Effects of heavy metals of municipal wastewaters and sewage sludges on crops and human health: The situation in Turkey

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During recent decades trace inorganic pollutants have been distributed so widely that even soils in remote regions show increased levels of certain trace elements of anthropogenic origin. Thus, it is of importance to know more about the long-term behaviour of trace elements in agricultural soils, in particular with regard to effects on crop uptake and leaching to water bodies used as drinking water.

Heavy metal pollution of soils resulting from sewage and wastewater irrigation is causing major concern due to the potential risk involved. Municipal refuses, sewage sludges and effluents affect heavy metal distributions in soils. On a local scale, sludges may represent the main source of trace elements in soils. Heavily sludged soils may easily become contaminated by heavy elements that will cause toxic effects to crop plants, possibly decrease their yield, and degrade the quality of food produced.

Rapid increase in the population of cities and economic activities intensifying in city centers causes pollution at alarming levels. Sewerage infrastructure and efficient purification systems are accepted as the indicator of social and economic development of cities. The environment protection principle is one of the most essential conditions for sustainable development. According to OECD data, Turkey and Hungary are the two countries with the highest population/purification plant rate.

There are 81 provinces in Turkey. Sixteen of the provinces are Greater Metropolitan cities. Only 43 out of the 81 provinces have wastewater treatment plants (UWWTPs). However, such UWWTPs are not efficient to remove the metal ions from waste waters. Gaziantep province, for example, is a metropolitan city, bearing one UWWTP near to Oğuzeli town under the control of Greater Municipality. Although one UWWTP has been constructed in recent years in Gaziantep, an important quantity of heavy metals flows with the waste water because of biological wastewater treatment. This wastewater is either directly used for irrigation or drained into dams to be also used for irrigation. An important part of vegetable and fruit demand of Gaziantep, a city with a population of about 1 Million, is supplied from these fields. This area consists of 65.000 decare. So far, no studies concerning determination of heavy metals in soils and crops have been conducted in the area.

The analytical results indicate that trace metals such as Cd, Pb, Cr, Cu, As, Ni and Fe levels in plants are higher than the recommended maximum tolerable levels proposed by FAO/WHO and Turkey Regulations, and in sludge amended soils higher than EU and Turkey limit values.

Determination of the total trace element levels of soils and materials added to it are of value in an absolute sense, but it is well known that only the chemical forms of a trace element have biological significance. Therefore, reliable analytical data on chemical forms, speciation and bioavailability of trace elements in different areas, a valid estimation of their background levels and reliable sample collection and preparation methods are necessary.

This study aims to attract attention to the heavy metals impacts on crops and humans consuming crops grown in wastewater-irrigated soils.

References