



Poland: meeting limits for PAHs

Polycyclic aromatic hydrocarbons (PAHs) are pollutants that can contaminate soils and are a threat to agricultural ecosystems, crop production and human health through accumulation in the food chain. Researchers have studied the distribution of PAHs in agricultural soils in Poland and found that overall there are low levels of contamination, similar to other European countries.

PAHs are derived from natural and anthropogenic sources. They are frequently the products of the incomplete combustion of fossil fuels, such as coal, and vegetation (including fires and wood burning) and are found widely distributed in soils. They enter the soils mainly via atmospheric depositions, but also derive from oil spills and industrial waste. PAHs can have a variety of effects on human health and the environment. Some are suspected cancer-causing agents¹.

It is important to assess and monitor diffuse pollutants in surface soils in agricultural lands. Even low concentrations of contaminants can have a significant impact on rural ecosystems: across the country, large quantities of soils cover extensive farming areas. For example, 46 per cent of Poland is arable fields. Large numbers of small farms are spread across the country, sometimes in urban or industrial areas.

Coal is the predominant source of energy in Poland, used for industry and heating homes. Similarly, as in other Central and West European countries, about three quarters of PAHs in soil samples in the study could be linked to anthropogenic sources. This suggests significant amounts of PAHs could be derived from coal combustion. Background levels of PAHs were also detected uniformly across the country: these are probably from natural fires or from widely dispersed, manmade emissions circulating in the atmosphere.

Other results of the study suggest that the average total concentration of PAHs (435 $\mu\text{g kg}^{-1}$, 435 micrograms of PAHs per kg of soil) was similar to those found in agricultural soils in other European countries. Urban and industrial areas had greater concentrations of contaminants compared with rural areas. For example, the South-West region of Poland had the highest levels of heavier types of PAHs, which are typically related to the burning of fossil fuels and vegetation. This region includes highly urbanised areas and a major coal mining area. Some PAHs in this region could also have arrived by atmospheric transportation from industrial and urban areas in neighbouring Germany and the Czech Republic.

Very low levels of PAHs were detected in soils in the North-East, a predominantly tourist area with large lakes and forests.

The researchers analysed soil samples taken from the upper layer of arable land in Poland for 16 different PAHs. The lowest mean concentration of individual PAHs was found for acenaphthylene (1 $\mu\text{g kg}^{-1}$), and the highest for fluoranthene (55 $\mu\text{g kg}^{-1}$). On average, about 90 per cent of soil samples contained concentrations of individual PAH compounds below the 100 $\mu\text{g kg}^{-1}$ limit set by Polish regulations². The exception was benzo(a)pyrene which has a limit value of 30 $\mu\text{g kg}^{-1}$. This accounted for 3 -12 per cent of the total concentration of PAHs in Polish soils, around 45 per cent of which was above the limit value. The researchers suggest that the Polish limit for benzo(a)pyrene is too strict, as compared to the limit value of 100 $\mu\text{g}\cdot\text{kg}^{-1}$ suggested in Denmark, for example.

1. See: http://irmm.jrc.ec.europa.eu/html/CRLs/crl_pah/about_pahs/JRC_50087_EN_CRL_PAH_factsheet.pdf

2. See: <http://prawo.money.pl/akty-prawne/dziennik-ustaw/rozporzadzenie-ministra-srodowiska;z:dnia,dziennik.ustaw,2002,165,1359.html> (in Polish)

Source: Maliszewska-Kordybach, B., Smreczak, B., Klimkowicz-Pawlas, A. (2009). Concentrations, sources, and spatial distribution of individual polycyclic aromatic hydrocarbons (PAHs) in agricultural soils in the Eastern part of the EU: Poland as a case study. *Science of the Total Environment*. 407:3746-375.

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