

2016 SCIENTIFIC REPORT



MINISTRY OF FOOD AND DRUG SAFETY

National Institute
of Food and Drug Safety Evaluation

Risk Assessment of Profenofos

Profenofos is an organophosphorous pesticide and miticide used to control insects such as tobacco budworms, bollworms, armyworms, cotton aphids, red spiders, capsids, fleahoppers, and whiteflies, and applied to cottonseed oil, etc. In Korea, it was first registered in the form of deltamethrin/profenofos emulsion in 1988, and its MRL is set at 0.05–3 mg/kg for 11 foodstuffs including potato and napa cabbage (MRLs for Pesticides in Foods, May 31, 2016).

Its main toxicity that appeared in acute and chronic, as well as short- and long-term studies, was the inhibition of activation of acetylcholinesterase, and it is related to neurotoxicity. The ADI of profenofos at 0.03 mg/kg bw/day was established by applying the safety factor 100 to the NOAEL of 2.9 mg/kg bw/day obtained from the repeated dose toxicity study on dogs.

The intake amount of profenofos 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, profenofos 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.

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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, adverse effect is not expected. The results of the risk assessment of profenofos in all age groups revealed HI between 0 (non-detection data 0 applied) and 0.003 (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 profenofos

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	5.7×10^{-3}	60	0	0.1×10^{-3}	0.03	0	0.003

Key words: Profenofos, Risk Assessment, Organophosphorus insecticide, ADI, Monitoring, Pesticide