SCIENTIFIC JUSTIFICATION OF THE SPECIFIC FEATURES OF COTTON PLANTING BASED ON NO-TILL TECHNOLOGY

Sadullaev Azamat Nafiddinovich
Teacher of Bukhara Institute of Natural Resources Management
Rajabova Nilufar Yarashovna
G'afforova Dilshoda Ikromjon qizi
Students of Bukhara Institute of Natural Resources Management

Abstract: Scientific research on no-till cotton planting is investigating its specific features and their effectiveness across various environmental conditions. While no-till offers potential benefits in terms of soil conservation and efficiency, its application for cotton requires careful evaluation. Studies are examining how no-till impacts soil properties like organic matter content, water infiltration, and microbial activity in cotton production systems. Research is needed to understand the long-term effects on soil fertility and potential nutrient limitations. No-till can pose challenges for ensuring proper seed placement and emergence, particularly in heavier residue conditions. Scientific inquiry focuses on developing optimal planting techniques and equipment adaptations for successful cotton establishment under no-till practices. The lack of soil disturbance in no-till systems necessitates alternative weed control methods. Research is exploring the efficacy of pre-emergent herbicides, cover cropping, and integrated weed management strategies for effective weed suppression in no-till cotton. Studies are investigating the impact of no-till on cotton yield compared to conventional tillage practices. Research considers factors like weather conditions, soil type, and crop rotation systems to determine if no-till can maintain or improve cotton yield over time. The long-term sustainability of no-till cotton production is a crucial area of scientific investigation. Research is examining potential drawbacks like increased reliance on herbicides, pest and disease pressures, and the need for specialized equipment. Evaluating the overall economic and environmental impact of no-till cotton compared to conventional practices is vital for its long-term adoption.

Key Words: No-till cotton, Conservation agriculture, Soil health (organic matter, water infiltration, microbial activity), Seed placement and emergence, Weed control strategies (herbicides, cover cropping, integrated management), Yield potential, Long-term sustainability (economic and environmental impact)

Successful application of any tillage machine requires selecting the correct mode of operation to maintain crop condition-regulatory factors. An exception is the single use of average 20-30 cm deep 45-60 cm wide covering non-leafy cod sower of a narrow-row boll cotton type combined with a rigid non-leaf aggregator–opener of combined probing and nonlinear sowing units, not characterized by the creation of complicated conditions, this mobilizes and mixes soil and residues, forms minimum loose seeds with few weeds in humid soil layers. Deep soil tillage up to 30 cm in short crops has been characterized as a regressive factor because it increases soil water evaporation, reduces soil temperature, weakens water accumulation in the sowing bed, reduces cultivated plants' adaptive responses and a possible stress reaction, causes wind destruction, and leads to vegetable dormitory arable weed destruction .

Shallow tillage and sowing or drilling during the cotton growing period without residue management on soils leads to a reduction of initial soil moisture, agglomeration and compaction of the sowing bed, and a significant deterioration of other favorable conditions for cotton development and increase the impact of existing ones."

"Conventional agricultural production has led to the degradation of soils due to flooding, compaction, and loss of organic matter. "Zero-tillage" (ZT) and "no-tillage" (NT) systems are considered alternative agricultural technologies that help prevent soil degradation and soil health, improve carbon storage in the soil profile, and are economically beneficial for farmers (B. Shrestha & N. Parajulee, 2010). A complete substitution of soil processes in conventional agriculture by zero soil treatment does not seem possible in modern agroecosystems, particularly during resource-limiting periods such as initial stands of crop establishment. "No-till" or "minimum tillage" fallow-term agro-technology suggest the mechanical destruction of surface biomass with a proper organization of the sowing-bed using the appropriate equipment.

The productivity and the seed rate of cotton – a drought-tolerant and warm-loving crop – largely depends on conditions and methods of sowing. There have been no tillage applications with a soft opener sowing unit is that it leaves an overly dense carbon mulch on the field surface, which impedes light penetration, delays soil and surface warming, slows down and unevenly progresses crop development, increases formation of common hygienic and weed arable weeds, and becomes a natural substrate for harmful organisms and pests (Hobbs et al., 2021).

No-till management of cotton is where seed is placed in undisturbed soil due to the emphasis on soil protection that has received an increased focus in modern agriculture. As of 2021, approximately 36% of all land in cotton production globally will implement no-tillage practice of cotton seed into soil that has not been turned over ahead of planting or other field preparation processes, namely conventional tillage, with the remainder of global production using either conservation tillage or minimum tillage systems. The bulk of these initial implementations of no-till cotton farming were done without any conscious plan to reduce soil erosion, mineralize or conserve soil organic carbon, yet activities such as reducing crop establishment costs and reducing greenhouse gas emissions were justified as reasons for change (Vulchi et al., 2022). Thus, implementing no-till is also expected to increase crop yield in addition to its focus on soil carbon, directly and indirectly through other environment interactions.

Sustainable and ecologically sound crop production is important to meet the increasing demand for crops. For example, the consumption of rice and wheat is likely to increase 1.18 and 0.70 fold, respectively by 2050 from 1995 levels. From the food security and, more generally, from a long-term environmental perspective, there are four key issues that must be addressed in agricultural production. Firstly, the rate of food production must be significantly increased to meet escalating demand from a growing human population.

Secondly, the ecological impact of unsustainable and intensive agriculture is contributing to a major threat to the environment and thus decreasing the productivity of future generations. Thirdly, rising greenhouse gas (GHG) emissions are contributing to global warming, while a reduction in arable land is imposing threats to the securing of global food demand. The adoption of CA is considered as a productive way for enhancing soil quality, crop performance and mitigating climate change (Pazhanivel Koushika et al., 2024). The overall consequences are usually reported as increases in soil organic carbon, water content, water percolation, reduced soil physical degradation, policy for ecological biodiversity, greenhouse gas emissions, soil erosion, sedimentation in downstream land and nutrients in lake and river water, general internal fertility in vadose zones, and reproductive nutrients flowing from the field (Loustau et al., 2024).

(Pazhanivel Koushika et al., 2024) The soil is the main factory for the production of the biological product—climate and the environment. Its fertility is ensured by the activity of the soil biota, which plays a primary role in the health of soil and its consequent ability to provide the crops with the necessary nutrients (carbon, nitrogen, phosphorus, and water). While soil is a living reservoir of plants, animals, bacteria, and fungi, small mammals, and earthworms, its surface is crisscrossed by the rhizosphere, distinguished by the productive and metabolic activity of roots which involves the root-soil interface. It is the main place for soil fertility and nutrient cycling (Noor Shah et al., 2022).

Cereals grown in tillage systems are grown with similar fertilization, hybrid seed, and plant protection chemicals. They follow the diversification of plants that are rich in crops and extend by planting residues and rigorous weeding. The transition of the cotton to agriculture produced with no-tillage technology requires alterations in the production of seed varieties which are suitable for crop growth, and the management of chemical fertilizers and crop protection which are combined with the application conditions of no-tillage. In this regard, it is a significant task to perform planting tests with appropriate plants for the growth of this crop, which will support greater seed harvest. In a test conducted to this end in Usacigo-GO, the aim was to identify the major strategies for planting crops and to estimate the components of the harvest of cotton planted on 25/25 cm and 50/50 cm apart as treatments compared by means of two recommended locations with no-tillage technology. (Khan et al., 2023).

Cerezini and Pennell in 2012, in their study on the structure of the fungal microorganisms in the roots of plants from different families, observed that conservation agriculture together with no-till sowing positively influences the amount of penetration of symbiotic fungi in roots. This effect was particularly evident in legumes. The same researchers in 2014 presented the effect resulting from no-till technology on taking up mineral nutrients by plants. They proved that the method of sowing influenced the final size of the green surface area, as well as the weight of roots and the above-ground plant parts. They documented the influence of no-till on an increase in the mass of root nodules. This result brings significant benefits to the further cultivation of cotton without the use of chemical fertilizers to which cotton is sensitive.

The use of no-till technology is an efficient method of, amongst others, lowering soil water erosion, which reaches higher values in monoculture soil subjected to traditional ploughing implemented in spring. The tilled soil shows a higher susceptibility to water erosion, and its lack of resistance to weather phenomena (pounding rains in early spring) causes degradation. A number of authors all over the world have investigated the possibility of using the no-till technology in cotton growing. An analysis of the no-till cotton cultivation in the global scale was presented by Perry and H. Hammond (Harman et al., 2021) in 2015. They pointed to a series of positive effects of this technology, such as: saving water, preventing wind erosion, and improving conditions for the development of new living organisms in the soil as for instance earthworms.

LIST OF USED LITERATURE

1. Nafiddinovich, S. A., & Adizovna, A. G. Z. (2024). THE VALUE OF ADHERING TO THE FUNDAMENTAL IRRIGATION GUIDELINES. SCIENTIFIC APPROACH TO THE MODERN EDUCATION SYSTEM, 2(22), 105-110.

2. Sadullaev, A. N. (2024). THEORETICAL ASPECTS OF IRRIGATION OF AGRICULTURAL CROPS. Educational Research in Universal Sciences, 3(3 SPECIAL), 190-193.

3. Sadullaev, A. N., & Azimova, G. Z. A. (2024). SCIENTIFIC JUSTIFICATION OF SOIL DENSITY AND MOISTURE CAPACITY: AN INTEGRATED APPROACH FOR SUSTAINABLE AGRICULTURE. GOLDEN BRAIN, 2(1), 414-417.

4. Sadullaev, A. N., & o‘g‘li Rajabov, O. R. (2024). UNEARTHING CONNECTIONS: EXPLORING THE DIRECT IMPACT OF TILLAGE REQUIREMENTS ON CROP YIELD. Educational Research in Universal Sciences, 3(2), 440-443.

5. Sadullaev, A. N., & qizi Jo‘rayeva, S. I. (2024). THE SCIENTIFIC RATIONALE FOR PLOUGHING TO INCREASE SOIL POROSITY. Educational Research in Universal Sciences, 3(2), 433-436.

6. Аманова, З. У., & Саъдуллаев, А. Н. (2020). WATER-SAVING TECHNOLOGY DEVELOPED BY “GIDROGEL” FOR IRRIGATION OF WINTER CEREALS. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).

7. Холматовна, С. Ҳ., Саъдуллаев, А. Н., & Джўраев, Ш. Б. (2020). ҚИШЛОҚ ХЎЖАЛИГИ ЭКИНЛАРИНИ СУҒОРИШДА СУВ ТЕЖАМКОР УСУЛЛАРДАН ФОЙДАЛАНИШ. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).

8. Амонова, З. У., & Саъдуллаев, А. Н. (2020). КУЧЛИ ШИШУВЧАН “ГИДРОГЕЛЬ” НИ ҚЎЛЛАБ ЯРАТИЛГАН СУВ ТЕЖАМКОР ТЕХНОЛОГИЯСИ. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).

8. 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).

10. Саъдуллаев, А. Н., & Чориқулов, Ш. (2020). ДУККАКЛИ ЭКИНЛАР ТУПРОҚ УНУМДОРЛИГИНИ ОШИРАДИ. ЖУРНАЛ АГРО ПРОЦЕССИНГ, (SPECIAL ISSUE).

11. Sadullaev, A. N., & Azimova, G. Z. A. (2024). SCIENTIFIC JUSTIFICATION OF SOIL DENSITY AND MOISTURE CAPACITY: AN INTEGRATED APPROACH FOR SUSTAINABLE AGRICULTURE. GOLDEN BRAIN, 2(1), 414-417.

12. Toshevna, T. H., Nafiddinovich, S. A., & Adizovna, A. G. (2024). SCIENTIFIC APPROACHES AND TECHNIQUES FOR ESTABLISHING

FOUNDATIONS AND QUANTIFYING SOIL MOISTURE LEVELS. JOURNAL OF AGRICULTURE AND LIFE SCIENCES, 7(1), 1-5.

13. Nafiddinovich, T. H. T. S. A., & Adizovna, A. G. (2024). SCIENTIFIC APPROACHES AND TECHNIQUES FOR ESTABLISHING FOUNDATIONS AND QUANTIFYING SOIL MOISTURE LEVELS [Data set]. Zenodo.

14. Juraev, U. A., & Nafiddinovich, S. A. (2022). APPLICATION OF RESOURCE-EFFICIENT IRRIGATION TECHNOLOGIES IN BUKHARA OASIS. In INTERNATIONAL CONFERENCE: PROBLEMS AND SCIENTIFIC SOLUTIONS (Vol. 1, No. 2, pp. 176-185).

15. Xamidova, S. M., Juraev, U. A., & Sadullaev, A. N. (2022). The effectiveness of phytomeliorative measures in conditions of saline soils. Academicia Globe: Inderscience Research, 3(7), 1-5.

16. Sadullaev, A. N. (2022, July). BUKHARA REGIONAL IRRIGATION AND MELIORATION SYSTEM. In INTERNATIONAL CONFERENCES (Vol. 1, No. 12, pp. 18-27).

17. Sadullaev, A. N. (2024). PECULIARITIES OF THE WATER PERMEABILITY PROPERTIES OF THE SOIL. Educational Research in Universal Sciences, 3(1), 4-6.

18. Sadullaev, A. N. (2022). INTERPRETATION OF PSYCHOLOGICAL KNOWLEDGE IN THE TEACHINGS OF OUR GREAT ANCESTORS. Educational Research in Universal Sciences, 1(2), 117-123.

19. Sadullaev, A. N. (2022). MEASURES OF EFFECTIVE USE OF WATER IN FARMS OF BUKHARA REGION. RESEARCH AND EDUCATION, 1(4), 72-78.

20. Sadullaev, A. N. (2022). EFFECTS OF IRRIGATED AGRICULTURE ON THE GROUNDWATER REGIME IN THE FOOTHILLS. Educational Research in Universal Sciences, 1(2), 124-128.

21. Sadullaev, A. N. (2023). IT IS A WATER-SAVING TECHNOLOGY CREATED WITH THE POWERFUL SWELLING “HYDROGEL”. Educational Research in Universal Sciences, 2(18), 207-210.

22. Xamidova, S. M., Juraev, U. A., & Sadullayev, A. N. (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.

23. 20. Akramova, P. A. Ecological situation and its impact on the level of health of the younger generation.". O ‘zbekistonda fanlararo innovatsiyalar va ilmiy tadqiqotlar" jurnali. Materiallari to ‘plami, 98-102.

24. Aminovna, A. P., & Zaripovna, S. Z. (2023). ENVIRONMENTAL EDUCATION IS AN URGENT TASK OF OUR TIME. Finland International Scientific Journal of Education, Social Science & Humanities, 11(2), 471-477.

25. Akramova, P. A., kizi Berdiyeva, Z. F., & kizi Makhamadzhonova, M. M. (2024). ECOLOGICAL FUNDAMENTALS OF NATURE MANAGEMENT IN THE MODERN WORLD. GOLDEN BRAIN, 2(2), 24-28.

26. Акрамова, П. А., & угли Шамуратов, О. К. (2023). ЭКОЛОГИЧЕСКИЕ ПРОБЛЕМЫ УГРОЗА БЕЗОПАСНОСТИ. Educational Research in Universal Sciences, 2(16), 35-38.

27. Акрамова, П. А., & кизи Махамаджонова, М. М. (2023). АТМОСФЕРНЫЙ ВОЗДУХ НАМАНГАНСКОЙ ОБЛАСТИ И ПУТИ СТАБИЛИЗАЦИИ ЭКОЛОГИЧЕСКОГО БАЛАНСА. Educational Research in Universal Sciences, 2(15), 140-142.

28. Акрамова, П. А., & Ражабова, Н. Я. (2023). ИСПОЛЬЗОВАНИЕ ЗЕМЕЛЬНЫХ РЕСУРСОВ И ОЦЕНКА В СОВРЕМЕННОМ МИРЕ. Educational Research in Universal Sciences, 2(14), 394-400.

29. Акрамова, П. А., & угли Турдалиев, Ж. О. (2023). НАУЧНЫЕ ЭКОЛОГИЧЕСКИЕ ОСНОВЫ ПРИРОДОПОЛЬЗОВАНИЯ. Educational Research in Universal Sciences, 2(13), 259-262.

30. Amankulova, K., Farmonov, N., Akramova, P., Tursunov, I., & Mucsi, L. (2023). Comparison of PlanetScope, Sentinel-2, and landsat 8 data in soybean yield estimation within-field variability with random forest regression. Heliyon.

31. Акрамова, П. А. (2023). ДИНАМИКА ЗАГРЯЗНЕНИЯ АТМОСФЕРНОГО ВОЗДУХА ПРИРОДНОЙ СРЕДЫ ГОРОДА БУХАРЫ. Scientific Impulse, 1(8), 1099-1106.

32. Aminovna, A. P. (2023). THE PRACTICE OF ENVIRONMENTAL PROTECTION FROM THE NEGATIVE IMPACT OF THE TECHNOSPHERE. Finland International Scientific Journal of Education, Social Science & Humanities, 11(3), 362-365.

33. Aminovna, A. P. (2023). THE STATE OF WATER RESOURCES UNDER PRESENT GLOBAL CLIMATE CHANGE. Finland International Scientific Journal of Education, Social Science & Humanities, 11(2), 879-884.

34. Равшанов, У. (2021). ИЗРАЗЦОВЫЕ ПЛИТКИ (МОЗАИКИ) ЭПОХИ КАДЖАРОВ В БУХАРСКОМ МУЗЕЕ. Scientific progress, 2(2), 501-505.

35. Уринов, Ж. Р., Рустамов, Э. Т., & Равшанов, У. Х. (2019). Исследования неавтоклавных ячеистых бетонов и конструкций из них для применения в сейсмостойких зданиях. Вестник науки и образования, (10-1 (64)), 32-34.

36. Fazliyev, Z. S., Shokhimardonova, N. S., Sobirov, F. T., Ravshanov, U. K., & Baratov, S. S. (2014). Technology of the drip irrigation use in gardens and vineyards. The Way of Science, 56.

37. Фазлиев, Ж. Ш., Хаитова, И. И., Атамуродов, Б. Н., Рустамова, К. Б., & Шарипова, М. С. (2019). Томчилатиб суғориш технологиясини боғларда жорий қилишнинг самарадорлиги. Интернаука, (21-3), 78-79.

38. Fazliev, J., Khaitova, I., Atamurodov, B., Rustamova, K., Ravshanov, U., & Sharipova, M. (2019). Efficiency of applying the water-saving irrigation technologies in irrigated farming. Интернаука, 21(103 часть 3), 35.

39. Pirimova, S. K. (2023). Distribution of Atmospheric Precipitation During the Year by Months and Seasons (Example of Bukhara Region). Texas Journal of Multidisciplinary Studies, 19, 44-49.

40. Pirimova, S. K., & o‘g‘li Shodiyorov, H. R. (2023). JIZZAX SUV OMBORI KIRIM SUVLARI HAJMINING YIL ICHIDA OYLIK, FASLIY VA YILLARARO TAQSIMLANISHI. Educational Research in Universal Sciences, 2(18), 360-364.

41. Pirimova, S. K., & o‘g‘li Qo‘ldoshev, S. S. (2023). SURXONDARYO HAVZASI DARYOLARI OQIMINING HOSIL BO‘LISHIGA TA’SIR ETUVCHI IQLIMIY OMILLAR. Educational Research in Universal Sciences, 2(18), 355-359.

42. Sarafroz, P., & Mirsharif, E. (2023). “OQ-SUV” IRRIGATSIYA BOSHQARMASI HISOBIDAGI SUV TAQSIMLOVCHI YAKKABOG'GIDROUZELINING ATROF MUHITGA TA'SIRI. In Uz-Conferences (Vol. 1, No. 1, pp. 322-326).

43. Alimardonov, L. (2023). ҚАШҚАДАРЁ ҲАВЗАСИДА ЙИЛЛИК АТМОСФЕРА ЁҒИНЛАРИНИНГ ОЙЛАР ВА МАВСУМЛАР БЎЙИЧА ТАҚСИМЛАНИШИ. Ta'lim innovatsiyasi va integratsiyasi, 11(7), 93-101.

44. Субҳоновна, Ҳ. Г. (2022). ҚУЛЖУҚТОВ ТИЗМАСИНИНГ ЖАНУБИЙ ЁНБАҒИРЛАРИДА АТМОСФЕРА ЁҒИНЛАРИНИНГ БАЛАНДЛИК БЎЙИЧА ЎЗГАРИШИ. ГЕОГРАФИЯ: ПРИРОДА И ОБЩЕСТВО, (2).

45. Зияев, Р. Р., Ганиев, Ш. Р., & Примова, С. К. (2022). ОЦЕНКА ИЗМЕНЕНИЯ КОЛИЧЕСТВА АТМОСФЕРНЫХ ОСАДКОВ В СРЕДНЕЙ ЧАСТИ БАССЕЙНА РЕКИ ЗЕРАВШАН. In Использование водных ресурсов в условиях изменения климата (pp. 37-41).