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Sustainable Land Management in Agriculture: Balancing Productivity and Environmental Health

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ABSTRACT

Agriculture plays a crucial role in global food security and economic stability, yet it is increasingly threatened by land degradation. As the demand for food production intensifies due to population growth, unsustainable agricultural practices such as excessive tillage, monocropping, and the indiscriminate use of chemical fertilizers and pesticides have led to severe environmental consequences. Land degradation manifests in multiple forms, including soil erosion, salinization, loss of organic matter, desertification, and contamination of water resources. Sustainable land management (SLM) approaches offer viable solutions to mitigate these challenges while maintaining high crop yields. Strategies such as conservation agriculture, agroforestry, integrated nutrient management, precision farming, and organic amendments enhance soil fertility, improve water retention, and reduce dependence on synthetic inputs. Additionally, technological advancements like remote sensing, Geographic Information Systems (GIS), and artificial intelligence-driven land monitoring provide critical insights into soil health and land-use patterns, enabling data-driven decision-making for sustainable agriculture. This paper reviews the intricate relationship between agricultural productivity and land degradation, exploring innovative soil and water conservation techniques, regenerative agriculture, and the role of indigenous knowledge in fostering resilience It also explores the impact of chemical inputs on soil health and, provides a comprehensive foundation for developing integrated strategies that balance agricultural productivity with long-term ecological sustainability and emphasize the need for multidisciplinary approaches that incorporate scientific advancements, traditional practices, and policy innovations to mitigate land degradation while ensuring global food security in an era of climate change.

Keywords: land degradation, soil health, regenerative agriculture, policy recommendations, climate resilience

References:

1. Hamdy, A.; Aly, A. Land Degradation, Agriculture Productivity and Food Security. In: *Proceedings of the Fifth International Scientific Agricultural Symposium "Agrosym 2014"*. **2016**, 708–717. DOI:10.7251/AGSY1404708H
2. Priya, R. Land Degradation in India. Linkages with Deforestation, Climate and Agriculture. **2021,** 111 p. DOI:10.1007/978-3-030-68848-6

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