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Perspective

SAP Application and Meta-Analysis of Crop Yield and Water Productivity Effects Depending on Soil Condition

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ABOUT THE STUDY

Water scarcity is a major issue in agriculture, especially in arid and semi-arid regions. Efficient use of water in agriculture is important for sustainable crop production. The use of Super Absorbent Polymers (SAPs) in agriculture has gained attention as a potential solution to improve water productivity and crop yield. SAPs are hydrophilic polymer materials that can absorb and retain large amounts of water. In this article, we will review the effects of SAPs on crop yield, water productivity, and soil properties based on a global meta-analysis [1].

A global meta-analysis was conducted to investigate the effects of SAPs on crop yield, water productivity, and soil properties. The meta-analysis included 50 studies from different regions of the world. The studies were conducted in different crop systems, including cereals, vegetables, fruits, and ornamental plants. The data were collected from published articles, conference proceedings, and theses [2]. The meta-analysis was conducted using the Comprehensive Meta-Analysis software.

The meta-analysis showed that the use of SAPs significantly improved crop yield, water productivity, and soil properties. The average increase in crop yield due to the use of SAPs was 14.5%. The increase in crop yield was observed in different crop systems, including cereals, vegetables, and fruits. The highest increase in crop yield was observed in vegetables (23.4%) and fruits (21.6%). The increase in crop yield due to the use of SAPs was attributed to the improvement in soil moisture availability and nutrient availability [3,4].

The use of SAPs also significantly improved water productivity. The average increase in water productivity due to the use of SAPs was 25.8%. The improvement in water productivity was observed in different crop systems, including cereals, vegetables, and fruits. The highest increase in water productivity was observed in vegetables (39.4%) and fruits (36.5%). The increase in water productivity due to the use of SAPs was attributed to the reduction in water loss through evaporation [5].

The use of SAPs also significantly improved soil properties. The average increase in soil organic matter due to the use of SAPs was 14.8%. The improvement in soil organic matter was observed in different soil types, including sandy soil, loamy soil, and clay soil [6]. The increase in soil organic matter due to the use of SAPs was attributed to the improvement in soil moisture availability and nutrient availability.

The meta-analysis indicates that the use of SAPs can improve crop yield, water productivity, and soil properties. The improvement in crop yield and water productivity due to the use of SAPs is attributed to the improvement in soil moisture availability and nutrient availability. The improvement in soil moisture availability is attributed to the ability of SAPs to absorb and retain water, which increases the water-holding capacity of the soil. The improvement in nutrient availability is attributed to the ability of SAPs to absorb and retain nutrients, which reduces nutrient leaching and increases nutrient availability to plants [7,8].

The improvement in soil properties due to the use of SAPs is attributed to the ability of SAPs to increase soil organic matter. Soil organic matter is important for soil fertility, water-holding capacity, and nutrient availability. The increase in soil organic matter due to the use of SAPs is attributed to the improvement in soil moisture availability and nutrient availability [9,10].

The use of SAPs can also have some negative effects on the environment. The production and disposal of SAPs can have environmental impacts, including the release of greenhouse gases and the accumulation of waste in landfills. Therefore, it is important to consider the environmental impacts of SAPs before using them in agriculture.

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