A Regenerative Agriculture Technique in an Almond Orchard, SE Türkiye

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1. Introduction

Even though most places continued to produce agricultural products using natural techniques after settling down, some improper land usage caused issues that ultimately resulted in the fall of many ancient civilizations. For example, the salinization of soils in Mesopotamia due to over-irrigation in the past (Scarre, 2010), as well as the degradation of 75% of the world's agricultural soils on various sizes today, are both negative effects of human farming activities (Çilek et al., 2020). The development of strategies for combating land degradation driven on by overuse of resources, inappropriate land use, and increasingly frequent and severe droughts as a result of climate change has begun (Cowie et al. 2018). The Adiyaman is vulnerable to climate change, according to the Silkroad Development Agency's 2019 Report on Evaluation of the Capacity of Agriculture to Adapt to Climate Change in TRC1 Region. Water harvesting was used in almond orchards to increase soil water and organic carbon within the framework of regenerative agriculture. Farmers, policymakers, and scientific researchers were given the results of field observations and laboratory data that were utilized for evaluating the practice's efficacy.

2. Materials and method

The research was conducted in a 12-year-old almond orchard in Adiyaman, which is in the semi-arid climate zone of southeast Turkey, between 2021 and 2022. The experimental area had 60 cm of soil depth and was composed of Leptic Cambisol Colluvic soil (IUSS Working Group WRB, 2022). Samples of soil were taken both before and after the treatment, from the soil beneath the canopy of treated and untreated trees, at depths of 0–20 and 20–60 cm for soil moisture content. Using the techniques outlined in NRCS (2004), soil samples were analyzed for pH, texture, organic carbon, electrical conductivity (EC), volume weight, organic matter, pH, and lime concentration. For water harvesting, crescent-shaped stone benches with a height of 30-40 cm and a length of 3 meters were constructed in October 2021 prior to rainfalls with 20-30 cm diameter stones left over from the marble quarries in the region.

3. Results

The almond orchard's organic matter value was found to be far below the 4% (>2% organic

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carbon) recommended level for agricultural soils (Oldfield et al. 2019). The latest soil moisture content measurement was taken in October 2022, the soil moisture content in the water harvesting study using waste marble stones had increased significantly compared to the non-treated regions, i.e., 12.6 tons per hectare at 0-60cm. This increase was 4.2% on average. Since soil organic matter reacts to treatments over a longer period of time than a year, there was no change in organic matter.

4. Discussion

In this study, it was shown that in degraded soils, restorative farming practices, even at the lowest level, produced quick, beneficial results. It is important to make sure that regenerative agricultural methods include low-cost investment techniques for farmers whose production costs have gone up recently. The increase in soil moisture content achieved through the use of completely natural marble stones, which contain no heavy metals or toxic elements despite being waste materials from rock processing, can be considered a successful example of regenerative farming in this context. However, supporting this method by incorporating orchard pruning residue into the soil that boost soil organic material suggests that it will be a beneficial approach to combating land degradation and climate change.

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