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Qualitative Analysis of Vegetables Irrigated by Fresh Water and by Contaminated Water nearby MR10 toll tax Ujjain road, Indore

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Abstract

The study is aimed at investigating metals and non-metals are present in contaminated water and vegetables and its effect on health.

Effect of pollution on animals nutrient pollution (nitrogen, phosphates etc.) causes overgrowth of toxic algae eaten by other aquatic animals, too much sodium chloride (ordinary salt) in water may kill animals, mercury in water can causes abnormal behavior, reduced product, and death, persistent organic pollutants may causes declines, deformities and death of fish life. The study is taken for knowing the metals and non-metals contents in contaminated water and vegetables irrigated by that water.

Keywords: Pollution, Contamination, Metals, Nonmetals and Vegetables

Introduction

Water contamination is term used to describe hazardous material of any kind, which is polluting sources of water. Contamination may include Organic and Inorganic substance. Water pollution is a major global problem.

The ill-effects of water pollution on humans and animals are a matter a concern. It is like a slow poison which slowly and gradually affects the aquatic ecosystem, it is plants, animals and human body adversely different types of chemicals and microbial pollutant affect humans and animals in different ways. Various consequences of water pollution on humans include.

Toxic pollution comes from heavy metals, such as Lead, Cadmium, Mercury, Zinc, Nickel act as micro nutrients at lower concentration, they become Toxic at higher concentration.

Metals Lead, Arsenic, Copper, Iron and non-Metals Chloride, Sulphate, Nitrate, Nitrite, Fluoride, Cyanide, Phosphate, Ammonium were may present in vegetables irrigated by contaminated water (near the bank of Khan River of Indore, India). They also effect on environment, human beings, animals and plants.

Dissolution and transport of metals and heavy metals by run-off and ground water is another example of environment problems with mining.

Water is the important input to fertilizer for crop production. If water is polluted, it is dangerous for plants, animals as well as for human beings. If heavy metals contaminated water is used for irrigation, it is create hazard both in soil, environment and crop quality. Twenty percent loss of crop production is observed due to high concentration (20 ppm) of heavy metals¹. Heavy metals are toxic to plant and its discharge into the environment must be carefully controlled and minimized.

Food safety issues and potential health risks make this as one of the most serious environment concerns. Vegetables are important food crops which are very essential for maintaining good health. 80% water contain present in the vegetables². Therefore, it is most importance to determine the metals content in vegetables. Very limited work has been done on the effects of using metals contaminated water on crop production and it is effect on food chain.

Heavy metals through contaminated vegetables may lead to various chronic diseases. Bio-toxic effects of heavy metals depend upon the concentration and oxidation states of heavy metals, kind of sources and mode of deposition. Severe exposure of Cd may result in

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pulmonary effect such as emphysema, bronchiolitis and alveolitis. Renal effects may also result due to sub chronic inhalation of Cd, Pd toxic causes reduction in the hemoglobin synthesis, disturbance in the functioning of kidney, joints, reproduction and cardiovascular system and chronic damage to the central nervous system. Concentration of Zn can causes impairment of growth and reproduction.

Pollution matters harm the environment on which people depend. The environment is not something distant and separate from our lives. It is not a pretty shoreline hundreds of miles from our homes or a wilderness landscape that we see only on Television the environment is everything that surrounds us life and health.

A Study of Arsenic Contaminated Irrigation Water and its Carried over Effect on Vegetable was studied by Farid et al¹. High levels of microbial contamination of vegetables irrigated with wastewater by the drip method was studied by Sadovski et al². Vegetables can absorb heavy metals from contaminated irrigation was studied by Stasinis et al³. Comparison of proximate and heavy metal content of vegetables grown with fresh and wastewater was studied by rehman et al⁴.

Microbial Contamination in Vegetables at the Farm Gate Due to Irrigation with Wastewater in the Tamale Metropolis of Northern Ghana was studied by Cobbina et al⁵. Concentration of mercury, lead, chromium, cadmium, arsenic and aluminum in irrigation water wells and wastewater used for agriculture in Mashhad, northeastern Iran was studied by Mousavi SR et al⁶.

Hazards of heavy metal contamination were studied by Jarup L et al⁷. Heavy metal accumulation in vegetables grown in a long term waste water irrigated agricultural land of tropical India was studied by Gupta et al⁸. Impact on crop quality from irrigation with water reclaimed from sewage was studied by Unkovich et al⁹.

Effect of Cadmium, Copper, Lead, and Zinc Contamination on Metal Accumulation by Safflower and Wheat was studied by Sayyad et al¹⁰. Arsenic contaminated in Food-chain: Transfer of arsenic into food materials through groundwater irrigation was studied by Lmamul et al¹¹. Removal of heavy metal ions in wastewater by semnan natural zeolite was studied by Mousavi et al¹².

Determination of cyanide and nitrate concentrations in drinking, irrigation and wastewaters was studied by Mousavi et al¹³. A systematic review on status of lead pollution and toxicity in Iran; Guidance for preventive measures was studied by Karrari et al¹⁴. Consumption of unsafe food in the adjacent area of hazaribag tannery campus and heavy metals contaminated was studied by Islam et al¹⁵.

Method and Material

All chemicals and materials will be taken of AR-grade. Irrigated vegetables by fresh water and contaminated water (polluted vegetables) will be find out in different places near the bank of Khan River in Indore, India. Metals and non-metals are determined by the tests provided in the book written by Gharia¹⁶.

The procedure for the test of metallic contaminations (metal)-Lead, Arsenic, Copper, Iron. Non-metallic contaminations (nonmetal) – Chloride, Sulphate, Nitrite, Fluoride, Cyanide, Phosphate, Ammonium etc will be determined with the help of reported methods.¹⁶

Result and Discussion

The studied area was nearby MR10 toll taxUjjain road, Indore and Vegetablestaken were :-Cauliflower, Spinach

Following tables were as follows for metal and nonmetal contaminations in different vegetables:

1. Non-Metallic Contaminations (Vegetables:-Cauliflower)

Non-metals	Contaminated Water	Fresh water	Vegetable (Cauliflower) Irrigated By Contaminated water	Vegetables (Cauliflower) irrigated by fresh water
Chloride	Absent	absent	absent	absent
Sulphate	Present	absent	Present	absent
Nitrite	Present	absent	absent	absent
Nitrate	Absent	absent	absent	absent
Fluoride	Present	absent	Present	absent
Phosphate	Present	absent	Present	absent
Ammonium	Present	absent	Present	absent

2. Metallic Contaminations

Metals	Contaminated Water	Fresh water	Vegetable(Cauliflower) Irrigated By Contaminated water	Vegetables (Cauliflower) irrigated by fresh water
Lead	Absent	Absent	Absent	absent
Arsenic	Absent	Absent	Absent	Absent
Copper	Present	Absent	Absent	Present
Iron	Absent	Absent	Present	Present

3. Non-Metallic Contaminations(Vegetables:-Spinach)

Non-metals	Contaminated Water	Fresh water	Vegetable (Spinach) Irrigated By Contaminated water	Vegetables (Spinach) irrigated by fresh water
Chloride	Absent	absent	absent	Absent
Sulphate	Present	absent	Present	Absent
Nitrite	Present	absent	Present	Absent
Nitrate	Absent	absent	Absent	Absent
Fluoride	Present	absent	Present	Absent
Phosphate	Present	absent	Present	Absent
Ammonium	Present	absent	Present	Absent

4. Metallic Contaminations (Spinach)

Metals	Contaminated Water	Fresh water	Vegetable (Spinach) Irrigated By Contaminated water	Vegetables (Spinach) irrigated by fresh water
Lead	Absent	Absent	absent	absent
Arsenic	Absent	Absent	absent	Absent
Copper	Present	Absent	Present	Present
Iron	Absent	Absent	Present	Present

Table-1 showed Non-metallic contaminations (contaminated water and vegetables) - Chloride and Nitrate are absent in water and vegetables (Cauliflower, Spinach). Sulphate, Fluoride, Phosphate, Ammonium are present in water in water and vegetables. Nitrite is present in water and Spinach but absent in Cauliflower.

In Table – 2, Non-metallic contaminations (Fresh water and vegetables) all seven non-metals are absent in water and vegetables.

In Table - 3, Metallic contaminations (contaminated water and vegetables) Lead and Arsenic are absent in water and vegetables (Cauliflower and Spinach) Copper is present in water and Spinach but absent in water and Spinach but absent in Cauliflower. Iron is absent in water but present in Cauliflower and Spinach.

In Table - 4, Metallic contaminations (Fresh water and vegetables) Lead and Arsenic are absent in water and vegetables (Cauliflower, Spinach) Copper and Iron are absent in water but present in Cauliflower and Spinach.

Some essential element (An essential nutrient is a nutrient required for normal physiological function that cannot be synthesized by the body and thus must be obtained from a dietary source.) are present in irrigated vegetables by fresh water. e.g. Calcium, Phosphorus, Potassium, Copper, Sulphur, Magnesium, Manganese, zinc, boron, Chlorine, Molybdenum, Cobalt, Sodium, Silicon, Iron, Arsenic, and Chloride are supplied to plants by the soil and water. All are necessary of life.

The results showed that Fluoride (non- metal) and Copper, Iron, and Lead (metal) are present in vegetables irrigated by fresh water but they are present in small amount. They are not side effects of our health.

Transfer of non-metals (Chloride, Sulphate, Nitrite, Nitrate, Fluoride, Phosphate, and Ammonium) and metals (Lead, Arsenic, Copper, and Iron) from contaminated water to vegetables. If non-metals and metal are present excess amount in water so this water is called contaminated water. This contaminated water is used for irrigating vegetables. It's very harmful for plants, animals as well as for human being.

Effect of Non-metals

Chloride Too little chloride in the body can occur when your body loses a lot of fluids. This may be due to excessive sweating, vomiting, or diarrhoea.

Sulphate Sulphate is one of the least toxic anions. Excess sulphate in the blood is rapidly eliminated by urinary excretion, although some may be excreted in the bile and pancreatic fluid as well.

Nitrate and nitrite Nitrates are relatively harmless, until they are converted into nitrites inside our body. Ingesting too many nitrites can cause ill effects such as an anemic-like disorder as well as cancer.

Fluoride

Fluoride is a highly toxic substance. Its more toxic than lead, but slightly less toxic than arsenic. Fluoridated water can cause serious poisoning incident, including death.

Ammonium Ammonium hydroxide is affected kidney and liver, our digestive system.

Effect of Metals

Lead

Lead is very toxic to many organs and tissues including the heart, bones intestines, kidney and reproductive and nervous system.

Arsenic

Arsenic is very toxic for human. Chromosomal abnormalities have been seen with the exposure of human leukocytes or cutaneous fibroblasts.

Copper

Copper toxicity, also called copper poisoning, refers to the consequence of an excess of copper in the body. Copper in drinking water, as a side-effect of estrogen birth control pills, or other environmental source. It can also result from the genetic condition Wilson's disease.

All heavy metals are particularly toxic, and some are essential, such as Iron, Copper, Lead, Arsenic, and Fluoride.

These element is a component of molecules that transport oxygen in blood. The physiological signs of Iron deficiency include anaemia, glossitis, Angular stomatitis, Koilonychia etc pathogenic consequence of Iron deficiency include immune function, Mental function impaired thermoregulation. Copper is involved in the cell metabolic activity and Copper regulates the expression of some genes Copper deficiency caused by a cellular defect in Copper transport and include a hypochromic, Normocytic, Macrocytic Anemia etc.

The present study showed that many metals and non-metals found in waste water. This water is affected. Vegetables irrigated by fresh water are good and fit for health as compared to contaminated water.

Conclusion

No doubt, heavy metals are very important constituents for plants, animals and human beings but only in small amount but at high concentration they show toxic effect. Result indicates that this type of contaminated water is not good for vegetables and other crops and therefore water should not be used for drinking purpose.

Uptake of metals and non-metals may increase the nutritional value significantly decrease crop yield. Where waste water was usually not fit for irrigation vegetables and severely damage human health.

Quality of fresh water in home garden is relatively good for production of vegetables and other crops as compared to contaminated water.

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