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Opinion Article

Farm factors influencing soil fertility

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DESCRIPTION

The ability of a soil to support plant growth by offering vital plant nutrients and desirable chemical, physical, and biological properties as a habitat for plant growth is known as soil fertility. Crops require nutrients, all the essential nutrients for basic plant nutrition, such as nitrogen, phosphorous, and potassium, as well as other nutrients required in lower amounts, will be present in a productive soil (e.g., calcium, magnesium, sulfur, iron, zinc, copper, boron, molybdenum, nickel. Ways to increase soil fertility include fallowing, using compost, manure, crop residues, fertilizer trees, intercropping legumes with cereals and including the principles of conservation agriculture (crop rotation, ensuring permanent cover for the soil and no disturbing of the top soil layer)

The mineral that is most frequently deficient in soil is bioavailable phosphorus. Large levels of potassium and nitrogen are also required. These three components are therefore always listed on a commercial fertilizer analysis. A 10-10-15 fertilizer, for instance, has 10% nitrogen, 10% accessible phosphorus (P_2O_5), and 15% water-soluble potassium (K_2O). The fourth element that can be found in a commercial analysis is sulphur; 24 contain 21% nitrogen and 24% sulphate.

In comparison to organic fertilizers, inorganic fertilizers are typically less expensive and have higher nutrient concentrations. Additionally, as plants often need nitrogen, phosphorous, and potassium in their inorganic forms in order to absorb them, inorganic fertilizers are typically immediately accessible to plants without alteration. The usage of inorganic fertilizers has drawn criticism from some, who contend that the water-soluble nitrogen does not meet the plant's long-term needs and pollutes the water. Slow-release fertilizers may increase the availability of the nutrients they offer over a longer period of time and decrease the amount of nutrients that are lost through leaching.

A complex process known as soil fertility involves the continuous transformation of nutrients from organic to inorganic forms. Mineralization is the process through which inorganic nutrients are released into the soil solution as a result of microorganisms' breakdown of plant and animal waste. The subsequent changes of those nutrients might be assisted or made possible by soil microorganisms. Many microorganisms, like plants, need or prefer to utilise inorganic forms of nitrogen, phosphorus, or potassium. These microorganisms will compete with plants for these nutrients, immobilising them in microbial biomass. The balance and availability of key nutrients and organic carbon to soil microbes determine how immobilisation and mineralization processes interact. Lightning strikes and other natural processes could convert atmospheric nitrogen to (NO_2). When denitrifying bacteria are present and anaerobic circumstances (such as floods) exist, denitrification may take place. Nutrient cations, including potassium and many micronutrients, are held in relatively strong bonds with the negatively charged portions of the soil in a process known as cation exchange. While the price of rock phosphate as a base material increased eight-fold in 2008, the cost of phosphorus as fertilizer more than doubled. Due to the rare occurrence of rock phosphate throughout the earth, the phrase "peak phosphorus" has just been developed. A wide range of substances, including biochar, which has numerous advantages for soil health, have been referred to as soil conditioners because of its capacity to enhance soil quality.

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