.10 and 0.20 mg/kg in the highest feeding group. The Meeting, therefore also confirmed the STMR of 0.05 mg/kg for poultry, edible offal of.

## **RECOMMENDATIONS**

On the basis of the data from supervised trials the Meeting concluded that the residue levels listed below are suitable for establishing maximum residue limits and for IEDI and IESTI assessment.

Definition of the residue for plant commodities (for compliance with MRLs and for estimation of dietary intake): flutolanil.

Definition of the residue for animal commodities (for compliance with MRLs and for estimation of dietary intake): flutolanil and transformation products containing the 2-trifluoromethylbenzoic acid moiety, expressed as flutolanil.

The residue is not fat-soluble.

## **DIETARY RISK ASSESSMENT**

#### *Long-term intake*

The International Estimated Dietary Intakes (IEDIs) of flutolanil were calculated for the 13 GEMS/Food cluster diets using STMRs estimated by the 2002 and current Meetings (Annex 3). The ADI is 0–0.09 mg/kg bw and the calculated IEDIs were 0–1% of the maximum ADI. The Meeting concluded that the long-term intake of residues of flutolanil resulting from the uses considered by the current JMPR is unlikely to present a public health concern.

***Short-term intake***

The 2002 JMPR decided that an ARfD is unnecessary. The Meeting therefore concluded that the short-term intake of residues of flutolanil is unlikely to present a public health concern.

