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Geochemical, geostatistical and geospatial interaction of soils and tobacco (*Nicotiana tabacum*) crops

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This study exposes the extent of contaminations and natural disturbance in soil and tobacco (*Nicotiana tabacum*) crops with potential health and ecological impacts caused by metals contaminated industrial waste water to surrounding environment. By exploring the extent of metals contamination the study find out the role of geochemical, geostatistical and geospatial inter and intra elemental relationship in soil and tobacco crops. By exploring the relation between and soil and Tobacco crops, a total of 51 samples were collected, pass through acid digestion and analyzed for thirteen major and toxic metals through atomic absorption spectroscopy (AAS 700). Geochemical results showed that the concentration of major and toxic elements in target area was exotically higher than the background areas (control area) with possible percentile (%) variations of 65.7, 27.5, 72.8, 7.5, 56.7, 54.26, 23.95, 31.56, 39.3, 22.04, 48.92, 34.11 and 42.6 for Chromium, Cadmium, lead, Nickle, Copper, Zinc, Cobalt, Iron, Manganese, Magnesium, Sodium, Calcium and Potassium respectively. Meanwhile transfer ratio from soil to tobacco crops are 1.64, 5.99, 3.39, 7.59, 7.40, 6.01, 9.29, 1.12, 13.72, 16.37, 1.7, 7.72 and 36.56 (%) respectively. By integrating geochemical and geospatial analysis hereby provide a mobility evidence of metals in the environment. Geostatistical techniques provide scientific evidence and magnitude of toxic and major elements in soils and tobacco crops. All the geostatistical techniques are coherent with each other and can +90 % reliable, except enrichment factor, which were not compatible with these methods. However geospatial analysis proved the mobility of metals in environment. Thus geochemical, geostatistical and geospatial analysis show that industrial discharge are responsible for hyper accumulation of major and toxic elements in soils and tobacco crops and their mobility causes severe ecological and health problems. The study recommends the prohibition of tobacco cultivation and processing. It calls for regular supervision of industrial contamination and its instant remediation through national and international agencies thereby reducing soil contaminations through economic feasibility and in a reasonable time frame.

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Electrochemical alternatives for drinking water purification

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Water the generous gift of nature is sure to become scarce unless the ever growing population is enlightened enough in handling the increasing stress and to avoid the crisis due to the expanding demand for this precious commodity. Management of water and its resources by conservation and its judicious use help to preserve the available water. Even then, whether it is from surface or underground sources, it has become impossible to obtain good quality water for human consumption. Thus, the dwindling quantity and lessening the quality of water require effective steps to be taken urgently for the sustenance of the living being of today and tomorrow. Water scarcity also affects ecosystem as numerous species might not be able to cope up with a decrease in the availability of freshwater. The development of sustainable, robust and energy efficient water purification technology is greatest challenges of this century. Currently available water treatment processes are based on biological, physical, physicochemical, chemical, thermal and electrochemical methods. Each treatment process has its distinct advantages/disadvantages over the other ones. In this talk some of the important and recent developments in the electrochemical alternatives for drinking water purification are reviewed. The talk also covers electrochemical technologies developed at CSIR-CECRI for decontamination of drinking water.

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