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Evaluate the Effect of Biodegradable Super Absorbent Polymers (SAPs) on Soil Hydro-physical Properties: Special Reference to Water Conservation in Agriculture

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Efficient water management is vital for sustaining agricultural productivity and ensuring food security. Recently, super absorbent polymers (SAPs) have emerged as valuable soil amendments due to their ability to conserve water by stabilizing soil structure and enhancing soil quality. However, many commonly used SAPs are not readily biodegradable, which can result in long-term environmental pollution. This study aimed to assess the effectiveness of biodegradable SAPs as soil conditioners for addressing water scarcity in subtropical regions. Five concentrations of biodegradable Fasal Amrit polymer (EFP) (P1: 0, P2: 0.02%, P3: 0.04%, P4: 0.08%, and P5: 0.12%) were tested to evaluate their impact on soil hydraulic properties. Soil water retention curves (SWRCs) were generated, and water capacity indicators were derived using the van Genuchten model. The SWRCs showed that EFP-treated soils enhanced water retention capacity compared to the control. With increasing EFP concentrations, the infiltration rate consistently declined, from the highest in P1 to the lowest in P5. Moreover, EFP-treated soils exhibited lower hydraulic conductivity than the control. Soil aggregate stability significantly improved ($p < 0.05$) with higher EFP concentrations, as the polymer promoted better soil aggregation. These results demonstrate that EFPs can improve water retention and availability for crops by enhancing soil hydrological properties, making them a promising solution for mitigating water scarcity as effective soil conditioners.

Keywords: biodegradable, soil hydrological properties, super absorbent polymer, water retention, water scarcity

Biography:

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