J. Agr. Food Chem. 19(1): 204-6; 1971. (13 references)

Simultaneous application of *p*-chlorophenyl methylcarbamate (PCMC) with 3',4'-dichloropropionanilide (propanil) to soil retards propanil degradation in soil and greatly reduces the formation of 3,3',4,4'-tetrachloroazobenzene (TCAB). An explanation for this phenomenon was found in enzymatic studies, conducted with a partially purified enzyme isolated from a propanil hydrolyzing soil fungus. Enzymatic hydrolysis of propanil to propionic acid and 3,4-dichloroaniline (DCA) was strongly inhibited by PCMC and 1-naphthyl methylcarbamate (carbaryl), but only weakly inhibited by 2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate (carbofuran). PCMC did not affect the conversion of DCA to TCAB in soil. (Author abstract by permission of the American Chemical Society)

71-0671. Davey, R. J.; Gerritz, R. J. (Animal Res. Div., Agricultural Res. Ser., Dept. of Agriculture, Beltsville, Md. 20705). Lindane residues in tissues and excreta of swine. *J. Animal Sci. 31(3): 491-3; 1970.* (6 references)

The effects of lindane as measured by residues in tissues and excreta of swine were determined. Duroc and Yorkshire boars weighing about 70 kg each were divided into groups of four and sprayed twice with a 0.05% lindane solution (ten times greater than the normal level used for ectoparasite control), fed 1 or 2 mg of lindane/kg/day for 3 weeks, or left untreated. Test animals were maintained on a standard 14% protein corn-soybean meal diet. During the final week of the experiment, the pigs were kept in metabolism cages for the collection of urine and feces. Pigs that were on the spray treatment were sprayed once at the beginning of the experiment and again the day before being transferred to the metabolism cages. Test animals gained an average of 10 lb during the test period. The pigs were sacrificed and the liver, kidney, backfat and longissimus dorsi muscle were removed and stored at -20 C. The method used for the residue determinations is described in the HEW publication, "The analysis of pesticide residues," Vol. 1, 1965. The levels of lindane found in the backfat of pigs that were sprayed, fed lindane at rates of 1 and 2 mg/kg/day or left untreated were 5.15, 19.50, 44.25 and 0.19 ppm, respectively. The correspondinglevels in the longissimus dorsi for the same groups were 0.57, 2.37, 6.55 and 0.05 ppm, respectively. Lindane concentrations in the urine and feces for all groups were generally less than 0.01 and 0.25 ppm, respectively. Fecal levels did not appear to be associated with treatment. The data indicated that lindane residues in excess of the present tolerance of 4 ppm can accumulate in the edible tissues of swine. Little residue accumulation occurs in edible tissues in those cases where pigs are sprayed with a 0.05% lindane solution no later than 30 days prior to slaughter.

71-0672. Korschgen, L. J. (Missouri Dept. of Conservation, Columbia, Mo. 65201). Soil-food-chain-pesticide wildlife relationships in aldrin-treated fields. *J. Wildlife Management 34(1): 186-99; 1970.* (39 references)

The results of a study of the concentration of aldrin-related residues in cropland soils and wildlife foods as a result of annual applications of aldrin for pest-control are reported. The test sites were two aldrin-treated cornfields separated by a 10-acre buffer strip in Saline County, Missouri. The fields were treated for 16 and 15 of the past 17 years with aldrin at 1 lb/acre. Samples were taken of soil, earthworms, crickets, two species of ground beetles at 24 sites from eight collecting stations in each field. As available, vertebrates and plant seeds were also gathered. Primarily, the residues consisted of dieldrin, the breakdown product of aldrin. Organochlorine analyses were done by gas and thin-layer chromatography. In soil samples taken in 1965 to 1967, aldrin and dieldrin were found in all samplings in a ratio of 1:4. Annual application of 1 lb/acre of aldrin was equivalent to 0.05 ppm evenly distributed in the top 6-in soil zone. Test field soils had a 3-year average amount of about 0.12 lb aldrin and 0.5 lb dieldrin/acre after 15 and 16 years of aldrin a k lb/acre. Combined aldrin-dieldrin residues were 0.31 ppm, or less than 1 year's application. There existed an annual carry-over but no sign of continuing accumulation. Although there was no record of DDT use, DDE and DDD were detected in small amounts. In earthworms combined residues of aldrin-dieldrin averaged 1.49 ppm; dieldrin formed 95.5% of the residue, with aldrin being 4.5%. Breeding populations of insects in the test fields argued for the survival of resistant adults. The pesticide burden was small in crickets, being generally less than in the soils; the 3-year average of aldrin-dieldrin combined was 0.23 ppm. In *Harpalus* and *Poecilus* spp. ground beetles, the combined 3-year average aldrin-dieldrin residue was 1.10 and 9.33 ppm, respectively. Pesticide burdens were most likely a reflection of feeding habits. Beetles because of predation have greater opportunity to accumulate residues via the food-chain than do crickets or mice. Young-of-the year toads (*Bufo americanus*) yielded an average combined aldrin and dieldrin residue of 4.6 ppm. Garter snakes showed 12.5 ppm as an average dieldrin-aldrin residue. Plant seeds (corn, sunflower and foxtail) showed residues at less than 0.02 ppm each. During the summer of 1967, earthworms, toads, and mice stored peak aldrin-dieldrin body burdens of 5.65, 8.3 and 2.52 ppm, respectively. This resulted in 10.3 to 14.4 ppm residues in garter snakes which fed upon these animals. The implications of pesticide-wildlife relationships are discussed.

71-0673. Holden, A. V. (Freshwater Fisheries Lab., Pitlochry, Scotland). Source of [redacted] contamination in the marine environment. *Nature 228(5277): 1220-1; 1970.* (9 references)

Samples of river water (surface and subsurface) and of sewage sludge were analyzed by gas-liquid chromatography to ascertain the source of PCB (polychlorinated biphenyls) residues in the Firth of Clyde. Aroclor 1254 and Aroclor 1260 (54 and 60% chlorine, respectively) were used as references. No PCB residues could be found in the river samples (detection limit 0.01 ppb) and samples of effluents discharged from trunk sewers into the river showed no significant concentrations of PCB. Samples of zooplankton and clupeoid fish in the region contained 0.03 and 2.6 ppm PCB, respectively. The GLC peak pattern for sludge A was closely similar to that of Aroclor 1254, suggesting that the PCB detected contained about 50% chlorine. Sludge B peak pattern was

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similar to Aroclor 1260, indicating a 60% chlorine concentration in the PCB residue. Extracts of the sludge from the various industrial plants consistently yielded concentrations of 50 to 160 ppm PCB (dry weight). On the basis of these results and the amount of sludge transported to the deep waters and dumped, it was calculated that about 1 ton of PCB was dumped each year. Similar analyses from Manchester and London revealed that these cities also dumped about 1 ton PCB each into the Northern Irish Sea and off the Thames estuary, respectively. The source of the PCB residues could be traced no further than the sewage treatment plants within the scope of this study. It is believed that the residues originate in industrial wastes. No PCB residues have so far been detected in freshwater fish in Scotland.

71-0674. Stewart, D. K. R.; Chisholm, D.; Ragab, M. T. H. (Res. Station, Canada Dept. of Agriculture, Kentville, Nova Scotia, Canada). **Long term persistence of parathion in soil.** *Nature 229(5279): 47; 1971.* (7 references)

Soil samples from plots which had been treated with 31.4 lb/acre parathion yearly from 1949 through 1953 were analyzed using a gas-liquid chromatograph (GLC) equipped with a flame photometric detector in order to identify the possible degradation products. Earlier studies (Chisholm) *et al.*, 1955) of soil from these plots found that the parathion residues had declined from the applied concentration of 15.7 ppm to 0.5 ppm in the fall of 1953. By 1961, the residue concentrations were further reduced to 0.2 ppm. This detection method (Averell and Norris, 1948) did not allow identification of degradation products. New samples were taken from depths of 0 to 4, 4 to 8, 8 to 12 and 12 to 16 in, air-dried, extracted with hexane/acetone (1:1) and prepared for analysis by GLC using the flame photometric detector. The samples were analyzed using three different columns: a 3% OV-17, 2% DEGS and a 10% DC-200 column. Small quantities of parathion were detected and identified, but no degradation products were found. These findings were confirmed by thin-layer chromatography (TLC) using an esterase inhibition technique (Mendoza *et al.*, 1968). Residue concentrations detected at the various depths were 0.060, 0.063, 0.008 ppm and only a trace at 0 to 4, 4 to 8, 8 to 12 and 12 to 16 in, respectively, which showed there was very little downward movement of parathion in this sandy loam soil. A total of about 0.1% of the parathion applied to the plots remained in the soil 16 years after the last application. That parathion may have been dissolved in lipids of the soil organic matter and thus protected from bacterial degradation and hydrolysis may explain its unusually long persistence in the soil.

71-0675. Lloyd-Jones, C. P. (Long Ashton Res. Station, U. of Bristol, Bristol, England). **Evaporation of DDT.** *Nature 229(5279): 65-6; 1971.* (8 references)

The evaporation rate of uniformly ring-labeled ^{14}C-DDT was investigated and compared to the calculated rates. Calculating the rate from the relation between the vapor pressure, the gaseous diffusion coefficient and the still air layer thickness, DDT should evaporate at the rate of 0.003 mcg/sq cm/hr at 20 C and at 0.0002 mcg/sq cm/hr at 5 C. Another method of calculating the rate using the relation between the rate of loss, the product of vapor pressure and the square root of the molecular weight results in a rate of 0.002 mcg/sq cm/hr. The labeled DDT (0.5 mcg/sq cm) was applied to ethanol to 3.8-sq cm aluminum planchets. During 53 days in a well-ventilated room away from direct sunlight, radioassays revealed that the counts steadily decreased from the initial value of about 180 to 10 cps. When maintained outdoors in a Stevenson's screen for 43 days when the average maximum and minimum temperatures were 7.0 and 1.3 C, the count declined from 200 to 80 cps. The mean rates of loss in these two experiments were 0.002 mcg/sq cm/hr and 0.0003 mcg/sq cm/hr, respectively. The same amount of DDT was placed in enamelled metal dishes and exposed continuously to blowing air (about 10 mph) for 14 days. Recoveries were between 26 and 33% of the control, equivalent to 0.001 mcg/sq cm/hr. A fourth experiment designed to recover the volatilized radioactivity, revealed that inverted untreated planchets acquired radioactivity with a mean count of 20 cps after 14 days at 20 C. The experimentally determined evaporation rates, in good agreement with the calculated values, are equal to about 2 lb/acre/yr in the summer and about 0.3 lb/acre/yr in the winter. About ½ of the DDT applied to field crops may enter the atmosphere.

71-0676. Acker, L.; Schulte, E. (Institut fuer Lebensmittelchemie, Universitaet Muenster, Muenster, **Germany**). **The occurrence of chlorinated biphenyls and hexachlorobenzene in addition to chlorinated insecticides in human milk and human fatty tissue.** *Naturwissenschaften 57(10): 497. 1970* (7 references) (German)

This is a report for the first time of the finding by gas-chromatographic techniques, in human milk and fatty tissue extracts of significant amounts of polychlorinated biphenyls (PCB), hexachlorobenzene (HCB), DDT, DDE and *beta*-HCH (*beta*-hexachlorocyclohexane). In whole human milk, the content of PCB and HCB was, 0.103 and 0.153 ppm, respectively; in human milk fat 3.5 and 5.3 ppm respectively, and in human fat tissue 5.7 and 6.3 ppm respectively. The possible origin of these residues in the light of the uses of PCB in electrotechnology, laquers, varnishes, plastics and synthetic products is discussed.

71-0677. Edwards, C. A.; Thompson, A. R.; Beynon, K. I.; Edwards, M. J. (Rothamsted Experimental Station, Harpenden, Hertfordshire, England). **Movement of dieldrin through soils. I. From arable soils into ponds.** *Pesticide Sci. 1(5): 169-73; 1970.* (11 references)

Dieldrin was applied at a rate of 22 to 45 kg/ha to strips above four ponds. Samples of soil from the strips, soil from the slopes leading to the ponds, pond water and pond-bottom mud were removed at intervals up to 81 weeks and extracted with hexane. The extracts were analyzed by gas-liquid chromatography (GLC) to trace the movement of dieldrin from the treated strips into the ponds. Recovery values ranged from 93% to 100%. At Kmeton (England) sites A and B, the dieldrin was lightly raked into the soil surface; at the Solihull site it was thoroughly incorporated into the soil and at Last Meon it was

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