

5.17 GLUFOSINATE-AMMONIUM (175)

RESIDUE AND ANALYTICAL ASPECTS

Glufosinate-ammonium is a herbicide or desiccant. It was first evaluated for residues and toxicology by the 1991 JMPR and re-evaluated (T, R) by the 2012 JMPR. The ADI of glufosinate-ammonium was 0–0.01 mg/kg bw and the ARfD was 0.0 1mg/kg bw. The compound was listed by the Forty-fifth Session of CCPR for the JMPR to consider residues in soya bean following a revision to the use-pattern.

The residue definition for compliance with MRL and for estimation of dietary intake (for animal and plant commodities) is the sum of glufosinate, 3-[hydroxy(methyl)phosphinoyl]propionic acid and N-acetyl-glufosinate, calculated as glufosinate (free acid).

For the current evaluation the Meeting received critical data required for the estimation of maximum residue levels for soya beans.

Stability of residues in stored analytical samples

The 2012 JMPR evaluated data on the storage stability of glufosinate-ammonium residues (and metabolites) in plant commodities that included soya bean. The studies concluded residues of glufosinate, NAG and MPP are stable under frozen conditions for at least 24 months in glufosinate-tolerant soya bean seed and for at least 12 months in glufosinate tolerant soya bean hay. The longest storage interval in the current trials was 5.4 months.

Results of supervised residue trials in crops

Soya beans, tolerant

The Meeting received field trials performed in the USA involving glufosinate tolerant soya beans. GAP for USA is for (1) one application pre-planting or pre-emergence at 0.59–0.74 kg ai/ha with additional applications from post-emergence to the early bloom growth stage at 0.45–0.59 kg ai/ha with a maximum seasonal rate of 1.3 kg ai/ha/year or (2) post-emergence only with applications from post-emergence to the early bloom growth stage at 0.41–0.50 kg ai/ha with a maximum seasonal rate of 0.91 kg ai/ha/year. The PHI is 70 days. Post-emergent application leads to higher residues.

The use pattern specifies both a last growth stage for application (before the bloom growth stage) and a PHI. The Meeting noted that the interval between the last application and harvest varies significantly depending on the trial location and the soya bean cultivar and that the growth stage at last application was the critical parameter in determining compliance with GAP rather than the PHI.

In trials previously reported by the 2012 JMPR and new trials made available to the current meeting approximating the revised critical GAP in the USA total residues (glyphosate+NAG+MPP) in soya bean seeds were (n=24): 0.04, 0.08, 0.08, 0.1, 0.18, 0.18, 0.19, 0.22, 0.3, 0.3, 0.32, 0.32, 0.32, 0.36, 0.39, 0.4, 0.45, 0.5, 0.51, 0.54, 0.65, 0.75, 1.09, 1.3 mg/kg. The Meeting estimated a median residue of 0.32 mg/kg for use in calculating livestock dietary burdens and a maximum residue level of 2 mg/kg for soya bean, dry to replace its previous recommendation of 3 mg/kg.

Residues for estimation of dietary intake (glufosinate + 0.1×[NAG+MPP]) residues were (n=24): 0.02, 0.02, 0.03, 0.04, 0.05, 0.05, 0.07, 0.08, 0.09, 0.09, 0.09, 0.09, 0.09, 0.10, 0.11, 0.11, 0.13, 0.13, 0.14, 0.14, 0.19, 0.25, 0.35 and 0.39 mg/kg. The Meeting estimated an STMR and HR of 0.09 and 0.39 mg/kg respectively for soya bean (dry) for use in calculation of dietary intake.

Fate of residues during processing

Processing factors reported by the 2012 JMPR are used to calculate median residues for aspirated grain fractions, hulls, meal and oil that are used in calculation of livestock dietary burden and also for oil used in calculation of the IEDI and IESTI for glufosinate-ammonium.

Summary of selected processing factors for glufosinate-ammonium

Raw commodity	Processed commodity	Individual PF	Best estimate PF	Median or STMR _{RAC} (mg/kg)	Median or STMR _{RAC} × PF (mg/kg)
Soya bean	Aspirated grain fraction	2.73 8.89	5.81	0.32	1.86
	Hulls	3.15, 11.4	7.275		2.33
	Meal	1.22	1.22		0.39
	Oil	< 0.11 < 0.12 < 0.22 < 0.9	< 0.17	0.09	< 0.015

Animal commodity maximum residue levels

The minor changes to the estimated soya bean and soya bean processed commodity levels do not result in significant differences in livestock dietary burdens. The Meeting agreed it is not necessary to make new estimates and recommendations for livestock commodities.

RECOMMENDATIONS

On the basis of the data obtained from supervised residue 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 (compliance with the MRL and for estimation of dietary intake) for animal and plant commodities: *sum of glufosinate, 3-[hydroxy(methyl)phosphinoyl]propionic acid and N-acetyl-glufosinate, calculated as glufosinate (free acid)*

The residue is not fat soluble.

DIETARY RISK ASSESSMENT***Long-term intake***

The Meeting noted that the reduction in the recommended maximum residue level for soya beans would result in lower IEDIs than those previously estimated for glufosinate-ammonium by the 2012 JMPR. The present meeting concluded that the long-term intake of glufosinate-ammonium resulting from the uses considered by the current JMPR is unlikely to present a public health concern.

Short-term intake

The WHO Panel of the 2012 JMPR established an Acute Reference Dose (ARfD) of 0.01 mg/kg bw for glufosinate-ammonium. The IESTI was calculated for soya bean and related commodities using STMR, STMR-P and HR values estimated by the current Meeting. The IESTIs represented 0 to 10% of the ARfD of 0.01 mg/kg bw. The Meeting concluded that the short-term intake of residues of glufosinate-ammonium resulting from uses that have been considered by the JMPR is unlikely to present a public health concern.