MINISTRY OF FOOD AND DRUG SAFETY
National Institute
of Food and Drug Safety Evalution

# Risk Assessment of Trichlorfon

Trichlorfon is a systemic organophosphorous pesticide used to control insects such as lepidoteran larvae, cicada larvae, mole crickets, leaf miners, stinkbugs, flies, ants, cockroaches, earwigs, diving beetles, water scorpions, and sow bugs. Its MRL in Korea is set at 0.05–2 mg/kg for 12 foodstuffs including walnut, soybean, and napa cabbage (MRLs for Pesticides in Foods, May 31, 2016).

The most representative toxicity effect for the establishment of the ADI of trichlorfon is the inhibition of activation of acetylcholinesterase. ADI was established at 0.002 mg/kg bw/day by applying the safety factor 10 for differences between individual entities and another safety factor 10 for the extrapolation of NOEL to the NOEL of 0.2 mg/kg bw/day obtained from the 6-day and 21-day repeated dose studies on male volunteers.

The intake amount of trichlorfon was estimated based on the results of the analysis of 2,082 samples of 52 foodstuffs including rice in the Monitoring of Agricultural Products in Korea (2011–2015) by the National Institute of Food and Drug Safety Evaluation. The result of the monitoring showed that the pesticide level was below the LOQ, and thus, trichlorfon was not detected in any of the samples. Concerning data lower than the LOQ, in case more than 60% of data were below the LOQ, estimation was made by applying 0 (non-detection) as the lower exposure limit or LOQ (upper exposure limit), according to the “evaluation of low level contamination of foods” recommended by the WHO. Food consumption was calculated through SAS 9.4 using the tertiary food code data from the KNHANES conducted for five years (2010–2014). For the average weight of all age groups, 60 kg, the weight currently (as of 2016) being applied for establishment and revision of pesticide residue standards, was used. Risk characterization was made by calculating the HI in consideration of the EDI calculated

in the exposure assessment and the ADI, the safe level of human exposure.

In general, when HI is 1 or higher, the adverse effects of toxicity may be expected from the exposure, and when HI is lower than 1, the adverse effect is not expected. The results of the risk assessment of trichlorfon in all age groups revealed HI between 0 (non-detection data 0 applied) and 0.011 (non-detection data LOQ applied), as shown in the table below, and that its concentration is within the safe level of human exposure.

**Table 1.** ADI and HI of trichlorfon

| Age | EDI (mg/person/day) | | Average weight (kg) | EDI (mg/kg bw/day) | | ADI (mg/kg bw/day) | HI | |
|---|---|---|---|---|---|---|---|---|
| | 0 | LOQ (mg/kg) | | 0 | LOQ (mg/kg) | | 0 | LOQ (mg/kg) |
| All | 0 | $1.3\times10^{-3}$ | 60 | 0 | $0.2\times10^{-4}$ | 0.002 | 0 | 0.011 |

**Key words:** Trichlorfon, Risk Assessment, Organophosphorus insecticide, ADI, Monitoring, Pesticide