

## 5.12 ENDOSULFAN (032)

### RESIDUE AND ANALYTICAL ASPECTS

Endosulfan is a synthetic cyclodiene non-systemic insecticide and acaricide with both contact and stomach activity. It has been widely used in agriculture to control a range of insects and mites on a broad spectrum of crops. It has been evaluated several times by the JMPR; the initial evaluation for residues was in 1967 and the latest in 2006. Under the CCPR Periodic Review Programme the toxicology was re-evaluated in 1998. The Meeting established an ADI of 0–0.006 mg/kg bw and an acute reference dose (ARfD) of 0.02 mg/kg bw. In 2006, a Periodic Review of the residue-analytical aspects was completed.

In the 2006 review, the Meeting was not able to recommend a maximum residue level for tea, as trials from India could not be matched against the provided GAPs from China, Japan or Malaysia. At the Thirty-ninth Session of CCPR in 2007, on the proposal of the delegations of China and India the CXL for tea (green, black) was retained for four years under the Periodic Review Programme. The Forty-first Session of CCPR in 2009 scheduled the review of data on tea from China by the 2010 JMPR. GAP for tea in China and new trials in tea performed over several years (2004–2007) were submitted by the Government of China.

#### *Methods of analysis*

The Meeting received a description and validation data of a GC-ECD analytical method for residues of total endosulfan (alpha endosulfan, beta endosulfan and endosulfan sulphate) in fresh leaves of tea, in made tea, and in tea infusions. The recoveries of the method for endosulfan (total residue) are satisfactorily over a range of 0.01–50 mg/kg in made tea.

#### *Results of supervised trials on tea*

The present Meeting received 17 decay trials and 30 residue trials (2-point decline) on tea, green and black, which were performed over a period of four years in four different provinces within China. GAP in China is one treatment at an application rate of 0.668 kg ai/ha (0.089 kg ai/hL, 750 L water/ha) with a pre-harvest interval of 7 days.

Ten of the decay trials were at GAP. Total endosulfan residue levels in ‘made tea’, were, in ranked order: 2.0 (2), 2.3, 2.5, 2.5, 3.2, 3.4, 4.1, 4.2 and 4.3 mg/kg.

Seven of the 2-point decline trials were at GAP. Total endosulfan residue levels in ‘made tea’, in ranked order, were: 1.9, 2.2, 4.1(2), 4.3(2), 4.7 mg/kg. Since the decay trials and the decline trials appear not to be independent, the Meeting decided to estimate a maximum residue level based on the data set yielding the highest STMR, the terminal residue trials.

The Meeting estimated a maximum residue level of 10 mg/kg for ‘made tea’, and an STMR of 4.1 mg/kg.

The maximum residue level estimate derived from use of the NAFTA calculator was 6 mg/kg.

#### *Fate of residues during processing*

The Meeting received information on the extraction rate of endosulfan residue during tea infusion. Tea infusions were prepared by adding boiling water to dried and processed tea leaves (‘made tea’) and allowed to stand for 20 minutes. This was repeated twice. The infusion was filtered and the % infusion (% of residue extracted in the boiling water) was calculated. This was done 4× for Hangzhou Green Tea, 4× for Fujian Oolong Tea, 3× for Hunan Black Tea, 4× for Anhui Baked Tea. After 3

infusions for endosulfan (total residue) the mean %infusion (or extraction rate) was 8.3%, range 7.1–9.7%, n = 15.

The Meeting estimated an STMR-P in tea infusion of 0.34 mg/kg.

### ***Residues in animal commodities***

Since tea is not an animal feed item, the recommendations for animal commodities as made by the 2006 Meeting are still valid.

## **DIETARY RISK ASSESSMENT**

### ***Long-term intake***

In 2006 the Meeting concluded that the long term intake of residues of endosulfan from uses that have been considered by the JMPR is unlikely to present a public health concern. The IEDI in the thirteen GEMS/Food regional diets, on the basis of the estimated STMRs, represented 2–20% of the maximum ADI of 0.006 mg/kg bw.

Due to the low contribution of tea in the entire diet, no revision of the chronic dietary exposure assessment has been carried out.

### ***Short-term intake***

In the 2006 evaluation no short-term intake for tea was calculated.

Based on the STMR-P of 0.34 mg/kg for tea (green, black), the short-term intake for both children  $\leq 6$  years and for the general population represented 1% of the ARfD. The Meeting concluded that the short-term intake of endosulfan from its use on tea (green, black) was unlikely to present a public health concern.