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INFLUENCE OF FERTILIZER APPLICATION ON THE SOIL PRODUCTIVITY AND EFFECT ON GREEN MASS HARVEST OF SUNFLOWER AND SOY BEAN

Abdurahimov O.Sh, Ruziyeva M.R

Abstract. In this article, illustrated the effect of fertilizer application on soil fertility and green mass during intercropping of sunflower and soybean crops. In the options planted with sunflower and soybean crops, relatively less compaction of the soil by volume mass. Adding IFO MACROMIX liquid fertilizer to the Fitovak stimulator, 300 ml/ha+1 during the period of the formation of 3-4 complex leaves. ,0 l/ha, in the period of 8-10 leaves formation, it was observed in the variant used in the norms of 500 ml/ha + 1.0 l/ha, and it was 1,365 g/cm3 in the tillage (0-30 cm) layer of the soil. 1,401 g/cm3 in the under-drive (30-50 cm) layer, 0.012 compared to the control option; It was found to be less dense by 0.010 g/cm3.

Keywords. Fertilizer, mineral, sunflower, soy, agrotechnics, planting dates, productivity, green mass, stimulator, irrigation, repeated cropping.

Introduction. Today, the global climate change and the constant increase in the number of people on earth, in turn, lead to an increase in the demand for agricultural products. Currently, the area under cultivation of sunflowers is 28.4 million hectares and soybeans are 130.5 million hectares, and 57.0 million tons of sunflower seeds and 381.2 million tons of soybeans are grown. Also, considering the high importance of these crops in providing livestock with food, it is one of the urgent tasks of today to achieve a high and quality harvest by improving the agrotechnical measures used in their care.

It is known that in a number of countries with a developed livestock industry, the main purpose of growing legumes and fodder crops is to provide livestock with food. However, in recent years, as a result of global climate change, adverse effects

such as adverse weather, water shortage, and drought have been observed. To overcome these problems, the optimal application period of growth regulators and liquid fertilizers in the cultivation of sunflowers, soybeans, corn and sorghum as a repeat crop after fall grain crops, early vegetable crops and the development and scientific justification of standards are also relevant.

Materials and methods. As the object of the researches were chosen sunflower "Dilbar" and soybean "Uzbek-2" varieties grown on typical gray soils of Tashkent region.

Placement of field experiments, calculations and observations "Methods of conducting field experiments", analyzes of soil and plants were carried out on the basis of methodological manuals "Methods of studying agro chemical, physical, and biological cotton fields". The statistical analysis of the obtained results was carried out on the basis of the Microsoft Excel program and the methodical guide "Methods of field's experiments" by B.A. Dospehov and the method of economic efficiency by N.A. Baranov.

In calculating the economic efficiency of the obtained results, is used "Sample technological cards for the care of the main agricultural crops and production of products. For 2016-2020 (Part II)".

Results. In 2023, at the end of the soybean vegetation period, in the control (water-treated) option, the volume mass of the soil in the plowed (0-30 cm) layer was 1.374 g/cm3, while in the under-ploughed (30-50 cm) layer it was 1.408 g/cm3 established. In the case of applying Fitovak biostimulant at the rate of 300 ml/ha during the period of 3-4 complex leaf formation, and 500 ml/ha during the period of 8-10 leaf formation, the volumetric mass of the soil in the driving layer (0-30 cm) was 1.372 g/cm3 was 1.405 g/cm3 in the sub-plowing (30-50 cm) layer of the soil, and 0.002 compared to the control option; It was found to be less dense by 0.003 g/cm3.

In 2023, according to the data obtained by the volume mass of the soil in the self-care options of soybean, relatively less compaction. Adding IFO MACROMIX liquid fertilizer to the Fitovak stimulator, the plant produces 3-4 complex leaves per leaf. 300 ml/ha + 1.0 l/ha during the formation period, 500 ml/ha + 1.0 l/ha during the period of 8-10 leaf formation, observed in the variant used in the norms, in the plow (0-30 cm) layer of the soil was 1.362 g/cm3, in the sub-driving (30-50 cm) layer it was 1.400 g/cm3, 0.012 compared to the control option; It was found to be less dense by 0.008 g/cm3.

In 2022, at the end of the sunflower growing season, in the control (water-treated) version, the volume mass of the soil in the tillage (0-30 cm) layer was 1,380 g/cm3, and in the under-tillage (30-50 cm) layer it was 1,413 g/cm3 established. In the case of applying Fitovak biostimulant at the rate of 300 ml/ha during the period of 3-4 complex leaf formation, and 500 ml/ha during the period of 8-10 leaf formation, the volumetric mass of the soil in the driving (0-30 cm) layer is 1,378 g/cm3 was 1.411 g/cm3 in the sub-plowing (30-50 cm) layer of the soil, and 0.002 compared to the control option; It was found to be less dense by 0.002 g/cm3.

In 2023, according to the data obtained on the volume mass of the soil in self-care options of sunflower, relatively less compaction by adding IFO MACROMIX liquid fertilizer to the Fitovak stimulator, the plant produces 3-4 complex leaves per leaf 300 ml/ha + 1.0 l/ha during the formation period, 500 ml/ha + 1.0 l/ha during the period of 8-10 leaf formation, observed in the variant used in the norms, in the plow (0-30 cm) layer of the soil It was 1.369 g/cm3, and it was 1.403 g/cm3 in the sub-driving (30-50 cm) layer, which is 0.011 compared to the control option; It was found to be less dense by 0.010 g/cm3.

In 2023, at the end of the growing season when sunflowers and soybeans were planted together, in the control (water-treated) option, the volume mass of the soil in the tillage layer (0-30 cm) was 1.377 g/cm3, while the volume mass of the soil in

the plow layer (30-50 cm) was 1.377 g/cm3 it was determined that it was 1.411 g/cm3 in the layer. Phytovac biostimulant was applied at the rate of 300 ml/ha during the period of 3-4 complex leaf formation, and 500 ml/ha during the period of 8-10 leaf formation. was 1.408 g/cm3 in the sub-plowing (30-50 cm) layer of the soil, and 0.002 compared to the control option; It was found to be less dense by 0.003 g/cm3.

Table 1

Effect of application of mineral fertilizers and foliar feeding on volume mass of soil g/cm3 in intercropping of sunflower and soybean crops

№	Plants	Fertilizers and preparations used in crop nutrition	During the period of 3-4 leaf formation	During the period of 8-10 leaf formation	2022		2023	
					0-30 cm	30-50sm	0-30 cm	30-50 cm
1	Soybean	Control	Control (with watering)		1,365	1,402	1,374	1,408
2		Fitovak	300 ml/ga	500 ml/ga	1,362	1,400	1,372	1,405
3		Karbamid	3,0 kg/ga	5,0 kg/ga	1,358	1,397	1,369	1,402
4		IFO MACROMIX	1,0 l/ga	1,0 l/ga	1,356	1,395	1,367	1,401
5		Fitovak+ karbamid	300 ml/ga+3,0 kg/ga	500 ml/ga+5,0 kg/ga	1,353	1,394	1,364	1,400

6		Fitovak+ IFO MACROMIX	300 ml/ga+1,0 l/ga	500 ml/ga+1,0 l/ga	1,350	1,392	1,362	1,400
7	Sunflower	Nazorat	Nazorat (suv bilan)		1,369	1,408	1,380	1,413
8		Fitovak	300 ml/ga	500 ml/ga	1,366	1,406	1,378	1,411
9		Karbamid	3,0 kg/ga	5,0 kg/ga	1,364	1,405	1,375	1,409
10		IFO MACROMIX	1,0 l/ga	1,0 l/ga	1,362	1,403	1,373	1,406
11		Fitovak+ karbamid	300 ml/ga+3,0 kg/ga	500 ml/ga+5,0 kg/ga	1,359	1,402	1,371	1,405
12		Fitovak+ IFO MACROMIX	300 ml/ga+1,0 l/ga	500 ml/ga+1,0 l/ga	1,357	1,401	1,369	1,403
13	Sunflower + Soybean	Control	Control (with watering)		1,367	1,404	1,377	1,411
14		Fitovak	300 ml/ga	500 ml/ga	1,365	1,402	1,375	1,408
15		Karbamid	3,0 kg/ga	5,0 kg/ga	1,362	1,400	1,372	1,405
16		IFO MACROMIX	1,0 l/ga	1,0 l/ga	1,360	1,399	1,370	1,404

17		Fitovak+ karbamid	300 ml/ga+3,0 kg/ga	500 ml/ga+5,0 kg/ga	1,357	1,397	1,368	1,402
18		Fitovak+ IFO MACROMIX	300 ml/ga+1,0 l/ga	500 ml/ga+1,0 l/ga	1,355	1,395	1,365	1,401

In 2023, in the options planted with the addition of sunflower and soybean crops, according to the data obtained on the volume mass of the soil, relatively less compaction. 300 ml/ha+1.0 l/ha in the period of leaf formation, 500 ml/ha+1.0 l/ha in the period of 8-10 leaf formation was observed in the variant used in the standards, and the plowing of the soil (0-30 cm) layer was 1.365 g/cm3, in the under-drive (30-50 cm) layer it was 1.401 g/cm3, 0.012 compared to the control option; It was found to be less dense by 0.010 g/cm3 (1-table).

Conclusions. Relatively less density of the soil in terms of volume mass in the options where the shade itself is taken care of. Add IFO MACROMIX liquid fertilizer to the Fitovak stimulator and feed the plant through the leaf during the period of 3-4 complex leaf formation 300 ml/ha+1.0 l/ha, in the period of 8-10 leaves formation, it was observed in the variant used in the norms of 500 ml/ha + 1.0 l/ha, and it was 1.362 g/cm3 in the tillage (0-30 cm) layer of the soil , in the under-drive (30-50 cm) layer is 1,400 g/cm3, 0,012 compared to the control option; It was found to be less dense by 0.008 g/cm3.

Relatively less compaction of the soil in terms of volume mass in self-tended sunflower variants. Adding IFO MACROMIX liquid fertilizer to the Fitovak stimulator, during the period of the formation of 3-4 complex leaves, 300 ml/ha + 1.0 l/ha, in the period of 8-10 leaves formation, it was observed in the variant used in the norms of 500 ml/ha + 1.0 l/ha, and it was 1.369 g/cm3 in the tillage (0-30 cm)

layer of the soil , is 1.403 g/cm3 in the under-drive (30-50 cm) layer, 0.011 compared to the control option; It was found to be less dense by 0.010 g/cm3.

In the options planted with sunflower and soybean crops, relatively less compaction of the soil by volume mass. Adding IFO MACROMIX liquid fertilizer to the Fitovak stimulator, 300 ml/ha+1 during the period of the formation of 3-4 complex leaves. ,0 l/ha, in the period of 8-10 leaves formation, it was observed in the variant used in the norms of 500 ml/ha + 1.0 l/ha, and it was 1,365 g/cm3 in the tillage (0-30 cm) layer of the soil. 1,401 g/cm3 in the under-drive (30-50 cm) layer, 0.012 compared to the control option; It was found to be less dense by 0.010 g/cm3.

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