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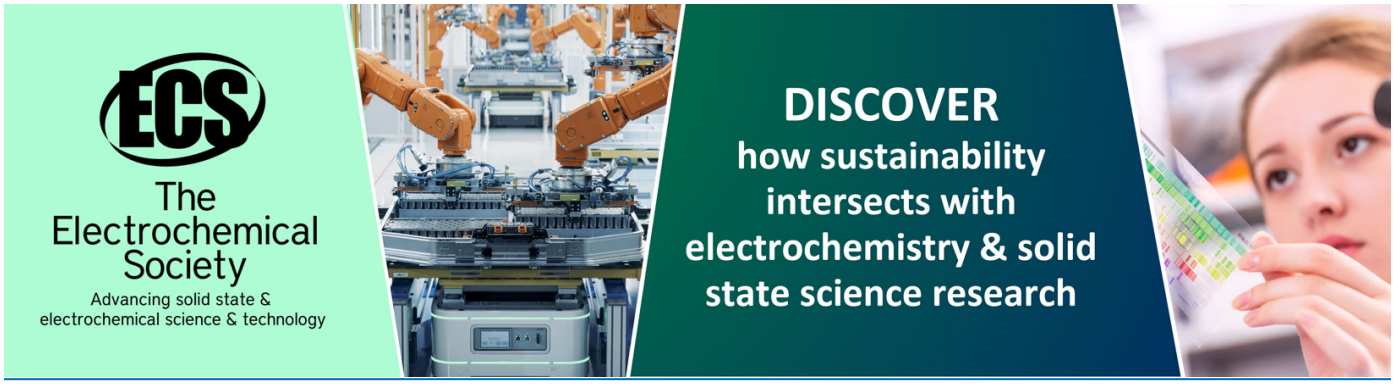

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Accounting for the fertility of land resources as a factor in the sustainable development of the Kursk region

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Abstract. The article deals with the problems of accounting for the fertility of land resources. The analysis shows that the most fertile soils (black soils) are under the threat of degradation. In the Kursk region, a negative balance of nutrient removal is observed annually. Growth in crop production is due to a decrease in soil fertility, as a result of an irrational farming system. Therefore, technologies that contribute to the preservation and improvement of land fertility should be used for the effective use of land resources in the Kursk region. The results of our study confirm the need to make adjustments to the current system of organization of agricultural production by improving the accounting system.

1. Introduction

The preservation and sustainable development of the agricultural sector is impossible without maintaining the fertility of agricultural land. This is due to the features of agricultural production and its role in ensuring national food security. 55% of the world reserves of black soil belong to Russia. The black soil is mainly located in the Central Black Earth Region, including the Kursk region, which is a cross-border territory with Ukraine. The most valuable type of land in the world must be preserved with current credentials [6], [7].

2. Materials and Methods

This paper analyzes various aspects of the fertility accounting of agricultural land using control procedures (methods and techniques), identifies the main directions of research in the field of accounting for land resources. In the framework of an integrated approach, the methods of observation, comparison, grouping, as well as the balance method were also used. The information base of the study was the official statistics of Russia and the Kursk region in particular.

3. Results

Soil is an indispensable, exhaustible, relatively renewable natural resource. Rules for the rational use of soil resources are not always followed, and soil loses its fertility as a result. Protection of renewable natural resources should be carried out through their rational use and expanded reproduction [1]. The presence and therefore quantitative and qualitative land accounting, especially of arable land, hayfields, and pastures, determines food security of any country.

In accordance with the State Standard GOST 27593-88 "Soils. Terms and definitions," the term "soil fertility" means "an ability of soil to satisfy the need of plants for nutrients, moisture and air, as well as to provide conditions for their normal activity."

Increasing the effective soil fertility implies increasing the content of nitrogen, phosphorus, and potash compounds available to plants [2].

The legislation of the Russian Federation provides for the main directions of ensuring the fertility of agricultural lands. In accordance with these directions, the following is carried out:

- Development and implementation of federal and regional targeted fertility programs;
- State rationing of fertility;
- State registration fertility indicators, fertility monitoring;
- Mandatory confirmation of compliance with plant protection products;
- Creation of data banks in the field of fertility.

Accounting data of land assets in various departments have significant differences. But reliable, standardized, and relevant data on the state of agricultural lands is necessary for their effective management.

Historical experience shows that accounting for agricultural lands is carried out on a separate synthetic account. Some authors suggest using analytical accounting, but fertility accounting is not highlighted (Table 1).

Table 1. Reflection of land as an accounting object.

Author	Publishing year	Name and code of the synthetic account	Analytical accounts
Pestrzhetsky, I.	1864	Land account	With field numbers, a number of tithes and cost of each plot
Rainbot, P. I.	1874	Land account	No data
Popov, A.	1891	Account No 27 "Land and Forest"	No data
Utekhin, N.	1897	Land account	With types of land according to the economic plan
Golts, T.	1898	Account "Land and buildings". He offered to open a separate the land account of and the buildings.	No data
Yasenetsky, B. I.	1913	"Land" account	No data
Pizengolts, M. Z.	2002	Account 08 "Fixed assets"	1 Acquisition of land. 2. Acquisition of environmental facilities 3. Construction of fixed assets 4. Acquisition of fixed assets (except cattle) 5. Acquisition of intangible assets 6. Transfer of young animals to the main herd 7. Purchase of adult animals 8. Acquisition of fixed assets for leasing 9 Other investments
Kozmenkova, S.V., Kovanov, S.I..	2015	Account 06 "Agricultural lands," "Agricultural lands" is an article in the balance sheet	1 Agricultural grounds 2 Lands in the stage of fertility restoration 3 Forest area 4 Trees and shrubs 5 Land under water 6 Other lands

Pizengolts, M. Z. notes that the main means of production in agriculture is land. It is important to ensure accurate accounting of land and land investments. Land takes into account additional (as capital) investments in physical terms (hectares), and it is in monetary terms for the purchased land [3].

Kozmenkova, S. V. & Kovanov, S. I. highlight effective aspects of its use. They propose to disclose information on unused lands (deposits), as well as on lands in the fertility restoration stage, as this directly affects the efficiency of agricultural production. These authors single out the account 06.2, i.e. these are those lands which are in the stage of fertility restoration [4].

The account 01.6 includes information related to land fertility, stating that the last should be disclosed, i.e. the distribution of agricultural land in terms of size, humus level, nutrients (nitrogen, phosphorus, potassium), lease period. Classification of land with the above parameters should be reflected in the subaccounts of the account 01.6 (01.6.01, 01.6.02, etc.).

Soil peculiarities as the main means (PBU 6/01) of agricultural production lie in the fact that soil does not reduce, but it increases fertility with right agricultural practices, relying on fertilizers and other methods.

The Kursk region is part of the Central Federal District of the Russian Federation. The territory of the region is 29.9 thousand km^2, the population is 1115, 237 thousand people, the rural population of it is 358.357 (32%). There are 28 municipal districts. The region's territory is 4.6% of the area of the Central Federal District and only 0.2% of the total area of Russia. The Kursk region is one of the five regions of the Central Black Earth economic region, occupying 18% of agricultural land and 19% of arable land. Two thirds of the soil cover of the Kursk region is "chernozem" (high quality black soils), and one fifth is represented by gray forest soils. The total length of the borders is 1,250 km, including 245 km (20%) falls on the border with the Sumy region of Ukraine. That is, the Kursk region has the status of the state border of Russia.

The high yield of agricultural crops in the Kursk region is the result of interaction of the following number of factors: increasing the quality of seed material, introducing mineral fertilizers, using new plant protection products, introducing innovative technologies for the cultivation of crops, improving forms and methods of organizing and paying for labor, etc.

In 2017, on average in the region, 151 kg of mineral fertilizers in terms of 100% of nutrients were applied to 1 hectare of sown areas, but it was more in 1990 (193 kg were added, or 27.8% more). During the period from 1990 to 2017, the measures contributing to the improvement of farmland were practically negated. In 1990, 36.4 hectares of acid soils were saturated with lime, then it was 8.7 thousand hectares in 2014, 7.0 thousand hectares in 2017. In 1992, 53.7 thousand hectares were produced, 28.4 thousand hectares in 1993, and 2.7 thousand hectares in 1994. In 1990, 339.9 thousand tons of limestone flour was introduced, which was 3.8 times more than in 2017. In comparison with the Soviet period, this is not enough.

Recently, organizational, economic, and legislative measures to return farmland into circulation have been undertaken. To accurately determine the amount of unused land, their inventory must be carried out and put on record.

One should note the concentration of land resources in the Kursk region. So, the land area of the average agricultural organization in the region amounted to 4008.2 hectares in 2016 (more than 2 times increase in comparison with 2006). The concentration of agricultural land requires tougher state control in order to prevent the monopolization of agricultural markets and the degradation of agricultural land.

A negative balance of nutrients is characteristic of contemporary agricultural production in the Kursk region (Table 2).

Table 2. Balance of nutrients, thousand c.d.v.

Balance sheet items	Years				
	2013	**2014**	**2015**	**2016**	**2017**
COMING					
Agricultural organizations					
With mineral fertilizers	1027.3	1130.3	1297	1649	1812.4
With organic fertilizers	43.0	65.3	65.7	83.2	92.9
Non-symbiotic nitrogen fixation	123	125	130	133	132
Symbiotic nitrogen fixation	41	42	43	44	44
Flow of nitrogen with precipitation	93	93	97	100	99
Households	*97.1*	*107.6*	*113.5*	*138.2*	*135.9*
Peasant farms	*238.7*	*279.6*	*326.2*	*419.5*	*454.7*
COMING - TOTAL	1620	1777	2007	2484	2679
CONSUMPTION					
Takeaway with crop	3741	4085	3779	4835	5294
In the process of soil erosion	54	55	57	58	58
During infiltration (leaching)	108	109	113	116	116
Denitrification (gaseous losses)	57	69	76	97	107
CONSUMPTION - TOTAL	3960	4318	4025	5106	5575
BALANCE	***-2340***	***-2541***	***-2018***	***-2623***	***-2896***

Based on the data in Table 2, we can conclude that about 50% of the nutrients removed with the crop are not contributed annually. To control and ensure the preservation of fertility of agricultural land, we consider it appropriate to make an annual calculation of the balance of nutrient removal, which could be reflected in the form of the 9-AIC annual report of organizations, taking into account changes in PBU 6/01.

PBU 6/01 in terms of the restoration of fixed assets should be summarized as follows. Restoration of fixed assets can be carried out through repair, modernization, reconstruction, and restoration of land is possible only with a positive balance of nutrient removal, taking into account the soils' radioactive contamination of the territories.

World experience shows that the mechanisms of economic incentives for agricultural producers need to be used; legislative acts aimed at preserving soil fertility, in the form of granting preferential loans, subsidies for fertilizers, etc. perform the role of such mechanisms. At the same time, the economic support of those land users who consciously allow land degradation should be completely excluded [5].

Funds of municipal budgets that come in the form of land tax can also be a source of funding for soil fertility reproduction. Currently, the amount of land tax does not depend on the results of economic activities of landowners, landowners, land users, and it is established in the form of stable payments per unit of land area per year.

4. Discussion

Accounting information is one of the sources of data on the state of agricultural land (acreage, gross yield, application of mineral and organic fertilizers, etc.). The bylaws do not stipulate how to use the available information to reduce soil fertility, and how they force land users to eliminate negative consequences of their activities.

The rise of the agrarian economy will be possible only if the role of the budget in the investment process increases. That is, the competitive selection of investment projects will take place. To do so, the regulatory and legal acts that control the implementation of programs on certain parameters, including the preservation of land fertility, are necessary.

As of today, many agricultural producers use software products that provide a source of uniform data. Accounting control occurs, it allows agricultural producers to obtain the appropriate agro-economic effect.

The authors have identified and systematized the main contemporary research directions in the field of land asset accounting.

1. Fertility as a unit of the agricultural land being allocated.
2. Clarifications on the application of the system of analytical subaccounts to account 01 "Fixed assets" / subaccount 6 "Land plots and objects of environmental management" are justified.
3. A nutrient removal balance leading to deterioration of agricultural land use is analyzed.
4. Amendments concerning the restoration of land resources are proposed for PBU 6/01.

5. Conclusion

Currently, the state has actually lost the function of land management, not properly carrying out land accounting and inventory, land use development planning, land management, and control over the use of land and their protection. The data of the 2006 and 2016 agricultural census do not coincide with other sources, it cannot serve as a basic assessment of the state. In order to monitor the state of food security, affordable food, indicators characterizing the structure, quality of agricultural land, acreage should be monitored. The use of digital technologies in accounting will significantly speed up and simplify decision-making on financing and state subsidization of projects for the development of various branches of agriculture.

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