



The Role of Soil and Water Conservation Measures in Sustainable Agriculture

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DESCRIPTION

Water conservation refers to all policies, strategies, and activities aimed at managing fresh water as a natural resource in a sustainable manner, protecting the hydrosphere. Water use is influenced by population, household size, growth, and wealth. For example, climate change has increased the demand for natural water supplies, particularly in irrigation and industry. Agronomic practices reduce the effects of raindrops by covering the soil's surface, increasing infiltration and water absorption capacity, and reducing runoff and soil erosion. These actions are less expensive, more environmentally friendly, and sometimes even more efficient than structural ones.

Contour farming, crop rotation, cover crops, intercropping, strip cropping, mulching, conservation tillage, land configuration techniques, and agroforestry measures are some of the most important agronomic measures. Contour farming is a popular agronomic technique for conserving soil and water in steep agroecosystems and swampy soils. Plowing, seeding, intercropping, and all other agricultural operations are performed in accordance with the contour line. The ridges and furrows of the slope create a continuous succession of minor obstacles to the movement of water, slowing runoff and preventing soil erosion and nutrient loss. It preserves soil moisture in low rainfall areas while reducing soil loss in high rainfall areas due to the higher infiltration rate and concentration time.

It reduces soil erosion, maintains soil fertility, and retains soil moisture in both cases, increasing overall crop output. However, the efficiency of this method is influenced by the local terrain, soil type, and rainfall intensity. Crop rotation is the practise of planting multiple crop varieties in succession on the same field in order to maximize profit with the least amount of investment while preserving soil fertility. Monoculture depletes soil fertility and causes nitrogen depletion. Soil erosion is reduced, soil fertility is restored, soil and water are conserved by incorporating legume crops into crop rotation. Furthermore, agricultural residue improves soil health, organic matter content, and reduces water pollution.

The benefits of using high canopy cover crops in a proper rotation to maintain soil fertility include increased input use efficiency, system productivity, decreased pest and disease infestation, and reduced soil erosion. Cover crops are plants that grow close together and have a dense canopy and are grown to prevent soil erosion. Legume crops have more biomass that protects the soil than row crops. The crop geometry and canopy growth for raindrop interception determine how effective cover crops are at reducing soil surface exposure for erosion. The best cover crops are cowpea, green gramme, black gramme, groundnut, and so on. Intercropping is the practise of growing two or more crops in the same field at the same time with a set or alternate row arrangement.

Intercropping can be classified as row, strip, or relay depending on the crops, soil type, topography, and climatic conditions. Intercropping includes both temporal and geographical elements. Crops that tolerate and allow for erosion should be interplanted. Crops should have a variety of rooting patterns. Intercropping increases soil surface coverage, reduces direct rain impact, and prevents soil erosion. This procedure slows runoff, prevents erosion, and prevents nutrient loss from the land. The erosion-resistant plants protect the soil from raindrops, slow runoff, and thus increase the time of concentration, which increases soil moisture levels and crop yield. Strip cropping is used to manage runoff and erosion while maintaining soil fertility.

Adopting appropriate land configuration and planting techniques based on crops, cropping systems, soil type, topography, rainfall, and other factors improves crop establishment and intercultural operations, reduces runoff, soil and nutrient loss, conserves water, and results in higher productivity and profitability. Agroforestry is a sustainable land management system that involves growing trees or shrubs on the same plot of land as agricultural crops and livestock production. Biological measures are both economical and environmentally friendly; they improve soil properties while conserving soil and water resources. Furthermore, biological measures will help to improve and sustain agricultural productivity.

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Received: 02-Jan-2023, Manuscript No. BABCR-23-19918; **Editor assigned:** 05-Jan-2023, Pre QC No. BABCR-23-19918 (PQ); **Reviewed:** 20-Jan-2023, QC No. BABCR-23-19918; **Revised:** 30-Jan-2023, Manuscript No. BABCR-23-19918 (R); **Published:** 07-Feb-2023, DOI: 10.35248/2161-1009.23.12.475

Citation: Sander M (2023) The Role of Soil and Water Conservation Measures in Sustainable Agriculture. *Biochem Anal Biochem.* 12:475.

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