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Commentary

Impact of cover crop systems on soil physical properties

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DESCRIPTION

Cover cropping methods are used all over the globe to keep soil fertility, which is measured by biochemical qualities including soil nitrogen and microbial activity. Cover crops maintaining soil availability entails supplying appropriate nutrients for cultivated plants. Furthermore, microbial activities boost plant production by sustaining soil processes related to the nitrogen cycle. These cover crop benefits have been determined to be sustainable in vegetable production systems. Grasses as well as leguminous and non-leguminous broadleaves are the most widely used cover crops in the world. Cover crops make a difference in soil qualities. The review begins with single and mixed cover crops, demonstrating that grass species are preferred for their decay and ability to provide substantial soil cover, broadleaf species are preferred for their quick decomposition and ability to release residues into the soil, and leguminous species are preferred for their ability to fix atmospheric nitrogen. Cover crops effects on soil health are examined. Integrating cover crops into traditional farming systems can help boost water penetration and storage by lowering soil bulk density, improving soil structure, and improving hydraulic characteristics. Microbial activity, abundance, and diversity may be improved by using cover crops. Finally, the study finds that, with correct management, cover crops may be an important part of soil conservation techniques for improved soil health.

Cover crop impacts in other farming systems and climatic zones, as well as the long-term effects of cover crops on soil characteristics, future crop productivity, and total cropping system profitability. The basic functions of soil are frequently defined by inherent soil qualities however human management can have a superimposing influence on soil quality. As a result, interpreting Soil Health (SH) values in the context of a region's soils and cropping systems is difficult. Dairy Crop systems had the best biological and physical soil health, followed by Pasture and Mixed Vegetable systems (Abalos, et al. 2014). Soil health was worse in annual grain and processing vegetable farming regimes. Cropping system impacts are thought to be connected to changes in carbon and nutrient balances, as well as the degree of soil disturbance caused by tillage (Abdalla, et al. 2018). To make it easier to understand SH test findings in the context of production-specific contexts, new scoring methods based on soil texture classes and cropping systems were devised (Aronsson, et al. 2011). Intensive cropping techniques can decrease soil health, which is critical for agricultural sustainability and environmental quality (Askegaard, et al. 2005). Improved agricultural systems and management approaches have the potential to significantly improve soil attributes related to soil health. In the field of four different potato cropping systems were evaluated for their effects on soil physical, chemical, and biological properties, with the goals of Soil Conservation (SC), Soil Improvement (SI), Disease Suppression (DS), and a Status Quo standard rotation (SQ), as well as a non-rotation (PP) control (Battany, et al. 2000). Increased rotation duration and the use of cover crops, green manures, decreased tillage, and, especially, organic amendments can improve soil physical, chemical, and biological aspects associated with soil health. Cultivation of Cover Crops (CC) can increase agricultural productivity, soil quality, and environmental quality. Cover crops serve a variety of purposes, including increasing the physical, chemical, and biological qualities of soil. The crops help improve organic matter and nutrient release, as well as inhibit weeds and pests (Brookes, et al. 2008). To reap the full benefits of CCs, it is necessary to continue to investigate and regulate their use. ln terms of species selection, termination stage, and termination techniques, on the consequences and advantages of CCs on soil quality in different cropping systems (Cherr, et al. 2006). Green manure application is a time-honored and beneficial method in agro ecosystem management. The effects of green manure on the production of the region's primary crops have been widely studied, but the contradictory findings reached in these cases cannot give appropriate direction for local agricultural

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output. Meta-analysis to produce a complete evaluation of green manure's impact on soil characteristics and crop output in this region (Delignette-Muller, et al. 2015). Although human activities play a vital role in generating positive feedback of soil–plant–environment interactions, knowledge of how they affect soil physiochemical, microorganism-induced characteristics, and soil health is still limited. The consequences of anthropogenic interventions on soil microbial community structure and function, such as crop diversity in rotations, soil physical disturbance, synthetic chemical inputs, and bio fertilizer usage. On agro ecosystem productivity and environmental sustainability. Bio-fungicides and bio fertilizers, on the other hand, are more sustainable However; they pose a significant risk of inciting the succession of the native soil microbial population, which can have a negative influence on soil health. The aim is to strike a reasonable balance between human activities that benefit agro ecosystem production and potential detrimental impacts on soil microbial community and long-term soil health.

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