CYCLE OF BIOMASS AND ELEMENTS OF PLANT NUTRITION IN SOYBEAN CROPS DEPENDING ON VARIOUS PRECEDING CROPS AND PRIMARY TILLAGE

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The article analyzes the main laws of the biological cycle of soybean plant biomass, and the parameters of recirculation of nutrients depending on the method and depth of the primary tillage and various preceding crops.

Studies have shown that the quantitative indicators of biomass of soybean plants depending on tillage and preceding crops vary from 5,90 t/ha in the version with placement after corn for grain and direct sowing to 9,92 t/ha in the version after winter wheat and shelfless cultivation soil (chisel-deep ripper) by 20-22 cm. The highest quantitative indicators of soybean biomass were obtained for the placement of soybeans after cereals (winter wheat and spring barley), where, depending on the main tillage, they were: for direct sowing 7,76 and 7,24 t/ha, shelfless cultivation by 6-8 cm – 8,84 and 8,62 t/ha, shelfless cultivation by 12-14 cm – 8,84 and 9,11 t/ha, shelfless cultivation (chisel-ripper) by 20-22 cm – 9,92 and 9,37 t/ha, plowing by 20-22 cm – 9,37 and 8,40 t/ha.

After corn, the highest values of soybean plant biomass (7,61 t/ha) were obtained in the variant with tillage (plowing) by 20-22 cm, and the lowest – 5,90 t/ha in the variant of direct sowing. After sunflower, these figures were 8.37 t / ha and 6,08 t/ha, respectively. Indicators of soybean plant biomass for its placement after soybean varied depending on the main tillage in the range from 7,90 to 9,17 t/ha. It should be noted that the highest values are obtained in the versions with shelfless chisel-deep ripper by 20-22 cm and disc harrow by 12-14 cm.

It was found that the share of biomass alienated from the field with soybean harvest, depending on the various preceding crops and the primary tillage varied from 31,6 to 32,8 %, which in absolute terms ranged from 1,93 to 3,25 t/ha, and received to the soil with plant residues: from 3,97 to 6,67 t/ha or from 67,2 to 68,4 %.

Thus, the biomass of soybean plants, including the mass of plant residues, as well as the total amount of nutrients in biomass are determined not only by the level of yield, but largely by the choice of preceding crops and tillage. This is evidenced by a comparison of the parameters of biomass yield of soybean plants in variants with placement after different predecessors and tillage, but the same level of fertilizer application.

It is believed that the amount of basic nutrients that field crops are involved in the biological cycle, to some extent reflects the biological needs of crops in nutrients. According to average data, soybean plants attracted annually to the biological cycle a total of basic nutrients from 251,1 to 420,5 kg/ha. The largest amount of nutrients from 310,2 to 420,5 kg/ha of NPK is involved in soybean crops placed after cereals (winter wheat and spring barley) in the variant of cultivated without soil tillage by 20-22 cm (chisel-deep-tiller), and the lowest after corn for grain from 251,1 to 302,9 kg/ha NPK obtained in the variant during plowing by 20-22 cm.

It should be noted that, depending on the preceding crops, the high parameters of the biological circulation of NPK obtained in the variants shelfless cultivation soil (chisel-deep ripper) by 20-22 cm for placing soybeans after grain crops (402,0 and 420,5 kg/ha) and variant with tillage (plowing) by 20-22 cm after corn and sunflower (232,2 and 351,9 kg/ha) and equivalent for placing soybeans after soybeans in versions chisel-deep ripper by 20-22 cm and disc harrow at 12-14 cm – 334,6 kg/ha.

The largest share in the total amount of nutrients in soybean biomass belongs to nitrogen from 61,6 to 65,3 %, the share of phosphorus varies from 12,4 to 14,4 %, and potassium from 20,3 to 25,7 %. The amount of nutrients returned to the soil with plant residues, in relation to their content in the biomass ranges from 41,7 to 55,4 % nitrogen, 11,1-14,7 phosphorus and 30,0-46,9 % potassium.

The highest percentage of enters with plant residues of nitrogen and phosphorus was obtained in variants with soybean placement after soybean, where

depending on the main tillage it varied in the range of 55,1-55,5 % and 14,5-14,7 %, respectively. Potassium enters the ranged from 29,8 to 30,0 %. When growing soybeans after cereals, corn and sunflower, the level of nitrogen with plant residues in the soil was 41,7-42,8 %, phosphorus 11,1-11,2 %, potassium 45,8-46,8 %.

From the obtained data of biomass of soybean plants (dry matter) and data of its chemical composition, the parameters of biological removal of nutrients by soybean plants were determined. From the data presented in table 3 it is seen that a significant amount of them – from 164,7 to 276,9 kg/ha (from 64,8 to 69,9 %) is removed from the field with the harvest of the main product (seeds) of soybeans.

The highest values of total NPK removal were characterized by variants with soybean placement after soybeans, where depending on tillage they ranged from 69,3 % (200,9 kg/ha) in the variant of direct sowing to 69.9% (226,5 kg/ha) in the version with plowing. The lowest values were obtained for the placement of soybeans after cereals from 64,8 to 66,2 %. However, analyzing the removal separately by elements, it should be noted that the lowest, in relative terms, nitrogen removal – 69,5-69,6 % were characterized by options for the placement of soybeans after soybeans. Although the removal of phosphorus (14,3 %) and potassium – (16,1 %), they prevailed over the placement of soybeans after cereals, corn and sunflower, where these indicators were respectively (13,0-13,1) and 14,5-14,7 %).

Key words: soybean, cycle, biomass preceding crops, primary tillage, elements of plant nutrition