NEW PROSPECTS FOR REFORMS IN HORTICULTURE

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Abstract. This article examines the role of land resources in agricultural production and sustainable national development. Soil is analyzed both as a physical environment essential to human life and as a primary, non-renewable means of production requiring systematic conservation. The study highlights the global significance of soil as the planet's principal medium for the decomposition of organic and mineral compounds. Special attention is given to the agricultural potential of Uzbekistan, which possesses 0.25 hectares of arable land and 0.15 hectares of irrigated arable land per capita, alongside favorable climatic conditions and abundant labor resources. The article presents practical recommendations for improving soil fertility through the application of technical, organic, and organomineral fertilizers in accordance with regional scientific guidelines, with reference to farming practices in the Altyary, Kuva, Tashlok, Fergana, and Rishtan districts of the Fergana region. The study also addresses ongoing efforts to restrict pesticide use and proposes integrated livestock management at the household level as a means of generating additional income and ensuring a sustainable supply of organic fertilizer. The findings underscore that the rational use of domestic land resources represents a strategic pathway toward food security and increased agricultural exports.

Keywords: land resources, soil fertility, agricultural production, Uzbekistan, organic fertilizers, pesticides, food security, sustainable land use.

INTRODUCTION

Soil is a living environment composed of living organisms, in which life processes occur continuously. It is an infinite space in which substances such as humus, nitrogen, phosphorus, iron, sulfur, and others pass from one state to another through the activity of billions of microorganisms (small creatures) per gram. The appearance of plants is considered the beginning of soil formation.

The word "earth" is used in different forms in different languages.

For example, Russians say "zemlya" (land). The Turkic term is close to the verb "est" (to eat). Essentially, the earth simultaneously nourishes itself and provides living beings with everything they need. Written on the forehead of every living thing is the fact that it comes from soil and returns to soil.

The most important characteristic of soil is that it is a source of inexhaustible wealth, essential food and raw materials for humanity and the entire world, essential for life, like the sun, air, and water. In human society, soil has a dual significance: on the one hand, it is the physical environment, the place and function for human life and survival, and on the other, it is an economic and primary means of production. Therefore, it requires constant care and conservation [1-10].

Soil, which covers the globe, like the world's oceans, is the planet's primary cleansing medium. The decomposition of most organic and mineral compounds occurs in soil. In global agriculture, it is considered the primary means of production and a non-renewable natural resource.

For example, how much energy does the earth expend to germinate a seed once it reaches its womb? The earth may not germinate the seed! From this perspective, one can only praise the generosity of Mother Earth, who distributes precious food among the 8.5 billion inhabitants of the Earth.

In particular, the earth is a living organism. It breathes, accumulating energy to grow crops, shrubs, trees, flowers, and plants. The earth also requires care. It's no wonder our ancestors said that if you take care of the land, it will nourish the people.

Peasant vocabularies include expressions such as "thick soil" and "lean soil." The soil is depleted by regularly planted crops, but if the soil mass removed is replenished promptly, it doesn't become depleted.

The problem of soil depletion has arisen, especially since the development of technology and the unprecedented expansion of irrigated land. While in ancient times our ancestors enriched the soil with local fertilizers, overly depleted land was insufficient.

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Meanwhile, our ancestors' practices have undergone a transformation—chemicals have entered the agricultural sector. Today, it's difficult to imagine landownership without chemical services and synthetic fertilizers.

EXPERIMENTAL RESEARCH

Our country, with its fertile, highly productive lands, favorable climate, vast natural resources, and ample industrious labor force, could, with wise use of its domestic resources, become one of the richest countries in the world, easily feeding its 100 million population, not only clothing them but also exporting large volumes of produce abroad. This can be seen in the following examples of countries with developing agriculture.

As is well known, China ranks first in population. Per capita, the country has 0.07 hectares of arable land and 0.05 hectares of irrigated land. Chinese farmers feed over 1.7 billion people and are among the leading countries in selling surplus agricultural produce to other countries [11-16].

In Japan, the most populous country in the world, arable land is extremely scarce, with only 0.03 hectares per capita. However, people around the world recognize that Japan is the richest and fastest-growing country.

This is achieved primarily by efficiently using the 0.03 hectares of land cultivated by Japanese farmers without degrading soil fertility.

Another example is the state of Kerala in southern India, which covers only 38,000 square kilometers. In this region, approximately 40 million people use the land productively and live comfortably. They regularly improve the soil composition.

An example is the Netherlands, which is significantly developing thanks to improved soil fertility. When we talk about Holland, we mean a small country that occupies a significant place in the world in terms of cheese-making technologies, meat, milk, and vegetable production. In fact, this small country has a population of 16 million and a land area per capita of 0,04 hectares.

However, despite this, thanks to skillful land management and improved soil fertility, this country produces over 180 kg of meat and 1,150 kg of milk per capita annually. This country is known as the land of tulips.

While the Netherlands, with a population of 16 million and 1.038 million hectares of arable land (60% of which is reclaimed coastal land), produces agricultural products worth $131 billion, Uzbekistan, with a population of 38 million and 4.4 million hectares of arable land, produces only $13.2 billion.

Our country has enormous domestic potential in this regard. For example, Uzbekistan has 0.25 hectares of arable land and 0.15 hectares of irrigated arable land per capita. We have the potential to produce 2.0 times more than Kerala (a state in India), 2.7 times more than China, and 5.5 times more than Japan, simply by improving soil fertility.

In recent years, the average cotton yield in our country has fallen to 24-25 centners per hectare, alfalfa hay yield to 80-100 centners, corn grain yield to 35 centners, rice yield to 45-47.2 centners, corn tops yield to 60 centners, and vegetable and melon yields to 60 centners. All of this is the result of violations of land use regulations and regulations. The taste, aroma, and quality of cultivated field crops do not meet state requirements.

Soil, an inexhaustible source of food for humanity, has become impoverished. For example, the unlimited potential of soil, a "cash cow," has been devalued, trampled, and exploited blindly over the past 80 years [1-11].

RESEARCH RESULTS

Currently, there is a shortage of food, meat, milk, and fat. The negative land situation has not gone unnoticed by our President Shavkat Mirziyoyev, and on February 2, 2024, an important and long-awaited document came into force in our country – the Law of the Republic of Uzbekistan "On Soil Protection and Increasing Its Productivity," signed by the head of state.

In our country, the conservation and rational use of soil, land, and the state's food security directly depend on the condition of the soil, which is our national treasure [1-16].

For the first time in history, a survey of agricultural land is being conducted in Uzbekistan. To date, electronic maps of 23 million hectares of agricultural land have been created, and a geoportal has been launched. This encourages every farmer and peasant to respect the precious land and soil, to treat it with love and care, ensuring food security and its balance, and to plan which crops should be planted on which land, in what quantities, and with love.

The demands of the modern era and the analysis of the above require a step-by-step solution to the critical issues of preserving and improving soil fertility.

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- Train farmers, households, and other types of farmers in land management and soil care to ensure their potential meets the demands of the times.

- Study the current soil fertility level step-by-step, regularly monitoring the appropriate crops for planting.

- Replenish lost soil nutrients from crops on cultivated land, primarily with organic fertilizers, and popularize the experience of leading farmers (e.g., farmers from the Altyaryk, Kuva, Tashlak, Fergana, and Rishtan districts).

Apply organic fertilizers, soil-friendly waste, manure compost at a minimum rate of 10-15 tons, as well as phosphorus and potassium fertilizers at a rate of 50-70% per year during plowing in the fall. Conduct regionally coordinated plowing and tillage depending on the crop type. Strictly adhere to fertilizer application in accordance with the agrochemical map.

On every farm and enterprise, weeds damage crops by 11-43%, depending on the crop type—this must be prevented. Weed control is carried out using mechanical, chemical, and biological methods.

Consider measures to reduce the negative impact of pests and diseases on agricultural crops, which cause serious damage and reduce yields by 13-40 percent. Plowed land should be leveled using laser and long-baseline levels to a level that ensures unimpeded water drainage.

Modern methods for removing salt from saline soils.

- Identifying and implementing strict measures to control plant diseases and pests, as well as ensuring winter irrigation.

- Cleaning all ditches and canals for efficient water use, ensuring unimpeded stormwater runoff.

- Following market trends in crop placement, planting crops in demand.

- Applying technical, organic, and organomineral fertilizers in accordance with strict regional scientific and technical recommendations.

- Implementing crop rotation and planting crops that are beneficial to the soil and profitable in the market, such as alfalfa, legumes, peas, soybeans, mung beans, beans, lupines, peanuts, potatoes, and carrots.

One of the main ways to eliminate the deficiencies in soil health in the republic through the implementation of the above-mentioned recommendations is to carry out agricultural work on irrigated lands using resource-saving technologies, increasing soil productivity and regularly replenishing it with organic matter, which will allow obtaining high and stable yields per hectare, including 45-50 centners of cotton, 220-240 centners of alfalfa hay, 70-80 centners of corn grain, 700-750 centners of corn stalks, 64.70 centners of wheat grain, 65-80 centners of rice, 200-250 centners of grapes, 250-200 centners of fruits, 650-700 centners of vegetables and melons, 250-300 centners of potatoes, and also increase the yield of food products obtained from cover crops. The above-mentioned opportunities make it possible to increase yields to 400-500 tons.

However, due to the fact that we don't fully utilize these opportunities, farmers produce 3-7 times less than they could.

Nevertheless, wheat is currently grown on approximately 1.2 million hectares in our country. However, a healthy, physically fit person should consume at least 60-65 kg of meat per year, according to health standards. In the years following independence, the amount of meat produced per capita in Uzbekistan averaged 25-26 kg.

Another important task for meeting the short-term needs of 38 million people in our country could be the cultivation of low-calorie soybeans, lupines, sorghum, peas, mung beans, peanuts, and the development of potato farming.

For example, among protein-rich legumes equivalent to meat, soybeans and lupines contain up to 50%, while mung beans, beans, and chickpeas contain 21% to 29%. To compensate for the lack of protein in meat, a person should consume an average of 60-80 grams of legumes daily.

To achieve this, we recommend sharply increasing the area planted with nutritious, vitamin-rich legumes with a short growing season, maturing in 80 days, on land cleared from winter wheat.

One of the main opportunities for filling the tables of our republic's population and ensuring prosperity is to enrich the soil and land composition of private farms, increase their productivity, and achieve three to four harvests per season. There is some experience in this regard.

For example, farmers in the Altyary, Kuva, Tashlak, Fergana, and Rishtan districts apply at least 20 tons of dry fertilizer and 400-500 kg of pure phosphorus per 10-12 hectares of land and then plow it. After harvesting, farmers in the village of Kairagoch in the Rishtan district grow at least 4-5 tons of cucumbers, corn, radishes, turnips, houseplants, and at least 3 tons of grapes per season on 10-12 hectares of land, totaling 20-25 tons of food products. They also obtain up to 40-50 kilograms of tomato seedlings from a single bush.

Residents of Kuva grow apple, pear, quince, pomegranate, apricot, rose, poplar, and various fruit and ornamental trees on 8-10 acres of land. Furthermore, they produce 30 to 40 kg of pomegranates per bush.

All of the above brings them a significant income from 8-10 acres of land, thanks to maintaining and continually improving soil fertility and efficient land management. The land allocated to the family must be divided so that the fruits and vegetables grown year-round, as well as potatoes, carrots, and onions, provide not

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only food for the family but also allow them to store the harvest for the winter and sell any surplus on the market.

If a farmer who grows an average of 20 tons of produce from 10 hectares of land per season can sell 20,000 kg of produce at 2,000 Uzbek soums simply by continually increasing their yield, their annual gross income will be 40 million soums. However, the market itself claims that the current market price for produced produce is no less than 6,000 soums for potatoes, 5,000 for onions, 10,000 for carrots, 10,000 for cucumbers, 10,000 for tomatoes, and 10,000 for grapes. Even the price of radishes, turnips, and beets is at least 6,000-7,000 soums.

In conclusion, a farmer who has grown his own fruits or vegetables will never agree to sell them at the lowest price of 2,000 soums on the market.

As we have already emphasized above, proper crop rotation is one of the key requirements for high-quality farming, and its main purpose is, firstly, to meet the population's food needs and, secondly, to maintain soil fertility and increase crop yields through effective control of weeds, pests, and diseases.

Consider these examples, which demonstrate how the effectiveness of mineral fertilizers is declining. Currently, the useful nitrogen ratio in agriculture is only 35-40 percent instead of 50-70 percent. In other words, 60-70 percent of the nitrogen fertilizer applied to cotton fields is not consumed by the cotton itself. This excess nitrogen poses a very serious threat to the environment.

Particularly on arable lands where groundwater is at the surface, a significant portion of it, along with runoff, drainage, and sewer water, disrupts the environment. In particular, in areas sown with cotton and wheat, large quantities of nitrate nitrogen enter sewer water, which is harmful to all living organisms.

Based on the results of field experiments conducted under various soil and agricultural conditions, it is possible to determine the average permissible rate of nitrogen fertilizer application for the republic. The average rate can be considered to be 140-150 kilograms of nitrogen per hectare of land, where a yield of 30-35 centners per hectare is planned.

It should be remembered that layered application of nitrogen fertilizers in areas with a residual nitrogen content of more than 300 kilograms per hectare in a 1-meter soil layer allows for high yields of cotton, wheat, and other crops without the use of nitrogen fertilizers at all.

On soils with a nitrogen content of up to 300 kilograms, yields can be increased by applying half the annual rate of nitrogen fertilizer. On soils with a nitrate nitrogen content of up to 150 kilograms, the established rate must be adhered to.

Using this agrochemical mapping based on the amount of residual nitrogen in the soil and determining the soil nitrogen requirement for cotton cultivation, it is possible to significantly reduce the aforementioned 140 kilograms. Serious shortcomings and problems also exist in the use of phosphorus fertilizers [11-16].

It is extremely regrettable that over the past 50 years, during the growing season of cotton and other crops, phosphorus has been applied at rates 5-6 times higher than the plant's biological requirements.

As a result, more than 2,000 kilograms of reserve phosphorus have accumulated in the 1-meter soil layer per hectare. We believe it is advisable to apply phosphorus fertilizers layer by layer, based on new research on fertilizer application rates for agricultural fields, taking into account the amount of excess accumulated nitrogen, phosphorus, and potassium in the soil.

Foreign countries recognized the critical ecological state of the soil and the loss of its fertility 40-50 years earlier than we did. Recognizing that the reckless use of synthetic chemicals can have very negative consequences for soil ecology, they have taken measures to radically improve the situation. Many countries have succeeded in dramatically reducing the use of synthetic mineral fertilizers and pesticides.

They are even completely abandoning synthetic fertilizers, especially pesticides, in agricultural production and introducing "organic farming." It should not be forgotten that over the past 70 years, the highest rates of mineral fertilizer and pesticide use have been recorded in our republic.

We believe that there is only one path to ensuring the sustainable development of cotton production and agriculture in general. Until now, no one has considered fully restoring the macro- and micronutrients extracted from the soil, maximizing its fertility, and subsequently increasing this indicator annually.

This is extremely difficult, but today it is the cheapest and only feasible solution for rescuing the soil from its difficult situation. Radical improvement of soil fertility is possible through the gradual implementation of the above proposals and the restoration of disease-affected soils.

All guidelines, decisions, and measures on this issue should be aimed at organic farming, maintaining and improving soil fertility. It is well known that soil fertility can only be restored and improved by organic matter. Due to limited resources of organic fertilizers and manure (1.5 tons per hectare of arable land), the main source of soil organic matter is the more frequent planting of alfalfa.

After winter wheat, crops such as soybeans, lupines, peanuts, sorghum, and peas improve soil fertility. They leave up to 5-15 tons of root residues in the soil per year. They enrich the soil with up to 100-120 kilograms of

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pure nitrogen. As is well known, meat is one of the main and most expensive ingredients for cooking black-eyed peas.

In general, the role of meat in cooking varies. Even a small child knows that dishes without meat do not produce the expected flavor. Therefore, it is necessary to increase meat production.

To achieve this goal, work should begin with the family plot, the household. Therefore, assistant khokims elected from mahalla committees (village citizens' assemblies) should be tasked with promoting the need for every family to keep one dairy cow and her calf, at least 10 hens, and a rooster.

If this procedure is implemented in every household in the more than 30,000 villages of our country, its effectiveness will be very high. At the same time, organic fertilizers and manure are added to the soil, increasing productivity.

Currently, the average annual cost of feeding one cow is 14,000 kg of hay, 13,000 kg of straw, 5,000 kg of silage, 1,000 kg of mixed feed, and 1,700 kg of green grass. Converting this amount of feed into monetary terms would amount to 14,000,600 (fourteen million six hundred thousand) soums.

In this case, one cow and her calf consume 40.5 kg of hay, 38.5 kg of straw, 13.5 kg of silage, 2.5 kg of mixed feed, and 4.6 kg of green grass per day.

If a dairy cow receives all of the above nutrients for 12 months and produces 12 liters of milk per day, then in 10 months her milk production will reach 3,600 liters. Considering that the market price of 1 liter of milk ranges from 8,000 to 10,000 soums, and assuming an average price of 6,000 soums, we will also receive a revenue of 21,000,000 (twenty-one million) soums from the sale of 3,600 liters of milk.

If we subtract the above components from this income at today's market prices, we get a net income of 21,000,000 - 14,000,600 = 7,599,400 soums. Thus, one cow can generate a net profit of 7,599,400 soums from milk alone (these results, calculated at market prices, are even more significant at today's market prices).

Of course, during this period, the calf will grow, and one cow will give birth to two calves. If 20 kg of manure are collected daily from two head of cattle for a year, then 7,320 kg of clean manure will be collected in a year. The collected manure is enough for the household's own yard, and the rest can be given to a neighbor. If the collected manure is applied to 8-10 acres, the organic fertilizer applied per hectare will be 35-40 tons.

Now let's consider the raw materials: if a household keeps one cow, 4-5 sheep and goats or other animals, and 20-30 chickens, it will receive additional income and will not need to buy manure for its own yard.

CONCLUSIONS

The Law "On Agricultural Cooperatives," signed on November 8, 2024, is also important, as it aims to further strengthen the legal framework for cooperatives and develop the horticultural sector.

In the new cooperative system, agricultural enterprises or farmers can work together to solve problems that are beyond the capacity of individual farms. Given that our country currently has 671 agro-clusters, over 91,000 farms, and over 5.5 million landowners, its importance is even greater.

In our country, 20 million hectares of land are used to grow agricultural products necessary for food production and economic activity.

A farmer who cares for his land and produces a bountiful harvest will never go to market to cook something in a pot, but will grow it in his field, providing for himself and others. As a result, he will have a reserve for his family, sell the surplus, and the market will be filled with produce. As the weight of the produce increases, competition will arise in the markets, and prices will automatically decrease.

Overall, additional jobs will be created at the expense of the household. Our children will be refrained from foolishness and will learn to live honestly through their labor. Thus, the development of personal subsidiary plots in households in a closely interconnected manner will not only become a source of income for each household, but will also open up opportunities for them to solve the problems of meat, milk and fat production by improving the soil and restoring its productivity.

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