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Significance of biological measures of soil and water conservation in agriculture farming

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DESCRIPTION

Soil-conservation Farming involves no-till farming, "green manures," and other soil-enhancing practices that make soil equalization difficult. Such farming techniques attempt to mimic the biology of arid lands. They can repair damaged soil, reduce erosion, promote plant growth, eliminate the need for nitrogen fertilizer or fungicide, produce higher-than-average yields, and protect crops during droughts or flooding. As a result, farmers' profits increase due to less labour and lower costs. Cover crops and no-till farming act as nitrogen and other nutrient sinks. This increases the amount of organic matter in the soil. 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, population, household size, growth, and wealth all have an impact on water use. For instance, the pressure on natural water supplies has increased due to climate change, particularly in irrigation and industries. Agronomic practises lessen the effects of raindrops by covering the soil's surface, increasing the soil's rate of infiltration and water absorption capacity, and decreasing runoff and soil erosion. These actions are more affordable, environmentally friendly, and occasionally even more efficient than structural ones.

Several key agronomic measures are contour farming, crop rotation, cover crops, intercropping, strip cropping, mulching, conservation tillage, land configuration techniques, agroforestry measures. Contour farming is one of the most extensively used agronomic techniques for soil and water conservation in steep agro-ecosystems and swampy soils. Plowing, seeding, inter-culture, and all other agricultural operations are carried out following the contour line. The slope's ridges and furrows create a continuous succession of minor obstacles to the water's movement, slowing runoff and preventing soil erosion and nutrient loss. Due to the higher infiltration rate and concentration time, it preserves soil moisture in low rainfall areas while lowering soil loss in high rainfall areas. In both cases, it lowers soil erosion, maintains soil fertility, and retains soil moisture, increasing overall crop output. The efficiency of this method, however, is influenced by the local terrain, soil type, and intensity of rainfall. Crop rotation is the practice of planting various crop varieties in succession on the same field to maximize profit with the least amount of investment while maintaining the fertility of the soil. Monoculture reduces soil fertility and causes nitrogen depletion in the soil. By incorporating legume crops into crop rotation, soil erosion is reduced, soil fertility is restored, and soil and water are conserved. Additionally, the agricultural residue enhances soil health, organic matter content, and water pollution reduction. Increased input use efficiency, system productivity, decreased pest and disease infestation, and reduced soil erosion are all benefits of using high canopy cover crops in a proper rotation to maintain soil fertility.

Cover crops are close-growing plants with a dense canopy that are grown to prevent soil erosion. Legume crops have better soil-protecting biomass than row crops. The geometry of the crop and the growth of the canopy for raindrop interception determine how efficient cover crops are at reducing soil surface exposure for erosion. Cowpea, green gram, black gram, groundnut, etc. are the best cover crops. In Intercropping the practice of growing two or more crops concurrently in the same field with a set or alternate row arrangement. Depending on the crops, soil type, topography, and climatic circumstances, intercropping can be categorized as row, strip, or relay intercropping. Intercropping has both temporal and geographical components. Crops that allow for and withstand erosion should be interplanted. Different rooting patterns ought to exist in the crops. Intercropping improves soil surface coverage, lessens the direct impact of rain, and prevents soil erosion. In Strip cropping the practice of growing crops with deep roots and high canopy densities in alternate strips that permit and resist erosion in the same land.

This procedure slows down runoff, stops erosion, and prevents the loss of nutrients from the land. The erosion-resistant plants shield the soil from the pounding of raindrops, slow down runoff, and so increase the time of concentration, which raises soil moisture levels and boosts crop yield. Strip cropping is used to manage runoff and erosion and keep the fertility of the soil.

Mulch is any organic or inorganic material applied to the soil's surface to prevent erosion, reduce evaporation, boost infiltration, control soil temperature, and improve soil structure in order to retain soil moisture. In conservation tillage, reduction of soil erosion and runoff, as well as other benefits such as carbon sequestration, at least 30% of the soil surface should be covered with crop residue before and after planting the next crop in this practice.

Reduced tillage, minimum tillage, no-till, direct drill, mulch tillage, stubble-mulch farming, trash farming, strip tillage, and other terms fall under this category. Adopting appropriate land configuration and planting techniques based on crops, cropping systems, soil type, topography, rainfall, and other factors aids in better crop establishment, 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 alongside agricultural crops and livestock production on the same plot of land. Biological measures are both cost-effective and environmentally friendly; they also improve soil properties while conserving soil and water resources. Furthermore, biological measures will aid in the improvement and maintenance of agricultural productivity.