

Elucidation of Pollution Source of PCDDs/Fs in Arable lands of KoreaDal-soon Choi¹¹Niast

Elucidation of Pollution Source of PCDDs/Fs in Arable lands of Korea Dal-Soon Choi, Su-Myeong Hong and Oh-Kyung Kwon National Institute of Agricultural Science and Technology, Seo-Dun Dong 249, Suwon 441-707, Korea

Introduction Dioxins are not substances manufactured industrially but by-products generated from processes when heat is applied to substances containing carbon, oxygens, hydrogens and chloride. Therefore, PCDDs/DFs congener patterns differently appear according to the pollution source of dioxins. In order to investigate substantial pollutant source of arable land, our study elucidated the effects of air pollution drifted from incineration practice as main pollutant source in arable land through the analysis of PCDD/DFs congener pattern of soils and reference samples of atmospheric pollution. Materials and Methods For the examination of PCDD/DFs residues status on arable land in Korea, soil samples were measured and then their congener patterns with pollutant source were compared. Analysis was conducted by EPA 1613 method. We utilized ASE(Accelerated Solvent Extractor) and DPS(Dioxin Preparation System) as automatic preparation system and HR/MS(High Resolution Mass Spectrometer; Finnigan 95XL) as analytical instrument. In order to investigate a pollutant source of PCDD/DFs, fly ash as the pollutant reference of incinerator was analyzed. Soil samples were collected at 4 different areas; typical rice paddy, upland cultivating areas, arable land around a wastes incinerator and non pollutant source. Results and discussion Incineration and it's emission In general, 17 congeners pattern of PCDD/DFs based on toxicity equivalency factor differently appears according to origin of pollution. Therefore, elucidation of pollutant origin can be established by comparison of congeners pattern. Recently, Korea has operated a lot of incinerator reported as the pollution source of PCDD/DFs in Japan. For investigating the relationship of flue gas and soil pollution, we examined the PCDD/DFs congener patterns of arable soil around incinerator and found out to be originated from the emission pattern of incinerator(fig. 1). Fig. 1. PCDD/DFs congener patterns of flue gas and around soil. 15 cultivating areas around incinerator was selected as sampling site to elucidate the effects of PCDD/DFs accumulation from incineration in arable land and then soil samples were analyzed for comparing with emission pattern from incineration. As showed in fig. 2, congener patterns of soil samples were similarly appeared as the relationship of flue gas and soil mentioned in fig. 1. Fig. 2. PCDD/DFs congener patterns of cultivating upland soil around incinerator Paddy soils were also analyzed to investigate the residue levels of PCDD/DFs of major rice cultivating 6 areas. As an analytical result, dioxins concentration of paddy soil mostly indicated low concentration. When compared with PCDD/DFs patterns of soils drifted flue gas, the total tendency of dioxin in paddy soils may also be affected by air pollution as as presented in fig.1(fig. 3) Fig. 3. PCDD/DFs congener patterns of paddy soils

Conclusion Dioxins were formed unintentionally, most often during the course of incineration. As showed in fig.4, PCDD/DFs pollutant origin of arable lands in Korea was in charge of industrial pollution and incineration. Especially, the pollution of PCDD/DFs in arable lands must be caused by the incineration of wastes during agricultural practice. Fig. 4. Comparison of PCDD/DFs congeners pattern ; a) fly ash, b) impurities of active ingredients in crop protection products, c) flue gas, d) surrounding soils of chemical waste incinerator, e) surrounding soils of waste incinerator, f) vegetable cultivating soils, g) paddy soils. Reference 1. EPA method 1613(1997) 2. Chung, Y. H. et al. (1997) A Study on the Emission Rate and Generation Mechanism of Dioxin in Environmental(I), National Institute of Environmental Research. 3. Chung, Y. H. et al. (1998) A Study on the Emission Rate and Generation Mechanism of Dioxin in Environmental(II), National Institute of Environmental Research.