

# 2016 SCIENTIFIC REPORT



MINISTRY OF FOOD AND DRUG SAFETY

National Institute  
of Food and Drug Safety Evaluation

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## Risk Assessment of Phorate

Phorate is an organophosphorous pesticide mainly used to control insects such as corn rootworms, mites, European corn borers, cicada larvae, leaf miners, thrips, black cutworms, leafhoppers, whiteflies, and nematodes. It is applied on crops including potato, corn, peanuts, cottonseed, barley, and beans. In Korea, it was first registered in the form of emulsion, and its MRL is set at 0.05–0.2 mg/kg for 9 foodstuffs such as soybean and peanuts (MRLs for Pesticides in Foods, May 31, 2016).

The ADI of phorate at 0.0007 mg/kg bw/day was established by applying the safety factor 100 (differences between species and individual entities) to the NOAEL of 0.07 mg/kg bw/day drawn from a 13-week neurotoxicity study on rats. The NOAEL was set at 0.07 mg/kg bw/day, the concentration level where toxicity effect (inhibition of activation of acetylcholinesterase in the brain) did not appear.

The intake amount of phorate was calculated based on the results of the analysis of 919 samples of 23 foodstuffs including rice in the Monitoring of Agricultural Products in Korea (2006) 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, phorate 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.

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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, adverse effect is not expected. The results of the risk assessment of phorate in all age groups revealed HI between 0 (non-detection data 0 applied) and 0.019 (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 phorate

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	$0.8 \times 10^{-3}$	60	0	$0.1 \times 10^{-4}$	0.0007	0	0.019

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