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Effects of Chemical Fertilizers on Human Health and Environment: A Review

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Abstract: Pollution is one of the major concerns on the globe today. Farmers use a variety of chemical fertilizers to increase production and manage weeds and insect pests in order to meet the demand for agricultural products and to feed the growing population. Synthetic pesticides and fertilizers have been utilized excessively, which has had a negative impact on both the environment and human health. As a result, the greatest important hazard to humanity on the planet is the increasing degradation of environmental contents. The imbalance between human needs and resource sustainability was accelerated by the rapidly expanding population in developing nations. The use of chemical fertilizers in agriculture has caused numerous environmental and health issues while increasing agricultural productivity. Water pollution is mostly caused by phosphates and nitrates found in chemical fertilisers.

Keywords: Chemical fertilizers, farmer, Environmental pollution, Human health.

I. INTRODUCTION

By boosting agricultural productivity, chemical fertilisers have proven to be a blessing for farmers everywhere. Today, various chemical poisons in the form of fertilisers and pesticides are produced in greater than 300 million tans under various brand names (Tomkins & Bird, 2002). Although Indian average consumption of pesticide is far lower than many other developed economies, the problem of pesticide residue is very high in India (Abhilash and Singh, 2008). In many developing nations over the past three decades, the careless use and handling of pesticides in agriculture has resulted in major issues with human health (Dasgupta et al. 2007). Globalization and the new market economy have influenced the use of fertilizers in agriculture to produce a large. Fertilizers increases efficiency of soil to obtains better quality of agricultural product. In recent years, fertilizer consumption increased exponentially throughout the world, causes serious environmental problems. Developing nations like India enabled the Green Revolution to end ongoing food scarcity by raising the production of food and other agricultural goods through the use of high-yielding seed types, changing farm machinery, and significantly expanding the usage of fertilisers.

Fertilizers are natural or artificial substance. Natural fertilizers are organic in nature and inorganic fertilizers are artificial or chemicals. The organic fertilizers include animal manure and other naturally occurring materials whereas inorganic fertilizers are artificial products. They usually have a higher nutrient content. Fertilizers enhance the natural fertility of the soil or replace the chemical elements taken from the soil by previous crops. Mixed fertilizers can be produced by chemically reacting different ingredients and utilizing the chemical reaction as the binding force; or simply by mechanically blending together straight fertilizers.

The fertilizer industry is composed of multi-product manufacturing plants. The application of chemical fertilizers and pesticides has become necessary by farmers to achieve maximum production of agriculture, produce and to feed the growing population. But excessive use of these fertilizers creates adverse effects to the public and environmental health. Excessive fertilisation used increased soil salinity, heavy metal accumulation, and accumulation of nitrate lead to problems of infertility in soil. Flora absorbs the chemical elements fertilizers through the soil and inter in the food chain. Use of exceed quantity of chemical fertilizers in soil, may contaminate the ground water and possibly the surface water of rivers and lakes with negative effects. Modern farming is based on commercial approach in which farmer are using huge quantity of chemical fertilizers and pesticides to produce large quantities of agriculture product.

Organic or inorganic fertilisers both include the chemical components that help plants grow and produce more. The major ingredients of non-organic fertilisers are salts of phosphate, nitrate, ammonium, and potassium. The fertiliser business is thought to be a source of natural radionuclides including 238U and 232Th as well as heavy metals like Hg, Cd, As, Pb, Cu, Ni, and Cu. These chemical components are indirectly having deadly impacts on the environment and human health when they are utilised as pesticides and fertilisers in agricultural farms. Only by adopting new agricultural technological practises, such as switching from chemical intensive agriculture and using organic inputs like manure, biofertilizers, biopesticides, slow-release fertiliser, and nanofertilizers, etc., can the harmful effects of these synthetic chemicals on human health and the environment be reduced or eliminated.

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Environmental Pollution through Chemical Fertilizers

Pollution is the term used to describe any material that is damaging to humans or other living things. Fertilizers are substances, either synthetic or natural, that are added to soils to provide vital nutrients for plant growth. A significant number of chemicals, mainly heavy metals like Hg, Cd, As, Pb, Cu, Ni, and Cu in the soil, are applied to agriculture each year in the form of fertilisers and pesticides (Atafar et al. 2010). Use of these pesticides and fertilisers outside of the allowed range results in a number of environmental issues, including soil, water, and air pollution.

Due to these pesticides, water contamination is increasing, and even at low concentrations, these pesticides pose a major harm to the ecosystem (Agrawal et al. 2010). Water contamination is primarily caused by chemicals, particularly nitrates, which are present in chemical fertilisers. India's arid and semi-arid regions have seen a rise in irrigation practises in recent years, which have led to more nitrate building up in the soil. The primary component of fertiliser and a significant indicator of water pollution is nitrate. The most prevalent type of dissolved nitrogen in groundwater is nitrate. Nitrate is absorbed by the intestine from drinking water and has an impact on the excretory system.

Chemical fertilisers also contain other substances including phosphates, arsenic, and chloride that contribute to water contamination in addition to nitrates. As a result of the deterioration in water quality and an increase in pollution from the growth of aquatic plants and algae, there is a high concentration of nitrogen and phosphorus compounds in the water. Sulfur dioxide and nitrogen oxide pollutants also contribute significantly to pollution by creating acid rain when they interact with atmospheric water. The pollution of chemical fertilisers poses serious threats to the environment and to creatures that are not the intended targets.

Chemical Fertilizers and human health

Use of agrochemicals are considered as a powerful weapon in the developing countries in order to enhance the agriculture productivity (Bhandari,2014). Continues use chemicals as fertilizer results in developing resistance of the pest, which become difficult to control.Nitrate and phosphates that are the component of the artificial fertilizers run-off in the agricultural fields or discharged into the nearest water bodies causing the eutrophication. Due to higher concentration of nitrates in the drinking water causes blood disorder in human beings in which, abnormal amount of methemoglobin produced that is unable to release oxygen effectively in body. High levels of sodium nitrate in groundwater can cause gastric cancer and testicular cancer.

Fertilizers are a mixture of toxic chemicals which are absorbed into the plants, leading toxins to enter the food chain via vegetables, cereals and water, create serious health issues. The study analysis of the last two decades regarding chemical fertilizers exposure and human health revealed that several pesticides cause neuron disorder; some effect embryo development and other are carcinogenic for human. Heavy metals such as Mercury, Lead, Cadmium and Uranium have been found in fertilizers, which can cause disturbances in the kidneys, lungs and liver and cause cancer (WHO,1990), Chemical fertilizer that are using from a long duration reduces the microbial activity and imbalance the pH of the soil. Some ingredients in the fertilizers are toxic to the dermal and respiratory system. Use of excessive quantity of chemical fertilizers damages the vegetation and reduces soil fertility.

Ammonium Nitrate is causes other health problems such as eye and skin irritation, producing a burning sensation. Inhalation exposure of it can result another health problems like irritation of the nose, throat, and lungs. Due to use of this, one can also experience nausea, vomiting, flushing of the face and neck, headache, nervousness, uncontrolled muscle movements, faintness and collapse.Accumulation of excess nitrogen in plants causes an infant disease, methaemoglobinemia. Amines produced from the nitrogenous fertilizer cause cancer in human beings. Potassium Chloride interruptsfunction of nerve impulses andother body functions, mainly affects heart functioning. It can cause all kinds of gastric and stomach pains, dizziness, bloody diarrhea, convulsions, headaches, mental impairments, redness or itching of the skin of eyes. Cadmium ultimately enters the human tissues resulting in diseases such as trachea-bronchitis, pneumonitis, pulmonary edema, renal failure, osteoporosis, and many others.Aluminum at high levels leads to birth defects, asthama, alzeimers and bone diseases. Calcium toxicity results in developmental and neurological toxicity, growth retardation, cognitive delay, kidney, nervous and immune system damage.

Cobalt only at high levels leads to lung damage. Boron causes low sperm count, nose, throat and eye irritation. Manganese is suspected to damage the respiratory reproductive and gastro intestinal systems. Lindane can cause breast cancer and acts as nerve poison. It also affects the reproductive system and is known as carcinogen. Chloropyriphos can cause fetal malnutrition, pneumonia, muscle paralysis and even death to respiratory failure. Malathion can damage nervous system, if it enters the body.In term of human health, DDT is the cause of many kinds of cancer, acute and persistent injury to the nervous system, lung damage, injury to the reproductive organs, dysfunction of the immune and endocrine systems, birth defects (Thuy, 2015). DDT a common insecticide, affects the nervous system and could actss

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a carcinogen. Women diagnosed with breast cancer were six to nine times more likely to have the pesticides DDT or hexa chlorobenzene in their bold streams compared to women who did not have breast cancer. There is a strong association between breast cancer and exposure to chemical pesticides. (K. Anitha*et al*. 2014).Organophosphate pesticides used in the vegetables gradually get deposit into human body and has a link with cancer (Miah et al. 2014).

II. DISCUSSION

Toxic residues of agricultural chemicals entering the human diet are of major concern today.In present global scenario of fast-growing economy, it is essential to use of fertilizers and technology in field of agriculture to meet out the demand of food fast increasing population and source of income butexcessive use of chemical fertilizers in agriculture resulting in large number of environmental and health problems.The environmental deterioration due to pesticides is endangering the situation of future (Sitaramaraju et al. 2014). The data for the last few decades regarding pesticide exposure and human health revealed that the numerous negative health effects that have been associated with chemical pesticides includes dermatological, gastrointestinal, neurological, carcinogenic, respiratory, reproductive and endocrine effects (Osman, 2011;Weisenburger, 1993;Mnif et al.,2011).The aims this review is to reveal environmental and health problems caused by improper fertilization provides and recommendation toward solving these problems.

By reviewing the literature, it can be concluded that use of excessive quantity of synthetic fertilizers is harmful for human health. It is contaminating the air, soiland surface water and directly or indirectly affecting human health. High levels of nitrates and nitrites in chemical fertilizer may cause some diseases. Somefertilizers contain heavy metals like cadmium and chromium and high concentrations of radionuclidesis cause of respiratory and excretory diseases. Cadmium poisoning, which comes from its excessive intake, can lead to kidney, bone and pulmonary damage (WHO, 1992).For this, fertilizers management is essential and it requires planning to reduce or replace harmful fertilizers usage.
The present study carried out by opting organic farming will create a healthy natural environment and Human health for the present as well as future generation. Development means not only economic growth, but it should be sustainable, to solve such problems everyone should have the knowledge of environment and environmental ethics. Through opting organic farming, we can create a healthy natural environment and human health.

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