



SOIL FERTILITY: NATURAL AND ARTIFICIAL FACTORS

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Annotation:

This article explores the factors affecting soil fertility, focusing on both natural and artificial influences. Natural factors such as climate, relief, parent material, biological processes, and time are analyzed for their role in shaping soil productivity. Artificial factors, including human activities like crop rotation, fertilization, irrigation, land reclamation, and other agronomic practices, are examined for their impact on maintaining and enhancing soil fertility. The article also reviews modern scientific approaches aimed at preserving soil resources and preventing land degradation. Based on the research findings, practical recommendations are provided for the sustainable use of soil and agricultural productivity.

Keywords:

Soil fertility, natural factors, artificial factors, agro-technology, fertilization, soil degradation, land reclamation, productivity, biological processes, land resources.

Introduction: Soil fertility is one of the most critical components in ensuring sustainable agricultural development and food security. It refers to the soil's ability to supply essential nutrients to crops in adequate amounts and proper balance for optimal plant growth. The fertility of soil is not a fixed property; it is influenced by a wide range of factors that can either improve or degrade its quality over time. Natural factors such as climate, topography, parent rock material, time, and biological activity play a fundamental role in the formation and maintenance of fertile soils. These factors determine the soil's texture, structure, moisture retention capacity, and nutrient content. However, in the modern era of intensive agriculture, artificial factors—such as the use of fertilizers, irrigation, crop rotation, and land management techniques—have become equally important in modifying and sustaining soil fertility. Understanding how these natural and artificial factors interact is crucial for developing effective strategies to maintain soil health, prevent degradation, and achieve long-term productivity. This article aims to analyze the complex interplay of these influences and propose practical measures for sustainable soil fertility management. Natural Factors Affecting Soil Fertility

Soil fertility refers to the ability of soil to supply essential nutrients to plants in adequate amounts for their growth and development. Natural factors play a crucial role in determining the fertility of soil. These factors are not influenced by human activity and include the following: 1. Parent Material The type of rock from which the soil is formed affects its mineral composition. Soils derived from volcanic rocks, for example, are often more fertile due to their high nutrient content, while sandy soils from granite may be less fertile. 2. Climate Climate greatly influences soil fertility. Temperature and rainfall affect the rate of weathering of parent rock, organic matter decomposition, and nutrient leaching: High rainfall can lead to nutrient loss through leaching. Warm temperatures increase microbial activity and organic

matter decomposition, enhancing fertility . 3. Topography The shape and slope of the land impact soil formation and erosion: Flat lands allow accumulation of nutrients. Steep slopes are prone to erosion, which can wash away the top fertile soil layer, reducing fertility. 4. Soil Organisms Microorganisms such as bacteria, fungi, earthworms, and insects play a key role in nutrient cycling: They decompose organic matter into humus. Some microbes fix atmospheric nitrogen, making it available to plants. 5. Natural Vegetation The type of vegetation that naturally grows in an area contributes organic matter to the soil and affects its nutrient cycle. Dense forests often lead to fertile soils due to the continuous input of organic litter. 6. Time

The age of the soil affects its development. Over time, soils evolve, accumulate organic material, and may become more fertile — or less fertile if nutrients are lost without replenishment



1-picture. Nature picture

Artificial factors are man-made actions and practices that affect soil fertility. One of the main artificial factors is the use of chemical fertilizers. These fertilizers provide important nutrients like nitrogen, phosphorus, and potassium to plants. However, using them too much can damage the soil and reduce its natural fertility.

Another important factor is the use of organic manure, such as compost or animal dung. These help to improve the structure of the soil and increase its nutrient content in a natural way. Irrigation is also an artificial factor. It helps supply water to the soil, which is important for plant growth. But too much water can cause waterlogging and salt build-up, which can harm the soil. Farmers also use pesticides and herbicides to control pests and weeds. These chemicals can be useful, but if they are used too often or in the wrong way, they can kill helpful soil organisms and reduce soil health. Crop rotation and good farming methods can help maintain soil fertility. But planting the same crop every year (monoculture) can remove the same nutrients over and over again, making the soil less fertile. Human activities like cutting down forests, building roads, or overgrazing can destroy the top layer of the soil, which is the most fertile part. This leads to erosion and loss of soil fertility.

To protect the soil, people use conservation techniques like terracing and contour plowing. These methods help prevent soil erosion and keep the nutrients in place.

Conclusion. In conclusion, artificial factors have a significant impact on soil fertility. While human activities such as the use of chemical fertilizers, irrigation, and modern farming techniques can improve crop production in the short term, they can also harm the soil if not managed properly. Overuse of chemicals, poor irrigation practices, and unsustainable land use can lead to soil degradation, nutrient loss, and pollution. On the other hand, using organic manure, practicing crop rotation, and applying soil conservation methods can enhance and preserve soil fertility in the long term. Therefore, it is important to balance modern agricultural practices with sustainable methods to maintain healthy and productive soil for future generations.

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