

The Benefits and Drawbacks of Chemical and Organic Fertilizers, as well as which is best for Plants

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Abstract: *Fertilization plays a critical role in the growth and development of the plant by providing it with nutrients (major and micro) in a form that can be absorbed through the soil or by spraying. The plant needs nutrients during its growth stages because it affects the speed of growth, the length of the root and vegetative groups, the fresh and dry weight, and affects the growth rate. The leaf area also has the impact of slowing down the rates of several physiological activities that the plant engages in, including protein synthesis, photosynthesis, respiration, and the movement of ions and molecules across cellular membranes. Today, using organic fertilizers has emerged as one of the effective strategies with a significant impact and one of the top concerns for people in charge of agriculture. In order to increase production, improve quality, and lessen the negative effects of improper use of chemical fertilizers, advanced agricultural technologies are being expanded and focused on, with the use of alternatives that have a better impact on plants, such as organic fertilizers that are abundant in vital nutrients for plants and do not cause toxicity. If utilized for a long time and in the right amounts for each crop and kind of plant, both for plants and people.*

Keywords: *Fertilization, plants, agricultural sector*

1. INTRODUCTION

As it works through integrated strategies to achieve sustainable agricultural development that is in line with social, economic, and political requirements, the agricultural sector is regarded as one of the most significant leading sectors in the national economies of countries. This has an impact on raising agricultural development rates, increasing crop productivity, increasing exports, increasing the area of reclaimed lands, and maximizing the use of agricultural waste. Justifying the use of agricultural chemicals, such as pesticides and fertilizers, results in pollution prevention and the achievement of healthy food security in a chemical-free environment.

Some international and Arab nations have focused on clean agriculture in their various bodies to increase agricultural production, achieve self-sufficiency, and try to export with standards recognized by the global market. Clean agriculture is devoid of chemicals, making it safe for human health and lowering the problem of pollution.

As a substitute for chemical fertilizers that contain microorganisms that are very important in agricultural systems, especially organisms that stimulate plant growth and development,

natural waste (animal and plant) must be used as efficiently as possible in order to provide the plant with some necessary nutrients (Glick et al., 2007).

The level of organic matter in the soil has become one of the decisive criteria for production since the lack of organic fertilization results in the excessive use of inorganic fertilizers under the intensive farming method, which contaminates the soil and water and consequently the plant. According to this perspective, the systematic application of organic fertilizers allows for the extension of organic farming programs and results in the preservation of soil fertility, an improvement in the qualities of the soil, and the production of safe, wholesome food.

Review the References

The importance of plant nutrients

In addition to the minor elements that plants require in smaller amounts, such as iron, which citrus trees lack due to its low solubility and non-transfer within the plant, particularly in calcareous soils, these major elements that plants require in large quantities include nitrogen, phosphorous, and potassium (Mohammed, 1985). The production of cytochromes, which are required for the processes of photosynthesis and respiration, as well as the synthesis of chlorophyll and amino acids, which serve as the building blocks for the synthesis of proteins, all include the use of nitrogen. eat. 2003).

The synthesis of nucleic acids, energy molecules, and cellular membranes like those found on the plasma membrane, mitochondria, green blastocytes, and vacuole membrane all demonstrate the relevance of the element phosphorus. It contributes to the root and its branch growth and makes up roughly 0.25% of the plant's dry weight (Al-Naimi, 1999).

Compost and organic farming

Organic fertilizer is a type of fertilizer manufactured from plant or animal waste that not only enhances the physical qualities of the soil but also gives plants vital nutrients. Recovering the fertilizer components that were removed from the soil during plant growth is done by fertilizing with organic fertilizers generated from agricultural waste. Contrarily, when synthetic organic fertilizers are added, agricultural microorganisms in the soil deal with them by destroying and decomposing them, creating soft organic compounds and nutrients for plants. These nutrients stay in the soil for a long time and continuously, giving the plants their fertility, which has several advantages.

- 1- Preventing pollution in the environment by rationalizing the use of mineral fertilizers.
- 2- Producing chemical-free, wholesome food for both people and animals.

The benefits of synthetic organic fertilizers include:

- 1- The manner of decay and lack of smell.
- 2- A high concentration of organic materials and fertilizer components.
- 3- Name and weed seeds, which are sources of plant illnesses, should not be present.

Depending on its origins, organic fertilizer comes in several types.

How to prepare organic fertilizer:

The production of high-quality organic fertilizers requires the use of field leftovers with little commercial value. Tree leaves, produce, reed straw, various kinds of hay, and tree pruning scraps are some of these wastes. The following requirements must be satisfied in order to effectively transform these wastes into suitable industrial organic fertilizers:

1. The material should be cut into pieces no longer than 10-15 cm.

2. Add sufficient nitrogen.
 - 3 Firmly press the pile.
 - 4- The medium is appropriate for the action of bacteria that decompose garbage.
 - 5- The pile's temperature should be within the recommended range (30-35 C).
- Factors affecting the degree and rate of decomposition of crop residues and organic residues in the soil:
- 1- The chemical composition of the waste
 - 2- The degree of aeration in the soil.
 - 3- N/C ratio
 - 4- The degree of humidity
 - 5- Its lignin content
 - 6- pH number.
 - 7- The degree of fragmentation of the organic matter.
 - 8- The earth's content of good elements.
 - 9- The nature of the dominant microbes.
 - 10- The texture of the earth. (Abdel-Moati and others, 2004).

Chemical fertilizers:

Chemical fertilizers are currently the major tool used in agriculture to boost output and make up for the deficiency of nutrients in the soil. However, using fertilizers excessively is bad for the soil, the environment, and people. Following their investigation, fertilizers still include a number of poisonous and hazardous byproducts that the soil cannot break down.

Chemical fertilizer damage:

- Chemical fertilizers that contain nitrogenous compounds may induce malignant diseases and can enter drinking water supplies through rivers and groundwater. Nitrates in the human intestine can also transform into nitrites, which can result in leukemia in the stomach and intestines.
- Because fertilizers leave toxic substances in the soil and wastewater, excessive fertilizer use raises the proportion of soil and water contamination. - Fertilizers significantly increase the vegetative growth of plants, so excessive fertilizer use promotes vegetative growth at the expense of fruits and crops, particularly when nitrate-rich fertilizers are used, which promote crop diseases and insects and lower yields.
- Inappropriate usage of urea fertilizer results in respiratory diseases and male infertility because it contains the poisonous biuret, which becomes active when the temperature rises. Urea also decomposes into ammonia gas when it breaks down.
- The buildup of toxic heavy metals in the soil brought on by the use of phosphate fertilizers, which in turn causes the buildup of cadmium, a poison that can harm humans whether it enters the system through plants or animals.
- In contrast to organic fertilizers, waste water's chemicals and nitrates, which they carry, promote the multiplication and growth of algae and parasites in drains and lakes, which causes the growth of algae and parasites in the waterways. running now.

What are chemical fertilizers

There are some artificial substances that were developed especially to boost agricultural yields. For instance, some chemical fertilizers contain nitrogen, whilst others are phosphate-based. However, most chemical fertilizers will run off or leach due to rainfall and heavy irrigation, which results in environmental pollution and low fertilizer effect. Applying

chemical fertilizers can quickly increase crop yields, but they can also cause soil hardening and reduce soil organic matter and pH after prolonged use, resulting in a loss of soil productivity.

How do chemical fertilizers cause water pollution?

Phosphates and nitrates, which are typically found in chemical fertilizers, are actually some of the biggest causes of water contamination. Eutrophication, a process that enriches the water's surface with nutrients, is a result of the environmental contributions of nitrogen and phosphorus. The growth of lake organic matter and nutrient levels are related to the trophic status of lakes. The following list includes some of the several signs of nutrient enrichment: The output of biomass, including phytoplankton, macrophytes, and related algae, has increased. A change in fluid characteristics happens when aggregation changes in aquatic plants. Less favored fish species take the place of more favored ones. Different poisons are released by algae. A change in the flavor and odor of the water occurs when algal blooms develop. Because of the drop in oxygen levels caused by algal blooms, fish die as a result. excessive water weeds clogging irrigation canals. Due to the weed, mud, and stink infestation, the water's usefulness as a recreational resource has decreased. Nitrates, potassium, and phosphates are released when organic fertilizers are used, contaminating the water. Nitrates can build up or become too abundant, which causes groundwater pollution. Heavy metals are present in great quantities in both groundwater and surface waters, and their toxicity is a danger to both people and animals. As well, Ammonia emissions from fertilizers also cause acidification, which lowers purity. Water bodies.

Why are chemical fertilizers harmful to water?

In order to grow crops of higher quality, farmers employ fertilizers. However, these fertilizers are also hazardous since runoff from fields to rivers and other water bodies lowers the quality of the crops. Other factors that cause fertilizers to enter surrounding water bodies include irrigation, snowmelt, rain, and snowmelt. We think fertilizers are extremely harmful to water for the following reasons: A high nitrogen content can contaminate drinking water, nitrates can seep into the groundwater, and when they are present in animals at higher amounts, they can poison them with nitrates. Eutrophication is caused by the high concentration of nutrients that leak into water bodies, as a result of which the water body experiences algal blooms. The oxygen level falls as a result, aquatic species perish, and moving through water becomes challenging. Runoff from fertilizers has a negative impact on marine life because it depletes nutrients, causes bacteria to thrive, which depletes oxygen, and causes aquatic species to suffocate to death. When fertilizer runoff causes algae to thrive, it produces toxic chemicals that have a significant negative influence on marine life. Aquatic animals are suffocated by these chemicals, which causes them to suffer and finally perish. Dead zones, which arise at significant river mouths, are caused by severe eutrophication and affect an entire area. A decline in marine activity is another effect of this phenomena. Even if the activity of the algae can decline with time, it takes a very long time to get back to its normal and previously healthy state.

Use of fertilizers: How important is it?

The use of pesticides and chemical fertilizers is one of the most popular strategies humans have used to increase agricultural output, second only to genetic manipulation. The application of these "additives" on the soil first started with organic manure, which is primarily composed of the feces of herbivores (animals that consume plants and herbs).

Chemical fertilizers, which are usually separated into two sorts in the agricultural field—the first being "nitrogenous" and the second being "phosphate"—have been developed by scientists as research has progressed. These "additives" replenish the salts that are absent from the soil and increase its fertility. In terms of pesticides, which are chemicals made to fit the unique conditions of each location, they aid in getting rid of dangerous insects and parasites that prevent the plant from properly finishing the growth process. Since experts estimate that the use of pesticides and chemical fertilizers is responsible for 50% of the increase in agricultural production, their use was clearly evident in agricultural production and played a crucial role in achieving the agricultural renaissance that was experienced globally. However, the overuse of these chemical substances, which goes beyond what plants and soil require and sometimes even when crop growth is not possible, has had a negative impact on the natural balances, whether these are related to plants specifically or biodiversity in the soil as a whole. Chemical fertilizers and pesticides are two of the most significant methods used by humans to increase agricultural output (Al-Haddad, 2000).

Harmful effects of chemical fertilizers on nature and the environment:

- 1- It reduces soil quality. Too much fertilizer can alter the soil's fertility by raising its acidity levels. For this reason, it is advised to perform a soil test at least once every three years to determine whether the correct amount of fertilizer is being used. the use of fertilizer.
- 2- Biology of water bodies: When we apply a lot of fertilizers to the soil, they have a hazardous effect because some of these chemicals, such nitrates and phosphates, get washed into lakes and seas by rain and sewage. It has been demonstrated that these compounds can poison aquatic life, causing an environment that is poisonous and the demise of fish, mammals, and other aquatic vegetation. They do this by promoting excessive algae development in water bodies and lowering oxygen levels. Since many of the diverse fish species found in water bodies serve as the primary food source for a variety of birds and other animals in the ecosystem, this may indirectly cause an unbalance in the food chain.
- 3- Human health: Generally speaking, nitrogen and other chemicals in fertilizers can impact groundwater and water used for drinking, and one of the most frequent outcomes of this can be the development of blue baby syndrome, which affects infants whose skin tissues are deficient in oxygen. Their skin looks blue or purple because of this.
- 4- Climate changes around the world: Fertilizers typically contain substances such methane, carbon dioxide, ammonia, and nitrogen, the emission of which significantly contributes to the amount of greenhouse gases existing in the atmosphere, resulting in global warming and weather changes. We cannot even begin to imagine how damaging the use of these chemical fertilizers will be to our environment, and as a result, we as humans must stay as far away from chemical fertilizers as we possibly can. Nitrous oxide, a by-product of nitrogen (which is found in chemical fertilizers), is the third most important greenhouse gas after carbon dioxide and methane.

The most important reasons and risks of using chemical fertilizers and pesticides:

In order to increase productivity in response to the rising global need for food, the use of pesticides and artificial fertilizers in agriculture has become widespread and even required. Scientists have created a number of methods to increase production through genetic modification, as well as the intensive use of fertilizers to improve the soil and pesticides to get rid of parasites and dangerous insects. This is due to the growing population of the planet and the ongoing pressure on cultivated areas.

By 2020, it is anticipated that there will be a surplus of about 23 million tons between the supply and demand for fertilizers alone, with a total global demand of 247 million tons. However, after studies revealed widespread use of pesticide fertilizers that does not adhere to international standards and these fertilizers have been blamed for some serious diseases, especially cancer, this increased use - sometimes to the point of excess - has become a global concern (Saber, 2005). Why has the use of chemical fertilizers and pesticides increased by twofold in recent years? How are pesticides that don't adhere to international standards being marketed, especially in developing nations? How has the extreme wastefulness in the use of chemical compounds—which often exceeds the needs of plants and soil and occurs during unsuitable times for crop growth—affects the natural balances, whether they are those that regulate whether or not certain crops grow?.(Al-Oudat, 2000).

2. CONCLUSIONS AND RECOMMENDATIONS

1. The use of organic fertilizers with biological (plant or animal) origins, as these have no detrimental effects on plants, people, or other animals.
 2. Compared to chemical fertilizers, fertilizers derived from plants and animals provide good fertility and enhance the physical and chemical properties of the soil over a longer time frame.
 3. The availability and low cost of animal and plant waste, as well as the fact that it can be used as fertilizer, all contribute to lessening environmental pollution.
- The majority of the nutrients a plant needs are supplied by organic fertilizers with animal and plant origins. This aids in the plant's quick development and ensures the generation of seedlings with healthy vegetative growth, high productivity, and a lack of disease infections.

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