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Contemporary Global Issue of Rising Water Scarcity for Agriculture: The Quest for Effective and Feasible Soil Moisture and Free-Water Surface Conservation Strategies

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ABSTRACT

There is the need to take seriously the task of conserving soil moisture in agricultural fields and free-water surfaces in reservoirs, especially in recent years of climate change. Many strategies exist for achieving this task and improving the productivity of arable soils. These strategies traditionally come under biological and physical or mechanical measures. Some other relatively new techniques operate neither on physical nor on biological principle. All these measures which operate on different principles frequently overlap. The principles involved, together with the prospects and constraints of the key techniques of conserving soil moisture found in the literature, are reviewed in this paper. Among other considerations, the effectiveness and/or practicability of any one of the techniques depend upon soil type, topography, climate, scale of production, level of technology, and socio-economic status. Such agronomic practices as conservation tillage and live vegetation mulch that maintain infiltration rates often appear to be more beneficial in the long run than engineering structures, especially those that lead to blocking of waterways on the soil surface. However, this review reveals that none of the soil moisture conservation strategies could be credited as universally applicable. Consequently, an integrated approach to soil water management and conservation, where feasible, is considered more appropriate. This is because the different principles involved in the techniques identified to be compatible would readily complement and strengthen one another. Such a multi-mechanistic approach is expected to result in improved efficacy in conserving water resources in soils and open reservoirs.

KEYWORDS

Effective Rainfall, Evapotranspiration Rate, Deep Percolation, Losses to Seepage, Integrated Soil Moisture Conservation Strategies

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