

Impact of Fertilizer on Environment

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ABSTRACT: *The chemical fertilizer increases the growth and vigor of the plant, thereby meeting the world's food security, but the plants grown in this way do not develop good plant characteristics, such as a good root system, shooting system, nutritional characteristics, and will not have time to grow and mature properly. In the human body, chemically processed plants accumulate poisonous substances that are very hazardous. The deleterious effect of chemical fertilizers itself begins with the processing of chemicals whose products and by-products are certain harmful chemicals or gases that cause air pollution, such as NH₄, CO₂, CH₄ etc. and when the wastes from the industries are disposed of untreated into nearby water bodies it will cause water pollution. It also includes the most devastating effect of chemical waste accumulation in the water bodies i.e., the water eutrophication. And when added in soil, its continuous use degrades the soil health and quality hence causing the soil pollution.*

KEYWORDS: *Chemical, Fertilizers, Environment, Ecosystem, Organic material, Hazards.*

INTRODUCTION

The industrial revolution, followed by the green revolution that met the food demands of the increasing population, has led to an increase in crop production yields per unit area, but the use of synthetic fertilizers in agriculture has also increased. One of the most vital constraints of improving agricultural productivity is less soil fertility. But too many health issues and unrecoverable environmental contamination have been caused by the heavy use of inorganic fertilizers in agriculture worldwide to ensure world food security [1]. Total world consumption of nitrogen (N), phosphorus (P), and potassium (K) in 1998/1999 was 81, 14, and 18 Tg/yr, respectively. Fifty per cent of the nutrients were used for cereal production, 12% for oilseed crops, 11% for grassland, 11% for commodities (e.g., cotton, sugar, and coffee), 6% for root crops, and only 5% for fruit and vegetable production. In 1950, fertilizers comprised just a small percentage of the nutrients needed for grain production, with the "natural fertility" of the soil and added manure supplying most of the supply. Over 70 percent of the grain yield will have to rely on fertilizers by 2020 [2]. With population growth, the demand for plant nutrients is expected to increase continuously. The world population is predicted to increase by around 2.3 billion by 2020 and to double by 2050, according to Keeney (1997). If the intake of meat and food in developing countries is balanced by the rest of the world by the middle of the 21st century, then the market for grain and nutrients is expected to triple. Keeping in mind that the amount of land used for food production changed very slightly over the past few decades, and may even have decreased in parts of the world due to urbanization, the nutrient load per unit area is steadily increasing. All this implies that food production will have to be much more intensive and efficient than ever before [3].

Thus, to reduce and eliminate the adverse effects of Synthetic fertilizers on human health and environment, a new agricultural method, called organic farming, sustainable farming or ecological agriculture, has been established today. Organic fertilizers are mainly cost-effective, rather than chemical fertilizers, readily available from local goods. The source of soil fertility is organic matter [4]. Microbial fertilizers are environmentally friendly, non-bulky, cost-effective and play an important role in the feeding of plants. On the other hand, if handled poorly, inorganic fertilizers are notorious for their high cost and their harmful environmental impact. Both of these, as a result of soil depletion and nutrient imbalance, contribute to reduced crop yields. Some other strategies and management practices can be adapted to provide balanced nutrients to plants, such as integrated nutrient management (INM), using slow release fertilizers or Nano-fertilizers, conservation tillage, cover cropping, etc.

For crop growth, yield, quality parameters and even for soil health, fertilizers are very important only when applied at the optimum recommended dose or when used judiciously [5]. By enriching it with nutrients that it lacks, fertilizer increases the nutrient status and consistency of the soil. To maintain the cell's normal physiological function, crop plants require nitrogen, phosphorus and potassium. Similarly, lack of nitrogen results in poor growth and slow growth, but delayed maturity and low leaf quality result from excess use of nitrogen. However, extensive application of fertilizers causes significant environmental problems, such as eutrophication of water, loss of biodiversity, global warming and depletion of stratospheric ozone, soil and plant health problems, as certain fertilizers often contain heavy metals, the excess usage of which leads fertilizers to reach the food chain via soil absorption. Fertilization thus contributes to degradation of the water, soil and air [6].

Fertilizer Basics

A fertilizer is any material of natural or synthetic origin (other than liming materials) used to supply one or more plant nutrients necessary for plant growth or to address plant nutrient deficiencies in soils or plant tissues. Many fertilizer sources, both natural and industrially developed, exist. Any natural or manufactured material that contains at least 5% of one or more of the three primary nutrients nitrogen (N), phosphorous (P), or potassium (K) can be considered a fertilizer. Industrially manufactured fertilizers are sometimes referred to as “mineral” fertilizers. Fertilizers contain varying proportions of plant essential major (N, P, K, etc.) and minor (Zn, Mn, Fe, etc.) elements, as well as impurities and other non-essential elements. This description includes both inorganic (mineral) and organic fertilizers, as well as soil conditioners such as lime and gypsum, which, by raising the availability of nutrients already in the soil or by changing the physical structure of the soil, can promote plant development [7].

Fertilizers Classification The term fertilizer is defined in the Act. No. 156/1998 Coll., as amendment. So fertilizers are required and thus applied to replenish nutrients taken away from the soil by crop harvest and so they are applied to supplement more nutrients to boost crop yield. For the world's growing population, plant nutrients are essential for the production of healthy crops. Therefore, plant nutrients are a critical aspect of sustainable agriculture. The increased production of crops is largely dependent on the form of fertilizer used to replace the essential nutrients of plants. The nature and role of inorganic, organic and bio fertilizer-released nutrients vary, and each type of fertilizer also has its own advantages and disadvantages in terms of crop growth and soil fertility. In order to ensure both an improved and protected environment, sound fertilizer management must be carried out; thus, a balanced fertilization strategy that incorporates the use of chemical, organic or bio fertilizer must be developed and evaluated [8]. It is possible to identify fertilizers in different ways, such as, for example, on the basis of a number of nutrient elements present, on the basis of the type of critical nutrient present, etc.

Impact of Chemical Fertilizers on Natural Resources

In order to produce more production per unit area, the world agricultural systems use a large number of chemicals such as fertilizers, pesticides, herbicides, but using more doses than optimum or recommended of these chemicals and fertilizers leads to many problems such as contamination of the environment (soil, water, air pollution), reduced input productivity, reduced food quality, creation of resistance in different ways. Despite so many challenges, meeting the food demands of the rising population of the world is also a challenge. Therefore, the production of food-rich and chemical-free agricultural products for human and animal consumption needs to be produced without degrading natural resources, which is why the focus should be put on the production of foods rich in both quality and quantity[9]. There is no question that the use of fertilizer is advantageous for plants in the supply of deficient nutrients; they also have many other conveniences, such as the cheaper nutrient source, higher nutrient content and its solubility, hence immediate availability, then it is needed in less quantity, making it more appropriate

than organic fertilizer. There is an abundance of evidence that inorganic fertilizers can substantially increase crop yields. Fertilizers improve soil fertility so that crop yields are independent and insufficient quantities of plant nutrients are no longer limited. Despite these advantages, because of its increasing usage and decreasing nutrient use quality, fertilizer has many detrimental effects on the environment. The key challenge in intensive agricultural production systems, therefore, is to combine intensive cultivation with high efficiency of nutrient usage [10].

Chemical Fertilizer Deleterious Effects the amount of soil nutrients is reduced over time as crop plants are harvested, and these nutrients are replenished either through natural decomposition or by fertilizers being applied. Therefore, the basic component of modern agriculture is fertilizer. However, while chemical fertilizers are the main cause of adequate crop production for the world's population, their overuse presents serious challenges for present and future generations, such as contaminated air, water and soil, degraded land, degraded soils and increased greenhouse gas emissions. Not only are these synthetic fertilizers being harmful to our climate, but also to humans, livestock, and microbial forms of life. It is high time that everyone realizes the detrimental effects of using excess chemical fertilizers and takes steps to minimize the usage of chemical fertilizers and pesticides by substituting other organic modifications such as organic manures that not only provide plants with essential nutrients, but also preserve soil quality for subsequent crops. There are so many other technologies that are being developed, such as slow or controlled release fertilizers, pilled or granular fertilizers, inhibitors of nitrification, Nano-fertilizers, etc., all of which are the promising alternatives we can use to solve these serious challenges and save both our environment and the ecosystem.

CONCLUSION & DISCUSSION

For today's agricultural crop production system, the application of fertilizers is very important as it restores soil nutrients and promotes crop growth & yield. However, in order to minimize the numerous types of hazards that occur due to the improper use of fertilizers, it is important to make judicious and sustainable use of fertilizers so that soil testing and examination should first be performed correctly and then fertilizer should be provided to the soil. Therefore, integrated use of various types of nutrient suppliers, such as chemical fertilizers, organic manures, bio fertilizers and other slow-release or controlled-release fertilizers, should be implemented in order to ensure both increased and sustainable agricultural production and to protect the environment. Improved nutrient use of efficient fertilizers, particularly nitrogen, should be adopted using organic manures, controlled-release or slow-release fertilizers in order to eliminate the pollution hazards caused by chemical fertilizers. Using different Nano-fertilizers which have a greater role in enhancing crop production this will reduce the cost of fertilizer for crop production and also minimize the pollution hazard.

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