

Bio-remediation of Municipal/Industrial Effluents for Safe Agricultural Usage



CHALLENGE:

Growing of vegetables in peri-urban areas is a common practice in many Asian and African countries including Pakistan. Such crops are invariably irrigated with untreated municipal/industrial wastewater because of its availability, low cost, high concentration of organic components and some nutrient value. However, its excessive and long-term application to arable land can adversely affect soil health and groundwater quality since it contains considerable amount of metals such as cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), and copper (Cu) which are serious source of health hazards.

INTERVENTION:

A sampling survey was conducted by Land Resources Research Institute, NARC scientists to evaluate the quality of untreated municipal/industrial effluent for irrigation used in Gujranwala, Sialkot, Kasure, Multan, Hyderabad and Mirpurkhas peri-urban areas. Chemical analyses of the wastewater when compared with the standard guideline of wastewater irrigation (WHO/FAO, 2001); it was found that about $\frac{3}{4}$ samples had Cd and Cr, whereas, Cu and Pb contents in almost all the effluent samples were above the recommended permissible limit (RPL). However, more than $\frac{1}{2}$ samples had higher Ni concentrations than RPL. Therefore, the remediation/treatment of the wastewater is vital for their safe use for food and fodder production.

OUTCOME:

For this purpose, LRRI, NARC scientist have isolated and identified fungal strains which exhibit a great deal of heavy metal tolerance and sorption. These high metal tolerant and sorbent fungal isolates can successfully be used for bioremediation of metals contaminated wastewaters for safe use in agriculture. Similarly, lignocellulosic agricultural byproducts materials have also been evaluated for their metal sorption capacity and can also be used for bio-remediation of wastewater.