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Effect of Sowing Terms and Norms of Autumn Rye Seeds on Agrophysical Properties of Soil

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Abstract: *The article describes the sowing dates and norms of autumn rye seeds to the agrophysical properties of the soil, which are important properties that determine the soft weight or density of the soil, including volume weight and water permeability. Autumn rye seeds will be sown on October 1 at a rate of 3 million tons per hectare. It was found that the soil was compacted in the 0–30 cm layer when sown at the expense of germinating seeds. In the medium term, ie on the 10th and 20th of October, 3 mln. variants 7 and 10 sown at the expense of germinated seeds were analyzed. 5 mln. When sowing seeds, it is 1.44–1.45 g / cm3, which is 4 mln. 0.04–0.07 g / cm3 each, 5 mln. in grains, the volume increased by 0.04–0.05 g / cm3. When analyzing the options sown in the evening, ie on November 1, the following data were obtained: 3 mln. was detected when seeds were sown.*

Keywords: agrophysical properties of soil, volume weight, mass, soil density, envelope method, validity period, mass, sample, density.

Introduction. One of the agrophysical indicators of soil is the bulk density of the soil, which is an important property that determines its softness or density. The volumetric mass of soil is said to be the ratio of the mass in grams of one cubic centimeter of dry soil (with air) in the natural state to the weight of water obtained at 40S of the same volume and expressed in g / cm3. Depending on the type of soil volume weight, an average of 1.30–1.35 g / cm3 is optimal for good growth and development of agricultural crops.

The mass of soil in a volume is called its density or volumetric mass. This figure is also expressed in g / cm3 relative to dry soil. Density depends on the mineralogical and mechanical composition of the soil, the structural condition and the amount of organic matter. In addition, the impact of tillage process and agricultural machinery on density is also large. Once the soil is directly tilled, it becomes the most porous, then gradually compacts, and after a certain time (until the next drive) the density changes less. However, in the cultivated areas up to a certain depth, it is observed that the plowed bottom layer becomes denser from year to year (this results in a "Plug Compensation" layer). In humus-rich, structured and mature soils, the density is low. Density plays an important role in the water-air properties of the soil and the course of biological processes in it, as well as in the accumulation of nutrients necessary for plants. In compacted soils, water absorption is reduced, there are unfavorable conditions for air exchange and free development of plant roots. The optimum density for the tillage layer of gray soils is 1.2-1.3 g / cm3 and at most 1.35 g / cm3. should be.

Glacial soils are characterized by low cation absorption capacity due to their poor content of humus and mineral colloids. The total amount of exchangeable cations in the grass layer of typical glacial soils is 13-15 mg / eq / 100 g of soil, and up to 17 mg / eq in fine-grained soils. Light and medium sandy loam gray soils have the lowest absorption capacity, and the amount of bases absorbed in their grass layer is 9-10 mg / eq. The absorption capacity of gray soils decreases downwards along the soil profile.

Of gray soil the volume weight and porosity depend on the amount of macro aggregates, and porosity is 55-59% in gray soils rich in macro aggregates. It is slightly less common in typical gray soils, with the lowest porosity being reduced to 47-50% in light gray soils. Maximum hygroscopicity, fading moisture and minimum moisture capacity increase from light sandy loams to heavy sands, from the lower layers of soil to higher horizons and from light gray soils to dark gray soils.

Procedure and method of conducting the experiment.

The research was conducted in 2016–2019 in the light gray soils of the Andijan Research and Experimental Station of the Research Institute of Cotton Breeding, Seed Production and Agrotechnology (PSUEAITI), which determined the timing of sowing of autumn rye seeds and seed sowing norms. The effect on grain yield was studied over a three-year short-rotation 1: 1 (cotton-grain) rotation system.

The experiment placed 15 variants in one tier in 3 repetitions. In the experimental field, the width of the field is 70 cm and the length is 100 m. The area of each spring is 560 m2, the area to be taken into account is 280 m2. The total area of the experiments was 2.5 ha. The experiment was conducted for 3 years in a 1: 1 (cotton: grain) short rotation rotation system. In the experiment, the variety of autumn rye "Vakhshskaya-116" included in the State Reserve was planted.

The experiment set five different sowing dates (September 20, October 1, October 10, October 20, November 1) and three different sowing rates (3 million, 4 million, 5 million).

For feeding rye, ammonium nitrate (N – 34%) from nitrogen fertilizers, superphosphate from phosphorus fertilizers (R2O5–12–14%), potassium chloride salt (K2O – 50%) from potassium fertilizers were used. In the experimental autumn rye, 70% of the annual norm of phosphorus fertilizers and 100% of potassium fertilizers were applied in autumn, under plowing, the

remaining 30% of phosphorus fertilizers were applied in the 1st feeding with nitrogen fertilizers, and the 2nd feeding was carried out with nitrogen fertilizers in the fallow period.

The bulk density of the soil is 0–50 cm. layer, at the beginning and end of the period of application was determined by the method of N.A. Kachinsky.

Soil permeability was determined at the beginning and end of the operation by NA Kachinsky;

In all agrophysical researches the manual "Methods of agrophysical researches (Tashkent, SoyuzNIXI, 1973) is used. [6]

Research results and their analysis.

One of the agrophysical indicators of soil is the bulk density of the soil, which is an important property that determines its softness or density. The volumetric mass of soil is said to be the ratio of the mass in grams of one cubic centimeter of dry soil (with air) in the natural state to the weight of water obtained at 4 0S of the same volume and expressed in g / cm3. Depending on the type of soil volume weight, an average of 1.30–1.35 g / cm3 is optimal for good growth and development of agricultural crops.

The soil volume weight of the experimental field was measured at the beginning and end of the growing season, using cylinders with a volume of 500 g / cm3 in the N.A. Kachinsky method, every 10 cm of soil. 50 cm from the layer. depth samples were taken and analyzed.

In particular, if we look at the results obtained at the beginning of the experiment (2016), when samples were taken from five points of the field in the envelope method and analyzed from the driving (0–30 cm) and bottom (30–50 cm) layers of soil, the volume weight of the soil was 0– 30 cm. The average depth of the plowed layer was 1.30 g / cm3, while the depth of the plowed soil was 30–50 cm. in the stratum, this figure was observed to be 1.40 g / cm3.

Towards the end of the application period (2017), it was observed that the effect of sowing times and seed norms was significant when the bulk weight of the soil was determined in the variant section.

In particular, autumn rye seeds will be sown on September 20 at a rate of 3 million hectares. When sowing at the expense of germinating seeds, the volume weight of the soil in the 0–30 cm layer averaged 1.38 g / cm3, and in the subsoil layer 30–50 cm, the average density of the soil in the 0–30 cm layer per layer. 0.08 g / cm3, and 0.07 g / cm3 in the 30–50 cm layer. and 5 million. In the variants sown at the expense of germinating seeds, this figure averages 1.36 g / cm3 in the 0–30 cm layer of soil, and 1.46–1.45 g / cm3 in the 30–50 cm layer of plowed soil. It was found that the yield was 0.06 g / cm3 in the 30 cm layer and 0.06–0.05 g / cm3 in the 30–50 cm layer.

During the rest of the sowing period, the above-mentioned laws were observed. Autumn rye seeds were sown on October 1 at a rate of 3 million hectares per hectare. When sowing at the expense of germinating seeds, the volume weight in the 0–30 cm layer of the soil showed an average weight of 1.39 g / cm3, the density of the soil increased by 0.09 g / cm3 per application, while in the 30–50 cm layer of the soil the volume weight averaged 1.46. g / cm3, and the soil density was found to be 0.06 g / cm3 relative to the application head. During this period, 4-5 mln. In our 5–6 variants sown at the expense of germinating seeds, by the end of the application period, when determining the volume weight of the soil, the average 0.6–0.35 g / cm3 in the 0–30 cm layer of soil was 0.06–0.05. g / cm3, in the 30–50 cm layer of the soil, the average was 1.45 g / cm3 and 0.05 g / cm3 per application.

In the medium term, ie on the 10th and 20th of October, 3 mln. In the analysis of variants 7 and 10 sown at the expense of germinated seeds, the volume weight in the 0–30 cm layer of the soil averaged 1.37–1.36 g / cm3, and the average soil density at the beginning of the application period was 0.07–0.06 g /. cm3, these figures are 4 mln. and 5 million. The volume weight of the soil in the 0–30 cm layer is 4 mln. 1.36–1.35 g / cm3 and 5 mln. 1.34 per unit, compared to an average of 4 mln. 0.06–0.05 g / cm3 each, 5 mln. in grains up to 0.04 g / cm3, and in the 30-50 cm layer of soil at the end of the application period the volume weight of the soil is 4 mln. When sowing germinated seeds, the average is 1.44–1.47 g / cm3, 5 mln. When sowing seeds, it is 1.44–1.45 g / cm3, which is 4 mln. 0.04–0.07 g / cm3 each, 5 mln. in grains, the volume increased by 0.04–0.05 g / cm3.

When analyzing the options sown in the evening, ie on November 1, the following data were obtained: 3 mln. At the end of the application period, in the 13th variant, when the volume weight of the soil was determined, the average density of 0.06 g / cm3 was observed in the 0–30 cm layer, and 30–50 cm of the soil was observed at the beginning of the application period. It was noted that the volume weight in the layer was on average 1.45 g / cm3, which is 0.05 g / cm3 higher than the application rate. During this period, 4-5 mln. When determining the volume weight of the soil in 14–15 variants sown at the expense of germinated seeds, by the end of the application period, the average density in the 0–30 cm layer of soil was 1.35–1.34 g / cm3, and the density was 0.05–0.04 g / cm3. cm3, and in the 30–50 cm layer of soil, the volume weight was 1.44 g / cm3 on average, with a density of 0.04 g / cm3 per application.

Table 1
Influence of autumn rye seed sowing times and norms on soil volume weight

Var	Seed sowing dates	Seed sowing norms	Soil layers, cm	
			0–30	30–50
At the beginning of the validity period 2016 y				

1			1,29	1,38
2			1,28	1,36
3			1,31	1,42
4			1,32	1,42
5			1,31	1,40
Average at 5 points			**1,30**	**1,40**
At the end of the validity period 2017 y				
1	20–September	3 million	1,38	1,47
2		4 million	1,36	1,46
3		5 million	1,36	1,45
4	1–October	3 million	1,39	1,46
5		4 million	1,36	1,45
6		5 million	1,35	1,45
7	10–October	3 million	1,37	1,45
8		4 million	1,36	1,44
9		5 million	1,34	1,44
10	20–October	3 million	1,36	1,46
11		4 million	1,35	1,47
12		5 million	1,34	1,45
13	1–November	3 million	1,36	1,45
14		4 million	1,35	1,44
15		5 million	1,34	1,44

From the data presented, it was observed that the increase in seed consumption per hectare had a positive effect on the volume weight of the soil, while maintaining the same regularity at all planting periods.

In our research conducted in 2017–2018 and 208–2019, it was observed that the above laws were observed, and in all planting periods, 4-5 mln. positive data were obtained from our variants sown at the expense of germinated seeds.

Another of the agrophysical properties of soil is its water permeability. The water permeability of the soil depends on the bulk density of the soil and is assessed by the water absorption properties of the soil itself over a 6-hour period.

The sum of all its properties that determine the state of water stored in the soil layer is called the properties of water (water-physical, hydrophysical). The most important water properties include soil's ability to hold and retain water, moisture capacity, water permeability, and water carrying capacity. Water retention ability is one of the important properties of soil, its ability to retain moisture, preventing water from seeping out. An indicator that quantitatively characterizes the ability of soil to retain water is its moisture capacity. Soil moisture capacity is the ability of a soil to absorb and retain a certain amount of water under the influence of various forces. Depending on the moisture holding capacity of the soil and under different conditions, the following types of moisture capacity are distinguished: maximum adsorbed moisture capacity, maximum molecular moisture capacity, capillary moisture capacity, minimum or field moisture capacity and total maximum moisture capacity.

Before conducting the experiment each year, the water permeability of the soil was determined by the envelope method from the five points of the field at the beginning of the application period, and at the end of the application period in the option section.

In particular, at the beginning of 2016, when determining the water permeability of the soil from the five points of the field in the envelope method to determine the water permeability, it was observed that the average was 880 m3 / ha.

Towards the end of the validity period (2017), the following data were obtained when soil water permeability was determined in the options section.

As of September 20, 3 mln. In Option 1, which was sown with germinated seeds, a total of 850 m3 / ha of water was soaked into the soil for six hours, which was 30 m3 / ha less than at the beginning of the application period. and 5 million. By the

end of the application period, 855–860 m3 / ha of water was absorbed into the soil, and 25–20 m3 / ha less water was absorbed than at the beginning of the application period.

Table 2

Influence of sowing dates and norms of autumn rye seeds on soil water permeability

Var	Seed sowing dates	Seed sowing norms	At the beginning of the application period, 6 hours, m3 / ha. 2016 y
1			880
2			890
3			870
4			870
5			890
Average			**880**
			At the beginning of the validity period, at 6 p.m., 2017
1	20–September	3 million.	850
2		4 million.	855
3		5 million.	860
4	1–October	3 million.	855
5		4 million.	860
6		5 million..	860
7	10–October	3 million.	860
8		4 million.	870
9		5 million.	870
10	20–October	3 million.	860
11		4 million.	865
12		5 million..	870
13	1–October	3 million.	860
14		4 million..	865
15		5 million..	865

During the period from October 1, 3, 4, 5 mln. At the end of the application period, when the soil water permeability was determined at the rate of 855–860–860 m3 / ha, it was noted that 25–20–20 m3 / ha less water was absorbed into the soil than at the beginning of the application period.

In mid-October, ie October 10, 3, 4, 5 mln. If the water permeability of the soil is 860–870–870 m3 / ha at the end of the application period, and 20–10–10 m3 / ha less than at the beginning of the application period, these seed norms will be applied by October 20. By the end of the application period, the water permeability of the soil was 860–865–870 m3 / ha, and 20–15–10 m3 / ha less water was absorbed into the soil than at the beginning of the application.

In the evening, ie on November 1, three different 3, 4, 5 mln. When analyzing the water permeability of the varieties sown at the expense of germinated seeds (13–14–15), by the end of the application period, the average was 860–865–865 m3 / ha, while the water content in the soil was 20–15–15 m3 was observed.

It is clear from the data presented that the norms of seed consumption per hectare had a significant impact on both the volume weight and water permeability of the soil.

Our studies in 2017–2018 and 2018–2019 also found that the above patterns were reflected, and it was observed that the increase in the number of seedlings had a positive effect on the agrophysical properties of the soil.

Conclusions, suggestions and recommendations.

1. From the given data it is shown that the increase of seed consumption per hectare had a positive effect on the volume weight of the soil, while maintaining the same regularity at all sowing periods.
2. In our research conducted in 2017–2018 and 208–2019, it was observed that the above-mentioned laws were observed, and in all planting periods, 4-5 mln. positive data were obtained from our variants sown at the expense of germinated seeds.
3. The data show that seed consumption per hectare has had a significant impact on both soil volume and water permeability.

4. Our studies in 2017–2018 and 2018–2019 also found that the above patterns were reflected, and it was observed that the increase in the number of seedlings had a positive effect on the agrophysical properties of the soil.

REFERENCES

1.Azimbaev SA The basics of agriculture, soil science and agrochemistry Publishing house "IQTISOD-MOLIYA" Tashkent - 2006.
2. Teshaev Sh, SulaymonovB. Cotton reference. Tashkent - 2016.
3. Turapov I, Kamilov BS, Qodirova D.Q, Saidova M.E., Namozov N.Ch., BurkhonovaD.U. Soil physics. Tashkent. 2014
4.OripovR.O., XalilovN.X. Botany Tashkent - 2007.
5. KuzievR., BoirovA., Abdurahmonov N. Land descriptions Tashkent - 2013
6. “Methods of agrophysical research Tashkent-SoyuzNIXI 1973
7.MaxsudovX.M., RaupovaN.B., KamilovB.S., NamozovX.Q.Topsoil science textbook TashDAU. 2013 y