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IMPACT OF HEAVY METALS IN PADDY FIELD SOIL ON HUMAN BODY

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Producers use increasing amounts of pesticides to safeguard their crops as the population grows and the demand for rice rises as a result.

It is because of the metals' non-biodegradable characteristics and tendency to bioaccumulate in the environment, heavy metal contamination in paddy fields has so recently raised serious concerns as an environmental contaminant.

Furthermore, heavy metals are categorised as significant hazardous substances because of their great potential damage to human health and the ecosystem. They have also been mentioned as possible contaminants in rice on a regular basis. Heavy metals come in two different types by nature which is organic and inorganic. Metallic elements with a density higher than that of water are referred to as heavy metals.

Figure 1. Paddy rice (Source: britannica.com)

Soil is one of the biggest sources of heavy metals and has an effect on food safety at the base of the food chain. Growing industrial growth means that dangerous and carcinogenic chemicals like heavy metals are finding their way into paddy rice. Both human health and the integrity of the food chain may suffer as a result of this. However, this is one of the most important environmental challenges because of the threats to food safety and public health. Figure 1 shows that healthy paddy rice due to healthy soil. Cadmium (Cd), a heavy metal, is one of the most hazardous and movable soil constituents. Because most of the calories ingested by southern Chinese inhabitants come from rice, the health hazards associated with consuming rice tainted with cadmium were particularly concerning. The respiratory, cardiovascular, and musculoskeletal systems are all negatively impacted by Cd exposure.

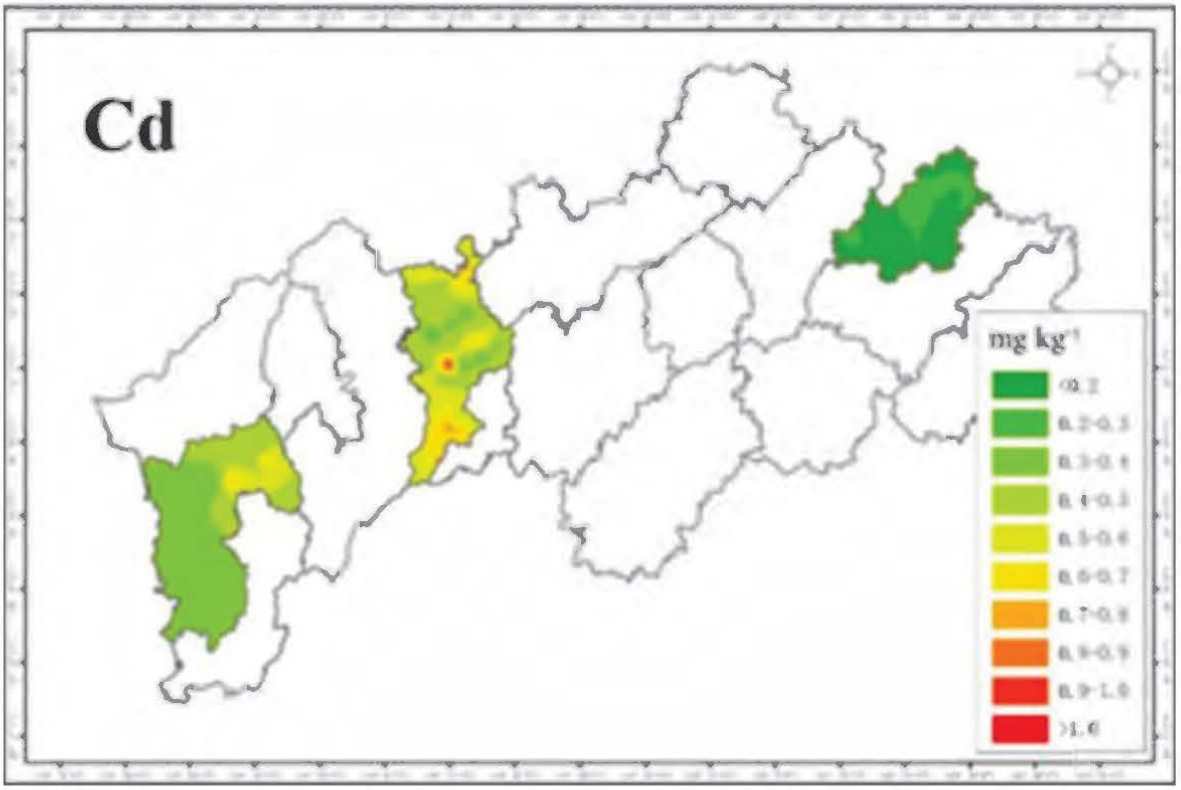

Figure 2 Paddy rice (Source: britannica.com)

The presence of nonferrous metal plants in the Jin-Qu Basin may have an impact on the greater levels of Cd contamination in rice grains found there compared to other agricultural areas as shown in Figure 2.

In a similar vein, field survey data on nonferrous metal manufacturing zones in China's Hunan province reveal that levels in 65% of the rice samples under study surpass the limits of national food standards.

Exposure to elevated cadmium levels can lead to fatal lung damage. It is believed that cadmium causes cancer.

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Furthermore, according to results on cancer risk (Risk), levels of As and Cd were responsible for approximately 15.7% and 76%, respectively, of cancer risk. Long-term exposure to cadmium can harm reproductive organs and disrupt hormone production, which can result in infertility and other reproductive issues.

In addition, lead (Pb) is classified as an element carcinogenic to humans. Chronic exposure to Pb causes headaches, convulsions, paralysis, and neurological damage, especially in young children. 30% of the rice samples were found to exceed the safe threshold level of 0.2 mg kg−1. The long-term consumption of Pb contaminated rice presented high risks to human health in the Jin-Qu Basin. Furthermore, the non-carcinogenic hazard quotients (HQ) of heavy metals indicate that Pb were the main causes of health hazards for people.

High lead exposure levels have the potential to seriously harm the brain and central nervous system, leading to coma, convulsions, and even death. Even after recovering from severe lead poisoning, children may always have behavioural issues and an intellectual handicap (Syahirah, 2019).

Pb is currently understood to cause a range of injuries across several body systems at lower exposure levels that don't show any overt symptoms. Moreover, Pb in particular, can have an impact on a child's brain development, which can lower their intelligence quotient (IQ), alter their behaviour such as shortening their attention span, becoming more antisocial, and lower their scholastic attainment. Anaemia, hypertension, renal impairment, immunotoxicity, and toxicity to the reproductive organs are further effects of lead exposure.

Lead is thought to have permanent impacts on the nervous system and behaviour. In conclusion, lead (Pb) and cadmium (Cd) are the most abundant heavy metal concentrations found in the paddy soil samples.

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The majority of heavy metals can be fatal to humans and pollute the ecosystem and atmosphere. When heavy metals combine with other environmental components like soil, water, or air, they can become extremely hazardous, and humans and other living things may be exposed to them through the food chain.

The majority of the food that humans eat comes from agriculture, and while rice consumption is a basic food source for humans, agricultural operations may also be the source of pollutants that contaminate soil. Food tainted with heavy metals from the soil may be of poor quality and potentially dangerous to humans. Adding chemicals to the soil that result in the production of minerals containing the heavy metals in a form that is difficult for people, animals, or plants to absorb is one method of stabilising the concentration of heavy metals. This technique is known as *in situ* stabilisation or fixing.

Pb can have an impact on a child's brain development Anaemia, hypertension, renal impairment, immunotoxicity, and toxicity to the reproductive organs are further effects of lead exposure

Hazardous waste is not produced by this procedure, nor does it cause environmental disturbance. Rather, the heavy metal forms a less hazardous combination with the additional component. Though in a far less dangerous form, the heavy metal is still present in the soil.

Therefore, in accordance with Sustainable Development Goal 3 (SDG 3), which states that by 2030, significantly reduce the number of deaths and illnesses from hazardous chemicals and water, and soil pollution and contamination, the community must avoid eating food exposed to heavy metals in order to avoid serious health problems.

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