5.18 FLUPYRADIFURONE (285)

RESIDUE AND ANALYTICAL ASPECTS

Flupyradifurone was first evaluated for toxicology and residues by the 2015 JMPR and 2016 JMPR respectively. The 2015 JMPR established an ADI for flupyradifurone of 0–0.08 mg/kg bw/day and an ARfD of 0.2 mg/kg bw. At the 48th Session of the CCPR (2016), flupyradifurone was listed for additional MRLs by the 2017 JMPR.

The manufacturer supplied information on an analytical method, storage stability information, a registered use pattern for stone fruit, supervised residue trials on cherries, peaches and plums and fate of residues in processing studies for peaches and plums. A product label was made available from the United States of America.

The residue definition for compliance with the MRL for plant commodities is flupyradifurone. The residue definition for estimation of dietary intake for plant commodities is the sum of flupyradifurone, difluoroacetic acid (DFA) and 6-chloronicotinic acid (6-CNA), expressed as parent equivalents.

The residue definition for compliance with the MRL and for estimation of dietary intake for animal commodities is the sum of flupyradifurone and difluoroacetic acid, expressed as parent equivalents.

The residue is not fat soluble.

Methods of analysis

The Meeting received an analytical method (RV-001-P10-03) suitable for the determination of the active substance flupyradifurone and the metabolites DFA, DFEAF and 6-CNA in plant matrices. This method involves minor modifications to the clean-up steps for method RV-001-P10-2 considered by the 2016 JMPR and has an LOQ of 0.01 mg/kg for parent, difluoroethyl-amino-furanone (DFEAF), and 6-CNA (as parent equivalents) and between 0.02–0.05 mg/kg (as parent equivalents and depending on the matrix) for DFA.

Method RV-001-P10-02 was used in the storage stability study and in the peach processing study, while the modified method RV-001-P10-03 was used in the stone fruit residue trials and in the plum processing study.

Stability of pesticide residues in stored analytical samples

The Meeting received information on the freezer storage stability of flupyradifurone in plant commodities. This is an extension to longer storage intervals of a study which was evaluated at JMPR 2016.

Residue trial data are supported by the supplied storage stability study which showed that flupyradifurone, DFEAF and DFA are stable for at least 52 months in high water, high acid, high oil, high protein, and high starch content matrices, when stored frozen at approximately -18°C. The storage periods in the storage stability studies cover the storage intervals in the residue trials.

Results of supervised residue trials on crops

The Meeting received supervised trial data for application of flupyradifurone on stone fruit (cherries, peaches and plums).

For maximum residue level estimation (compliance), residues of flupyradifurone parent have been considered. For dietary intake assessment (risk assessment), residues of flupyradifurone, DFA and 6-chloronicotinic acid expressed as parent equivalents (referred to as total residues of flupyradifurone), have been considered.

Where parent or DFA residues were not detected or were less than the LOQ (*i.e.* generally < 0.01 mg/kg for parent or 0.05 mg/kg for DFA) the LOQ value was utilised for maximum residue estimation and dietary intake assessment. For 6-CNA, values less than the LOQ were not added for calculation of total residues of flupyradifurone.

The following table shows how residues in the trials were added to give total residues of flupyradifurone.

Parent	DFA	6-CNA	Total
< 0.01	0.05	0.01	0.07
0.01	< 0.05	0.01	0.07
< 0.01	< 0.05	< 0.01	< 0.06
0.01	0.05	< 0.01	0.06
0.01	0.05	0.01	0.07

Stone Fruits – cherries, peaches and plums

The USA GAP for stone fruit is two foliar applications at 205 g ai/ha with a 10 day minimum retreatment interval and a 14-day PHI.

Residue data for cherries (sweet and sour), peaches and plums that match the US GAP have been submitted. Foliar applications were made using either concentrated or dilute sprays. The highest residue observations have been selected from each trial for estimation of maximum residue levels and for dietary intake purposes.

The Meeting noted that the use in the USA is for the stone fruit group (Crop Group 12-12). Although the median residues for each fruit differed by a factor of less than five, the Meeting decided to recommend maximum residue levels for the individual sub-groups of stone fruit, as there are sufficient trials for each sub-group.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in cherries from supervised trials according to the GAP in the USA was 0.014, 0.17, 0.25, 0.36, 0.36, 0.58, 0.62 and 0.94 mg/kg.

For the estimation of dietary intake the ranked order of total residues of flupyradifurone in cherries from supervised trials according to the GAP in the USA was 0.40, 0.49, 0.50, 0.54, 0.57, 0.82, 1.1 and 1.1 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for the subgroup of cherries of 2, 0.555 and 1.1 mg/kg respectively.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in peaches from supervised trials according to the GAP in the USA was 0.13, 0.14, 0.22, 0.25, 0.28, 0.31, 0.31, 0.33, 0.62, 0.72 and 0.73 mg/kg.

The ranked order of total residues of flupyradifurone in peaches from supervised trials according to the GAP in the USA was 0.16, 0.25, 0.34, 0.35, 0.37, 0.39, 0.43, 0.62, 0.71, 0.94 and 1.1 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for the subgroup of peaches (including nectarine and apricots) of 1.5, 0.39 and 1.1 mg/kg respectively.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in plums from supervised trials according to the GAP in the USA was 0.037, 0.046, 0.068, 0.089, 0.098, 0.14, 0.15 and 0.26 mg/kg.

For the estimation of dietary intake the ranked order of total residues of flupyradifurone in plums from supervised trials according to the GAP in the USA was 0.087, 0.14, 0.16, 0.20, 0.26, 0.27, 0.40 and 0.59 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for the subgroup of plums (including fresh prunes) of 0.4, 0.23 and 0.59 mg/kg respectively.

Fate of residues during processing

The Meeting received processing studies for peaches and plums. Additionally, some processing data was generated for peaches and cherries as part of the residue trials.

Based on the best estimate flupyradifurone processing factor (parent only, i.e. the residue definition for enforcement) of 5.3 for prunes and the plums maximum residue level of 0.4 mg/kg, the calculated expected highest residues in prunes are 2.1 mg/kg. The Meeting estimated a maximum residue level for flupyradifurone in prunes of 3 mg/kg.

All other processing factors for parent compound only (with the exceptions of peach peel, which is not of significance as either a processed food commodity or a by-product for animal feeding and pitted fresh plums, for which maximum residue levels are not set) are < 1.

The table below summarises STMR-P and HR-P values calculated from the processing factors determined for total residues of flupyradifurone (residue definition for dietary risk assessment).

RAC	Processed Commodity	Best Estimate Processing Factor (total residues)	RAC STMR (total residues)	Processed commodity STMR-P (total residues)	RAC HR (total residues)	Processed commodity HR-P (total residues)
Peach	Fruit, washed	0.80	0.39	0.31	1.1	0.88
	Fruit, peeled	0.60		0.23		0.66
	Fruit, cooked	0.35		0.14		0.38
	Canned peaches (peeled fruit with stone removed)	0.43		0.17		0.47
Cherry	Fruit, washed	0.975	0.555	0.54	1.1	1.07
	Fruit, cooked	0.35		0.19		0.38
Plum	Fruit pitted (stone removed)	1.40	0.23	0.32	0.59	0.83
	Fruit, washed, pitted	1.4		0.32		0.83
	Fruit, pitted and dried (prunes)	5.0		1.15		2.95

Farm animal dietary burden

Estimated maximum and mean dietary burdens of farm animals

No stone fruit commodities are used as livestock feeds. Therefore the livestock dietary burden is unchanged from that previously calculated.

Animal commodity maximum residue levels

As the additional livestock dietary burden for flupyradifurone is nil, no changes are required to animal commodity MRLs or dietary parameters.

RECOMMENDATIONS

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

Definition of the residue (for compliance with the MRL for plant commodities): *Flupyradifurone*

Definition of the residue (for estimation of dietary intake for plant commodities): Sum of flupyradifurone, difluoroacetic acid (DFA) and 6-chloropyridine-3-carboxylic acid (6-CNA), expressed as parent equivalents