



CYCLE AND BALANCE OF NUTRITION ELEMENTS IN AGRICULTURAL CENOSIS OF THE KASHKA-DARYA RIVER BASIN

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Article history:	Abstract:
Received: 11 th September 2022 Accepted: 11 th October 2022 Published: 20 th November 2022	<p>It was established that under cotton, grown on newly irrigated typical serozem soils balance of nitrogen and phosphorus formed as a positive, income exceeds output. A potassium balance is negative, so introduction of potassium fertilizers does not match the required norms, which makes it necessary to review the norms of potassium fertilizer application. On the irrigated typical serozem soils under cotton nitrogen balance is positive, but phosphorus and potassium balance is negative.</p> <p>Under winter wheat nitrogen and potassium balance is negative, and balance of phosphorus is slightly positive. In general, removal of the nutrient elements exceeds the refund.</p>

Keywords: Balance, a typical serozem soil, nutrient elements, winter wheat, prescription development.

INTRODUCTION. It is known that the role of plants in the nutrient cycle is enormous. Plants absorb these elements in a form accessible to them for their formation. Every year there is an irrevocable removal of individual elements with marketable products (cotton - raw, grain, green mass of corn, alfalfa hay, wheat grain, rice, etc.) and with the removal there is a return of them to the soil with leaf drop, with ovaries, root and crop residues and, if fertilizers are not applied, then the return of nutrients in the soil is not replenished, which leads to a loss of soil fertility. Fertilizers are not only a direct source of plant food, but also an increase in the effective fertility of soils, as they replenish the reserves of soil nutrients.

Thus, every year there is a cycle of biogenic elements in the soil-fertilizer system of e-plants, therefore. The study of the balance of elements of mineral nutrition of plants is one of the main components of the theory of the use of fertilizers, and it is necessary to predict changes in soil fertility.

The scientific basis for the development of a rational system for the use of fertilizers is the study of the balance of nutrients in soils.

D.N. Pryanishnikov [1] wrote: "Approximate calculations of the balance of nitrogen and ash elements for the rotation of crop rotation can thus be used to assess the fertilizer system (in relation to the total doses of nitrogen and ash elements and their ratios) to find out how much this system corresponds to the intended task in terms of obtaining yields of a certain height and the tasks of systematically increasing fertility soils".

Numerous studies have established that in modern conditions of intensive farming, studies on the balance of nutrients are of particular importance, because the solution to the problem of increasing agricultural production increasingly depends on the management of plant nutrition, on the impact on soil processes in favorable directions. A complete calculation and analysis of all balance sheet items is very difficult, as many of them fluctuate within very wide limits depending on constantly changing conditions. Nitrogen losses due to denitrification and leaching, the intake of nutrients with precipitation and even their content in the crop and other indicators are taken mainly as average values that can differ significantly from the indicators that develop in specific conditions. And yet, balance calculations make it possible to assess the availability of crops with nutrients, to identify all changes that occur over a certain period of time. And yet, balance calculations make it possible to assess the availability of crops with nutrients, to identify all changes that occur over a certain period of time. Time, to establish the prospective need for fertilizers, taking into account the preservation or increase of soil fertility.

Therefore, in order to preserve and maintain soil fertility, it is necessary to regulate the balance of nutrients by taking into account the chemical composition of plants and the removal of nutrients from the crop yield.

Currently, the most widespread is the so-called economic balance, which provides, first of all, in the expenditure part, the removal of nutrients with the harvest of basic and by-products. Some of these nutrients, especially nitrogen nutrients, are lost during leaching into groundwater, some pass into a hard-to-reach form as a result of chemical absorption (retrogradation of phosphates, unexchangeable fixation of ammonium, potassium and other immobilization factors).

The incoming part of the balance includes nutrient inputs with mineral and organic fertilizers, plant residues, seeds, precipitation, etc.

Studies on the study of the balance of nitrogen, phosphorus, potassium in soils for cotton were conducted by Tursunkhodjaev Z.Kh., Sorokin N.A., Toropkinoy A.A. [2], Ryzhovym SN., Pirakhunov T.P. [3] and others. Long-term studies have been carried out on the typical serozeme in permanent crops of cotton and when cultivating it in crop rotation with grasses against the background of the introduction of mineral and organic fertilizers. Changes in the nutrient content in the soil and their balance in these conditions are shown. They revealed that the balance of nitrogen and phosphorus when applying mineral fertilizers and manure is positive, and the balance of potassium, even in the NPK background, was negative both in permanent crops of cotton and in crop rotation.

Zakirov T.S., Valiev V.V. (1980) calculated the conditional balance of nitrogen, phosphorus and potassium for cotton in agriculture of 10 regions of Uzbekistan for the period 1967-1976, taking into account the alienation of these elements with cotton crops and their entry into the soil with organic and mineral fertilizers. Balance of nutrients in the republic was positive for nitrogen and phosphorus and negative for potassium [4].

As the authors note, the reimbursement of phosphorus in the republic significantly exceeded its removal and contributed to a further increase in the effective fertility of soils. The insufficiency of potash fertilizer application to create a modern crop was compensated by soil resources, which led to the depletion of soils by this nutrient, which requires a revision of potash fertilizer doses upwards to optimize its balance.

Research on the balance of nutrients in the agroecosystems of Karakalpakstan has shown that the balance of nutrients under different crops is different: under cotton - for nitrogen, phosphorus and potassium - negative. Under corn, rice - there is a negative balance in trace elements. In this regard, on the studied soil, according to balance calculations, it is necessary to increase the norms of mineral fertilizers [5].

It is known that in cotton growing, all the main products are removed from the field, as well as most of the by-products (stems, flaps), part of which, in the form of leaf mass, returns to the soil. The return of nutrients with leaves to the soil is excluded from the expenditure item of the balance and is included in the incoming one.

The balance, based on such calculations, does not reflect all the quantitative changes in a particular element in the soil-fertilizer system of crops, being approximate. However, even approximate calculations of the balance of nutrients clearly show the possibility of creating optimal conditions for plant nutrition with the help of fertilizer.

In connection with the need to systematically increase the efficiency of soil fertility and crops, improve the regime of nutrients and their ratios in the soil, predict the development of agriculture, improve and protect the environment, we used a more economic balance in our research. The calculation of the balance is conditional, since nutrients received with fertilizers, plant residues, etc. are not fully used by plants.

The purpose of this work is to study the balance of the main elements of nutrition - nitrogen, phosphorus and potassium in the soil-fertilizer-plant system to develop a rational system for the use of fertilizers.

The task of the research was: to study the provision of irrigated typical serozemes with mobile forms of nutrients, to determine their content in cotton and winter wheat plants and, on their basis, to calculate the balance of nutrients in the agricultural assessments of the Kashka-Darya river basin.

The study of the removal of nutrients by plants, as well as the incoming items of nutrients, made it possible to present the incoming and consumable economic balance of nitrogen, phosphorus and potassium in the soil-plant system on the hilly areas of the soils under study.

MATERIALS AND METHODS OF RESEARCH: Studies were conducted on typical serozemes located in the middle part of the valley of the Kashkadarya River, from whether they are delayed by the age of development, mechanical composition, degree of salinization, etc.

1. Oldly irrigated typical serozemy, medium loamy, developed on proluvial and loess deposits of foothill sloping plains (Shakhrisab district, massif them. U.Ibragimova) .

2. Newly irrigated typical serozemy, tigelosuglinist y, developed on alluvial-proluvial deposits of foothill pokaty x plains (Yakkabag district, K. Ashurov, department "Isat").

On each soil there are supporting soil sections, from which soil samples were taken for analysis. In addition, plant samples (cotton, winter wheat) were taken from the fields where soil sections are laid.

Analysis of soils provided trace of the following methods: determination of the mechanical composition of soils - according to Kachinsky, humus - according to N.V. Tyurin, nitrate form of nitrogen - according to Granvald-Lizhu by the ion-selective method. Determination of mobile phosphorus - according to B. Machigin, potassium - according to P.V. Protasov. On the determination of nitrogen, phosphorus and potassium in samples of cotton and winter wheat was carried out according to the method of I.M. Maltseva, L.P. Gritsenko [6, 7].

When calculating the balance, we used statistical data on the norms of fertilizers, yields and crops from the annual reports of farms, districts, etc.

The removal of nutrients with the harvest of cotton and winter wheat and their balance has been studied by calculation.

RESEARCH RESULTS AND THEIR DISCUSSION. The studied soils are characterized mainly by a low content of humus. According to our data, the content of humus in the arable horizon of soils ranges from - 0.89-1.23%. Soils are medium-provided with the nitrate form of nitrogen, mobile potassium and the bottom too without phosphorus.

The nitrate form of nitrogen is very dynamica. Throughout the vegetation of plants, depending on the temperature and humidity of the soil, it migrates to the underlying soil horizons and groundwater.

The average yield of cotton grown on newly-irrigated typical sulfur soils was 30.0 c / ha, and on old-growing ones - 27.5 c / ha. On newly-irrigated typical sulfur soils with a yield of raw cotton, 54.0 kg / ha of nitrogen, 45.0 kg / ha of phosphorus and 33.0 kg / ha of potassium are carried out.

Our research took into account the structure of the cotton crop, winter wheat (organ weight), the chemical composition of plants according to the content of nutrients in them, as well as their removal with crops.

On old-irrigated typical serozems with a harvest, fewer nutrients are carried than on newly-irrigated ones, which depends on the yield of cotton: for example, nitrogen is carried out 49.5 kg / ha of nitrogen, 35.7 kg / ha of phosphorus and 33.0 kg / ha of potassium.

The main article of the arrival of nutrients in the soil are fertilizers - mineral and organic (manure).

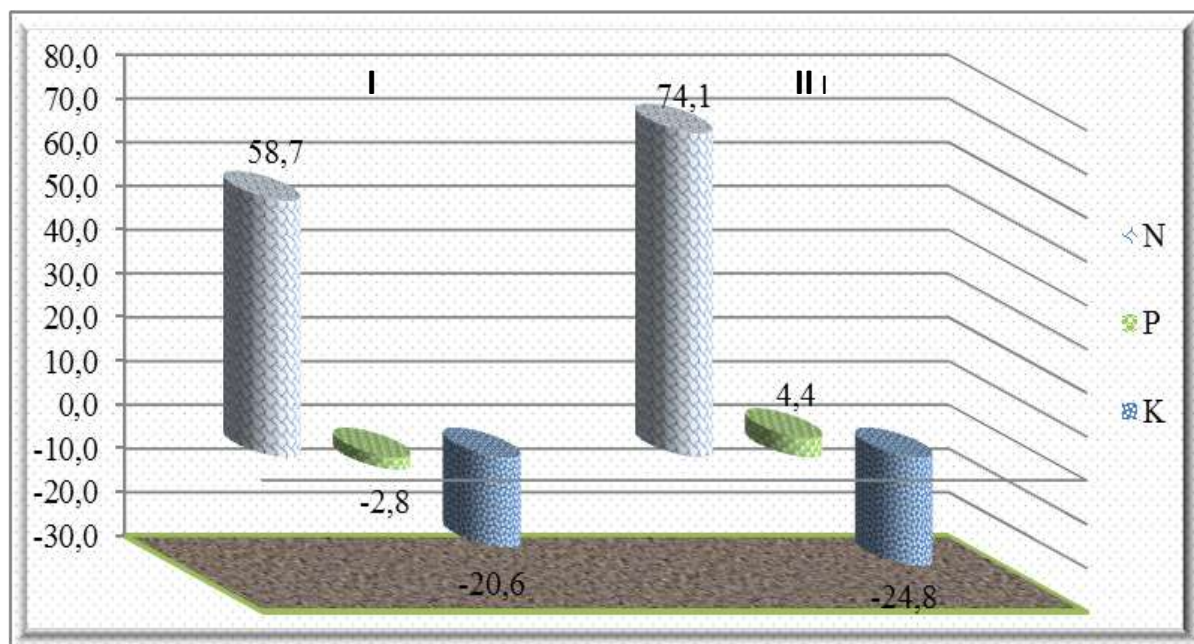
With mineral fertilizers, 126.1 kg / ha of nitrogen, 48.1 kg / ha of phosphorus and 35.8 kg / ha of potassium enter the soil under cotton on newly-irrigated typical sulfur soils. With organic fertilizers, 11.7 kg / ha of nitrogen, 11.3 kg / ha of phosphorus and 22.5 kg / ha of potassium are applied.

On old-irrigated typical sulfur soils, in comparison with newly-irrigated ones, fewer nutrients are absorbed from mineral fertilizers: 104.1 kg / ha of nitrogen, 31.4 kg / ha of phosphorus and 37.8 kg / ha of potassium. As for organic fertilizers, 10.4 kg / ha of nitrogen, 10.0 kg / ha of phosphorus and 20.0 kg / ha of potassium enter the soil with them (Figure 1).

The main expenditure item of the balance is the alienation of nutrients with agricultural products, the value of which is largely determined by the climate, soil type, biological characteristics of crops, methods and level of agricultural technology, doses, types of fertilizers, their combinations, etc. The balance of nutrients in soils under different crops develops in different ways.

It has been established that under cotton cultivated on a newly-irrigated typical sulfur soil, the balance of nitrogen and phosphorus is positive, because the incoming item exceeds the expenditure item. And the potassium balance here is negative, because the introduction of norms of potassium fertilizers does not correspond to the required ones, which makes it necessary to revise here the norms for the application of potassium fertilizers.

Picture 1
Balance of nitrogen, phosphorus and potassium in soils under cotton, kg/ha



Old irrigated (I) and new irrigated (II) typical gray soils

On old-irrigated typical sulfur soils, a positive nitrogen balance is created under cotton, and the balance of phosphorus and potassium is negative here.

An analysis of data on the nitrogen balance for cotton on new-hydrated and old-growing typical serozems indicates that the use of nitrogen fertilizers and manure ensures a positive nitrogen balance and a good cotton crop.

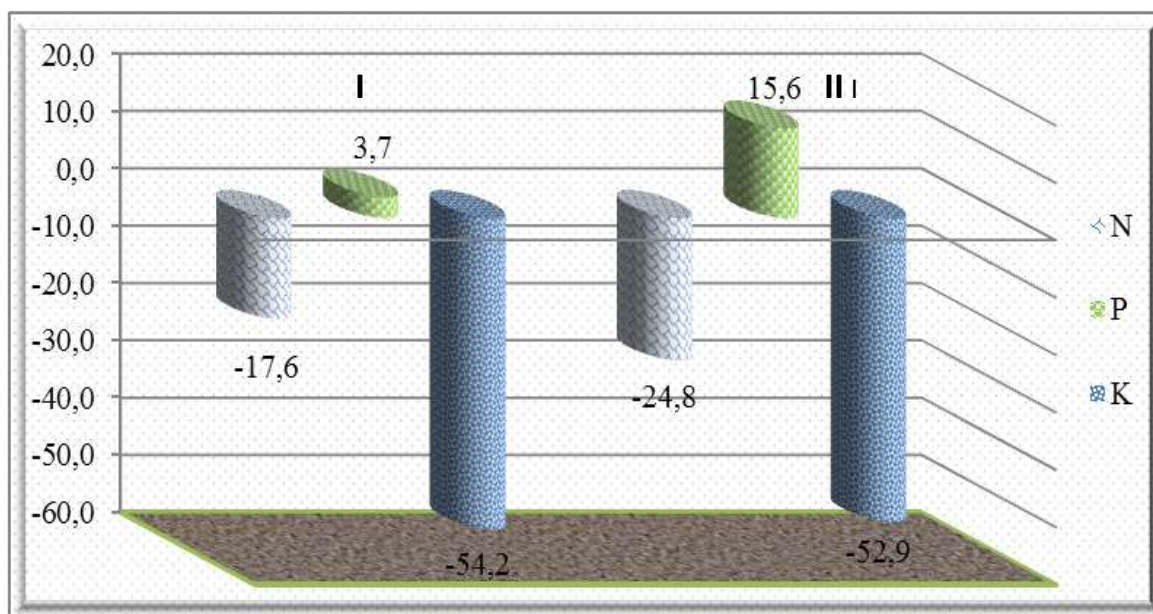
The balance of phosphorus for cotton on the studied soils shows that its intake into the soil depends entirely on its application with mineral and organic fertilizers. The balance of phosphorus on the old-irrigated typical sulfur soil was negative, but insignificant.

Along with nitrogen and phosphorus, potassium is an indispensable biophilic element for the nutrition of cotton. The acute deficiency of potassium in the studied soils is mainly due to the insufficient use of potash fertilizers in these farms due to high unilateral removal. Only a small part of the potassium alienated with the crop is replenished

by fertilizers. Basically, the yield exceeds the intake, so in the studied soils there is a deficit balance of potassium, which restrains the further growth of cotton yields.

As our studies have shown, under winter wheat, the balance of the main elements of nutrition - nitrogen and potassium, is mainly negative, which is due to the low availability of new and old-growing typical serozems with mobile forms of these elements and low doses of applied fertilizers, which occurs due to the irretrievable losses of nitrogen and potassium with crop and straw, which amount to nitrogen in old-irrigated typical serozems of 158.9 kg / ha, in the newly irrigated - 177.0 kg / ha. With mineral and organic fertilizers, crop residues, etc. nitrogen comes - 141.3-152.2 kg / ha, while a negative balance is created - 17.6 kg / ha - 24.8 kg / ha. Potassium yield is also higher than the intake and is for old-irrigated soils 3.0 kg / ha, new-irrigated - 135.8 kg / ha. Potassium enters the soil in the amount of 48.8 kg / ha, creating at the same time a negative balance of 52.9-54.2 kg / ha. The phosphorus balance in the cultivation of winter wheat is positive for old-irrigated typical serozems + 3.7 kg / ha, and newly irrigated is slightly higher than + 15.6 kg / ha. The intake of phosphorus into the soil under wheat with fertilizers, straw, crop residues is 52.7-73.2 kg / ha (Figure 2).

Figure-1
Balance of nitrogen, phosphorus and potassium under winter wheat, kg/ha



Old irrigated (I) and new irrigated (II) typical gray soils

Under winter wheat, a negative balance of nitrogen and potassium is created and a small, positive balance for phosphorus is created. Basically, the removal of nutrients exceeds the return.

FINDINGS. It has been established that the balance of nutrients in the conditions of cotton cultivation on irrigated typical serozems is satisfactory in nitrogen and, in part, in phosphorus, which causes the need to eliminate potassium deficiency.

The balance of nitrogen, phosphorus and potassium under winter wheat cultivated on new- and old-irrigated typical sulfur soils is somewhat different than under cotton.

As our studies have shown, under winter wheat, the balance of the main elements of nutrition - nitrogen and potassium, is mainly negative, which is due to the low availability of new and old-growing typical serozems with mobile forms of these elements and low doses of fertilizers applied.

The acute deficiency of potassium in the studied soils is mainly due to the insufficient use of potash fertilizers in these farms due to high unilateral removal. Only a small part of the potassium alienated with the crop is replenished by fertilizers. Basically, the removal exceeds the intake, therefore, in the studied soils there is a deficient balance of potassium, which restrains the further growth of cotton yields.

On the studied soils, according to the balance calculations, it is recommended to use the norms of applied x potassium x fertilizers and, partially, phosphorus. For winter wheat, doses of nitrogen and potassium fertilizers are recommended.

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