APPROACHES TO THE ECONOMIC EVALUATION OF ELEMENTS OF ORGANIC AGRICULTURAL PRODUCTION OF INNOVATIVE TYPE

Anatoliy M. Bondarenko, Vladimir I. Savkin, Sergey A. Shelkovnikov, Lyudmila S. Kachanova
Don State Agrarian University, Zernograd, Russian Federation
Oryol State Agrarian University named after N. V. Parakhin, Oryol, Russian Federation
Novosibirsk State Agrarian University, Novosibirsk, Russian Federation

Abstract: *Organic agricultural production facilitates a solution to the problem of food security of the state by promoting the development of the agricultural sector through increasing the profitability of its industries. The aim of the study is to develop approaches to the economic evaluation of the technology of artificial soil formation and improvement of soil quality and their approbation under conditions of arid farming. Two approaches are proposed for determining the economic assessment of artificial soil formation technology and improving soil quality. The first approach provides for an economic assessment of the value added of the soil, that is, of the value of the soil cover, which is additionally obtained in the process of restoring soil fertility. The second approach provides an economic assessment through the calculation of the growth of crop yields grown on artificially formed restored soils. The results of the economic evaluation of the first approach indicate that for all types of the considered soils with their stage-by-stage (I, II, III stages) and full (I-III stages) transformation, the added value of soil creation during the first year exceeds the cost of their restoration (in terms of on 1 hectare) by 17.4%. As a result, it was revealed that the most effective is the option of using artificial soil formation technology with a one-time restoration of soil resources and their further use for crops' cultivation: the lowest costs, net discounted income of about 21 million rubles / ha for each type of soil. Despite the differences in methods for determining the economic evaluation of artificial soil formation technology and soil quality improvement, both proposed approaches presented positive results, which predetermines the use of artificial soil formation technology as an innovative component of organic agricultural production.*

Keywords: technological processes; organic fertilizers; technology of artificial soil formation; value added; profitability.

The problem of food security of the Russian Federation remains significant, its solution will significantly reduce the dependence of industry and the agro-industrial complex on the economies of other countries[1]. With reference to the agro-industrial complex in the current situation, an

[1] D.A. Kaldiyarov, E.O. Kydyrbayeva, B.K. Shomshekova, M. Toregozhina, G.R. Baytaeva, "Cooperation of small forms of managing in agro-industrial sector in the Republic of Kazakhstan", in *Espacios*, 2017, vol. 38, no. 62, p. 13.

important role in providing the population with food is given to its basic branches: animal husbandry and crop production. In this regard, one of the promising approaches is the improvement of the organic system of agricultural production as a fundamental tool that contributes to boost crop yields and the gross output of agricultural crops, growth of animal productivity with a simultaneous increase in profits of agricultural producers[2].

It is important to understand that organic agricultural production of the 21st century should move away from the soil as the traditional attitude to the main mean of production. It is important not only to use productive soils, restoring fertility, but also to artificially generate a humus-containing layer. Thus, the innovative component in modern organic agricultural production is based on the application of artificial soil formation technology and improvement of soil quality. However, the question arises how the use of this technology is economically feasible and how the costly part will affect the cost of agricultural production.

The aim of the study is to develop approaches to the economic evaluation of the technology of artificial soil formation and improvement of soil quality and their approbation under conditions of arid farming.

Materials and methods

As a result of the study, two approaches were developed to determine the economic assessment of artificial soil formation technology and improve soil quality. The first approach provides for an economic assessment of the value added of the soil, that is, of the value of the soil cover, which is additionally obtained in the process of restoring soil fertility. The second option provides an economic assessment through the

[2] I.B. Kalashnikov, N.V. Ukolova, V.I. Afanasyev, R.N. Murtazaeva, "The Russian economy is on the way to the emergence of a new technological order", in *Scientific Review: Theory and Practice*, 2018, vol. 3, p. 52-60; N.I. Kuznetsov, N.V. Ukolova, S.V. Monakhov, J.A. Shikhanova, "Provisions for effective development of regional agricultural systems in Russia's economy", in *Journal of Advanced Research in Law and Economics*, 2017, vol. 8, no. 2, p. 490-495; N.I. Kuznetsov, N.V. Ukolova, S.V. Monakhov, Yu.A. Shikhanova, M.O. Sannikova, "Fundamentals of the theory and methodology for the transfer of high-tech production technologies in the agrarian economy of Russia", in *Agrarian Scientific Journal*, 2018, vol. 1, p. 65-68; I.S. Sandu, A.A. Polukhin, P.I. Burak, "Economic aspects of technical and technological modernization of agriculture in the context of integration into the Eurasian Economic Union", in *Economics of Agriculture of Russia*, 2015a, vol. 7, p. 84-89; I.S. Sandu, M.Ya. Veselovsky, A.V. Fedotov, E.I. Semenova, A.I. Doshchanova, "Methodological aspects of social and economic efficiency of the regional activities", in *Journal of Advanced Research in Law and Economics*, 2015b, vol. 6, no. 3, p. 650-659.

calculation of the growth of crop yields grown on artificially formed restored soils. The soil productivity here was determined in the cultivation of winter wheat according to five options to substantiate the economic efficiency of the application of biotechnology of artificial soil formation.

The organic system of agricultural production provides for interaction on the basis of a closed cycle of the branches of plant growing and animal husbandry. In turn, the technological processes implemented in each industry are based on the principles of biological synergy of agriculture. The interrelation of technological processes in organic plant growing and animal husbandry implies the presence of basic blocks (Figure 1)[3].

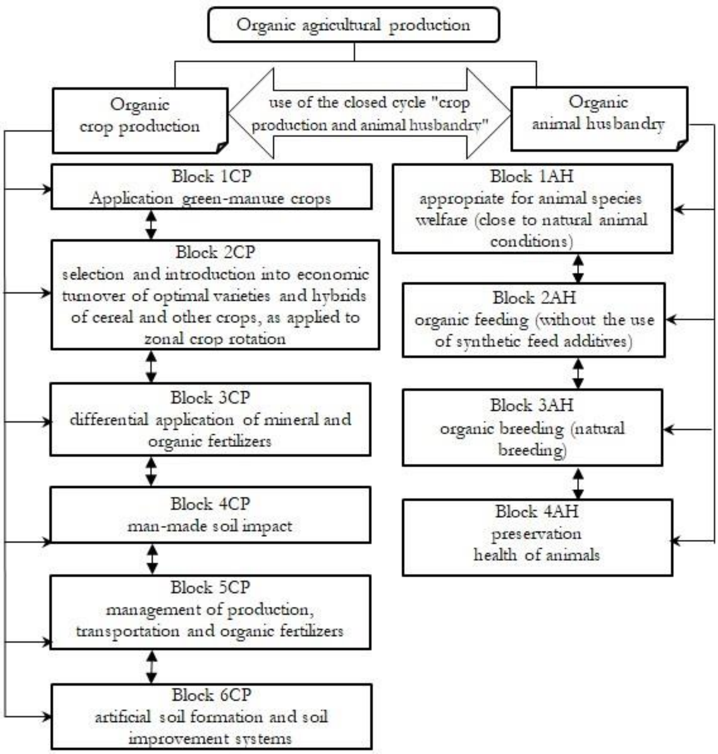

Figure 1: The Interaction of elements of organic agricultural production

3 V.V. Filatov, "Strategies and mechanisms for the modernization of innovative and technological development of the Russian economy", in *Quality. Innovation. Education*, 2013, vol. 103, no. 12, p. 8-17; I.M. Rukina, V.V. Filatov, V.N. Zhenzhibir, I.V. Polozhentseva, "Economic convergence and technological foresight", in *Microeconomics*, 2018, vol. 2, p. 112-127; A.T. Stadnik, S.A. Shelkovnikov, D.M. Matveev, N.V. Grigoriev, T.A. Stadnik, "Improving the management of technological processes in agricultural organizations", in *Bulletin of the Altai State Agrarian University*, 2011, vol. 81, no. 7, p. 123-127.

There are distinctive features of organic husbandry in relation to traditional husbandry. Exceptional rules on the humane maintenance of animals, restrictions on livestock and high requirements for premises (ban on crowding, requirements for the size of premises depending on the type of animals, the ban on tie-up housing) are applied (block 1AH). If possible, feeds of own production are used, rations are prepared taking into account the biological characteristics of animals (for example, feed of animal origin is not used in feeding ruminants). Synthetic feed additives, amino acids and growth stimulants are not used (block 2AH).

The goal in organic animal husbandry is animal breeding; natural tupping is mainly used, but artificial insemination is also allowed. The purchase of animals from ordinary enterprises (non-organic) is strictly regulated and must proceed according to the prescription of the eco-EU 2003 (block 3AH)[4]. Reducing the use of veterinary drugs may preserve the health of animals through proper maintenance, feeding and care. The owner of farm animals cannot maintain the health of animals in case of complex infectious diseases, epidemics, but in most cases animal diseases are associated with improper housing conditions, improper feeding, poor hygiene etc. (block 4AH).

In organic crop production, 1CP- 4CP blocks associated with the use of green manure (they are sown at the same time as direct harvesting) and the introduction of optimal varieties and hybrids of cereal crops in economic use, as well as the differential application of mineral and organic fertilizers (is the most important element of the system of precision farming) and the technogenic impact on the cultivated environment (soil) of the running systems of power machines are sufficiently described in the scientists' works[5].

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[4] E. Akhmetshin, E. Danchikov, T. Polyanskaya, N. Plaskova, N. Prodanova, S. Zhiltsov, "Analysis of innovation activity of enterprises in modern business environment", in *Journal of Advanced Research in Law and Economics*, 2018, vol. 8, no. 8, p. 2311-2323.

[5] V.V., Kuznetsov, N.F. Gaivoronskaya, O.V. Egorova, "Modeling the technological development of crop production in Russia", in *Scientific journal of the Russian Research Institute of Land Reclamation Problems*, 2014, vol. 15, no. 3, p. 158-175; V.I. Trukhachev, V.Z. Mazloev, I.Yu. Sklyarov, Yu.M. Sklyarova, E.N. Kalugina, A.V. Volkogonova, "The strategic directions of innovative economy development in Russian agribusiness", in *Montenegrin Journal of Economics*, 2016a, vol. 12, no. 4, p. 97-111; V.I. Trukhachev, I.Y. Sklyarov, J.M. Sklyarova, L.A. Latysheva, H.N. Lapina, "Contemporary state of resource potential of agriculture in South Russian", in *International Journal of Economics and Financial Issues*, 2016b, vol. 6, S5, p. 33-41.

It is important to note that the above aspects of the implementation of organic crop and animal husbandry activities depend on the soil as the main means of production. Obtaining high yields of agricultural crops and significant indicators in animal husbandry is impossible without the use of soil resources of certain parameters, that is, with a certain content of humus. All experts note that there is a rather intensive decrease of humus in the southern Russian chernozem (black earth) soil, and we can lose this invaluable gift of nature in 20 years. Currently, the humus content is practically not restored, spending it on the creation of the crop; due to a sharp decline in the livestock of animals, especially cattle, manure as organic fertilizer is not introduced into the soil and crop by-products (not the grain part of the crop) are still far from being developed as organic fertilizer.

With reference to the conditions of dry farming, which prevails in the grain-producing regions of southern Russia, it is important to study and solve problems in connection with the issues mentioned in blocks 5CP and 6CP. Rostov scientist, Ph.D., Biology P.I. Korolenko developed in the "know-how" mode of production of active dietary supplements as the basis for the process of accelerated soil formation; the fact of increasing the fertility of soils with different humus content and varying degrees of eroding has been established[6].

Results and discussion

The first approach is the economic evaluation of technology of artificial soil formation and improvement of soil quality. Thanks to the obtained data, for the first time in solving this problem, it was possible to make an economic assessment of this process, i.e. solve one of the most intricate tasks.

Table 1: Baseline data: the degree of influence of erosion and dehumidification on soil fertility

[6] A.I. Altukhov, *Methodological support for conducting scientific research on the economic problems of the development of the agro-industrial complex of Russia,* Izdatelstvo Fond "Kadrovyy rezerv", Moscow, 2016; P.I. Korolenko, *Agrovit-Kor. Agrotechnology,* OOO NPO "Nooekosfera", Rostov-on-Don, 2008; I.S. Novikov, D.V. Serdobintsev, T.S. Volkova, "The vector of development of integration and cooperation processes in the Volga agro-industrial complex", in *Agrarian Scientific Journal*, 2018, vol. 9, p. 83-86; D.V. Serdobintsev, O.M. Stukalenko, E.B. Solov'eva, "Theoretical and practical aspects of the mechanism of cooperation processes in the agro-industrial complex of the regions", in *Scientific Review: Theory and Practice*, 2016, vol. 3, p. 112-121.

Degree of erosion	Humus level in the soil, %		
	Chestnut soils	Ordinary chernozem (black earth)	Pre-Caucasian chernozem (black earth)
Non-eroded	1,0-3,5	1,0-3,5	1,0-3,5
Slightly eroded	0,6-2,1	0,7-2,5	0,8-2,8
Medium eroded	0,4-1,4	0,5-1,8	0,6-2,1
Highly eroded	0,2-0,7	0,2-0,7	0,3-1,1

Table 2: Calculation results: the cost of restoring the properties of the soil and the added value (chestnut soils)

Stage I. Transformation of highly eroded (humus 0.7%) soils to medium eroded (humus 1.4%) soils				
SFC, kg / t	SFC, t / ha	The cost of restoration, rub / ha	Cost of soil, rub/ha	Added value of soil, rub / ha
1	2	3	4	5
7	25200	252000	556920	304920
14	50400	504000	1113840	609840
Stage I		**Δc=252 000**		**Δinc=304 920**
Stage II. Transformation of medium-eroded (humus 1.4%) soils in slightly eroded (humus 2.1%) soils				
14	50400	504000	1113840	609840
21	75600	756000	1670760	914760
Stage II		**Δc=252 000**		**Δinc=304 920**
Stage III. Transformation of slightly eroded (humus 2.1%) soils in non-eroded (humus 3.5%) soils				
21	75600	756000	1670760	914760
35	126000	1260000	2784600	1524600
Stage III		**Δc=504 000**		**Δinc=609 840**
Stages I-III. Transformation of highly eroded (humus 0.7%) soils in non-eroded (humus 3.5%) soils				
7	25200	252000	556920	304920
35	126000	1260000	2784600	1524600
Stages I-III		**Δc=1 008 000**		**Δinc=1 219 680**

Artificial soil formation is based on segregation into the production layer of soil by soil formation centers (SFC) or catalytic supramolecular systems of humic substances. The main practical task of artificial soil formation is the qualitative improvement of the soil condition. The impact of erosion and dehumidification on soil fertility (table 1) was used as the initial data for the implementation of the first approach to determine the economic assessment of artificial soil formation and improve soil quality.

Table 3: Calculation results: the cost of restoring the properties of the soil and the value added (ordinary chernozem)

Stage I. Transformation of highly eroded (humus 0.7%) soils to medium eroded (humus 1.8%) soils				
SFC, kg / t	SFC, t / ha	The cost of restoration, rub	Cost, rub / ha	Added value of soil, rub / ha
1	2	3	4	5
7	25200	252000	556920	304920
18	64800	648000	1432080	784080
Stage I		**Δc= 396 000**		**Δinc= 479 160**
Stage II. Transformation of medium-eroded (humus 1.8%) soils in slightly eroded (humus 2.5%) soils				
18	64800	648000	1432080	784080
25	90000	900000	1989000	1089000
Stage II		**Δc=252 000**		**Δinc= 304 920**
Stage III. Transformation of slightly eroded (humus 2.5%) soils in non-eroded (humus 3.5%) soils				
25	90000	900000	1989000	1089000
35	126000	1260000	2784600	1524600
Stage III		**Δc= 360 000**		**Δinc= 435 600**
Stages I-III. Transformation of highly eroded (humus 0.7%) soils in non-eroded (humus 3.5%) soils				
7	25200	252000	556920	304920
35	126000	1260000	2784600	1524600
Stages I-III		**Δc=1 008 000**		**Δinc=1 219 680**

The economic assessment was carried out according to the value added of the soil, that is, the part of the cost of soil cover, which was additionally obtained in the process of restoring soil fertility. For three types of soil (chestnut, ordinary chernozem, pre-Caucasian chernozem), an economic assessment of the transformation from highly eroded to medium eroded (stage I), from medium eroded to slightly eroded (stage II), from slightly eroded to non-eroded (stage III), and the transformation of highly eroded soil in non-eroded soils (tables 2 – 4). For each of the stages the amount of SFC in a hectare of soil needed to restore to a given value of humus, the cost of restoring the soil, the cost of soil at the average market price, as well as the added value of soil acquired as a result of the restoration of soil fertility were calculated. From the presented data (table 2, 3) it can be seen that for all types of the considered soils with their stage-by-stage (I, II, III stages) and full (I-III stages) transformation, the added value of soil creation during the first year exceeds the cost of their restoration (in terms of 1 ha) by 17.4%.

Table 4: Calculation results: the cost of restoring the properties of the soil and the resulting value added (Pre-Caucasian Chernozem)

Stage I. Transformation of highly eroded (humus 1.1%) soils to medium eroded (humus 2.1%) soils				
SFC, kg / t	SFC, t / ha	Cost of restoration, rub / ha	Cost, rub / ha	Added value of soil, rub / ha
1	2	3	4	5
11	39600	396000	875160	479160
21	75600	756000	1670760	914760
Stage I.		**Δc= 360 000**		**Δinc= 435 600**
Stage II. Transformation of medium-eroded (humus 2.1%) soils in slightly eroded (humus 2.8%) soils				
21	75600	756000	1670760	914760
28	100800	1008000	2227680	1219680
Stage II.		**Δc=252 000**		**Δinc= 304 920**
Stage III. Transformation of slightly eroded (humus 2.8%) soils in non-eroded (humus 3.5%) soils				
28	100800	1008000	2227680	1219680
35	126000	1260000	2784600	1524600
Stage III		**Δc= 252 000**		**Δinc= 304 920**
Stages I-III. Transformation of highly eroded (humus 1.1%) soils in non-eroded (humus 3.5%) soils				
11	39600	396000	875160	479160
35	126000	1260000	2784600	1524600
Stages I-III		**Δc=864 000**		**Δinc=1 045 440**

In the presented calculations (Table 4) for the following years, the costs of restoring soil properties are not required, and therefore there is an accumulation of the added value of soil creation based on integral dependence. The added value of soil creation in the second year exceeds the cost of their restoration by 58.7%, in the third year by 72.5%, in the fourth year by 79.3%, in the fifth year by 83.4%. The added value of new soils is an economic platform for the realization of their productivity.

Table 5: Economic evaluation of artificial soil formation and soil quality improvement

Soil types / Flow data	Chestnut soils	Ordinary chernozem (black earth)	Pre-Caucasian chernozem (black earth)
Option 1. First year using of ASF			
Additional investments,	**1008,00**	**1008,00**	**864,00**
Payback period for additional capital investments, years	**2,05**	**2,05**	**1,76**
Index of profitability of additional capital investments	**21,48**	**21,48**	**25,02**
Net present value, thousand	**21650,58**	**21650,58**	**21621,02**
Option 2. Using of ASF every 2 years			
Additional investments,	**1134,00**	**1134,00**	**990,00**
Payback period for additional capital investments, years	**2,31**	**2,31**	**2,01**
Index of profitability of additional capital investments	**19,00**	**19,00**	**21,73**
Net present value, thousand	**21542,05**	**21542,05**	**21512,49**
Option 3. Compensation of losses from erosion in the amount of 1 t / ha on the basis of ASF			
Additional investments,	**1183,00**	**1183,00**	**1039,00**
Payback period for additional capital investments, years	**2,41**	**2,41**	**2,11**
Index of profitability of additional capital investments	**18,17**	**18,17**	**20,66**
Net present value, thousand	**21499,35**	**21499,35**	**21469,79**
Option 4. Compensation of losses from erosion in the amount of 2 t / ha based on ASF			
Additional investments,	**1358,00**	**1358,00**	**1214,00**
Payback period for additional capital investments, years	**2,77**	**2,77**	**2,47**
Index of profitability of additional capital investments	**15,72**	**15,72**	**17,56**
Net present value, thousand	**21348,12**	**21348,12**	**21318,56**

Option5. Compensation of losses from erosion in the amount of 3 t / ha based on ASF			
Additional investments,	**1533,00**	**1533,00**	**1389,00**
Payback period for additional capital investments, years	**3,13**	**3,13**	**2,83**
Index of profitability of additional capital investments	**13,83**	**13,83**	**15,24**
Net present value, thousand	**21196,90**	**21196,90**	**21167,34**

The second approach is the economic evaluation of technology of artificial soil formation and improvement of soil quality. The approach is based on the calculation of soil productivity in the cultivation of winter wheat using five options to substantiate the economic efficiency of using biotechnology of artificial soil formation.

For three types of soil (chestnut, ordinary chernozem, pre-Caucasian chernozem) economic evaluation of their use in the cultivation of grain crops using biotechnology of artificial soil formation for the qualitative improvement of natural soils and restoration of soil resources was carried out. The calculation was made on 1 hectare of soil with a horizon of 50 years with a bank deposit interest of 6 percentage points, an inflation rate of 5.38%. The yield of winter wheat in the restored soil resources is 60 c / ha. According to the results of the calculations, the payback period for additional capital investments, the profitability index, and net present value were determined.

The first version of economic feasibility of the effective strength of the biotechnology of artificial soil formation (ASF) for the qualitative improvement of natural soils and the restoration of soil resources provides for its one-time use for the recovery of soil resources from highly eroded (humus content in chestnut soils 0.7%, in pre-Caucasian chernozems (1.1%) to non-eroded with a humus content of 3.5% in all types of soils for the purpose of the subsequent production of grain crops on them (Table 5).

The second option involves the use of biotechnology of artificial soil formation to restore soil resources from highly eroded (humus content in chestnut soils 0.7%, in chernozem ordinary 0.7% and in chernozem pre-Caucasian 1.1%) to non-eroded with humus content 3.5% in all types of soil, then every 3 years, the use of ASF to compensate for the loss of soil from erosion in the amount of 30 t / ha (Table 5).

The third option provides for the use of biotechnology of artificial soil formation to restore soil resources from highly eroded (humus content in chestnut soils 0.7%, in chernozem ordinary 0.7% and in chernozem pre-Caucasian 1.1%) to non-eroded with humus content 3.5% in all types of soil, as well as annual compensation of soil loss from erosion in the amount of 10 t / ha (Table 5).

The fourth version of the economic substantiation of the effectiveness of biotechnology of artificial soil formation (ASF) for the qualitative improvement of natural soils and the restoration of soil resources provides for its one-time use for the recovery of soil resources from strongly eroded (the humus content in chestnut soils is 0.7%, and in pre-Caucasian chernozems (1.1%) to non-eroded, with a humus content of 3.5% in all types of soil, as well as annual compensation of soil loss due to erosion in the amount 20 t / ha (Table 5).

The fifth option provides for its one-time use for the restoration of soil resources from highly eroded (humus content in chestnut soils 0.7%, in black soil 0.7% and pre-Caucasian chernozems 1.1%) to non-eroded with a humus content 3.5% in all soil types, then annual compensation of soil loss due to erosion in the amount of 30 t / ha (Table 5).

In each of the proposed options in the first year, the year of biotechnology restoration and qualitative improvement of soil resources, the costs of its use as additional capital investments were taken into account, and the soil resources acquired added value (Tables 2-4), due to the improvement of their quality indicators in determining net present value.

Table 6: The results of the calculation of the efficiency of cultivation of winter wheat; soil type – ordinary chernozem, selling price 8000 rubles/c

Indicators	Accounting variant							
	Option 1	Option 2			Average values for the option	Option 3	Option 4	Option 5
		1 year– 30 t/ha	2 year	3 year		10 t/ha	20 t/ha	30 t/ha
Basic data – the cultivation of grain by the traditional technology (using mineral fertilizers) SEC (collective farm) "KOLOS" Matveyev-Kurgan district of the Rostov region								
The humus level in the soil, %	3.50	3.20	3.20	3.20	3.20	3.40	3.30	3.20
Yield, c/ ha	52.00	32.00	32.00	32.00	32.00	41.70	38.50	32.00

Total technological costs: - rub / ha - rub / c	24807.37 477.06	24807.37 775.23	24807.37 775.23	24807.37 775.23	24807.37 775.23	24807.37 594.90	24807.37 644.35	24807.37 775.23
Cost of production, rub. / ha	41600.00	25600.00	25600.00	25600.00	25600.00	33360.00	30800.00	25600.00
Net income: - rub / ha	16792.63 322.94	792.63 24.77	792.63 24.77	792.63 24.77	792.63 24.77	8552.63 205.10	5992.63 155.65	792.63 24.77
Estimated data – cultivation of grain with the simultaneous use of biotechnology of artificial soil formation (without the use of mineral								
The humus level in Yield, c/	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
The humus level in Yield, c/	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Production costs, rub/ha, inc. -the cost of cultivation of winter wheat	20750.37 20750.37 0	31251.37 20750.37 10500	20750.37 20750.37 0	20750.37 20750.37 0	24250.37 20750.37 3500	24250.37 20750.37 3500	27750.37 20750.37 7000	31251.37 20750.37 10500
Total costs: - rub / ha	20750.37 345.84	31251.37 520.86	20750.37 345.84	20750.37 345.84	24250.70 404.18	24250.37 404.17	27750.37 462.51	31250.37 520.84
Cost of production, rub. /	48000.00	48000.00	48000.00	48000.00	48000.00	48000.00	48000.00	48000.00
Net income: - rub / ha	27249.63 454.16	16748.63 279.14	27249.63 454.16	27249.63 454.16	23749.30 395.82	23749.63 395.83	20249.63 337.49	16749.63 279.16

Change in the level of profitabilit	30.84	71.68	107.95	107.95	92.37	60.37	61.98	71.68

Thus, according to the results of calculations of flow data of economic efficiency revealed the following (Table 6).

1. The most effective is the first use of ASF with a one-time restoration of soil resources and their further use for the cultivation of crops: the lowest cost, net discounted income of about 21 million rubles / ha for each soil type, the yield index varies 21-25, which indicates on the high efficiency of the considered option.

2. The third, fourth and fifth uses of ASF are the least effective. With the growth of compensation for losses from erosion from 10 to 30 t / ha, the cost part of the project grows (from 1039 thousand rubles / ha to 1533 rubles / ha, respectively), the payback period for additional capital investments increases (from 2.11 to 3, 13 years). The value of net present value slightly decreases and the index of profitability of capital investments decreases. However, the profitability index in the third, fourth and fifth variants is greater than one, which indicates the economic efficiency of these options for the use of ASF.

3. Intermediate in terms of efficiency is the second ASF application with the restoration of soil resources every 3 years in the amount of 30 t / ha removal offset from erosion: additional capital investments compared to the other options are increased and amount to 9901134 thousand rubles / ha, net discounted income of about 21 million rubles / ha, payback period varies from 2.01 to 2.31 years. The index of profitability of capital investments for chestnut soils and ordinary chernozem is 19, for pre-Caucasus chernozem it is 21.73, the use of biotechnology will be effective.

In the course of the study, approaches were developed to determine the economic valuation of artificial soil formation technology and improve soil quality. The first of these approaches provides for an economic assessment of the value added of the soil. As a result of its testing, it was revealed that the added value of soil creation in the second year exceeds the costs of their restoration by 58.7%, in the third year by 72.5%, in the fourth year by 79.3%, in the fifth year by 83.4%. Thus, the approach made it possible to identify the economic feasibility of the realization of the productivity of soil resources created by the technology of artificial soil formation and improvement of soil quality.

In the course of testing the second economic assessment approach, it was revealed that the ASF application with the one-time restoration of soil resources and their further use for the cultivation of grain crops is the most effective: the lowest costs, net discounted income of about 21 million rubles/ha for each soil type. Therefore, both proposed approaches have confirmed the economic feasibility of improving soil quality through the use of artificial soil formation technologies, as an innovative component of organic agricultural production.