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4.1.2. Селекция, семеноводство и биотехнология растений (биологические науки, сельскохозяйственные науки)

БАЛАНС ГУМУСА И ЭНЕРГЕТИЧЕСКИХ РЕСУРСОВ ПОЧВЫ ПОД ВЛИЯНИЕМ ОБРАБОТКИ И УДОБРЕНИЙ

Новиков Алексей Алексеевич
Доктор сельскохозяйственных наук, профессор
E-mail: al.al.novikov@gmail.com
ORCID: 0000-0001-9013-2629
SPIN-код: 6421-5833
Новочеркасский инженерно-мелиоративный институт имени А. К. Кортунова – филиал федерального государственного бюджетного образовательного учреждения высшего образования «Донской государственный аграрный университет» Россия, Ростовская область, Новочеркасск

В статье представлены результаты исследований различных видов основной обработки почвы и минеральных удобрений по влиянию на баланс гумуса и энергетических ресурсов на почвах каштанового типа в комплексе с солонцами в полевом севообороте в условиях сухостепной зоны Нижнего Дона. Показано, что баланс гумуса в полевом севообороте каштановой почвы в комплексе с солонцами в независимости от различий технологий способа основной обработки почвы без внесения минеральных удобрений имеет отрицательные его значения – 1322-1372 кг/га. Внесение азотных и фосфорных минеральных удобрений не обеспечило без дефицитности баланса гумуса, увеличив его до 1474-1558 кг/га

Ключевые слова: ПЛОДОРОДИЕ, ГУМУС, БАЛАНС, СЕВООБОРОТ, УДОБРЕНИЕ, ОБРАБОТКА ПОЧВЫ, ЭНЕРГЕТИЧЕСКИЕ РЕСУРСЫ

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4.1.2. Plant breeding, seed production and biotechnology (biological sciences, agricultural sciences)

BALANCE OF HUMUS AND SOIL ENERGY RESOURCES UNDER THE INFLUENCE OF TREATMENT AND FERTILIZERS

Novikov Aleksey Alekseyevich
Doctor of Agricultural Sciences, Professor
E-mail: al.al.novikov@gmail.com
ORCID: 0000-0001-9013-2629
RSCI SPIN-code: 6421-5833
Novocherkassk Engineering and Meliorative Institute named after A. K. Kortunov – a branch of the federal government budget Institution of Higher Education «Don State Agrarian University» Russia, Rostov region, Novocherkassk

The article presents the results of studies of various types of basic tillage and mineral fertilizers on the effect on the balance of humus and energy resources on chestnut soils in combination with solonetz in the field crop rotation in the conditions of the dry-steppe zone of the Lower Don. It is shown that the humus balance in the field crop rotation of chestnut soil in combination with solonetz, regardless of the differences in the technologies of the main tillage method without applying mineral fertilizers, has negative values – 1322-1372 kg/ha. The introduction of nitrogen and phosphorous mineral fertilizers did not ensure a deficit-free humus balance, increasing it to 1474-1558 kg / ha.

Keywords: FERTILITY, HUMUS, BALANCE, CROP ROTATION, FERTILIZER, TILLAGE, ENERGY RESOURCES

Introduction. Efficient agricultural production involves ensuring high and sustainable yields while increasing soil fertility [1]. The constantly growing energy saturation of agricultural production and crop yields contribute to the alienation of a significant amount of energy from the soil than it is formed [1].

Therefore, a negative balance of humus and mineral nutrition elements is observed almost everywhere [1].

It should be noted that this problem manifests itself not only on chernozems, which are the main arable fund, but also on chestnut soils.

The basis for the development of our research was the development of methods that prevent degradation processes, which are based on research in the dry steppe zone of the Lower Don.

Conditions and methods. The study area is characterized by a pronounced continentality and low moisture availability. Hydrothermal coefficient - 0.5-0.7.

The soil cover is mainly represented by chestnut soils, where solonetzic spots account for from 5-7 to 40-50%. Of the absorbed bases in horizon A, Ca prevails in horizon B - sodium 15-20 and magnesium - 40-46% of the exchange capacity.

These soils are characterized by a low content of humus - less than 3.5%, depletion in mobile phosphorus, and a heavy granulometric composition. Methods of basic tillage: traditional (control), soil-protective, mid-depth. Nitrogen-phosphorus fertilizers in doses of N220, N340, P120 were applied under the main tillage in the field crop rotation.

Results. The results shown in Table 1 indicate that in the field rotation on the variant without fertilizers, up to 1372 kg/ha of humus is lost annually.

In the fields of crop rotation, depending on the method of the main tillage, the greatest losses of humus without the use of fertilizers were obtained in the fallow field 2000 kg/ha, as well as when sowing winter wheat in fallow - 1790 kg/ha in the variant of soil protection cultivation. A high loss of humus during the cultivation of corn for all types of basic tillage, a maximum of 1530 kg/ha was observed when using mid-depth tillage in crop rotation.

Table 1 - Humus balance in the field crop rotation with different technologies of the main tillage, kg/ha

cultures crop rotation	Type of basic tillage								
	Traditional, control			Soil protective			Mid-deep		
	Humus loss (-)	Formed humus (+)	Balance (±)	Humus loss (-)	Humus is formed (+)	Balance (±)	Humus loss (-)	Humus is formed (+)	Balance (±)
1	2	3	four	five	6	7	8	nine	10
Without mineral fertilizers									
Clean steam	2000	-	-2000	2000	-	-2000	2000	-	-2000
Winter wheat	2600	840	-1760	2630	840	-1790	2430	800	-1630
Corn for silage	1700	460	-1240	1730	460	-1270	2050	520	-1530
Winter wheat	1220	460	-760	1330	500	-830	1180	450	-730
sudan grass	1450	600	-850	1590	620	-970	1560	630	-930
Per 1 ha of crop rotation area			-1322			-1372			-1364
P120									
Clean steam	2000	-	-2000	2000	-	-2000	2000	-	-2000
Winter wheat	2970	920	-2050	2800	880	-1920	2670	860	-1810
Corn for silage	2130	540	-1590	2090	530	-1560	1230	560	-1670
Winter wheat	1550	560	-990	1500	550	-950	1410	520	-890
sudan grass	1620	460	-1160	1620	620	-1000	1620	620	-1000
Per 1 ha of crop rotation area			-1558			-1486			-1474
N220									
Clean steam	2000	-	-2000	2000	-	-2000	2000	-	-2000
Winter wheat	2910	900	-2010	2790	880	-1910	2670	850	-1820

Table 1 continued

1	2	3	four	five	6	7	8	nine	10
Corn for silage	2110	540	-1570	2120	540	-1580	2230	560	-1670
Winter wheat	1020	400	-620	1610	580	-1030	1440	530	-910
sudan grass	1620	620	-1000	1610	620	-990	1680	640	-1040
Per 1 ha of crop rotation area			-1440			-1502			-1488
N340									
Clean steam	2000	-	-2000	2000	-	-2000	2000	-	-2000

Winter wheat	2870	900	-1970	2790	888	-1910	2740	870	-1870
Corn for silage	2180	660	-1520	2150	650	-1500	1290	650	-1610
Winter wheat	1560	570	-990	1550	570	-980	1440	530	-910
sudan grass	1740	620	-1120	1620	620	-1000	1730	650	-1080
Per 1 ha of crop rotation area			-1520			-1478			-1494

Thus, on average, per hectare of crop rotation area, the smallest loss of humus is when using traditional tillage technology, the largest in the variant of the soil protection system of tillage.

Mineral fertilizers to some extent help to compensate for the removal of nitrogen by agricultural crops in the crop rotation, but does not solve the problem of a deficit-free balance of humus, and in some cases increase it.

When P210 was applied, the humus balance deficit increased compared to the control, its loss ranged from 1474 kg/ha when using the mid-depth method of the main tillage to 1558 kg/ha with the traditional one.

Against the background of various doses of nitrogen fertilizers, the loss of humus also turned out to be somewhat greater when applying N220 - 1440-1502 kg/ha, against the background of N340 - 1478-1520.

Conclusion. Thus, the results obtained on the calculation of the humus balance in the field crop rotation of chestnut soil in combination with solonetzes, regardless of differences in the technology of the main tillage method, show its negative values.

The introduction of nitrogen and phosphorus mineral fertilizers did not provide a deficit-free balance of humus.

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