American Journal Of Agriculture And Horticulture Innovations
(ISSN – 2771-2559)
VOLUME 04 ISSUE 11 Pages: 46-52
OCLC – 1290679216

Publisher: Oscar Publishing Services

Journal Website: https://theusajournals.com/index.php/ajahi

Research Article

IMPROVING THE PHYSICAL AND AGROCHEMICAL PROPERTIES OF IRRIGATED GRAY-MEADOW SOILS USING VARIOUS PLANT RESOURCES

Submission Date: November 20, 2024, Accepted Date: November 25, 2024,
Published Date: November 30, 2024
Crossref doi: https://doi.org/10.37547/ajahi/Volume04Issue11-07

Shakhobiddin M.Turdimetov
Professor, Doctor of Biological Sciences (DSc), Department of Agro-soil science and land reclamation, Gulistan State University, Uzbekistan

Mokhinur M.Musurmanova
Phd Student, Gulistan State University, Uzbekistan

ABSTRACT

The article presents the results of scientific research aimed at increasing the fertility of irrigated gray-meadow soils in the Mirzachul oasis by planting various green manure crops. As a result of planting green manure crops, the soil has become enriched with organic residues, and the humus content has increased to some extent. The soil density has decreased, its porosity has improved, and there have been positive changes in the amount of mobile nutrients in the soil. Consequently, the yield of crops planted after the green manure crops has increased to a certain extent.

KEYWORDS

Humus, nitrogen, phosphorus, potassium, siderates, oats, rye, Fatselia, mustard, rapeseed, soil density, soil porosity.

INTRODUCTION

Increasing soil fertility with the help of plant resources is an optimal method both ecologically and economically. In this case, the environment will not be harmed, and the cost of the grown product will be low.

S. Sharma et al. [1] experimentally studied the enrichment of soil with phosphorus, organic residues, and an increase in the number of water-resistant microaggregates as a result of planting green manure crops.

American Journal Of Agriculture And Horticulture Innovations
(ISSN – 2771-2559)
VOLUME 04 ISSUE 11 Pages: 46-52
OCLC – 1290679216
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

P. Sullivan [2] studied the effect of planting vetch on maize yield. In the studies, the costs of planting green manure crops were covered by the additional yield obtained from maize. Due to the improvement of soil properties, the yield of maize planted in recent years has increased.

Y.G. Mishchenko et al. [3] conducted studies on the effect of various crops on potato yield. As a result of planting oilseed radish, the type and number of weeds also decreased. It was found that there is an inverse correlation between oilseed radish phytomass and weed infestation.

Research has been conducted on the properties of the soils of the Mirzachul oasis, as well as on the differences in the productivity of soils developed in different geomorphological conditions [4-10]. It has been noted that the physical properties and agrochemical characteristics of these soils also vary depending on natural and climatic conditions.

Kh.A.Batirov, Sh.M.Turdimetov, R.B.Nurillaeva [11] provided information on the ecological role of siderat crops. They emphasized that the combined use of siderat crops is more effective than their separate use.

In articles on the properties of irrigated grassland soils of the Mirzachul oasis and ways to increase their productivity, it was found that the efficiency of green manure crops on these soils with low soil productivity is better than on other soils [12-17].

METHODS

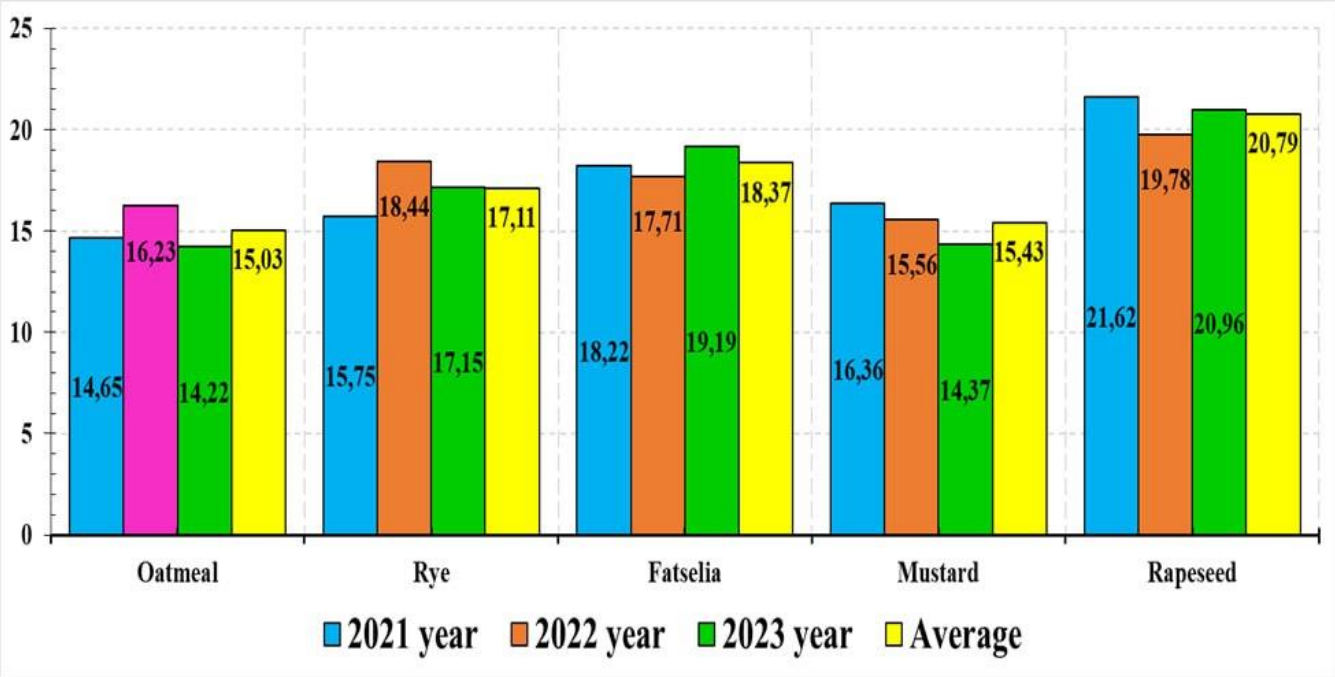
When selecting the research object, an attempt was made to locate it in areas typical for the soils of the Mirzachul oasis. The research work was carried out on irrigated meadow soils in the old irrigated part of Mirzachul. Before planting siderat crops, the physical properties and agrochemical indicators of the soil were determined, and then after harvesting these crops, these properties were repeatedly studied and compared. We used such crops as oats, rye, Fatselia, mustard and rapeseed as siderats.

RESULTS

The importance of root and shoot residues in improving soil properties is important. Plant remains in the soil are the main source of organic matter and enrich the soil with nutrients and humus. Due to plant remains, the soil becomes soft, the amount of agronomically valuable aggregates increases, biological activity increases, favorable water-air properties and oxidation-reduction conditions are formed.

Below is information on the amount of biomass remaining in the soil as a result of planting siderate crops (Figure 1).

American Journal Of Agriculture And Horticulture Innovations
(ISSN – 2771-2559)
VOLUME 04 ISSUE 11 Pages: 46-52
OCLC – 1290679216
Publisher: Oscar Publishing Services



1-picture. The amount of biomass remaining under the influence of siderates, t/ha (2021-2023 years)

The highest indicator of the amount of biomass remaining from plants was obtained in the rapeseed planting variant. The amount of biomass obtained over three years was 20.79 t/ha. The least amount of biomass was obtained in the oats planting variant. It was also noted that the phacelia planting variant also showed good results, with more than 18 tons of biomass per hectare.

Planting Siderate crops is one of the best ways to improve soil fertility, but it is not widely used. Green manures are important in enriching the soil with organic matter and thereby improving the physical properties of the soil.

As a result of planting siderate crops, a decrease in soil density was observed (Table 1). A decrease in soil density was observed in the 30-50 cm layer of the mustard-planted variant. Here we can see a decrease from 1.46 g/cm2 to 1.34 g/cm2. It can be seen that the soil density is almost unchanged in the 0-30 cm layer where phaccelia is planted as a siderate crop. In the oat-planted variant, the decrease in density in the arable layer and the arable sublayer was almost the same. In the case of rye planting, it is possible to observe that the density has changed little in the driving layer.

American Journal Of Agriculture And Horticulture Innovations
(ISSN – 2771-2559)
VOLUME 04 ISSUE 11 Pages: 46-52
OCLC – 1290679216
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

Table-1.

Change in soil bulk density under the influence of Siderates (2021-2023)

№	Experience options	Layer depth, cm	Volume weight, g/cm^2		
			Before planting	After siderates	Difference (±)
1	Control-Sideratless	0-30	1,33	xx	xx
		30-50	1,42	xx	xx
2	Oats	0-30	1,38	1,34	-0,04
		30-50	1,46	1,44	-0,02
3	Rye	0-30	1,35	1,34	-0,01
		30-50	1,46	1,38	-0,08
4	Fatselia	0-30	1,38	1,38	0
		30-50	1,44	1,36	-0,08
5	Mustard	0-30	1,38	1,35	-0,03
		30-50	1,46	1,34	-0,12
6	Rapeseed	0-30	1,38	1,28	-0,10
		30-50	1,46	1,38	-0,08

If we pay attention to the experiments on the change in mobile nutrient elements under the influence of siderats, it can be observed that the amount of nitrate nitrogen in the lower layer of the plowed soil changed significantly in all variants (Table 2).

Changes in nutrients under the influence of siderate crops are better felt under the influence of mobile phosphorus. It is known that gray soils are carbonates, so there is a high probability of formation of calcium phosphates. That is why the amount of mobile phosphorus is low.

Table 2.

Changes in the amount of nitrate nitrogen, mobile phosphorus, and exchangeable potassium in the soil under the influence of Siderate (2021-2023)

American Journal Of Agriculture And Horticulture Innovations
(ISSN – 2771-2559)
VOLUME 04 ISSUE 11 Pages: 46-52
OCLC – 1290679216
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

		Depth, cm	Nitrate nitrogen, mg/kg	Mobile phosphorus, mg/kg	Exchangeable potassium, mg/kg
1	Control-Sideratless	0-30	20,65	38,3	246
		30-50	13,1	26,4	178
2	Oats	0-30	26,62	39,2	236
		30-50	19,44	21,2	176
3	Rye	0-30	25,52	39,1	254
		30-50	17,45	21,8	209
4	Fatselia	0-30	29,96	44,6	262
		30-50	20,55	31,2	214
5	Mustard	0-30	26,93	42,5	262
		30-50	19,32	30,5	210
6	Rapeseed	0-30	24,12	45,7	263
		30-50	18,43	31,6	215

Siderate plants secrete special secretions in their roots, and these secretions dissolve difficult-to-dissolve phosphates and increase the amount of mobile phosphorus.

In our experiments, compared to the control variant, an increase in the amount of mobile phosphorus was observed in the variant planted with rapeseed. It can be observed that it increased by 20 percent (45.7 mg/kg) compared to the initial state (38.3 mg/kg). This shows that rapeseed had a greater effect on the amount of mobile phosphorus than other crops. It can be seen that the amount of mobile phosphorus has increased in the variants planted with Phacelia and mustard crops.

In terms of the amount of exchangeable potassium, it can be observed that its amount increased in all crops, both in the arable and under-arable layers. A relatively higher increase was observed in the variant planted with rapeseed. A slight decrease in the amount of exchangeable potassium in the arable under-arable layer of the variant planted with oats can be observed. This is explained by the fact that this crop absorbs more potassium than other crops.

CONCLUSION

American Journal Of Agriculture And Horticulture Innovations
(ISSN – 2771-2559)
VOLUME 04 ISSUE 11 Pages: 46-52
OCLC – 1290679216
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

As a result of planting siderate crops and plowing them into the soil during the flowering period, the properties of the soil, the phytosanitary condition are improved, and it is enriched with nutrients. This has a positive effect on the yield of crops planted after it. As a result of planting siderat crops, it is possible to grow environmentally friendly and inexpensive products.

REFERENCES

1. Sharma S., Kaur S., Choudhary O., Singh M., Al Huqail A., Ali H.M., Kumar R., Siddiqui M. Scientific Reports | (2022) 12:7167 | https://doi.org/10.1038/s41598-022-11106-x.
2. Sullivan P. Overview of Cover Crops and Green Manures. Appropriate technology Transfer fo Rual Areas. July, 2003. pp. 1-16.
3. Mishchenko Y.G., E.A. Zakharchenko, S.I. Berdin, O.V. Kharchenko, E.R. Ermantraut, I.M. Masyk, V.S. Tokman. Herbological monitoring of efficiency of tillage practice and green manure in potato agrocenosis. Ukrainian Journal of Ecology, , pp. 210-219.
4. Turdimetov Sh., Khudoyberdiyeva Z., Tadjibayev A. Quality Assessment of Gypsum Soils of Mirzachol Oasis. Journal of Population Therapeutics and Clinical Pharmacology, 2023. 30(12), pp. 295–301.
5. Turdimetov Sh., Musurmanova M. Properties of Soils located in different Geomorphological Conditions. American Journal of Agriculture and Horticulture Innovations. Volume 02 Issue 11-2022. pp 01-06.
6. Turdimetov Sh., Urazalieva M., Esonboeva N. PROPERTIES AND QUALITY ASSESSMENT OF HYDROMORPHIC SOILS OF MIRZACHOL OASIS. Eur. Chem. Bull. 2023,12 (Special Issue 1, Part-B), 3992-4000.
7. Turdimetov Sh.M., Musurmanova M.M., Urazalieva M.D., Khudayberdieva Z.A., Esanbayeva N.Y. MORPHOLOGICAL FEATURES OF MIRZACHOL OASIS SOILS AND THEIR CHANGES. ACTA INNOVATIONS, 2024, 52, 1–8. https://doi.org/10.62441/ActaInnovations.52.1.
8. Turdimetov Sh.M., G'oipova S.A. Agrochemical properties and characteristics of pomegranate. // Ethiopian International Journal of Multidisciplinary Research. Volume11, Issue 03, 2024. pp. 138-141.
9. Arabov S., Abdurakhmonov N., Bakhodirov Z., Sobitov U. Salinization processes in irrigated soils of Mirzachul//Halt soil salinization, boost.soil productivity- Global Symposium on Salt-Affected Soils, 20-22 October 2021. 4-5 pp. Proceedings. Rome, https://doi.org/ doi_number.
10. Abdurakhmonov N.Yu., Sobitov O'.T., Kurdashev K.D. Mirzaobod tumani gipsli tuproqlarini gumus va asosiy ozuqa elementlar bilan ta'minlanganligi // O'zbekiston Zamini Ilmiy-amaliy va innovatsion jurnal. 4/2023. Б- 15-19.
11. Batirov Kh.A., Turdimetov Sh., Nurillaeva R.B. Ecological Role of Different Siderate Crops in Improving Soil Properties. American Journal of

American Journal Of Agriculture And Horticulture Innovations
(ISSN – 2771-2559)
VOLUME 04 ISSUE 11 Pages: 46-52
OCLC – 1290679216
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

Agriculture And Horticulture Innovations. Volume 03 Issue 011-2023. pp 01-06.

12. Turdimetov Sh., Esonboyeva N. Mirzaobod tumani tuproqlarining meliorativ holati. Международный научно-образовательный электронный журнал «ОБРАЗОВАНИЕ И НАУКА В XXI ВЕКЕ». Выпуск №37 (том 3) (апрель, 2023). С. 67-73.
13. Turdimetov Sh., Esonboyeva N. Mirzaobod tumani gidromorf tuproqlarinig xossalari. Eurasian Journal of Technology and Innovation. Volume 1, Issue 5, May 2023. pp 81-85.
14. Turdimetov Sh.M., Goziyev U/.L., G'oipova S. A. Zamonaviy sharoitda organik anor plantatsiyalarini tashkil etish va ekologik sof anor mahsulotlarini yetishtirish. // Central Asian journal of Multidisciplinary Research and Management Studies. Volume 1, Issue 8, May 2024. B. 4-8.
15. Namozov X.Q, Turdimetov Sh.M. O'zbekiston tuproqlari va ularning evolutsiyasi. // darslik. Toshkent, O'zbekiston Milliy ensiklopediyasi, 2016.
16. Мусурманова М.М., Турдиметов Ш.М. Влияние различных сидератных культур на ферментативное состояние почвы. SCIENTIFIC ASPECTS AND TRENDS IN THE FIELD OF SCIENTIFIC RESEARCH: a collection scientific works of the International scientific online conference (30th October, 2024) – Poland, Warsaw : "CESS", 2024. Part 26– pp. 48-50.
17. Aburaxmonov N.Yu., Sobitov O'.T., Kurdashev K.D. Mirzacho'l vohasi o'tloqi-bo'z tuproqlarining fizik-kimyoviy xossalari // Hozirgi zamon ilm-fani va ta'limning dolzarb muammolari. Xalqaro ilmiy-amaliy konferensiya. - Qoraqalpoq, 2023. - B. 333-336.