

## 5.5 CARBOFURAN (096)

### RESIDUE AND ANALYTICAL ASPECTS

The insecticide, nematicide and acaricide carbofuran has been evaluated numerous times by the JMPR since 1976, the most recent being in 2008 for toxicology and 2009 for residues. The 2008 Meeting estimated an acceptable daily intake (ADI) for humans of 0–0.001 mg/kg bw and an acute reference dose (ARfD) of 0.001 mg/kg bw. The residue (for compliance with the MRL and for estimation of dietary intake) for plant and animal commodities was defined as the sum of carbofuran and 3-OH carbofuran expressed as carbofuran. The information provided in 2009 to the JMPR did not preclude that the IESTI of carbofuran in bananas will be below the ARfD. However the 2009 Meeting also noted that the short-term dietary risk assessment of bananas could be refined, if a metabolism study on banana or residue trials employing a very sensitive analytical method were available.

The current Meeting received new information on residue analysis, use pattern and residues resulting from supervised residue trials on bananas.

#### *Methods of analysis*

The Meeting previously evaluated several methods of analyses for carbofuran and 3-OH carbofuran in different vegetable matrices each with varying LOQs and LODs ranging from 0.005–0.1 mg/kg for both analytes.

The method reported to the current Meeting and used in the supervised residue trials determined carbofuran and 3-OH-carbofuran. The limit of quantification (LOQ) for bananas was 0.01 mg/kg for both carbofuran and 3-OH carbofuran. The limit of detection (LOD) of 0.003 mg/kg for carbofuran and for 3-OH carbofuran was assumed to be thirty percent of the LOQ.

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

##### *Bananas*

In bananas, carbofuran residues may arise from ground treatment use against nematodes. The 2009 Meeting noted that in eight Central and South American trials, no residues of carbofuran or 3-OH carbofuran were detected in any sample (whole fruit, peel or pulp). The LOQ and LOD were 0.05 mg/kg and 0.01 mg/kg, respectively, both for carbofuran and 3-OH carbofuran. In an additional Brazilian trial (LOQ: 0.1 mg/kg) and in a Spanish trial (LOQ: 0.05 mg/kg, LOD: 0.02 mg/kg) no residues were detected in pulp or peel either.

Monitoring data from the United States Department of Agriculture (USDA) reviewed in 2009 showed that in almost 4000 banana samples no carbofuran or 3-OH carbofuran residues above the LODs (0.002–0.076 mg/kg for carbofuran and 0.004–0.076 mg/kg for 3-OH carbofuran) have been detected.

Based on the overall findings, the 2009 Meeting concluded that in the case of bananas, a zero-residue situation seemed plausible. However, the Meeting decided to use the LODs for carbofuran and 3-OH carbofuran as reported in the eight Central and South American trials (0.01 mg/kg for each of them) for the estimation of an STMR and HR of 0.02 mg/kg each for carbofuran in bananas.

For the present evaluation new supervised field trials involving bananas were performed in Central America (Costa Rica, Honduras and Ecuador). The maximum GAP for carbofuran on bananas in these countries is 2 × 3.1 g ai per plant and year with an interval of 4–5 months and no specified PHI.

In four trials matching the GAP no carbofuran and 3-OH carbofuran residues in bananas (whole fruit) were detected following DATs ranging from 0–124 days:

Carbofuran: < 0.01 mg/kg (n=4) and not detected (LOD: 0.003 mg/kg)

3-hydroxy-carbofuran: < 0.01 mg/kg (n=4) and not detected (LOD: 0.003 mg/kg).

The Meeting noted that the use of carbofuran according to the GAPs submitted lead to a very low residue situation in bananas, in which with no detectable residues in the fruits and concluded that the sum of both analytes would be unlikely to exceed 0.01 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR of 0.01\* mg/kg, 0.01 mg/kg and 0.01 mg/kg, respectively, for the sum of carbofuran and 3-OH carbofuran, expressed as carbofuran in bananas.

The Meeting withdraws its previous recommendation of 0.02\* mg/kg for bananas.

### DIETARY RISK ASSESSMENT

#### *Long-term intake*

The Meeting of 2009 concluded that the long-term intake of residues of carbofuran from uses that have been considered by the JMPR is unlikely to present a public health concern. As the current Meetings estimated STMR for bananas is lower than that estimated in 2009, no new long-term intake calculations were performed.

#### *Short-term intake*

The ARfD for carbofuran is 0.001 mg/kg bw. The International Estimated Short-term Intake (IESTI) was calculated for banana using an HR of 0.01 mg/kg for bananas. The IESTI was 90% of the ARfD for bananas. The short-term intake of residues of carbofuran from uses of carbosulfan on banana is unlikely to present a public health concern.