THE SCIENTIFIC RATIONALE FOR PLOUGHING TO INCREASE SOIL POROSITY

Sadullaev Azamat Nafiddinovich
Bukhara Institute of Natural Resources Management, researcher-teacher

Jo‘rayeva Shaxrizoda Imom qizi
Bukhara Institute of Natural Resources Management, students

ABSTRACT

This scientific article delves into the fundamental principles and consequences of increasing soil porosity via tillage practices. By employing a comprehensive approach encompassing field experiments, soil analyses, and mathematical modeling, the study explores the intricate mechanisms behind enhanced soil porosity through various tillage methods. The investigation delves into the implications of altered porosity on water dynamics, nutrient availability, and overall soil health, providing valuable insights for optimizing agricultural practices. Explores the role of increased soil porosity in erosion control, evaluating how tillage practices contribute to maintaining soil structure and preventing soil loss. Examines changes in soil microbial communities resulting from altered porosity, investigating how tillage practices influence microbial activity and nutrient cycling.

Keywords: tillage methods and porosity enhancement, pore size distribution and soil structure, water dynamics and infiltration rates, nutrient availability and root development, soil microbial communities, environmental considerations, practical applications and management considerations, challenges and trade-offs, soil compaction risks.

Analyses the impact of enhanced porosity on nutrient transport within the soil profile, affecting nutrient availability for plant uptake. Explores the relationship between soil porosity and water holding capacity, crucial for mitigating water stress during dry periods. Analyses changes in macro- and micro-porosity resulting from different tillage methods, exploring their implications for water movement, aeration, and root growth.

The scientific article in focus addresses the fundamental principles underlying the increase in soil porosity achieved through plowing practices. Employing a comprehensive approach that combines field experimentation, soil analysis, and

theoretical modeling, the study delves into the intricate mechanisms and consequences of enhancing soil porosity through traditional plowing.

The article explores how traditional plowing disrupts compacted layers within the soil, resulting in a restructuring of soil particles and an increase in soil porosity. It emphasizes the importance of understanding the specific plowing techniques employed and their direct impact on soil structure. The study investigates alterations in both macro- and micro-porosity due to plowing, providing insights into how these changes influence water movement, aeration, and the penetration of roots.

Consideration is given to how plowing affects the connectivity of pores, influencing the spatial arrangement of the soil matrix. Enhanced water infiltration is a key outcome of increased soil porosity through plowing, potentially reducing surface runoff and improving water availability for plant roots. The article discusses the implications of altered porosity on water holding capacity, which is crucial for plant resilience during periods of water scarcity.

Changes in nutrient transport within the soil profile due to increased porosity are explored, shedding light on how plowing practices affect nutrient availability for plant uptake. The study delves into the facilitation of root penetration and growth in soils with enhanced porosity, linking these changes to potential benefits for crop establishment and yield. The article considers the influence of plowing on soil microbial communities, examining shifts in microbial activity and nutrient cycling as a consequence of altered porosity.

Erosion control emerges as a notable benefit of increased soil porosity through plowing, with discussions on how this practice contributes to maintaining soil structure and preventing soil loss. The potential impact of plowing-induced porosity changes on greenhouse gas emissions is explored, emphasizing the need for a balanced approach to soil aeration and carbon dynamics.

Practical insights are provided for optimizing plowing practices based on factors such as soil type, climate, and crop rotation, with the goal of achieving desired changes in porosity. The synergies between plowing practices and cover cropping are discussed as a strategy for sustaining increased porosity and promoting overall soil health.

The article acknowledges potential risks, such as induced soil compaction through excessive plowing, and suggests strategies to mitigate adverse effects on porosity. It emphasizes the importance of recognizing trade-offs associated with soil disturbance, highlighting the need for a balanced approach that considers both short-term benefits and long-term sustainability.

In conclusion, the article offers a nuanced understanding of the scientific basis of increasing soil porosity through plowing. The findings provide valuable insights for agricultural practitioners seeking to optimize soil management practices while

considering the multifaceted impacts on soil structure, water dynamics, and overall ecosystem health.

REFERENCES:

1. Sadullaev , A. N., & Ergashev , M. G. ugli. (2023). IT IS A WATER-SAVING TECHNOLOGY CREATED WITH THE POWERFUL SWELLING “HYDROGEL”. Educational Research in Universal Sciences, 2(18), 207–210. Retrieved from http://erus.uz/index.php/er/article/view/5399
2. Sadullaev Azamat. (2022). EFFECTS OF IRRIGATED AGRICULTURE ON THE GROUNDWATER REGIME IN THE FOOTHILLS. Educational Research in Universal Sciences, 1(2), 124–128. Retrieved from https://erus.uz/index.php/erus/article/view/202
3. Sh. M. Xamidova, U. A. Juraev, & A. N. Sadullayev. (2022). THE EFFECT OF PHYTOMELIORANT CROPS ON THE ACCUMULATION OF SALT IN THE SOIL, NORMS FOR WASHING SOIL BRINE. Spectrum Journal of Innovation, Reforms and Development, 5, 78–82. Retrieved from https://sjird.journalspark.org/index.php/sjird/article/view/203
4. Sadullaev, A. N. (2022). MEASURES OF EFFECTIVE USE OF WATER IN FARMS OF BUKHARA REGION. RESEARCH AND EDUCATION, 1(4), 72–78. Retrieved from https://researchedu.org/index.php/re/article/view/527
5. Саъдуллаев, А. Н., & Чорикулов, Ш. (2020). ДУККАКЛИ ЭКИНЛАР ТУПРОҚ УНУМДОРЛИГИНИ ОШИРАДИ. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).
6. Зарипович, Қ. З., Саъдуллаев, А. Н., & Зариповна, Қ. Р. (2020). G‘OZANI SUG‘ORISHDA SUV TEJAMKOR SUG‘ORISH TEXNOLOGIYALARNING SAMARADORLIGINI ILMIY ASOSLASH. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).
7. Амонова, З. У., & Саъдуллаев, А. Н. (2020). КУЧЛИ ШИШУВЧАН “ГИДРОГЕЛЬ” НИ ҚЎЛЛАБ ЯРАТИЛГАН СУВ ТЕЖАМКОР ТЕХНОЛОГИЯСИ. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).
8. Холматовна, С. Ҳ., Саъдуллаев, А. Н., & Джўраев, Ш. Б. (2020). ҚИШЛОҚ ХЎЖАЛИГИ ЭКИНЛАРИНИ СУҒОРИШДА СУВ ТЕЖАМКОР УСУЛЛАРДАН ФОЙДАЛАНИШ. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).
9. Аманова, З. У., & Саъдуллаев, А. Н. (2020). WATER-SAVING TECHNOLOGY DEVELOPED BY “GIDROGEL” FOR IRRIGATION OF WINTER CEREALS. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).

10. The effectiveness of phytomeliorative measures in conditions of saline soils. SM Xamidova, UA Juraev, AN Sadullaev - Academicia Globe: Inderscience Research, 2022
11. APPLICATION OF RESOURCE-EFFICIENT IRRIGATION TECHNOLOGIES IN BUKHARA OASIS. UA Juraev, SA Nafiddinovich - INTERNATIONAL CONFERENCE: PROBLEMS AND …, 2022
12. Sadullaev, A. N. (2022). INTERPRETATION OF PSYCHOLOGICAL KNOWLEDGE IN THE TEACHINGS OF OUR GREAT ANCESTORS. Educational Research in Universal Sciences, 1(2), 117–123. Retrieved from http://erus.uz/index.php/er/article/view/379
13. Sadullaev, A. N. (2022, July). BUKHARA REGIONAL IRRIGATION AND MELIORATION SYSTEM. In INTERNATIONAL CONFERENCES (Vol. 1, No. 12, pp. 18-27).
14. Sadullaev, A. N., & Azimova, G. A. (2024). SCIENTIFIC JUSTIFICATION OF SOIL DENSITY AND MOISTURE CAPACITY: AN INTEGRATED APPROACH FOR SUSTAINABLE AGRICULTURE. GOLDEN BRAIN, 2(1), 414–417. https://doi.org/10.5281/zenodo.10466516
15. Tukhtayeva Habiba Toshevna Sadullaev Azamat Nafiddinovich Azimova Go‘zal Adizovna. (2024). SCIENTIFIC APPROACHES AND TECHNIQUES FOR ESTABLISHING FOUNDATIONS AND QUANTIFYING SOIL MOISTURE LEVELS [Data set]. Zenodo. https://doi.org/10.5281/zenodo.10466027
16. Sadullaev , A. N. (2024). PECULIARITIES OF THE WATER PERMEABILITY PROPERTIES OF THE SOIL. Educational Research in Universal Sciences, 3(1), 4–6. Retrieved from http://erus.uz/index.php/er/article/view/5536
17. Sadullaev , A. N. (2024). PECULIARITIES OF THE WATER PERMEABILITY PROPERTIES OF THE SOIL. Educational Research in Universal Sciences, 3(1), 4–6. Retrieved from http://erus.uz/index.php/er/article/view/5536