P311-WE

SOURCE APPORTIONMENT OF UNKNOWN PESTICIDE IN PADDY SOIL USING STABLE CARBON ISOTOPE RATIO

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In Japan, a so-called positive list system for regulating pesticide residues in food has been active since May 29, 2006. Aim of the system is to prohibit the distribution of foods that contain agricultural chemicals, veterinary drugs and food additives unless they have been established under the Food Sanitation Law. A default level of positive list system is 0.01 ppm and uniformly applied to chemicals. This means that after application of the system the farmers have to take care unintentional exposure (e.g. through drift using a drone) of neighboring crops for one's own crops. Since it is very difficult for farmers to completely avoid the drift of sprayed pesticides by neighboring farmers as the country like Japan farming many different crops in small areas, however, many farmers worry about positive list system.

We investigated pesticides in soil from paddy field and collected soil samples on 41 days between May 27 and October 28, 2005 at four sites in Yurihonjyo City, Akita prefecture, rice farming as primarily industry, Japan. Diazinon, an organophosphate insecticide and used extensively, was detected high concentrations from July 29 to August 15. Because of no application records and no user information in sampling area, however, we cannot comprehend source and reason etc.

Recently progresses of analytical technique enable us to measure $\delta^{13}C$ each compound. In the results, studies using $\delta^{13}C$ each compound spread revolutionarily the various field, e.g. bioremediation. Moreover, in source apportionment field, since the different sources do have distinct characteristics for the $\delta^{13}C$ values, source identification for polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and low molecular weight compounds in contaminated areas have been successful using $\delta^{13}C$ each compound (e.g. O'Malley *et al*., 1996, Horii *et al*., 2005 and Dempster *et al*., 1997). Aim of this study is to clarify source of high level diazinon from July 29 to August 15 by using $\delta^{13}C$ of diazinon. Analysis of $\delta^{13}C$ of diazinon was carried out with a Thermo Electron Trace GC coupled via a Thermo Electron GC-combustion-III-interface to a Thermo Electron MAT253 mass spectrometer. The GC was equipped with a fused silica capillary column (30 m × 0.25 mm i.d) coated with BPX5 phase (0.25 μm film thickness). Helium was used as the carrier gas. We selected 10 pesticide products (Granule 5% (3), Granule 3% (4), Wettable Powder (1) and Emulsifiable Concentrate (2)) included diazinon used by farmers mainly in Akita prefecture, Japan and analyzed $\delta^{13}C$ of diazinon with soil samples of high levels diazinon.

Results were shown that $\delta^{13}C$ of diazinon of products ranged from -29.52±3.66‰ (N.N. Co. Ltd.) to -19.54±2.98‰ (N.S Co. Ltd.) and diazinon of soil samples resulted -24.11±1.21‰ (Fig. 1). Four products were suspected as a reason of high concentrations from July 29 to August 15. $\delta^{13}C$ of pesticide in use can be applied for source apportionment for the first time.

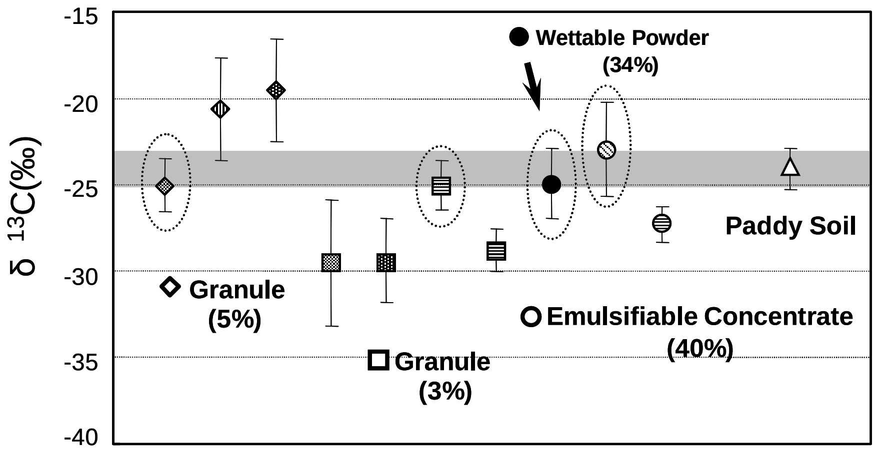

Figure 1. $\delta^{13}C$ of diazinon of 10 products (Granule 5% (3), Granule 3% (4), Wettable Powder (1) and Emulsifiable Concentrate (2)) and paddy soil. Error bars show 1 standard deviation.

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