



THE GROWTH OF DEVELOPMENT OF ARTIFICIAL AND NATURAL COTTON SCREENS IN THE SAND

Zakirova Sanoat Khomdomovna,
Doctor of Agricultural Sciences, Professor,
Fergana State University,

Sayidmirzaeva Gulnora Gairotovna,
Director of the Fergana District School

Abstract

Nitrogen migration depends on fertilizer rates and precipitation and increases in soils with a lighter texture. Based on research conducted on light loamy soil, N-NO₃ is rapidly washed out of the 0-15 cm layer and accumulates only slightly in the 15-30 cm layer.

Keywords: Soil, screens, nitrogen, phosphorus, potassium, microelements.

Introduction

Nutrient leaching depending on the artificial screen created in laboratory conditions. It is known that irrigation changes soil moisture, intensifies groundwater movement, and alters the movement of salts in the soil. Irrigation reduces the content of essential nutrients—carbon, nitrogen, phosphorus, potassium—as well as micronutrients, in the upper layers. E. Högborg believes that readily soluble nitrogen in the form of nitrate (NO₃) also migrates with soil moisture moving to the lower layers. Furthermore, the author writes, nitrogen migration occurs more rapidly in sandy soil than in clay soil. In sandy soil, nitrogen migration occurs 50% faster than in light clay, given the same amount of infiltrated soil moisture. He found that the maximum nitrogen concentration, if concentrated in the topsoil and 100 mm of precipitation penetrates the soil, is observed at a depth



Modern American Journal of Biological and Environmental Sciences

ISSN (E): 3067-7920

Volume 2, Issue 4, April 2026

Website: usajournals.org

This work is Licensed under CC BY 4.0 a Creative Commons Attribution 4.0 International License.

of 40 cm. A very small portion of the applied nitrogen will remain in the arable layer, while the rest will migrate to a depth of 70 cm. Water and nutrient losses by plants depend on soil moisture conditions. Excessive moisture (at the FWH level) leads to inefficient use of irrigation water and increased nutrient leaching.

The effect of intensive fertilizer application on nitrogen migration in soil was studied. Nitrogen migration depends on fertilizer rates and precipitation amounts and increases in soils with a lighter texture. Studies conducted on light loamy soil indicate that N-NO₃ is rapidly washed out of the 0-15 cm layer and accumulates slightly in the 15-30 cm layer. Our laboratory experiments on sandy soils indicate that the greatest amount of nitrate nitrogen was removed during the first irrigation. In the unscreened condition, this value ranged from 2.27 to 2.36 g/L. The lowest removal (0.91 g/L) was observed in the condition with a screen at a depth of 70 cm. In the condition with fine earth ploughed to a depth of 40 cm, nitrogen removal was higher than in the condition with ploughing to a depth of 70 cm, but significantly less than in the control. Nitrate nitrogen content in the irrigation water after the second and third irrigations was insignificant. In the control, it averaged 0.036 g/L, but decreased to 0.015 g/L when a screen was placed at a depth of 70 cm.² This indicates that nutrient leaching is occurring in the control.

Table 1 The amount of nitrate nitrogen washed out after watering, g/l

Experimental option	Washed in 1st watering	Washed in 2nd watering	Washed in 3rd watering	Total washed
Control (16 cm)	2.20	0.040	0.036	2.27
Control (25-30 cm)	2.29	0.040	0.036	2.36
Artificial screen at a depth of 40 cm (16 cm)	1.26	0.032	0.029	1.32
Artificial screen at a depth of 40 cm (25-30 cm)	1.43	0.023	0.027	1.48
Artificial screen at a depth of 70 cm (16 cm)	0.93	0.017	0.017	0.96
Artificial screen at a depth of 70 cm (25-30 cm)	0.89	0.012	0.015	0.91

Note: From here on, the depth of fertilizer application is indicated in brackets.



A similar pattern is observed for ammonia nitrogen removal with irrigation water, but the rate is significantly lower, ranging from 0.673 to 0.143 g/L (Table 2).

Table 2 The amount of ammonia nitrogen washed out after watering, g/l

Experimental option	Washed in 1st watering	Washed in 2nd watering	Washed in 3rd watering	Total washed
Control (16 cm)	0.504	0.140	0.029	0.673
Control (25-30 cm)	0.460	0.140	0.026	0.626
Artificial screen at a depth of 40 cm (16 cm)	0.138	0.110	0.018	0.266
Artificial screen at a depth of 40 cm (25-30 cm)	0.178	0.101	0.015	0.294
Artificial screen at a depth of 70 cm (16 cm)	0.083	0.061	0.013	0.157
Artificial screen at a depth of 70 cm (25-30 cm)	0.076	0.058	0.011	0.143

The content of available phosphorus was negligible. The highest removal of available phosphorus was observed in the control (0.0008 g/L), while the lowest was observed in the variant with fine earth tilled to a depth of 70 cm (0.00028 g/L) (Table 3). This indicates the ability of phosphorus to convert into more complex compounds in the soil.

Table 3 The amount of mobile phosphorus washed out after irrigation, g/l

Experimental option	Washed in 1st watering	Washed in 2nd watering	Washed in 3rd watering	Total washed
Control (16 cm)	0.0006	0.0002	Traces	0.0008
Control (25-30 cm)	0.0005	0.0002	Traces	0.0007
Artificial screen at a depth of 40 cm (16 cm)	0.0003	0.0001	Traces	0.0004
Artificial screen at a depth of 40 cm (25-30 cm)	0.0005	0.0001	Traces	0.0006
Artificial screen at a depth of 70 cm (16 cm)	0.0002	0.0001	Traces	0.0003
Artificial screen at a depth of 70 cm (25-30 cm)	0.0002	0.00008	Traces	0.00028

Potassium content in irrigation water varied between 0.988 and 0.789 g/L (Table 4). It should be noted that nutrient removal increased with increasing discharge.



Table 4 The amount of potassium washed out after watering, g/l

Experimental option	Washed in 1st watering	Washed in 2nd watering	Washed in 3rd watering	Total washed
Control (16 cm)	0.90	0.054	0.034	0.988
Control (25-30 cm)	0.90	0.054	0.033	0.987
Artificial screen at a depth of 40 cm (16 cm)	0.80	0.059	0.031	0.890
Artificial screen at a depth of 40 cm (25-30 cm)	0.80	0.059	0.028	0.887
Artificial screen at a depth of 70 cm (16 cm)	0.70	0.061	0.028	0.789
Artificial screen at a depth of 70 cm (25-30 cm)	0.70	0.062	0.027	0.789

Table 5 Nutrient content of sand (laboratory experiment)

Experimental option	Layer, cm	Nitrate nitrogen, mg/100	Ammonia nitrogen, mg/100	Potassium mg/100 g
Control (16 cm)	0-20	0.45	133.0	60
	20-40	0.36	111.5	60
	40-60	0.28	104.0	60
	60-80	0.26	84.7	60
	80-100	0.36	77.8	100
Control (25-30 cm)	0-20	0.54	136.3	60
	20-40	0.45	145.5	60
	40-60	0.32	149.5	60
	60-80	0.31	125.5	60
	80-100	0.34	116.0	100
Plowing at 40 cm (16 cm)	0-15	0.56	133.0	80
	15-30	0.42	142.0	100
	30-40	1.0	169.5	80
	40-60	0.63	134.5	100
	60-100	0.53	121.0	100
Plowing at 40 cm (25-30 cm)	0-15	0.53	124.0	80
	15-30	0.45	157.5	120
	30-40	1.0	165.5	80
	40-60	0.48	133.0	100
	60-100	0.42	116.0	100
Plowing at 70 cm (16 cm)	0-20	0.56	99.3	80
	20-40	0.48	124.0	80
	40-60	0.80	134.5	100
	60-70	1.13	164.0	140
	70-100	0.50	130.0	140
Plowing at 70 cm (25-30 cm)	0-20	0.53	99.5	80
	20-40	0.45	134.5	100
	40-60	0.69	130.0	80
	60-70	1.18	165.5	140
	70-100	0.29	124.0	140



Conclusion

The results of the laboratory experiment demonstrate that nutrient leaching in sandy soils is strongly influenced by soil texture, irrigation intensity, fertilizer placement, and the presence or absence of an artificial screen. Due to the high permeability and low retention capacity of sandy soils, nitrate nitrogen, ammonia nitrogen, mobile phosphorus, and potassium are easily transported with irrigation water from the upper soil layers to deeper horizons. This process is especially intensive during the first irrigation, when the largest amount of nutrients is washed out from the soil profile.

The highest nutrient losses were observed in the control treatments without an artificial screen. In these variants, nitrate nitrogen leaching reached 2.27–2.36 g/L, while the use of an artificial screen at a depth of 70 cm reduced nitrate nitrogen losses to 0.91–0.96 g/L. A similar pattern was observed for ammonia nitrogen, where the total leaching in the control reached 0.626–0.673 g/L, whereas the lowest values, 0.143–0.157 g/L, were recorded in the treatments with an artificial screen at 70 cm depth. These results confirm that the artificial screen significantly reduces the downward migration of nitrogen compounds in sandy soils.

The leaching of mobile phosphorus was relatively low compared with nitrogen and potassium. This is explained by the ability of phosphorus to transform into less soluble compounds in the soil. Nevertheless, the control treatments showed higher phosphorus losses than the screened variants. The lowest phosphorus leaching was recorded when fine earth was incorporated to a depth of 70 cm, indicating that the artificial screen also contributes to the retention of phosphorus within the soil profile.

Potassium leaching was also affected by the artificial screen. In the control treatments, potassium removal reached 0.987–0.988 g/L, while in the treatments with an artificial screen at 70 cm depth it decreased to 0.789 g/L. Although potassium losses were lower than nitrate nitrogen losses, the results show that potassium is also subject to migration under sandy soil conditions, particularly when irrigation water movement is intensive.



Modern American Journal of Biological and Environmental Sciences

ISSN (E): 3067-7920

Volume 2, Issue 4, April 2026

Website: usajournals.org

This work is Licensed under CC BY 4.0 a Creative Commons Attribution 4.0 International License.

The analysis of nutrient distribution in the sand profile confirmed that the artificial screen improves the accumulation and retention of nutrients in the root zone. In treatments where fine earth was incorporated at 40 cm and 70 cm depths, the content of nitrate nitrogen, ammonia nitrogen, and potassium increased in the corresponding screened layers. This indicates that the artificial screen acts as a stabilizing layer, reducing nutrient losses and improving the agrochemical condition of sandy soils.

Overall, the study proves that the creation of an artificial screen in sandy soils is an effective ameliorative measure for reducing nutrient leaching, improving nutrient retention, and increasing the efficiency of fertilizer use. Among the studied treatments, the artificial screen formed at a depth of 70 cm showed the highest effectiveness in reducing the migration of nitrogen, phosphorus, and potassium. Therefore, the use of fine earth as an artificial screen can be recommended as a scientifically justified method for improving the fertility of sandy soils and creating more favorable conditions for crop growth under irrigated agriculture.

References

1. Zakirova S., Axmedova D., Akbarov R., Xonkeldiyeva K. Light Industry Enterprises In Marketing Activities Experience Of Foreign Countries In The Use Of Cluster Theory. The American Journal of Management and Economics Innovations. 2021: 5. 562. 36-39 ctp.
2. Zakirova S., Xolmatova Sh., Ergasheva N. Productivity of grain of wheat of sand of central. ACADEMICIA AnInternational Multidisciplinary Research Journal. Vol. 11, Issue 9, September 2021. 606-609 ctp.
3. Isaev S., Zakirova S., Haydarov B., Isagaliev M. Clarification of irrigation technology of cotton varieties with mineralized water in the water shortage conditions (Scopus). Journal of Critical Reviews. 2020 years. 179-185 pp.