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EDITORS

CALCULATION OF TEMPERATURE FIELD IN HELIOGLASS POULTRYHOUSE FLAT WALL WATER TANK HEAT ACCUMULATOR BY ANALYTICAL AND NUMERAL METHODS

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ABSTRACT

The article describes the changes in the temperature field in the construction of a flat-walled water tank heat accumulator in a helioglass poultryhouse, analytical and numerical methods, the results of experimental research on scientific and practical basis.

Keywords: hydraulic accumulator, poultry house, flat wall, temperature field, hydrodynamic resistance.

As known, an important role in microclimate creating is played by the effective use of a heat accumulator in helioglass poultryhouse. For this purpose, a one-dimensional model equation was developed with an ideal calculation of the temperature field with a heat accumulator in a water tank. However, when solving the issue, an increase in the level of accuracy of calculating temperature fluctuations in the tank water accumulator in the time interval with a conditional limitation and a numerical method based on the C++ program will be achieved. For helioglass poultryhouse the design of the water tank-heat accumulator has been developed (Figure 1-a, b). The efficiency of the amount of heat stored in the heat accumulator is determined in accordance with the results of analytical and experimental studies and, on this basis, its coefficient of efficiency is determined in accordance with the process and method of study. Also, development of design characterizing process of thermal accumulator operation in optimal mode requires use of equations characterizing its high-efficiency process [1,2]. When calculating heat and height distribution in a water tank accumulator, the degree of efficiency of water tanks in the process of their resettlement along a flat wall and their transfer to a building where birds leave through a lower window with a hot air flow along the perimeter is determined. Also, when

determining the volume values and optimal modes of hydrodynamic resistance of heat accumulators composed of water tanks, we determine the limit conditions when accumulating heat as a result of the implementation of air flow through the exhaust fan (Figure 2) due to mandatory convection

$$t_{ак} = t_{ч} \text{ here } \bar{x} = 0, \qquad \frac{\partial t_{ак}}{\partial \bar{x}} = 0 \text{ here } \bar{x} = 1 \tag{1}$$

When solving the equation given on the boundary conditions, the Laplace integral variable method [3] was used. In accordance with formula (1), we express the boundary conditions as follows

$$T_{ак} = T_{ч}, \text{ here } \bar{x} = 0, \frac{\partial T_{ак}}{\partial \bar{x}} = 0 \text{ here } \bar{x} = 1 \tag{2}$$

In the water tanks located in the flat wall, we express the Laplace equation, consisting of integral variables in the basis of the distribution of the temperature field in the process of acclimatization of heat

$$T = c_1 exp\left[\left(\frac{1}{2F_0} + \sqrt{\frac{1}{4F_0^2} + \frac{P+\overline{q_t}}{F_0}}\right)\cdot \bar{x}\right] + c_2 \exp\left[\left(\frac{1}{2F_0} - \sqrt{\frac{1}{4F_0^2} + \frac{P+\overline{q_t}}{F_0}}\right)\cdot \bar{x}\right] \tag{3}$$

Here we enter the following notations

$$K_e = \frac{1}{2F_0}; \qquad K_p = \sqrt{\frac{1}{4F_0^2} + \frac{P+\overline{q_t}}{F_0}} \tag{4}$$

We put the expression (4) into (3) and create the following equality

$$T = c_1 exp\left[\left(K_e - K_p\right)\cdot \bar{x}\right] + c_2 \exp\left[\left(K_e - K_p\right)\cdot \bar{x}\right] \tag{5}$$

We enter the following system notations for integration constants from boundary conditions (2)

$$\begin{cases} T_{ч} = C_1 + C_2 \\ C_1 = (K_1 + K_2) exp(K_1 + K_2) + C_2 (K_e - K_p) exp(K_e - K_p) = 0 \end{cases} \tag{6}$$

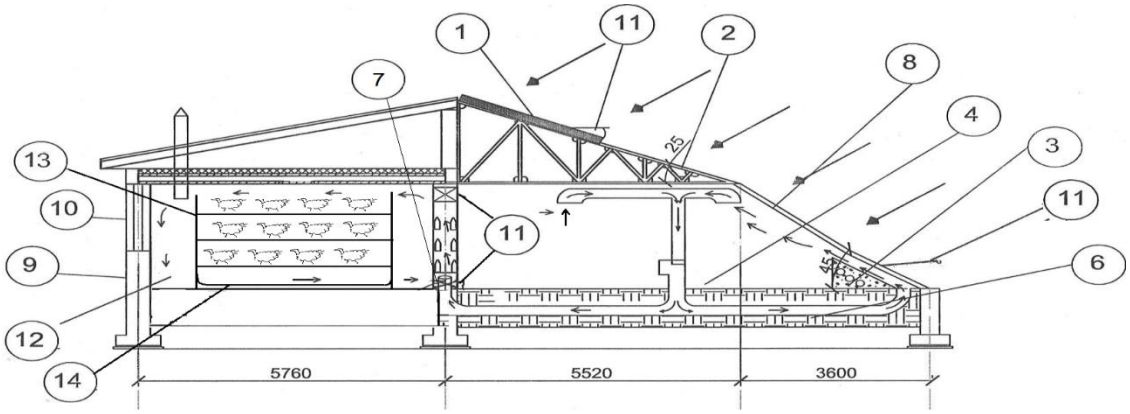


Figure 2. Diagram of the cross-section of the solar poultry house in farm and entrepreneurial farms, combined with the walls of collector batteries. Solar photographic battery. 2. The additional surface for daylight penetration; 3. Heat exchanger for heating with additional hot water from the bioenergy device; 4. Soil heat accumulator; 5. Thermal accumulator of flat wall with plastic bottles filled with water; 6. Cylindrical pipes with a diameter of 0.2 meters, made of pan; 7. An air circulation fan; 8. The fundamental thin surface for daylight penetration; 9. Flat wall made from heat keeper composite material (with cane interlaying). 10-11. Ventilation window; 12. Helioglass poultryhouse. 13. Racks for poultry care in helioglass poultryhouse.14. Washing device for poultry plant waste.

The fan diagram given in the figure 3 is water fan with automatic air temperature control by ventilation circulating through a steam heat accumulator with a flat wall of the automated helioglass poultryhouse.

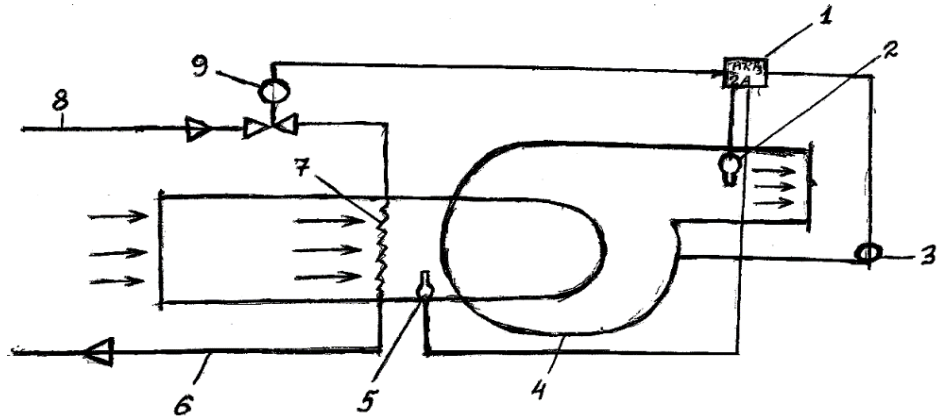
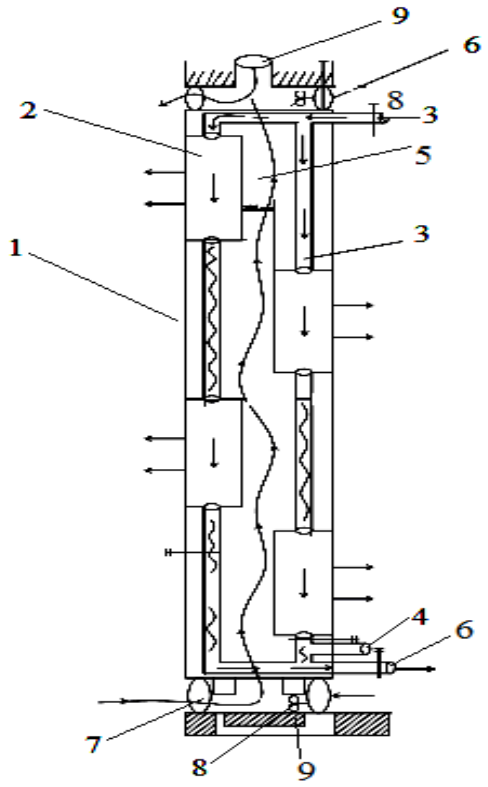


Figure 3. Controlled ABTZ-2A fan circuit with automatic electronic unit for maintaining air temperature in helioglass poultryhouse in normal mode. 1- electronic unit; 2 warm air temperature sensor; 3- a fan electric motor; 4 - fan;5- a device providing a warm flow rate of air moving through a hot accumulator with a water flat wall;6- electric current conductor, which converts into solar photobattery; 7- additional electric

heating unit; 8- an electrical conductor transmitted to the device from the solar photobattery; 9- automatic device starting mechanism.



1[b]-figure. Diagram of heat accumulator with flat tank wall. 1- heat accumulator with flat tank wall; 2- total 16 water tanks and each tank consists of 20L and 320L water tanks; 3- suction fan; 4- air flow control device; 5- air flow moving pipeline; 6- device for air flow control, which passes into helioglasshouse; 7- control device designed for ventilation of poultryhouse; 8- suction fan for fresh and low-temperature air in the helioglasshouse; 9- base.

(6) тенгламалар системасини C_1 ва C_2 га ечамиз We solve system of equations (6) comparatively C_1 and C_2.

$$\left.\begin{aligned} C_1 &= -T_\Gamma \frac{\left(K_e - K_p\right)exp(-K_p)}{\left(K_e + K_p\right)exp\left(K_e + K_p\right) - \left(K_e - K_p\right)exp\left(K_e - K_p\right)} \\ C_2 &= T_\Gamma \frac{\left(K_e - K_p\right)exp(K_p)}{\left(K_e - K_p\right)exp\left(K_p\right) - \left(K_e - K_p\right)exp\left(-K_p\right)} \end{aligned}\right\} \quad (7)$$

In this case, the temperature change in heat accumulators consisting of flat walls of waterproof tanks is determined by the following equation.

$$T = T_\Gamma exp\left[\left(K_1\right)\bar{x}\right]\frac{\left[\left(K_e - K_p\right)exp(-K_p)(1-\bar{x})\right] + (K + K_p)exp[K_p(1-\bar{x})]}{\left(K_e + K_p\right)exp\left(K_p\right) - \left(K_e - K_p\right)exp\left(-K_p\right)} \quad (8)$$

Or $$T_a = T_r exp(K_1\bar{x})\frac{K_e ch[K_p(i-\bar{x})] + K_p sh[K_p(1-\bar{x})]}{K_e ch\left(K_p\right) + \left(K_p\right)sh\left(K_p\right)} \quad (9)$$

The figure and cover of the formula (9) express an infinite polynomial p. So, applying the formula Winter C.D [4] to this formula, the actual temperature area of the battery was found in tanks with a flat wall.

$$t_{ak} = A + \sum_{n=1}^{x} \frac{B(P_n)}{P_n \cdot C^1(P_n)} \cdot e^{p_n x} \tag{10}$$

Here, $A = \lim_{p\to 0} T, B(P_n) -$ is grub of the image p_n in formula (10) and characterizes the essence of the equation.

$C^1(P_n)$ is the root of formula (10) and it optimizes the value of the equation.

Equality
$$A = \frac{k_1 ch\left[1-\bar{x}\right] + k_2 sh\left[k_2(1-\bar{x})\right]}{k_1 ch(k_2 + k_2 sh)(k_2)} \tag{11}$$

was defined directly from the equations (4) and (9).

Here $k_2 = \sqrt{\frac{1}{4F_0^2} + \frac{q_{ucc}}{F_0}}$

Dividing into equal parts, we introduce a new variable

$$\mu = i\sqrt{\frac{1}{4F_0^2} + \frac{p + q_{ucc}}{F_0}} = ik_p \tag{12}$$

$$p = (\mu^2 \cdot F_0 + \frac{1}{4F_0^2}) - \bar{q}_{ucc} \tag{13}$$

Also, taking into account the following symbols

$$chk_p = \cos(ik_p), shk_p = i\sin(k_p) \tag{14}$$

we determine the value of temperature change in water tank accumulator::

$$T = T_r \exp\left[(-k_1)\bar{x}\right] \cdot \frac{k_1 \cos\left[\mu(1-\bar{x})\right] - \mu \sin\left[\mu(1-\bar{x})\right]}{k_1 \cos\mu - \mu\sin\mu} \tag{15}$$

The roots of this equation will be determined through the following equations:

$$k_1 \cos\mu - \mu\sin\mu \tag{16}$$

or

$$\frac{k_1}{\mu} = tg\,\mu \tag{16^1}$$

This equation is known from the nostationary theory of thermal conductivity [2], the roots of which are graphized. Therefore, we define the value of equation (9) on P

$$C^1(k+1)\frac{sh\sqrt{\frac{1}{4F_0^2}+\frac{p+q_{ucc}}{F_0}}}{2F_0\sqrt{\frac{1}{4F_0^2}+\frac{p+q_{ucc}}{F_0}}}+\frac{ch\sqrt{\frac{1}{4F_0^2}+\frac{p+q_{ucc}}{F_0}}}{2F_0} \quad (17)$$

By entering the signs of formula (12) in this equation, we get the following equality

$$C^1=\frac{k_1+1}{2F_0}\cdot\frac{\sin\mu}{\mu}\cdot\frac{\cos\mu}{F_0} \quad (18)$$

and by means of equations (15) and (18) temperature change t_{ak} in the water thermal accumulator of the solar greenhouse

$$t_{ak}=t_r^1\exp(k_1\bar{x})\left\{\frac{k_1ch\left[k_2(1-\bar{x})+k_2sh\left[k_2(1-\bar{x})\right]\right]}{k_1ch(k_2)+k_2sh(k_2)}+\sum_{n=1}^{\infty}\frac{k_1\cos\left[\mu_n(1-\bar{x})-\mu_n\cdot\sin\left[\mu_n(1-\bar{x})\right]\right]}{\left[\frac{k_1+1}{2F_0}\cdot\frac{\sin\mu}{\mu}\cdot\frac{\cos\mu}{F_0}\right]\left[\mu_n^2F_0+\frac{1}{4F_0}-\bar{q}_{ucc}\right]}\right\}\times$$

$$\times\exp\left\{\left[\mu_n^2F_0+\frac{1}{4F_0}-\bar{q}_{ucc}\right]\tau\right\} \quad (19).$$

A hot water battery can be obtained provided that the temperature fluctuations in the upper and lower parts are similar. t_{ak} is the network change of the water temperature in the tank battery and it depends on the change of the temperature in the upper and lower part of the battery and is determined by the equation:

$$t_{ak}=\Delta t_в\left\{\frac{sh(\frac{\bar{x}}{2F_0})}{sh(\frac{1}{2F_0})}+\sum_{n=1}^{\infty}\frac{2\mu_n\sin(\mu_n\cdot\bar{x})}{\mu_n{}^2+\frac{1}{4F_0{}^2}\cdot\cos\mu_n}\right\}\times$$

$$\times\exp\left[-\left(\mu_n{}^2F_0+\frac{1}{4F_0}\right)\bar{\vartheta}\right]\cdot\exp\left[\frac{1}{2F_0}(\bar{x}-1)\right]+ \quad (20);$$

$$+\Delta t_n\left\{\frac{sh(\frac{\bar{x}-1}{2F_0})}{sh(\frac{1}{2F_0})}+\sum_{n=1}^{\infty}\frac{2\mu_n\sin[\mu_n(1-\bar{x})]}{(\mu_n{}^2+\frac{1}{4F_0{}^2})\cdot\cos\mu_n}\times\right.$$

$$\left.\times\exp[-(\mu_n{}^2F_0+\frac{1}{4F_0})\cdot\tau\right\}\exp\left[\frac{1}{2F_0}\bar{x}\right]$$

here $\Delta t_в$ is temperature change at the top of the battery with water;

Δt_n – is temperature change in the lower part of the water tank battery;

$$F_0 = \frac{a}{u \cdot н}; \quad \bar{x} = \frac{x}{н}; \quad \bar{\tau} = \frac{\tau}{\tau_0} = \frac{\tau u}{н}.$$

When calculating temperature fluctuations in a water tank battery using formula (20), it is taken into account that the height 2 m and volume $V = 320л$ of the battery.

Figure 4 shows the relative temperature change $\bar{T}$ in height in different values of the water tank battery F_0.

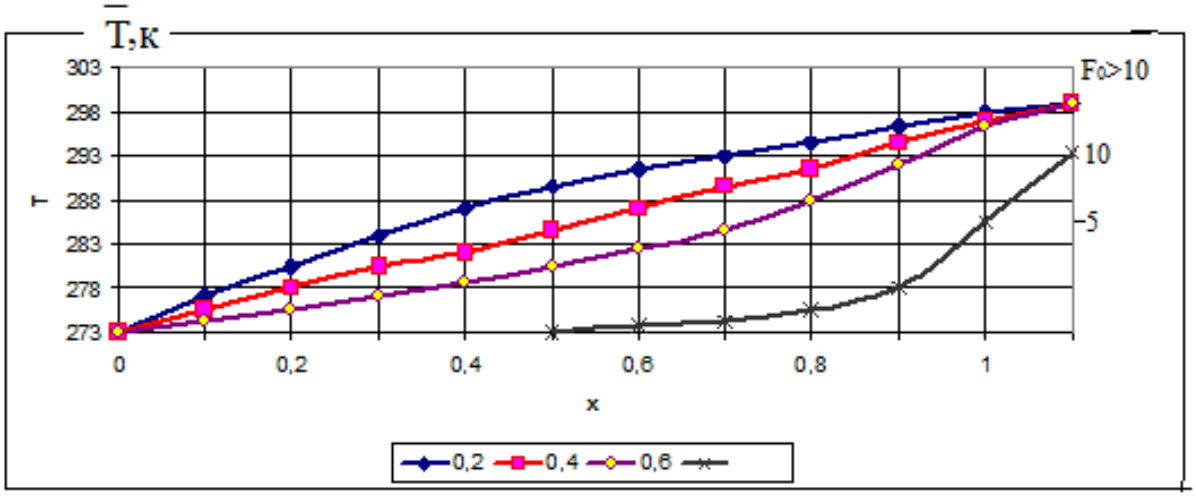


Figure 4. The change in Fourier number in different values $\bar{T}$ in the average height H of water heat accumulator F_0 with flat wall.

It can be seen from the graph that in the tank of the battery with a flat wall of the helioglass poultryhouse, the results of calculations based on the numerical method using the formula for relative temperature change (20) correspond to experimental attributes. From the conducted experiments on heating heat accumulators, consisting of tanks with a flat wall, it follows that when exposed to warm water energy circulating from an additional biogas boiler plant on cold days, the water temperature in a slow accumulator with a flat wall varies in thickness, indicated in Figure 2. Using the equations given in the citation [4,5,6], it has been found that the accumulator accumulates 22-26% of the thermal energy on a water tank basis.

Arbitrary notations:

$\bar{T}$ - change of heat accumulator with water by height; $t_ч$- air temperature coming out of accumulator manifold with flat water wall; P- complex variables, τ - time; F_0 – Fourier test; x- coordinate characterizing heat flows in the width direction of the water heat

accumulator; U- medium section of coolant movement through water heat accumulators; a – temperature conductivity coefficient; H- height of heat accumulator with water; t_{ar}- air temperature included in the heat accumulator; $\overline{q_{uc}}$ - the average amount of heat transferred through the water heat storage tank to the poultry house.

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VIEWS OF FRENCH RENAISSANCE THINKERS ON CHILD UPBRINGING

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ABSTRACT

This article discusses the importance of the Renaissance in the upbringing of children by the thinkers who created it in French literature. Parenting is not a topic born in the age of enlightenment. Nevertheless, the philosophical and innovative spirit inherent in this period attracts the attention of many authors. They write their own textbooks, their goal is to raise children adequately, but they are still subject to the will and authority of the family. In addition to the fact that the issue of education is at the center of revolutionary changes, the attention paid to women and the views of thinkers on recognition were discussed.

Keywords: education, college, religious education, pedagogical authorities, education of women

INTRODUCTION

In this article is showed education of children has long given rise to the interventions of a few French writers between the Renaissance (Rabelais and Montaigne in particular) and the Revolution. In the midst of the ferment of the Enlightenment, the formation of the child is transformed into a priority with a view to the renewal of the modern individual. After 1750, and especially at the end of the eighteenth century, many writings appeared focusing exclusively on education or having education as one of the main subjects, such as Rousseau's Émile (1762), which depicts one of the masterpieces of educational research. Despite the great reputation enjoyed by Emile, Voltaire denigrates Rousseau's educational work because of the ideas presented and the character differences characterizing one rather than the other. Other novelists (such as Diderot and Laclos) and some women (such as Madame d'Épinay and Madame de Genlis) offer the public their own educational proposals. This study considers the delineation of an overall framework explaining the evolution of education during the eighteenth century, as well as its importance in some writers of the century.

RESEARCH MATERIALS AND METHODS

In the eighteenth century, education was still reserved for the wealthy classes and, above all, aimed at the intellectual formation of the male gender within the framework of French society under the Ancien Régime. At the age of ten the children are taken away from the family because of family projects: the children intended for the ecclesiastical career or the public administration are sent to colleges, while those who will devote themselves to a military career are supported by soldiers. Because of the forced separation wanted by the families, the children rarely have the opportunity to know their own brothers and sisters[1,334]. In the same way, relations with parents are often severed. Since the seventeenth century the Jesuits have controlled education in colleges as well as teaching in some universities by imposing their educational model throughout Europe: the best representatives of the Enlightenment (Voltaire) and the Revolution (Desmoulins and Robespierre), moreover, were formed with the Jesuits [2, 245].

The teaching given by the monks involves the study of classical Greek and Roman authors, on the one hand, and the analysis of French authors, on the other. Although he is anticlerical, Voltaire speaks with respect and gratitude of the teachings received at the Parisian college Louis-le-Grand, the most famous of the Jesuit colleges, which offers free in-depth education. Despite his enlightened opinions, Voltaire rejected the literacy of the people, as evidenced by the letter of April 1, 1766 addressed to Mr. Damilaville [3,333]. Provided in the convent or at home, the education given to girls is generally considered inadequate and neglected. While several novelists of the century denounced the insufficiency of religious education, it was Madame de Genlis who spoke out forcefully against conventual education in her Discourse on the suppression of convents of nuns and on the public education of women (1791). Remembering her religious training, she observed that domestic education was sometimes given to girls from the well-to-do classes by governesses, although there were complaints of the ignorance of certain teachers. One of the first writers to propose an educational change was certainly Montesquieu. After highlighting the superiority of the pedagogical model of Antiquity, Montesquieu observes the diversification of modern education as well as a gap between the modern model and the ancient one.

While Voltaire's education is still indebted to a rather traditional pedagogical model, d'Alembert offers a more modern and concrete training [2,245]. Following the condemnation of the methods and programs of the Jesuits, whose colleges would be abolished ten

years later, d'Alembert proposed a very modern reform aimed at the teaching of mathematics and physics, the introduction of foreign languages modern and classical and modern philosophy, as well as the deepening of history and fine arts.

Despite the pedagogical renewal that anticipated the abolition of the Jesuit colleges, D'Alembert did not appear expressly among the pedagogical authorities until 1770. It was rather the publication of Rousseau's Émile (1762) that sparked a growing interest in pedagogical issues and influences the next generation to which Bernardin de Saint-Pierre and Chateaubriand belong. In the letter addressed to Christophe de Beaumont in 1763, Rousseau summarizes the difference between the two types of education by explaining that positive education begins before the age of reason, while negative education is opposed much earlier to the birth of vices: “I call positive education that which tends to form the mind before age and to give the child the duties of man. I call negative education that which tends to perfect the organs, instruments of our knowledge, before giving us this knowledge and which prepares for reason by the exercise of the senses” [5,14-15].

RESULTS AND DISCUSSIONS

Rousseau's pedagogical positions were quick to trigger different reactions among writers. On the one hand, few authors show their disdain like Voltaire who, for example, speaks of the absurdity of the pedagogical principles put into action by Rousseau: "M. Jean-Jacques wants his pupil to be ignorant to the age of fifteen, and that he knows how to plane instead of learning geometry, history, belles-lettres" . In the second half of the eighteenth century several writers turned their attention to the education of women. One of the first is Rousseau who, in Book V of his Émile, manifests all his anti-feminism despite the presence in society of women recognized for their intelligence, such as Madame du Châtelet or Madame du Deffand. Unlike the man who can receive an education and work, the woman is condemned to a subordinate position because of her alleged intellectual and physical inferiority. [6, 637].

Like Rousseau, Diderot and Laclos reflect on the type of education traditionally reserved for girls by highlighting the limits of such a pedagogical organization. In this respect, Diderot observes that female training is deceptive because it is centered on the search for worldly pleasures: “The main care is to prevent boredom, to multiply amusements, to extend enjoyments.
At this time, women are eagerly sought after, both for the amiable qualities which they inherit from nature, and for those which they

have received from education [7, 56-59]. The education of women by Laclos, written in response to the subject proposed by the Academy of Dijon concerning women's education, testifies to a non-conformist reader of Rousseau as well as a critic of the society of the Ancien Régime. In Dangerous Liaisons, Laclos notes the state of enslavement of women through the character of the Marquise de Merteuil who, retracing her life and career in the famous letter 81, recognizes her inferiority linked to her sex. In Women and Their Education, Laclos ends up admitting that women could have changed their painful condition through a revolution: have neither the will nor the power to finish them, and how could they want to train women in front of whom they would be forced to blush? Learn that you can only get out of slavery by a great revolution"[8,9-10]. Women's education aroused the attention of several ladies such as Madame d'Épinay and Madame de Genlis. After writing Lettre à mon fils, which did not achieve the hoped-for educational results, Madame d'Épinay's reflections end with Les conversations d'Émilie (1782) inspired by the author's relationship with her granddaughter. The work, however, is configured through a dialogue between a mother and her daughter who possesses these qualities as faults[9, 58-59.].

One of the last eighteenth-century contributions to the education of women came from Madame de Genlis who, best known as the educator of the children of the Duke of Orléans (between 1782 and 1791), always had an inclination for the 'education. In her Memoirs she tells how, still very young, she improvised herself as a schoolteacher to teach little boys the catechism, a few verses from the tragedies of Mademoiselle Barbier and the principles of music that she had learned by heart. In January 1782 the Duke of Chartres appointed Madame de Genlis governor of the princes her sons[10, 52.].His masterpiece remains Adèle et Théodore (1782), a rival work to the Conversations d'Émilie for obtaining the Montyon prize for the year 1783. If we consider her pedagogical theories on the training of women, Madame de Genlis proposes a model still influenced by Rousseau by affirming the need to stimulate the natural education of girls through practical experience, contact with nature, the apprehension and the realization of manual and practical activities. The great merit of Madame de Genlis is, however, to detach herself from the philosopher of Geneva when she admits that female education must include knowledge of the arts, music and living languages [11,59].

CONCLUSION

In conclusion the education of children is not a subject born in the Age of Enlightenment. Yet it is the philosophical and

innovative spirit characterizing the eighteenth century that arouses the attention of many authors. They write a kind of educational guides whose purpose is an adequate training of children who, however, still remain subject to the will and authority of the family [12,145-146]. On the eve of the Revolution, there was also a desire for a radical change concerning the education of young girls, traditionally considered misleading (Diderot) or insufficient (Laclos).

This is why new educational models come from certain more or less erudite enlightened women (Madame d'Épinay for example) who imagine an education based on the ancient dialogic model associating philosophy with pedagogy [13, 158]. However, aware of new pedagogical trends, the latter wants the State to be able to take charge of education. Because of her direct experience, Madame de Genlis conceives an educational model oscillating between male tradition and female innovation: on the one hand, the young girl must be submitted sometimes to the father, sometimes to the husband once married and, on the other hand, she must be well educated through multidisciplinary knowledge. The question of education is also at the center of the revolutionary changes if we consider that Condorcet is developing a modern school system that goes beyond the traditional limits of social classes, yet at the foundation of the society of the Ancien Régime.

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THE INFLUENCE OF AGRICULTURAL SECTORS ON THE ECONOMY OF UZBEKISTAN

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ABSTRTACT

The article provides information on the role of agriculture in the economy of Uzbekistan. Examples are given with separate statistics on the huge share and importance of these sectors in the development of the economy. The article also discusses ways to overcome economic problems through the development of agriculture.

Keywords: agriculture, statistics, economic problems, resources, raw materials, produces and exports.

INTRODUCTION

Uzbekistan is among the world's leading cotton producers. It is known for its orchards and vineyards and is also important for raising Karakul sheep and silkworms. Uzbekistan's mineral and oil and gas reserves are substantial. The country produces and exports a large volume of natural gas. The central bank issues the national currency, the sum.

The country's resources include metallic ores; in the Olmaliq (Almalyk) mining belt in the Kurama Range, copper, zinc, lead, tungsten, and molybdenum are extracted. Uzbekistan possesses substantial reserves of natural gas, oil, and coal. The country consumes large amounts of its natural gas, and gas pipelines link its cities and stretch from Bukhara to the Ural region in Russia as well. Surveys show petroleum resources in the Fergana Valley (including major reserves in the Namangan area), in the vicinity of Bukhara, and in other places. The modern extraction of coal began to gain importance, especially in the Angren fields, only during World War II. Hydroelectric dams on the Syr Darya, the Naryn, and the Chirchiq rivers help augment the country's nuclear-, coal-, and petroleum-powered generation of electricity.

PROBLEMS WITH CURRENT METHODOLOGIES

Centuries-old rumours of extensive gold deposits in Uzbekistan evidently arose from a basis in fact. Rich polymetallic

ores have been found in the Ohangaron (Akhangaran) field southeast of Tashkent. Miners there extract copper, some gold, lead, molybdenum, tungsten, and zinc. A plant for heat-leaching gold from low-grade ore was built in the mid-1990s by a subsidiary of the Newmont Mining Corporation in the Muruntau field in the Kyzylkum Desert of north-central Uzbekistan. It was intended to be a joint venture with the government, but Newmont Mining Corporation's share was forfeited in a legal battle in 2007.

Uzbekistan requires greater water resources. By the early 1980s the government considered the shortage of water desperate. Officials in Moscow and Tashkent developed a plan to divert substantial amounts of water out of the Irtysh River far to the north into a pumped system that would aid in watering parts of lower Russia, Kazakhstan, and Uzbekistan. The project was killed, however, before it began, leaving Uzbekistan with chronic water shortages.

Ample sunlight, mild winters of short duration, fertile irrigated soil, and good pastures make Uzbekistan suitable for cattle raising and the cultivation of cotton. Irrigation has fallen into disfavour owing to the depletion of the great rivers, and the construction of new irrigation systems has been prohibited or curtailed. Already existing grand canals include the Great Fergana, Northern Fergana, Southern Fergana, and Tashkent. Several large artificial lakes and reservoirs have been created on the Zeravshan and other rivers.

In addition to the high and stable cotton yield in this most northerly of the great cotton regions of the world, growers have raised silkworms systematically since the 4th century. The silkworms are fed mulberry leaves from the many trees planted along streets and ditches. The Fergana Valley is especially noted for silk production.

Varieties of melons, apricots, pomegranates, berries, apples, pears, cherries, and figs grow abundantly, as do vegetables such as carrots, cucumbers, onions, tomatoes, and greens. Uzbekistan's grapes are made into wine or raisins or are eaten fresh. Fruits and vegetables are sold both in the bazaars of Tashkent, Samarkand, Fergana, and other localities and in trade with neighbouring states. Korean agriculturalists cultivate rice along the middle Syr Darya. Sheep are the principal livestock.

Uzbekistan is the main producer of machinery and heavy equipment in Central Asia. The republic manufactures machines and equipment for cotton cultivation, harvesting, and processing and for use in the textile industry, irrigation, and road construction. This emphasis on making machinery also makes ferrous and nonferrous metallurgy

important. The first metallurgical plant began operation at Bekobod in 1946.

Light industry includes tea-packing plants and factories for garment making. The leading exports from Uzbekistan consist largely of extracted natural resources or raw materials cotton, natural gas, oil, coal, silk, fruit, and Karakul pelts. Some fresh produce reaches Moscow and other northern markets. Manufactured goods such as machines, cement, textiles, and fertilizer are also exported. Uzbekistan's largest sources of imports are China, Russia, South Korea, and Kazakhstan. Its main export destinations are Switzerland, China, Turkey, and Kazakhstan.

The great obstacle to further development of markets for Uzbekistan's copious truck gardening and fruit growing remains the antiquated means of distribution. Neither the surface nor air transport now available can efficiently or with adequate refrigeration handle the volume produced in Uzbekistan and needed by the Baltic states, Russia, Belarus, and Ukraine.

Old railways connect the republic's major urban centres with other Central Asian republics and extend to Moscow and Siberia. Uzbekistan never had a domestic airline of its own until after independence in 1991, when former Soviet Aeroflot airplanes and their pilots were chartered to fly rather infrequently from such cities as Samarkand and Tashkent to nearby cities. Air service now connects Tashkent with London, New York, and other international cities.

Cotton is Uzbekistan's main cash crop, accounting for 17% of its exports in 2006.[1] With annual cotton production of about 1 million ton of fiber (4%-5% of world production) and exports of 700,000-800,000 tons (10% of world exports), Uzbekistan is the 6th largest producer and the 2nd largest exporter of cotton in the world.[4] However, because of the risks associated with a one-crop economy as well as from considerations of food security for the population, Uzbekistan has been moving to diversify its production into cereals, while reducing cotton production. Thus, the area sown to cotton was reduced from 1.9 million hectares in 1990 to 1.4 million hectares in 2006, while the area under cereals increased from 1.0 million to 1.6 million hectares (in part at the expense of areas allocated to feed crops). Another cause behind moves to diversify may be environmental, because the large quantities of irrigation and fertilization needed to produce cotton have contributed to the drying up of the Aral Sea and to the severe pollution of the soil in the surrounding areas.

The main cereals are wheat, barley, corn, and also rice, which is grown in intensively irrigated oases. Minor crops include sesame, onions, flax, and tobacco. Fresh fruits are mainly consumed domestically, while dried fruits are also exported. Uzbek melons, known for

their long life and unique taste, are widely sought after in the large cities of the CIS.

CONCLUSION

As for conclusion the influence of agriculture has a great importance in economy of Uzbekistan. Pelts of the karakul sheep bred in Bukhara and its environs are a traditional export commodity, but their contribution to total exports today is negligible. The production of karakul pelts dropped from 1.4 million pieces in 1990 to less than 700,000 pieces in 2004. Cattle, sheep, and chickens are raised for meat. There are 3 million cows in Uzbekistan, and they produce 5 million liters of milk per year. The achieved yields of around 1,600 kg of milk per cow per year are among the lowest in the CIS (compared to 2,500 kg per cow per year for Russia, Ukraine, and Moldova) and dismally low compared to those in the EU countries or North America. The low milk yields are attributable to insufficient feed and reluctance of peasants to use artificial insemination for breed improvement.

Although silkworms and mulberry trees have existed in Uzbekistan since the 4th century and the country is known for its colorfully patterned silks, the silk industry continues to be statistically insignificant.

Up to 1991, agriculture in Uzbekistan (then Uzbek SSR), as in all other Soviet republics, was organized in a dual system, in which large-scale collective and state farms coexisted in a symbiotic relationship with quasi-private individual farming on subsidiary household plots. The process of transition to a market economy that began in independent Uzbekistan after 1992 led to the creation of three types of farms: the traditional household plots were renamed farms the large-scale collective and former state farms were reclassified agricultural production cooperatives or other corporate forms (joint-stock societies, limited liability companies, partnerships); and a new category of midsized peasant farms or “farmers” was introduced between the small dehkan farms and the large-scale *shirkats*.

As of 2006, "farmers" cultivate 75% of sown area, while dehkan farms cultivate 12.5% and various corporate farms control the remaining 12.5%. The situation is totally different with regard to livestock: 95% of cows is in dehkan farms, 4% in peasant farms, and just 1% in corporate farms. Dehkan farms produce 62% of gross agricultural output, followed by 32% in peasant farms, and a mere 6% in corporate farms.

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THE ECONOMIC SIGNIFICANCE OF SEED POTATO GROWING IN AGRICULTURE

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ABSTRACT

This article analyzes the economic indicators of the value chain in the cultivation of seed potatoes, the current state of potato production in the country, problems on the example of state statistics. The analysis showed that the raw material of seed potatoes grown for agriculture in our country is growing from year to year, but we see that the raw material of seed potatoes grown is not enough for the needs of agriculture.

Keywords: seed potato production, value chain, food security, entrepreneurship.

INTRODUCTION

In recent years, our country needs to radically develop the cultivation of seed potatoes, specialize the regions, strengthen the economic and financial system, improve the system of clusters and cooperation in this area, create potato products, storage, deep processing and value chain. Therefore, in order to ensure food security, it is proposed to fully use all the opportunities in the country, as well as to radically reform the industry and encourage the interests of growers. In this regard, the Resolution of the President of the Republic of Uzbekistan dated May 6, 2020 "On measures to expand the cultivation of potatoes and further development of seed production in the Republic." According to the resolution, a number of areas for potato clusters and cooperatives engaged in potato growing, in particular areas related to potato seed, have been identified as the main activities. Including;

- ✓ Consumption and cultivation of seed potatoes in integrated areas and creation of value chain in the field on the basis of innovative and resource-saving technologies;
- ✓ Expanding the cultivation of super elite and elite generations of seed potatoes, seed production and construction of modern potato plantations;
- ✓ Satisfaction of domestic market demand for consumption and seed potatoes, as well as expansion of its exports;

✓ Establishment of super elite and (or) elite generations of seed potatoes in at least 50% of the area under potatoes;

✓ Establish storage, sorting, delivery and processing of seed potatoes;

Introduction of advanced technologies, innovative know-how and scientific achievements in the field of potato growing.

The resolution also lists "areas in the country that specialize in the consumption and cultivation of seed potatoes, including its super-elite, elite generation."

MATERIALS AND METHODS

An average of 2.9 million tons of potatoes are grown annually in the country, including 2.5 million tons in residential areas and 443,000 tons by farmers and agricultural enterprises. Out of this, 1.8 million tons are used for human consumption, 450,000 tons are stored for seeds, and 700,000 tons are lost naturally and technically. Given the annual demand for 2-2.1 million tons of potatoes for human consumption, there is a shortage of 300,000 tons of potatoes for consumption. In addition, due to the lack of high-quality seeds in the country, 15-20 thousand tons of seed potatoes are imported annually. For information: 285 thousand tons of consumer potatoes were imported in 2019, and 130 thousand tons in January-March 2020. In addition, 22.3 thousand tons in 2017, 34.2 thousand tons in 2018, 12 thousand tons in 2019 from Belarus, Germany, Iran, Ireland, Kazakhstan, Kyrgyzstan, the Netherlands, Pakistan, Russia, Turkey, France and other countries. imported. One of the important links in the value chain in potato growing is the direct supply of raw materials for potato production. In order to provide the industry with quality raw materials, the development of potato seed has recently received a lot of attention in our country. In Samarkand region, Bulungur, Jambay, Taylak, Samarkand and Urgut districts were involved in the production of potato, while Bulungur, Jambay, Taylak and Urgut districts were involved in the production of seed potatoes, including its super elite and elite generations. specialization is emphasized. At the same time, taking into account the soil and climatic conditions of the regions, “F.Yuldash” “X.Olimjon”, “Kildon”,“ Navoi” and “A. Makhsumov” mahalla. This means that our government has created a legal framework for growing seed potatoes.

Good quality seed is a high productivity requirement in almost all potato production systems. Much of the yield that currently limits productivity in low-income countries is due to poor seed quality. Thus, the development of the potato seed sector is a major

concern for governments, researchers, development agencies, and civil society organizations. Potato seed systems are often described as formal or informal, but the informal seed system is complex and the informal seed system can be found in large numbers, especially in low-income countries.

In low-income countries, informal systems produce variable and often poor quality seeds. In areas with high potato yields (e.g., the U.S. and Europe), although some production subsectors (e.g., organic producers) often use uncertified seeds, the role of formal systems with high-quality certified seeds is high. is Attempts to introduce a formal seed system in low-income countries have largely failed; therefore, most low-resource potato farmers obtain their seeds through an informal system. Development community networks require alternative solutions, which typically include formal and informal seed systems or semi-formal systems such as quality declared seeds and a policy framework that protects farmers 'right to store and sell seeds. Given that seed quality currently affects low potato yields in low-income countries, the focus is primarily on developing the seed sector in resource-poor areas.

There are various references to formal and informal seed systems in the literature. In particular, the informal seed system of potatoes is a system of seed potatoes in which the tubers used for planting are produced and distributed by farmers without any regulation. In the official seed system of potatoes, seed roots are produced by licensed private sector specialists and cooperatives. The concept of a formal seed system is relatively clear, with components regulated by the public sector, a process of verification commonly referred to as "certification," and a variety to ensure that existing seeds are a recognized variety, low in disease. characterized by emission control. The informal system is complex and conceptually less clear because it basically owns everything informal, including self-saving seeds, seeds sold among farmers, and seeds purchased in local markets.

As mentioned above, special attention is paid to the development of seed potatoes in the country, which, of course, aims to increase the yield of potatoes. From the descriptions of the seed system in potato growing, it can be said that at present, both formal and informal seed systems are used by potato growers in agriculture.

If we talk about the production of raw potatoes in the country, Table 1 below shows the situation with the cultivation of raw potatoes in agriculture over the past five years.

Table 1

Dynamics of raw potatoes grown in agriculture of the republic (thousand tons)

Name of regions	2017	2018	2019	2020	2021	The differences between 2021 and 2017	
						(+,-)	%
The Republic of Karakalpakstan	61390	70305	83690	85700	123000	61610	2.0 times
Andijon	303399	343904	369141	376108	287932	-15467	94.9%
Bukhara	200989	209352	215598	222724	160995	-39994	80.1%
Jizzax	67275	62221	79267	82378	144334	77059	2.2 times
Qashqadaryo	183485	172632	173638	176752	226694	43209	123.5%
Navoi	76170	77011	79281	80349	56495	-19675	74.2%
Namangan	260977	264341	282924	289019	348131	87154	133.4%
Samarkand	**590706**	**579627**	**622594**	**626414**	**643903**	**53197**	**109.0%**
Surxondaryo	274251	306128	324157	331456	280805	6554	102.4%
Sirdaryo	52002	56795	59876	61278	79582	27580	153.0%
Tashkent	351636	363511	366692	367142	369839	18203	105.2%
Fergana	255751	290273	310283	318239	389466	133715	152.3%
Khorezm	115658	115833	122517	126235	124395	8737	107.6%
Total	**2793689**	**2911933**	**3089658**	**3143794**	**3235572**	**441883**	**115.8%**

Table 1 shows that in the last five years, potato production in the Republic of Karakalpakstan and Jizzakh region has doubled, while in Andijan, Bukhara and Nazi regions in 2021, potato production has decreased compared to 2017. This decrease may also have been due to the potato seed industry, which provides farms with quality varieties.

Regarding the situation with potato production in Samarkand region, which is the object of study, according to Table 1, raw potatoes are one of the largest in the country and the leader in comparison with other regions.

Improving the activities of each entity in the value chain in potato growing is a guarantee of timely delivery of cheap and high-quality potato products to consumers. In particular, most of the potato growers we analyzed do not take advantage of the opportunities to increase yields, especially the use of organic fertilizers and crop rotation. It is advisable to use such practices in potato growing.

CONCLUSIONS AND SUGGESTIONS

Improving the production of seed potatoes in the creation of a mechanism to ensure food security in the Republic of Uzbekistan;

Regulation and development of seed potato production, production of quality seed potatoes in agriculture and increase of capacity in this area;

Introduce domestic and foreign investment in the potato industry, encourage the establishment of free agrarian economic zones, agricultural clusters in the regions of the country, create a favorable business environment for their development;

In the Republic of Uzbekistan, it is expedient to further increase the volume of high-quality potato seeds in agriculture and accelerate their growth, to introduce practical experience of foreign countries in achieving high production efficiency.

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AGRITOURISM AND *FERMERS* DIVERSIFICATION IN SAMARKAND REGION

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ABSTRACT

The main purpose of this study is to examine the current situation and identify issues influencing the sustainable development of agritourism in rural areas in Samarkand region of Uzbekistan Increasing the economic potential of the rural areas by introducing innovative activities on Samarkand region's *fermers* and ensuring sustainable development is essential. Samarkand has extremely favorable conditions for many forms of tourism, especially agritourism. Th study conducted with 110 randomly selected *fermers* in Samarkand. Based on this data collection and analysis using chi-square and t tests, this study found significant socio-economic differences among agritourism and nonagritourism *fermers*. The results also indicated that agritourism is not popular among *fermers* in Samarkand. Finally, this paper investigated the general characteristics of *fermers* in the region, the current state of agritourism, the economic situation of *fermers*, and challenges in the development of agritourism.

Keywords: Agriculture; tourism; agritourism; sustainable development; rural areas.

INTRODUCTION

Agritourism has been discussed as a useful alternative activity to promote income growth on farms and rural development. It has been increasing steadily worldwide and has become one of the most significant supplementary income sources for farmers. It is not a new activity in many countries, having been undertaken since the early 20th century (Busby *et al.*, 2000; Arroyo *et al.*, 2013). In 2019, the value of agritourism activities in the global economy amounted to 69.24 billion USD (FBI, 2020). It is already being practiced in countries including Italy, the United States, Germany, Spain, France, Malaysia, and India, and is providing many benefits to the rural areas of these countries. Agritourism activities have become an alternative and important part of the agricultural sector and the development of rural areas in these countries. Moreover, agritourism is said to promote sustainable development, as it diversifies farming and is

predominantly focused on improving the livelihoods of the rural farming community. In Uzbekistan, agritourism is a new and innovative direction for development, because *fermer*s and rural communities lack even an initial understanding of this type of tourism (Togaymurodov *et al.,* 2016). Only 0.11% of farms in Uzbekistan have commenced agritourism activities. This is because agritourism is not sufficiently popular enough among Uzbekistan's *fermers* or medium-sized farms, many of which are accustomed to engaging only in agricultural activities. Moreover, there is little cooperation on the organization of nonagricultural activities.

Agriculture in Uzbekistan is the main livelihood of the rural people, and the sector needs to focus on building potential linkages with other sectors of the economy. Uzbekistan has three types of agricultural farms—*dehkhans*, *fermers*, and agricultural enterprises—each of which are legal farms with their own operating characteristics. *Dehkhans* are small farms with small land areas. *Fermers* are medium-sized farms and one of the main producers of agricultural products. *Agricultural enterprises* are small business companies engaged in the production of agriculture and all other farming and agricultural-related industries. The majority of the population, around 50%, in Uzbekistan resides in rural areas and around 23% engage in agricultural activities as their main livelihood (World Bank, 2020). The experience of developed countries shows that agritourism is playing an important role in the diversification of agriculture and the sustainable development of rural areas. Although Uzbekistan has various agricultural sector activities and resources that can be used for agritourism, it has not been adequately adopted compared with agritourism in other countries. The agricultural sector has been emerging as the leading economic contributor in Uzbekistan, and key areas of Uzbekistan are rural, with potential for the development of both tourism and agriculture. Linkages between agriculture and tourism would be beneficial for both sectors. However, Uzbekistan has not used these linkages to maximize the benefits of agritourism as a strategy for creating alternative sources of income for the rural community, including *fermer*s. In the existing literature, few studies examine the interrelated aspects of tourism and agriculture in Uzbekistan and only examine a narrow range of linkages and agritourism activities; this is even more the case in the Samarkand region of Uzbekistan. However, Samarkand is one of the world's greatest cities from a historical perspective, with a rich heritage and potential for agritourism, given that heritage and pilgrimage tourism is one of the most popular forms of tourism (Statistics Department of Samarkand Region, 2019).

Therefore, it is important to study the existing opportunities in the region.

MATERIALS AND METHODS

A survey questionnaire was the main method that we used for primary data collection. To collect the data, we conducted face-to-face interviews with *fermers*, one of the popular types of agricultural farms in Uzbekistan. The main interviews with *fermers* were conducted to determine the challenges facing the sustainable development of agritourism in the Samarkand region. Based on the data collected from 100 *fermers* that did not engage in agritourism and 10 agritourism *fermers*, we studied the existing opportunities for agritourism development and the challenges facing the implementation of agritourism activities at the *fermer* level. In addition, we gathered and analyzed data on the current agritourism activities in the region.

RESULTS AND DISCUSSION

We found that among these nonagritourism *fermers* in the Samarkand region, 12% were familiar with the concept of agritourism, 47% had heard of the concept, and 41% had no awareness of it. However, 36% of *fermers* were interested in agritourism, whereas 64% of *fermers* were interested in other off-farm activities.

Table 1. General information on nonagritourism *fermers* (based on owners) in the study area (n = 100)

Variables	Categories	All *fermers*	Including	
			Interested in agritourism	No-interested in agritourism
Gender	Male	82	29	53
	Female	18	7	11
Age	Less than 24 years	0	0	0
	25-30 years	3	1	2
	31-40 years	24	7	17
	41-50 years	30	10	20
	51-60 years	23	9	14
	More than 61 years	20	9	11
Education	Secondary school	25	7	18
	Bachelor degree	71	25	46

Master degree	3	3	0
Other	1	1	0

Source: Survey results of study areas, 2021

As shown in Table 1, out of the 100 nonagritourism *fermers*, the owners of 82 *fermers* were men and only 18 were women. The average age of these farmers was between 41 and 50 years. Most possessed higher education qualifications, most of which were bachelor's degrees. This is higher than the average education level in Uzbekistan, as less than 20% of the population possesses bachelor's degrees. We compare the gender, age, and education levels of the agritourism and nonagritourism *fermers*. The results, based on a t test of the difference between *fermers* interested in agritourism and *fermers* not interested in agritourism, showed that a clear correlation was observed only for education ($t = 2.071$; $p < 0.05$). The results indicated that the education level of *fermers* interested in agritourism is higher than that of *fermers* who are not interested (see Table 1.)

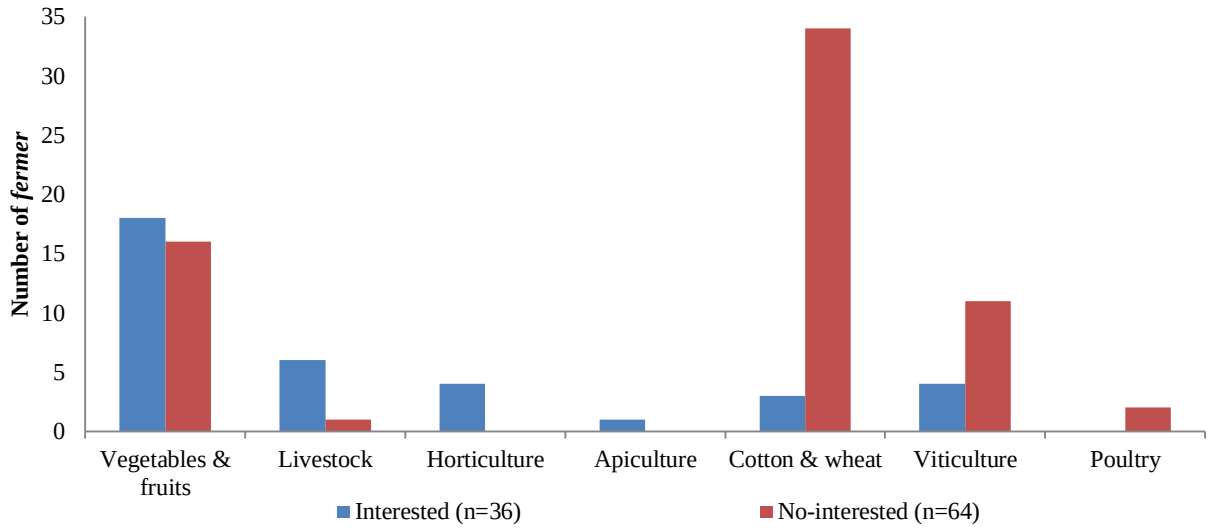

Fig. 1. *Fermers*' interest in agritourism by agricultural specialties (n = 100)

As shown in Fig. 1, this study studied the interest in agritourism activities based on dividing *fermers* into seven specialties, namely *v*egetables and fruits, livestock, horticulture, apiculture, cotton and wheat, viticulture, and poultry. This study divided the specialties into two broad groups based on the level of *fermers*' interest in agritourism. Group A consists of *fermers* specializing in vegetables and fruits, livestock, horticulture, and apiculture *fermers*. In Group A, there are a greater number of *fermers* interested in agritourism activities compared with those not interested in agritourism. These

fermers independently plan and manage their agricultural production activities and, for this reason, they are attempting to earn extra income by organizing alternative agritourism activities on their *fermers*. In Group B are the cotton and wheat, viticulture, and poultry *fermers*. Group B *fermers* mainly produce for and sell according to government or company orders. That is, this group of *fermers* operates under the control of the government or companies. Therefore, the level of interest in alternative activities is lower among this group.

Table 2. *Fermers*' annual incomes in Samarkand region, 2019

Categories	All *fermers* (n=110)	All *fermers*	
		Agritourism (n=10)	Nonagritourism (n=100)
US$ 0 - 5000	23.9%	0.0%	11.0%
US$ 5001 - 10000	34.8%	0.0%	16.0%
US$ 10001 - 20000	87.0%	0.0%	40.0%
US$ 20001 - 30000	43.5%	20.0%	20.0%
US$ 30001 - ~	28.3%	80.0%	13.0%
Mean	19722.7	36098.4	18085.1
Min	2299.5	23861.0	2299.5
Max	63101.6	50000.0	63101.6

Note: 1 USD = 9,350 Uzbekistan som (UZS) (Central Bank of Uzbekistan, 2019)

Agritourism had a strong impact on farm incomes, as shown in Table 2. A statistical comparison between agritourism and nonagritourism *fermers* showed that the average income of the former is double that of the latter (36,098.4 USD versus 18,085.1 USD). Furthermore, more than 80% of agritourism *fermers* have annual incomes of more than 30,000 USD. When we analyzed the average income of the 100 nonagritourism *fermers* and 10 agritourism *fermers*, we found that the average and minimum incomes of the agritourism *fermers* are higher than those of nonagritourism *fermers*.

As shown in Fig. 2, *fermers* face several challenges in developing agritourism in the Samarkand region. We used a survey questionnaire to determine and analyze such challenges. Based on the survey data, we divided challenges into three groups. Group A consists of challenges for both *fermers* who are currently engaged in agritourism and *fermers* who want to commence agritourism activities, as both these types of *fermers* face similar challenges. Group B challenges are those that agritourism *fermers* consider to be low-level challenges. This is because such *fermers* have practical skills in agritourism. However, these issues are important for *fermers* who are intending to commence agritourism activities. According to the results of the t tests, there is a strong

association between Group B challenges and agritourism beginners. In Group C are challenges that the main agritourism *fermers* are attempting to solve by formulating plans for the future development of agritourism. In general, *fermers* who are just commencing or about to commence agritourism activities should consider all three groups of challenges because they play an important role in the sustainable development of agritourism. For now, however, the main focus should be on solving the Group C challenges, as doing so will increase the propensity to adopt agritourism among the nonagritourism *fermers*.

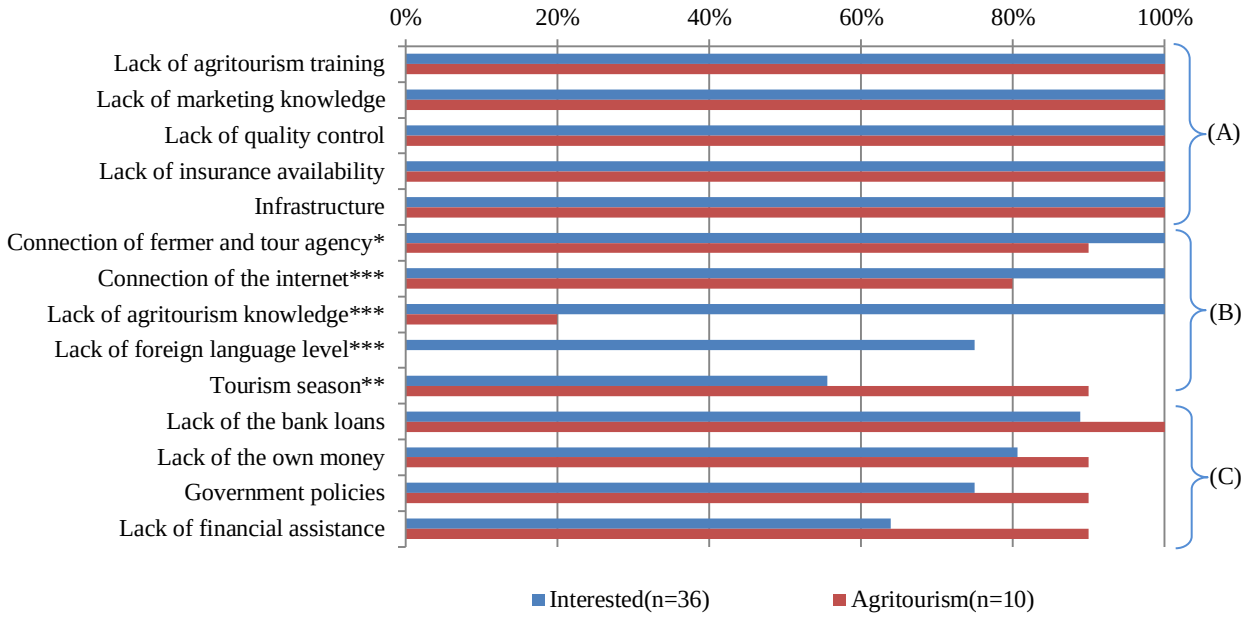

Fig. 2. Challenges to the development of agritourism by *fermers*

CONCLUSIONS

Samarkand has the potential and sufficient opportunities to develop agritourism. The concept of agritourism and the details of agritourism practices are not sufficiently well known or popular among *fermers*. However, many *fermers* have an interest in engaging in agritourism activities on to earn additional income. There is strong potential for the development of agritourism activities by *fermers*, particularly given that the annual income of *fermers* engaged in agritourism is twice as high as that of other *fermers*. Thus, actively engaging in agritourism is a good opportunity for *fermers* to increase their farm income.

We make the following recommendations for the sustainable development of agritourism by *fermers* in the region. To encourage the sustainable development of agritourism on *fermers*, it is necessary to increase the knowledge of agritourism among *fermers*, teach the owners of

fermers foreign languages, improve their use of the Internet and online services, strengthen communication between *fermers* and tourism agencies, and organize agro-activities suitable for the tourist season on the *fermers*. These activities will have a positive impact in terms of increasing the number of agritourism *fermers* in the future.

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THE INFLUENCE OF THE DIAMETER OF THE ROLLING ROLLERS ON THE UNIFORMITY OF THE DEPTH OF SEALING SEEDLINGS OF PHYTOMELIORANTS OF THE COMBINED TOOL

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ABSTRACT

The article presents the results of experimental studies of rolling rollers of a combined implement for planting seedlings of phytomeliorants.

Keywords: roller, seedling sealing, compaction, angle of inclination.

INTRODUCTION

A huge part of the Republic of Uzbekistan consists of desert and semi-desert pastures. However, the condition of these pastures is deteriorating year after year.

In favorable years, the yield of these pastures does not exceed 1.5...3.6 kg/ha. And in the acutely arid years they decreased by 2-3 times [1, 2, 3].

To date, there are several principles for improving pastures. However, these technological processes are carried out manually, by running flocks or by technical means used in irrigated agriculture. These technical means cannot meet agrotechnical requirements, or are material-intensive and energy-intensive.

MATERIALS AND METHODS

Based on this, we have developed a combined tool (Fig. 1) for tillage and planting seedlings of phytomeliorants designed for strip tillage with a width of 20-25 cm, and plant seedlings of phytomeliorative plants in these strips, as well as seal these seedlings to the required depth.

The combined tool consists of a frame 1, a hinged device 2, a basket for seedlings 3, a seat for the operator 4, a clamp 5, a template 6, a chain 7, a shelf 8 for the operator`s legs, sealing rollers 9, a opener 10, a ripper 11, support wheels 12 and a furrow maker 13.

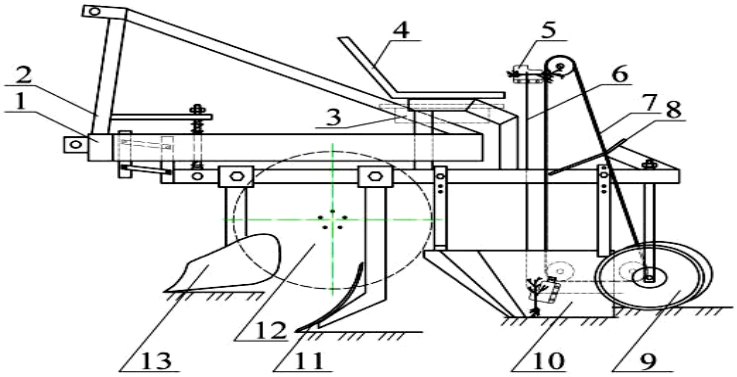


Fig. 1. The design scheme of the combined tool

The principle of operation of the gun is as follows.

When the tool moves, the furrow opener (Fig. 1) 13 cuts through the covered soil layer and wraps it to the sides, forming a groove, the ripper 11 following it processes the soil to the required depth, resulting in a treated strip of soil for planting seedlings. The opener coulter, moving along the treated soil, forms a landing slot. The operator, sitting on the seat 4, takes the seedling from the basket 3, installs it on the clamp 5 and runs away until it is securely fixed. The clamps 5 are mounted on a chain 7, which is driven from the support wheels 12 through intermediate gears. The seedling, together with the clamp 5, descends into the formed landing slot of the opener 10 and is held in an upright position until the soil is sealed around the seedling, the rolling rollers 9 produce soil compaction on both sides of the seedling.

In order to verify the results of theoretical studies, as well as to determine the rational values of the parameters of the rolling working bodies, laboratory studies were conducted.

The experiments were carried out in a special soil channel using a combined tool consisting of a tillage and planting part.

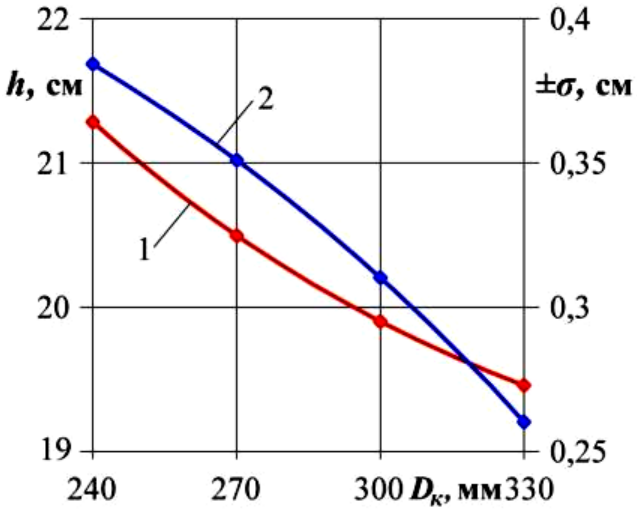
Each time before the start of laboratory studies on the soil channel, the working organs of the tool were adjusted. After that, one pass of the gun in the forward direction was carried out. On this passage, three accounting areas with a length of 1 m were measured for the entire width of the tool processing and the shape of the rolling was determined on them. Each experiment was carried out three times.

To conduct the experiments, rolling rollers with diameters of 240, 270, 300 and 330 mm with a width of 55 mm were manufactured (Fig.2). The remaining parameters were constant: the angle of inclination of the forming rim of the rolling rollers $\alpha_к$ = 20 °, the speed of movement V_{op} = 1.1 m/ s (Fig.4).

1)240; 2)270; 3)300; 4)330 mm.

Fig. 2. Rolling rollers with different diameters

Fig.3. Fragment of the study of the work of the rolling rollers



1-average depth (h) of seedling embedding; 2-standard deviation (±σ) of seedling embedding depth

Fig.4. The dependence of the uniformity of the depth of planting seedlings on the diameter of the rolling roller

RESULTS AND ANALYSIS

The experimental data obtained show (Fig. 4) that with an increase in the diameter of the rolling rollers from 240 to 300 mm, the depth of planting seedlings decreases from 21.5 to 19.5 cm. This is due to the fact that with an increase in the diameter of the rolling roller, their contact area with the soil increases. As a result, the depth of immersion of the rolling roller into the soil decreases. The standard deviation of the depth of planting seedlings with an increase in the diameter of the rolling rollers from 240 to 300 mm decreases from 0.38 to 0.36 cm, and with further increases from 300 to 330 mm, it practically does not change. However, an excessive increase in diameter leads to an increase in the metal consumption and dimensions of the rolling roller, which is undesirable.

CONCLUSIONS

Thus, based on the experimental studies carried out, it can be said that in order to ensure uniform embedding of seedlings in the soil, the diameter of the rolling roller should be within 300-330 mm.

The influence of diameter on the depth of seedling embedding and on its uniformity can be expressed by the following empirical formulas

$$h = 22{,}803 + 0{,}00493D - 0{,}000039D^2 ;$$

$$\sigma = 0{,}435 - 0{,}0008x + 0{,}000012x^2$$

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POSSIBILITIES OF USING GENETICALLY MODIFIED FOODS

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ABSTRACT

This article summarizes the results of laboratory studies conducted in animals on the effects of genetically modified products by many scientists, and on this basis provides opinions and comments on the pros and cons of genetic modification. It was also noted that a large-scale study should be conducted in this regard in our country.

Keywords: genetic modification, genetic engineering, genes, genetics, branding, ecology, eco-friendly products, food safety.

Relevance of the topic. It is known that one of the global problems of today is the growing demand for food in proportion to the growth of the world's population. Solving this problem, in turn, requires the use of new technologies in the cultivation, processing and storage of food. One such method is the use of genetic engineering in the cultivation of plant and animal products. GMOs are obtained using genetic engineering. In this case, a foreign gene is introduced into the genome of the organism.

Mankind has always strived for perfection. Experiments on the cultivation of plants began in the eighth millennium BC, and biotechnology was first used in the production of bread, beer, and cheese products four thousand years before Christ.

Genetic modification of plants began in 1977 with the use of soil microorganism Agrobacterium tumesacitns as a tool (vector) in the transfer of potential foreign genes to other plants. Field testing of genetically modified agricultural products began in 1987 with the development of virus-resistant tomato varieties. Since 1993, genetically modified products have been on sale.

Nowadays, genetically modified crops are grown in much of Europe, in countries such as the United States, Brazil, Argentina, India, Canada and China. In these countries, soybeans, corn, sugar beets, rice are often grown by genetic modification. High-ranking government agencies, in particular the U.S. and European Commission Food and Drug

Administration, the Food Standards Agency of Australia and New Zealand, and reputable scientific organizations have also positively assessed the cultivation of genetically modified crops for human life. considered safe IA Kuznetsov (2015), V. Lebedev (2003). In general, today genetically modified agricultural crops are grown in more than 20 countries around the world and have an area of 80 million hectares. more than a hectare.

Since the field of genetic engineering is not widely popular, it is natural that it generates different attitudes from the public. In most cases, there is an attitude by the population towards genetic modification and consumption of such products. The public's negative attitude towards the use of modified products can be explained by the lack of normative documents regulating the production and consumption of genetically modified products in most countries, as well as consumers' lack of any scientifically based information about genetically modified products and their future impact on the human body.

A few years ago, the European Commission officially acknowledged that it had no information about the long-term effects of genetically modified products on the human and animal body, and that none of the experts could guarantee the safety of consumption of genetically modified products. It is predicted that even after several years, the consumption of genetically modified products can lead to adverse events. Many experts explain the prevalence of allergies in the United States and the fact that one in four people suffers from various forms of it by consuming genetically modified products. However, it is impossible to ignore the results of scientific research in this area in recent years.

In experimental studies conducted by German scientists with mice in the laboratory, it was found that foreign genes can be embedded in the internal organs of animals. Italian scientists conducted a series of experimental studies and found that genetically modified soy can have a negative effect on the liver and other internal organs of mice. In Russia, I.V. Ermakov (2006), D. Quist., I. Chapela (2001), A. Coghlan (2002) found that modified shadows have a negative impact on the health of adult animals and cause poor internal development of children.

Laboratory studies with genetically modified potatoes at the Institute of Nutrition of the Russian Academy of Medical Sciences (RAMN) show that consumption of genetically modified products can worsen blood composition and cause pathological changes in internal organs. Similarly, genetically modified corn has been shown to cause significant internal organ damage and worsen blood composition.

The position of the Republic of Uzbekistan on this issue was clearly expressed by the first President of our country IA Karimov at the opening ceremony of the international conference "Important resources for the implementation of the food program in Uzbekistan" on June 6, 2014 in Tashkent. traditional vegetable and horticultural culture has long been based on the principles of biological farming, which involves the use of local fertilizers. This allows the cultivation of environmentally friendly fruits and vegetables with very tasty taste and consumption characteristics without the use of genetic modification technologies. The same issue can be addressed separately, but this topic is very relevant in the world, and there are different, sometimes even contradictory opinions about it. In my opinion, gene modification technologies are generally well-intentioned, i.e., aimed at increasing productivity. But until it is clearly proven that such technologies do not harm human health and do not cause negative consequences after ten or twenty years, I would advise those who are now actively engaged in this issue not to be too devoted to this work. In doing so, I think, first and foremost, commercial, even selfish goals often prevail. My personal opinion is that this issue should be considered in depth. " In his speeches, the President of the Republic of Uzbekistan Sh.M.Mirziyoev reiterated that today the production of environmentally friendly food products that do not harm human health is an important task.

It is known that one of the basic rights of a consumer is the right to receive complete and accurate information about the goods and services he buys. These rights of consumers are also reflected in the relevant laws. This type of data can include data indicating whether the food purchased contains genetically modified raw materials. But there are different approaches in the world to labeling products that contain genetically modified raw materials. For example, the label of food products containing genetically modified raw materials does not contain information about this in the United States, Canada and Argentina. In the countries of the European Union, data on genetically modified raw materials are provided only if the amount of genetically modified raw materials in food products exceeds 0.9%, and in Japan and Australia - more than 5%.

In today's era of globalization and intensification of trade, no country can guarantee the complete ecological purity of food products and their sale without genetically modified raw materials. For this reason, it is advisable for the consumer to know what quality food products he is buying and to be interested in the information on the packaging of the goods. As mentioned above, if the goods contain genetically modified raw materials in

accordance with the relevant requirements, then the packaging of the goods must contain information about it. It is up to the buyer to decide whether or not to purchase such a good. This shows that every consumer is not indifferent to their health and is considered to have contributed, albeit indirectly, to the production and sale of environmentally friendly products.

The bottom line is that each of us needs to be attentive to the changes taking place around us, to read my face, to be aware of the news, and to realize that maintaining our unique health is in many ways dependent on us. In this way, we will make a significant contribution to the prosperity and development of our independent country, at least with these qualities.

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THE INTERACTION OF ROOTSTOCKS, WATER AND SOIL HUMECTANTS AND YOUNG APPLE TREE GROWTH

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ABSTRACT

Young apple trees that are planted in areas with limited water resources face challenges in their early growth stages. Insufficient intake of moisture often stunts the growth of the young tree and impacts its subsequent growth. In this study, we observed the interaction of semi-vigorous Marubakaido (Ma) (*Malus prunifolia* 'Ringo') and dwarfing Jm7 ('Marubakaido' × M.9) rootstocks, water treatments (50% and 70% soil water content) and soil treatments (water retention substances) on young 'Miyabi Fuji' apple trees and how this interaction impacts their growth under dry climactic conditions. The development of shoots, stems and roots was analyzed. The results showed that the interaction of rootstock and water and soil treatments had a significant impact on total shoot length ($p < 0.01$), as did the interaction of rootstock and soil treatment on the length of the top three shoots ($p< 0.05$) and trunk fresh weight ($p < 0.05$). In addition, it was found that the interaction of water and soil treatments impacted shoot fresh weight ($p < 0.05$).

This study revealed that the growth of young apple trees in areas with limited water resources can be aided by providing a 70% and 50% saturation of water and soil retention treatments for young trees that have been grafted onto semi-vigorous Ma and dwarfing Jm7 rootstocks. Growers in these areas should think about which rootstock to use, what soil water retention treatments that can be introduced into the soil as well the amount of water that should be applied.

Keywords: 'Miyabi Fuji', rootstock, shoot growth, water treatment, water retention.

INTRODUCTION

In arid and semi-arid regions of the world, access to a stable supply of water is necessary for the successful propagation of apple trees, particularly for young trees shortly after planting. This is because obtaining a sufficient number of shoots on the young tree in the first growing season greatly influences future fruit-bearing capacity. Research (Tromp, 1996 and Bobomirzayev et al., 2022) found that soil temperature affects shoot growth, especially when it rises to where it enables sylleptic shoot growth. It has also been noted that notching techniques increase branching at the top of young apple trees (Greene and Autio, 1994). Arakawa et al (2014) showed that planting season and root mass have an impact on the length of the top two shoots on one-year-old ‘Fujis’ that where grafted onto ‘Marubakaido’ (Ma) rootstocks.

Another factor that promotes shoot growth and other physical changes in young trees is the uptake of nutrients from moisture in the soil. The hot and dry conditions during the growing season in some parts of the world, where water resources are scarce, can hinder the growth of young apple trees. To alleviate these problems, the introduction of efficient irrigation practices and water retention substances that could help maintain sufficient water moisture levels in the soil should be adopted.

It has been established that sufficiently high temperatures along with adequate irrigation contribute to the improved growth of young apple trees after they are planted. Ro (2001) found that when water was applied to young apple trees in soil with a water content level of 50%, they showed better average shoot length than those in soil with a water content level of 80%. Zhou et al. (2019) noted that if the soil moisture content was adjusted to 65-75% and an N-P_2O_5-K_2O fertilizer mixture controlled at 20-20-10 g·tree^{-1} was added, this combination proved to be the most effective for young apple trees planted in semiarid areas. In another study, Hydretain® ES Plus (Hydretain, Inc.), a water retention substance which is a blend of organic hygroscopic and humectants component (sugar alcohols, polysaccharides and neutral salts of alpha-hydroxy propionic acid), was shown to effectively hydrate the soil. On the other hand a further study reported that Hydretain ES Plus and other humectants had no observable effect on soil water retention in drought-tolerant Coleus ‘Wasabi’ during the plant growth stages (Greenwell et al., 2017).

Rootstocks play an important role in sustaining stable tree growth and controlling tree shape in the early fruit-bearing process of young apple trees. Soejima et al. (1998) reported on the benefits of Marubakaido (*Malus prunifolia* Borkh. v*ar. Ringo* Asami), a

semi-vigorous rootstock for apple trees that is widely used in Japan. Soejima et al. (2010) also studied the dwarfing rootstock Jm7 ('Marubakaido' × M.9), a rootstock included in the JM series of rootstocks. They found that growth intensity is similar to M.9 and that it is easy to graft by hardwood cutting.

The studies cited above focused on particular elements that promote young apple tree growth. However, the interaction between rootstock, irrigation, and soil treatments (water retention substances) has not yet been tested. The purpose of the present study is to examine the interaction between rootstock (Ma and Jm7) and water and soil treatments and the impact of this interaction on young apple tree growth and the implications it has for farm management practices in areas with limited water resources. The results led to the conclusion that the upper part of young apple trees show more growth when grafted onto Ma than on Jm7 and that the root system is significantly affected by water content levels and soil treatments.

MATERIALS AND METHODS

2.1. Plant materials and soil treatments.

Young 'Miyabi Fuji' (Botirov A., and Arakawa O., 2021) (a bud sport of 'Fuji' having good fruit coloration) apple trees were grafted onto semi-vigorous 'Marubakaido' (*Malus prunifolia* 'Ringo') rootstock and also onto dwarfing Jm7 ('Marubakaido' × M.9) rootstocks and planted on April 24, 2020. The young apple trees were placed in 11 L black plastic nursery pots that contained a mixture of one-part potting soil used for trees and two parts volcanic black soil.

Before planting, all apple saplings were scaled to the same size by cutting them to a length of 70 cm; roots were cut back to 10 cm. Two soil humectants (water retention substances) were used. One was a mixture of Glutan (amino acid "γ-PGA" produced→manufactured by *Bacillus* natto) and Kalpak 66 "ROYAL INDUSTRIES" Co, Ltd (Made in Japan). The other was Hydretain ES Plus 11 mL. Irrigation was done by hand-watering.

Sixty young apple trees were used in the experiment. Half of them were grafted onto Ma rootstocks, the other half onto Jm7. Half of the Ma rootstocks were irrigated to a 70% water content level, the other half to a 50% water content level. The same was done for trees grafted onto Jm7. Of the fifteen trees in each of these lots, five were treated with Glutan (11 mL/p) x Kalpak 66 (11 mL/p [z]), five were treated with Hydretain ES Plus (11 mL/p) and the remaining five were left untreated as controls. (Table 1). All trees were purchased from "HARADA NURSERY" Co, Ltd. The

experiments were conducted on the campus of the Hirosaki University Faculty of Agriculture and Life Science. The experiment design is shown below in Table 1.

Table 1. Experiment materials and used solutions for soil treatment

Rootstocks	Water treatment	Soil treatment
Ma	70%	Control Glutan (11 mL/p) x Kalpak 66 (11 mL/p [z]) Hydretain ES Plus (11 mL/p)
Jm7	50%	

z: mL/p – soil treatments mixed with soil and 11 mL per pot

2.2. Preparing the experiment site

A half-covered greenhouse (5 m wide and 10 m in length) was prepared for the experiment, with a clear plastic film polyethylene cover installed at the top as a shield against unexpected rain. The ground surface inside the greenhouse was layered with a black weed prevention sheet. Concrete bricks were placed on top of these sheets and four boards (1.21 m × 2.44 m) were placed on top of the bricks with a spacing of 0.50 cm between each board. The potted plants were then placed on the boards. Changes in soil water content were measured with a Decagon (pF meter). Insecticide and fungicide sprays were applied during the shoot growth period after planting at the same intervals as they are in area orchards.

2.3. Preparation samples for measuring

On November 24, each tree was carefully dug up and any soil or other matter was washed away with tap water. After that, the shoots, the main trunk (including the rootstock above the roots) and the roots were separated and measured. Root volume was measured in accordance with the Archimedes principle (10) by which a 5-liter plastic cylinder was placed in a large plastic bowl and filled with water, after which each root was carefully immersed in the cylinder. The overflow was poured into a graduated cylinder to measure the root volume.

2.4. Statistical analysis

All of the young apple trees were headed to the same height at the beginning of the experiment, cutting them at a point 70 cm above the graft union. During the growing season, shoot growth was observed from the headed area to the point below the four or more lateral shoots from the top. The same shoot growth was observed on both Ma and Jm7. Before proceeding with a statistical analysis, all shoots were designated as follows: The topmost shoot was called the “top shoot,” the second, third and fourth shoots were named

the “top-three shoots” and the remaining shoots were designated as “below shoots;” the combined lengths of all shoots are referred to as “total shoot length”. The results of the observations of soil treatments were analyzed using a three-way ANOVA for the interaction of rootstocks, water treatments, and soil treatments, plus a Tukey test using the R studio version 1.3.1073 (© 2009-2020 RStudio, PBC) software.

RESULTS

3.1. Impact of rootstock, soil and water treatments on shoot growth

A three-way ANOVA revealed that trees grafted onto the two rootstocks showed significant differences in the number of shoots (Table 2), total shoot length and top first and top three shoot length. The number of shoots, total shoot length and the length of the top first and top three shoots were significantly greater for those on Ma than those on Jm7.

Water saturation levels also had a notable impact on the number of shoots and total shoot length, but exerted no significant influence on the length of the top first and top three shoots. The greatest number of shoots were observed on Ma in soil with 70% water content levels, decreasing significantly on Jm7 in soil with 50% water content.

Soil treatments greatly influenced total shoot length, although they had no significant impact on the number of shoots or the length of the top first and top three shoots. The greatest total shoot length was observed on Jm7 in the trees that were taken from the pots with 70% soil water levels and non-treated soil. Total shoot length was significantly diminished on Jm7 trees that were taken from the pots having water content levels of 70% and soils treated with Hydretain ES Plus. As for total shoot length variation, the Hydretain ES Plus soil treatment had the greatest impact on Ma that were grown in pots with 70% soil water levels, followed by Ma in which Glutan and Kalpak 66 soil treatments were combined with 70% soil water levels.

There were significant differences in rootstock and soil treatment interactions on the lengths of the total and the top three shoots, although there were no significant differences in the number of shoots or the top shoot length. A three-way interaction (rootstock, water and soil treatment) was observed on total shoot length. Among the different sections of the trees, the greatest impact of the treatments was observed on the number of shoots on Ma in 70% water-saturated, untreated soil, whereas the longest total shoot lengths were seen on Jm7 in 70% soil water level, untreated soil. The greatest top shoot lengths

were observed on Ma in 50% soil water content, untreated soil, whereas the greatest top three shoot lengths were observed on Ma 70% water-saturated, that had also been treated with Glutan and Kalpak 66.

Table 2. Effects of treatments on the number of shoots and total shoot, top first shoot and top three shoot length (Means ± SE) for 'Fuji' on Ma and Jm7.

Rootstock	Water treatment	Soil treatment	Number of shoots[b]	Total shoot length (cm)[a]	Top first shoot length (cm)	Top three shoot length (cm) [a]
Ma	70%	Control	13 ± 0.6b	497 ± 25.4ac	105.9 ± 5.9ac	206 ±15.4ab
		Glutan + Kalpak 66	9 ± 1.5ab	394.2 ± 23.8a	117.7 ± 3.0 c	225.6 ± 10.8b
		Hydretain ES Plus	7.8 ± 0.6ab	630.7 ± 33.6cd	102.7 ± 4.2ac	189.7 ± 9.4ab
	50%	Control	7.2 ± 1.3ab	499.7 ± 17.5ac	124.7 ± 5.56c	189 ± 8.4ab
		Glutan + Kalpak 66	10.6 ± 2.7ab	397.7 ± 18.3a	113.6 ± 3.17bc	198.8 ± 7.1ab
		Hydretain ES Plus	7.8 ± 1.7ab	449.9 ± 10.0ab	118.4 ± 3.5bc	208 ± 17.8ab
Jm7	70%	Control	6.6 ± 0.5ab	715.8 ± 48.0d	93.3 ± 4.8ab	202.9 ± 16.9ab
		Glutan + Kalpak 66	6.2 ± 1.5ab	603.9 ± 44.4cd	111 ± 5.9ac	167.14 ± 5.3a
		Hydretain ES Plus	6.2 ± 1.6ab	540.8 ± 29.0bc	94.1 ± 8.3ab	162.3 ± 8.0a
	50%	Control	5.2 ± 1.4a	558.8 ± 28.2bc	102 ± 6.8ac	192.5 ± 11.1ab
		Glutan + Kalpak 66	5.6 ± 0.7a	541.3 ± 21.4bc	103.3 ± 7.5ac	153.3 ± 10.0a

	Hydretain ES Plus	6.4 ± 0.9ab	464.2 ± 20.0ab	86.7 ± 3.5a	179.5 ± 15.0ab
		Significance			
Rootstock (R)		***	***	***	***
Water treatment (W)		*	***	ns	ns
Soil treatment (S)		ns	***	ns	ns
R × W		ns	ns	ns	ns
R × S		ns	***	ns	*
W × S		ns	ns	ns	ns
R × W × S		ns	**	ns	ns

Different letters by column indicate statistically significant differences according to a Tukey test and significant levels: (ns) no significance, (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$ (n=5).

[a] From top to below second, third and fourth shoots.

[b] Only those shoots that were longer than 10 cm and shorter than 35 cm were counted.

3.2. Effects of treatments on trunk and shoot diameter

A three-way ANOVA showed that top shoot and trunk diameters and shoot and trunk weight were affected by the rootstock (Ma or Jm7) onto which they had been grafted (Table 3). The weights of the top shoot, trunk diameter and then shoot and trunk were significantly greater on Ma compared with Jm7.

Water treatment significantly affected trunk diameter as well as shoot and trunk weight, although no impact was observed on top shoot diameter. Trunk diameter was greater on Ma with 70% water content, but decreased significantly on Ma with 50% water content and on Jm7 in 50% and 70% water-treated soil. Shoot weight was significantly greater for trees grafted onto Ma in 50% and 70% water-treated soil, whereas no significant differences were observed for Jm7 in 50% and 70% water-treated soil. There were significant differences on Ma in 50% and 70% water when compared with Jm7 in 50% water-treated soil.

Soil treatments had a significant impact on top shoot diameter and trunk fresh weight, although no significant difference was observed on trunk diameter and shoot fresh weight. Rootstock and water treatment interaction affected top shoot diameter, whereas the rootstock and soil treatments impacted trunk fresh weight and water and soil treatments

affected shoot fresh weight. There were no observable changes in tree diameters due to the interaction between rootstock, water and soil treatments. Top shoot diameter and shoot fresh weight was significantly altered on Ma in 70% water levels in untreated soil. Trunk diameter and trunk fresh weight were significantly different on Ma in 70% water-treated soil that was followed by a Hydretain ES Plus soil treatment.

Table 3. Effects of different treatments on top shoot diameter, trunk diameter, shoot weight and trunk weight (Means ± SE) of young 'Fuji' apples.

Rootstock	Water treatment	Soil treatment	Top shoot diameter (mm)	Trunk diameter (mm) [a]	Shoot weight (g) [a]	Trunk weight (g)
Ma	70%	Control	11.6 ± 0.3 d	17.7 ± 0.6 de	132.6 ± 11.9c	140.8 ± 6.8bc
		Glutan + Kalpak 66	10.6 ± 0.5 cd	16.1 ± 0.3 be	110.8 ± 5.2ac	117.0 ± 7.7ab
		Hydretain ES Plus	10.6 ± 0.3 cd	18.14 ± 0.8 de	122.0 ± 6.5bc	154.2 ± 6.0c
	50%	Control	11.2 ± 0.3 d	18.2 ± 0.3 e	117.6 ± 3.7bc	141.4 ± 4.3bc
		Glutan + Kalpak 66	11.0 ± 0.3 cd	16.8 ± 0.4 cde	109.0 ± 7.3ac	119.0 ± 5.2ab
		Hydretain ES Plus	11.2 ± 0.3 d	17.2 ± 0.3 de	117.3 ± 6.3bc	130.3 ± 3.7ac
Jm7	70%	Control	8.5 ± 0.6 ab	15.8 ± 0.6 bd	96.7 ± 7.5ac	136.0 ± 9.3ac
		Glutan + Kalpak 66	9.1 ± 0.5 bc	14.7 ± 0.3 abc	92.7 ± 16.5ac	119.4 ± 8.7ab
		Hydretain ES Plus	8.1 ± 0.3 ab	14.8 ± 0.6 abc	96.2 ± 11.3ac	116.9 ± 10.7ab
	50%	Control	8.2 ± 0.6 ab	14.3 ± 0.3 ab	86.7 ± 5.1ab	112.5 ± 3.8ab
		Glutan + Kalpak 66	7.9 ± 0.2 ab	14.4 ± 0.6 ab	81.9 ± 6.9ab	113.5 ± 7.8ab
		Hydretain ES Plus	6.7 ± 0.4 a	13.4 ± 0.4 a	71.8 ± 6.7a	104.3 ± 6.3a
			Significance			
	Rootstock (R)		***	***	***	***

Water treatment (W)	ns	*	*	*
Soil treatment (S)	*	ns	ns	*
R × W	*	ns	ns	ns
R × S	ns	ns	ns	*
W × S	ns	ns	*	ns
R × W × S	ns	ns	ns	ns

Different letters by column indicate statistically significant differences according to a Tukey test and significant levels: (ns) no significance, (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$ (n=5).

[a] all shoots (top, top three, below and secondary shoots).

3.3. Effects of treatments on root gowth

A three-way ANOVA was utilized to determine the effects of rootstock, water treatments and soil treatments on root fresh weight, root volume and root-to-shoot ratio (Table 4). The two rootstocks had a significant impact on root weight, root volume and root-to-shoot ratio when grafted onto Ma and Jm7. Root weight, root volume and the root-to-shoot ratio increased significantly on Jm7 when compared with Ma.

Water treatments exerted a significant influence on root weight and root volume, but showed no significant difference for the root-to-shoot ratio. Root fresh weight was higher on Jm7 with 70% water content and significantly higher on Ma with 50% water content. Root volume in trees grafted onto Ma in soil with 70% water content was significantly higher than Jm7 in both 50% and 70% water-treated soil.

Soil treatments showed a marked impact on root weight, but no significant difference was observed on root volume and root-to-shoot ratio. Root weight was significantly greater on Ma with 70% water content when the soil was treated with Hydretain ES Plus. Root weight for Jm7 with 70% water content treated with Hydretain ES Plus was substantially lower than the root weight in trees in untreated soil.

The interaction of rootstock, water content treatments and soil treatments showed no significant impact on root weight, root volume or root-to-shoot ratio. Rootstock, water treatment and soil treatment interaction were observed for root weight, root volume and the root-to-shoot ratio. Significant increases in root weight growth and root volume were observed on Ma with 70% water treatment levels in soil treated with Hydreatain ES Plus, as well as on Jm7 with 70% water levels in untreated soil. Root-to-shoot ratio increases were higher on Jm7 in 70% water content in untreated soil.

Table 4. Effects of treatments on root weight, root volume and root to shoot ratio (Means ± SE) for 'Fuji' on Ma and Jm7.

Rootstock	Water treatment	Soil treatment	Root weight (g)	Root volume (ml)	Root: shoot ratio
Ma	70%	Control	115.2 ± 11.6ab	153.5 ± 17.3 ac	0.9 ± 0.1ab
		Glutan + Kalpak 66	74.7 ± 9.6a	97.5 ± 11.5 a	0.7 ± 0.1a
		Hydretain ES Plus	240.4 ± 19.3cd	253.5 ± 21.5 c	2 ± 0.1ac
	50%	Control	121.9 ± 10.1ab	106.5 ± 17.3 a	1.0 ± 0.1ab
		Glutan + Kalpak 66	74.0 ± 7.8a	69.1 ± 7.3 a	0.7 ± 0.1a
		Hydretain ES Plus	104.0 ± 7.1ab	109.5 ± 12.5 a	0.9 ± 0.1ac
Jm7	70%	Control	266.5 ± 34.5d	237.5 ± 28.6 bc	2.8 ± 0.3c
		Glutan + Kalpak 66	181.0 ± 18.9bd	158.1 ± 21.3 ac	2.1 ± 0.3bc
		Hydretain ES Plus	147.9 ± 11.1abc	136.5 ± 22.0 ab	1.7 ± 0.4ac
	50%	Control	165.4 ± 26.2abc	141.5 ± 25.8 ab	2 ± 0.1ac
		Glutan + Kalpak 66	161.3 ± 33.9abc	134.5 ± 38.4 ab	2. 1± 0.6bc
		Hydretain ES Plus	127.6 ± 10.2ab	112.5 ± 13.3 a	1.8 ± 0.2ac
			Significance		
Rootstock (R)			***	***	***
Water treatment (W)			***	**	ns
Soil treatment (S)			**	ns	ns
R × W			ns	ns	ns
R × S			***	***	**
W × S			ns	ns	ns
R × W × S			***	*	*

Different letter by column indicates statistically significant differences according to a Tukey test and significant levels: (ns) no significance, (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$ (n=5).

DISCUSSION

In this study we investigated the impact of rootstock and water and soil treatments on young 'Miyabi Fuji' apple tree growth. Young apple trees are usually planted as unbranched one-year whips. According to Hull (2018), nursery trees are usually headed 70 to 90 cm above the grafted union before planting in order to obtain a sufficient number of side branches when planted in the spring, to promote the growth of new shoots. When this is done, three or four dominant new shoots emerge at the top. It has been observed that when this occurs only very short shoots grow under these top shoots (Kikuchi et al., 2003). This phenomenon has been understood as a physical characteristic of trees having a top predominance. In this experiment, the upper three to four shoots in spring-planted trees were significantly longer than the lower shoots. Similar results have been reported by. Kikuchi et al., (2003) found that in 'Fuji', top shoot weight was the same for both pruned and unpruned shoots. While Kikuchi et al., only compared pruned and unpruned trees, in our study, we found that the rootstock affected top shoot length on pruned trees, and that shoot length was greater on Ma with 70% water content than on Jm7 with 70% water content (Table 2), and that top shoot length differed in soil with a moisture content of 70% depending upon the rootstock.

Our results also suggest that the impact of the rootstock on shoot fresh weight is greater on Ma with 70% water content than on Jm7 (for both 50% and 70% water content). The trunk fresh weight of the young apple trees was higher on Ma with 50% water content than on Jm7 with 70% soil water. These findings extend those of Campbell and Bould (1970), confirming that the number of shoots was closely related to the rootstock. In our experiment it was not only the rootstock but also the water saturation treatments (set at 50% and 70%) that affected the top parts of the young apple trees. Changes in trunk diameter and fresh weight were more pronounced on Ma with 50% water content than on Jm7 (50% water content). Tworkoski and Fazio (2016) have explored the effects of environmental stress (e.g., water and nutrient availability) on the size-controlling capacity of different rootstocks. In our study, trunk growth indicated that semi-vigorous Ma rootstock with 50% soil water content was greater on Jm7 dwarfing rootstocks treated with water content levels of both 50% and 70%.

Changes in the roots showed that some soil treatments had a positive impact on the fresh weight of the root (Table 3). In this experiment, Ma with 70% water content combined with Hydretain ES Plus showed good growth results. Our findings do not, however, support those

of Greenwell et al., (2017) on the impact of humectants on plant root parameters. We found that root fresh weight and root volume changes occurred in trees on Ma with 70% water content in Hydretain ES Plus treated soil resulting in increased root biomass and root volume.

According to Botirov et al., (2022) cited fruit tree observation in some experimental orchards and their results of growing nurseries related on different conditions. And other experiment reported that the root growth of young apple trees in winter planted, and their occurring root growth (Botirov and Arakawa, 2021). The healthy growth of new shoots after planting greatly influences future tree shape and initial production. It is therefore important to promote and manage root growth, even after planting, by managing water content and introducing humectants in order to using soil. Even though this study was carried out under artificially constructed conditions, the results can be applied in orchards. Therefore, in the future we plan to implement these findings in field experiments in areas with limited access to water. These results may provide suggestions to growers in such areas as to how as to how they might better manage their orchards and which rootstocks, which soil moisture levels and which soil water retention treatments would work best for their young apple trees.

CONCLUSION

The question of how to promote the growth of young apple trees after they are planted in areas with limited water resources was examined in this paper. We designed an experiment to determine how the choice of rootstock, moisture levels in the soil and water retention treatments can be combined to promote young tree growth. Our findings led us to the conclusion that the interaction of rootstock, water levels and soil treatments affected total shoot length, root weight, root volume and the root-to-shoot ratio of young ‘Miyabi Fuji’ apple trees.

The fresh weight of the root was greatest for Jm7 with 70% soil water content in untreated soil and for Ma with 70% soil water content treated with Hydretain ES Plus. Root volume on Ma with 70% soil water content in soil treated with Hydretain ES Plus was greater than that on Jm7 with 70% soil water content in untreated soil. The interaction between rootstock, soil water content, and soil treatments was the highest on Jm7 with 70% soil water content in untreated soil and the lowest on Ma with 70% soil water content in Hydretain ES Plus treated soil and on Jm7 with 50% soil water content in untreated soil.

Rootstock, soil water content and soil treatment interaction were more pronounced on the dwarfing Jm7 rootstock, compared with Ma, in terms of total shoot length, root weight and root to shoot ratio. Root volume and top three shoot length (rootstock and soil treatment interaction) was more pronounced on Ma with 70% soil water content in soil treated with Hydretain ES Plus and Glutan and Kalpak 66 soil treatments when compared with Jm7.

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PHOTOSYNTHETIC ACTIVITY OF DURUM WHEAT ON IRRIGATED LANDS AT DIFFERENT TIMES AND SEEDING RATES

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ABSTRACT

The article presents the results of research on the dynamics of the formation of leaf area, photosynthetic potential, the accumulation of dry biomass and net productivity of photosynthesis durum wheat sort Krupinka depending on the timing and rate of sowing the irrigated lands in the southern region of Uzbekistan.

Keywords: Durum wheat, planting dates, planting rules, leaf area, photosynthetic potential, net productivity, photosynthesis, dry biomass of irrigated land, variety, grain yield.

INTRODUCTION

Photosynthesis is considered the main power plant in the formation of primary organic substances. In the process of photosynthesis is formed and accumulates 80-90% of the stock of dry biomass. Therefore, growth, development and yield of plants depends on the passage of the process of photosynthesis.

It has important agronomic factors such as the timing of sowing seed rate to create optimal conditions in the passage of the process of photosynthesis.

Great importance is to optimize the timing of sowing seed rate in obtaining high yields in all crops as well as wheat.

Irnazarov Sh. I. [4] and other authors believe that can be controlled by controlling the photosynthetic activity of farming practices.

The optimal value of the leaf surface changes a lot of external factors, including variety, growing conditions, planting dates and plant density [1, 10, 11].

One of the main indicators of photosynthetic activity of photosynthetic leaf area and its dynamics of formation. The highest harvest is possible to form an optimum value of leaf area in sowing that work throughout the growing season and a long time. Therefore, each plant under specific conditions during the whole period of the growing season

for optimum development, with a strong photosynthetic capacity are the optimum plant density, nutrient regime. Here are all agricultural practices should be designed to create the optimum leaf area, and actively working a long period of time.

MATERIALS AND METHODS

The experiments were conducted in 2015-2017 irrigated typical serozem soils of the farm "Ravshanova Tumaris", Chirakchi district of Kashkadarya region. The objects of research of durum wheat sort Krupinca. The following planting durum wheat were studied in the experiments: September 20, October 11 and November 1 at seeding rate is 3.0; 4.0; 5.0 and 6.0 million viable seeds/ha. Field experiments were carried out in a 4-fold repetition, the accounting area of 50 m^2 plots, location of plots in two-levels. The predecessor to the experience was the corn.The experiments were applied to wheat cultivation technology of irrigation adopted in this area. Leaf area taken into account by the method of V. Orlov. The photosynthetic potential and net photosynthesis productivity determined by the method of A. A. Nichiporovich [7].

Observations and biometric surveys implementation in two non-contiguous duplicate, phonological observations were carried out according to the procedure Uzbekistan Scientific Research Institute of Cotton [2]. The experimental results were processed by dispersion and correlation analysis [3].

RESULTS AND DISCUSSIONS

In experiments (Table 1) in all planting dates with increased seeding rates of leaf surface area of durum wheat increased.

In the phase of tillering durum wheat crops on 21 September the rate of 3.0 million viable seeds/ha, determined of leaf surface area per hectare 2.80 thousand m2 or formed 1 m^2-2.8m^2 of leaf surface. These patterns were observed in planting dates 11 October and 1 November.

Further phases of the development of durum wheat in all terms and regulations of the leaf surface area sown to grow. The highest rate was observed in earing phase. The maximum value of leaf area reached in earing phase.

When sowing october 11 at the rate of 3.0 million viable seeds per hectare in phase.

Table 1 The dynamics of leaf area of durum wheat in depending on the timing of sowing seed rate (2015-2017), m^2/m^2

Dates of sowing	Seeding rates million viable seeds/ha	Phases of development							by vegetation
		the spring bushing	access to the tube	earing	flowering	milk ripeness	wax ripeness	Entireli ripeness	
21.09	3.0	1.90	3.10	5.22	3.02	2.44	1.10	-	2.80
	4.0	1.96	3.29	5.48	3.31	2.66	1.41	-	3.02
	5.0	2.02	3.63	5.79	3.57	2.94	1.77	-	3.29
	6.0	2.08	3.88	6.03	3.82	3.24	2.01	-	3.51
11.10	3.0	1.78	3.97	6.13	4.00	3.33	2.16	-	3.56
	4.0	1.94	4.12	6.38	4.36	3.47	2.24	-	3.75
	5.0	2.32	4.44	6.71	4.65	3.66	2.40	-	4.03
	6.0	2.45	4.49	6.82	4.76	3.74	2.39	-	4.11
1.11	3.0	0.75	2.97	5.11	3.14	2.46	1.23	-	2.61
	4.0	0.97	3.49	5.28	3.32	2.67	1.29	-	2.84
	5.0	1.19	3.96	5.49	3.50	2.84	1.42	-	3.07
	6.0	1.41	4.49	5.65	3.61	3.02	1.54	-	3.29

Earing phase leaf area reached 6.13 m^2, with increasing seeding rate of up to 6.0 million viable seeds/ha were equal to 6.82 m^2. This pattern was observed in other times of planting and seeding rates. Under optimal timing of sowing experienced the highest leaf area. In the early and later stages of crop in all seeding rate was observed a decrease in leaf surface area of 1 m^2 of leaves. The phases of the flowering development, dairy, wax ripeness plants in crops m^2 leaf area decreased due to occur in the lower parts of the yellowing of the leaves and dried. Depending on the timing of planting and seeding rate in leaf surface varied from 1.10 to 1.29 m^2. The area of leaf area and plant many deciduous all show the value of the crop. Keldiyarova H.H. [6], Irnazarova N.I. [5], Maxmatmurodov A, Mashrabov M. [9], Rizayev Sh.X. [10], Oserboeva T and other authors [8] believe that the photosynthetic potential and productivity, independent of each other.

Optimum leaf area is defined in a lot of crops, including wheat should be at least 40-50 thousand m^2, and photosynthetic capacity of 2 million m^2/ha. days.

In our experiments, the photosynthetic capacity of durum wheat varied depending on the sowing date and seeding rate (2 table). The highest photosynthetic capacity of the plants was observed in the phase of

earing durum wheat. Photosynthetic capacity was increased with the development phase of tillering to flowering phase.

In the experiments we observed the highest photosynthetic capacity in the optimal timing of sowing. Photosynthetic capacity was increased in all sowing dates with increased seeding rates. When sowing October 11 at a seeding rate of 3.0 million viable seeds/ha during vegetation photosynthetic capacity amounted to 3283.6 thousand. m^2/ha. days. with increasing seeding rate of 6.0 million viable seeds/ha equal to 3701.7 thousand. m^2/ ha. days.

Early or late sowing of the optimal time for all seeding rates reduced photosynthetic capacity.

During the growing season the accumulation of dry plant biomass yield sets. Depending on the area of leaf surface and the net productivity of photosynthesis varies accumulation of dry biomass development phases during the day.

According Irnazarov Sh.I. [4] the maximum dry weight accumulates in earing phase.

In field experiments, the accumulation of dry matter before the flowering stage in all sowing dates with hanging seeding rates were increased. In the flowering stage with increasing seeding rates of 5.0 million to 6.0 million viable seeds/ha. reduces the accumulation of dry matter per hectare from 105.7 to 103.3 centner. This depends mainly on the early during sowing. Strong tillering plants, thick stems and dried lower leaves of plants. Collect the maximum dry weight at all times and norms of crop plants in wax ripeness. The full ripeness of grain aboveground plant dry weight decreased.

The net productivity of durum wheat photosynthesis depends not only on the value of the carrying device and the intensity of the work leaves a duration of time.

Changes net photosynthetic productivity of plants during the growing season, at the beginning of development is gradually increased to the flowering phase is decreased net photosynthetic productivity in the flowering stage to wax ripeness.

High leaf area observed in earing phase. But it decreased the net photosynthetic productivity than the output in the receiver phase (Table 3).

Table 2 Effect of sowing time and seeding rate on the photosynthetic the potential of durum wheat (2015-2017), thousand m^2 days/ha

Dates of sowing	Seeding rates mil. viable seeds/ ha	Phases of development							by vegetation
		the spring bushing	access to the tube	earing	flowering	milk ripeness	wax ripeness	Entireli ripeness	
21.09	3,0	190.1	297.0	1180.1	207.6	351.5	393.9	-	26202
	4,0	196.0	366.3	1198.7	221.3	384.7	435.3	-	2802.3
	5,0	202.1	394.3	1303.7	235.6	387.9	482.9	-	3006.5
	6,0	208.0	416.0	1323.6	247.8	420.9	539.6	-	3155.9
11.10	3,0	178.2	429.4	1319.3	354.8	437.1	564.8	-	3283.6
	4,0	194.3	452.2	1402.3	370.1	467.0	587.9	-	3473.8
	5,0	222.2	490.2	1464.0	280.6	483.9	603.6	-	3544.5
	6,0	245.0	518.7	1512.6	291.1	505.5	628.8	-	3701.7
1.11	3,0	95.2	295.2	1011.1	207.5	305.9	348.3	-	2263.2
	4,0	104.1	360.0	1126.8	219.0	327.4	385.1	-	2522.4
	5,0	119.0	409.6	1215.2	226.2	346.6	415.0	-	2731.6
	6,0	141.3	471.6	1304.9	234.3	365.3	445.2	-	2962.6

Reduction of net productivity of photosynthesis with increasing plant density. In early sowing (21.09) at a rate of 3.0 million. viable seeds/ha net photosynthetic productivity was 5.54 g/m^2 and with the increase of planting 6.0

Table 3 Net photosynthetic productivity of durum wheat, depending on the timing and application rate (2015-2017), g /m^2 days

Dates of sowing	Seeding rates mil. viable seeds/ha	Phases of development						by vegetation
		the spring bushing	access to the tube	earing	flowering	milk ripeness	wax ripeness	
21.09	3,0	-	5.54	4.91	9.94	5.67	3.91	5.99
	4,0	-	5.28	4.96	9.03	4.16	2.43	5.17
	5,0	-	5.07	4.71	6.52	3.61	2.19	4.42
	6,0	-	5.00	4.14	4.33	2.96	2.07	3.70

11.10	3,0	-	6.27	4.25	8.45	4.13	3.40	5.30
	4,0	-	6.14	4.02	7.64	3.75	3.11	4.93
	5,0	-	5.55	3.90	7.39	3.66	3.08	4.72
	6,0	-	5.13	3.73	7.25	3.60	2.97	4.54
1.11	3,0	-	6.08	4.01	7.96	4.09	3.33	5.09
	4,0	-	5.70	3.96	7.24	3.86	3.23	4.80
	5,0	-	4.93	3.77	7.03	3.74	3.11	4.52
	6,0	-	4.89	3.43	6.24	3.49	2.80	4.17

million standards viable seeds/ha, 5.00 g/m^2. A similar pattern is observed in other terms and norms of sowing.

The net productivity of photosynthesis were observed in the phase of exit in the tube, the high was in the optimal timing of sowing than in the early and later stages of crop.

High net productivity of photosynthesis observed at the early crops in the phase of earing (3 table). Decreases net photosynthetic productivity to the detention of sowing date in all seeding rates very high net productivity of photosynthesis observed in earing phase, when sown on 21 September sowing norm of 3.0 million viable seeds/ha was 4.91 g/m^2, and the lowest at november 1 seeding seeding rate of 6.0 million viable seeds/ha, 3.43 g /m^2.

The maximum net photosynthetic productivity is observed in the flowering stage when sowing on September 21 at a rate of 3.0 million viable seeds/ha and 4.0 million viable seeds/ha, respectively, 9.94 and 9.03 g/m^2. With increasing seeding rates to 5.0 and 6.0 million. viable seeds/ha. It leads to a decrease net photosynthetic productivity. A further phase of the development of the dairy, wax ripeness net productivity of photosynthesis decreased. Net photosynthetic productivity of durum wheat during the vegatation season, depending on the terms of seeding rate ranged from 5.99 to 3.70 g /m^2.

CONCLUSIONS

Thus, on the irrigated lands in the southern region of Uzbekistan durum wheat sort "Krupinka" is formed by plating October 11 at the rate of 5.0 million viable seeds/ha grain yield was 60.4 centner per hectare, with a net productivity of photosynthesis during the vegetation season 4.72 g/m^2, a sheet surface of 4.03 m^2/m^2, 3544.5 thousand photosynthetic potential m^2/ ha days.

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THE CHANGING OF PHOSPHATE REGIME OF SOILS WITH CARBON-MAGNESIA SALTING UNDER THE INFLUENCE OF NEW COMPLEX FERTILIZERS AT COTTON CULTIVATION

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ABSTRACT

In condition of meadow ground Zarafshan oasis studied influence phosphorus containing fertilizers NPhF, NCPhF on phosphate mode of these ground are installed utilization ratio of phosphorus from fertilizers. The installed коррелятивные to dependencies between rate of the fertilizers and available forms of phosphorus of ground, capacity of the contents available phosphate, growing and development of the plants of the cotton plant sort "Omad" and "Akdariya-6". Will installed optimum rate of the contributing (175 kgs/ha P_2O_5) phosphorus containing fertilizers in condition of meadow ground Zarafshan oasis.

Keywords: Phosphate, carbonates, Kizil-Kum phosphorites, NPhF (nitric-phosphoric fertilizers), NCPhF (nitro-calcium phosphate fertilizers).

INTRODUCTION

It's well known, that conditions of phosphate nourishing of cotton-plant on the soils with carbon-magnesium salting, when the content of carbonate in the soil is higher than 10 %, and in separate cases it reaches 45 %, and the share of carbonates of magnesium exceeds 20-30 % from these total amounts depends on the degree of availability of phosphorus in the content of phosphorus containing fertilizers [1, 2, 3, 10, 11, 12, 13, 14].

It is proved by numerous researches, conducted on the given soils the surplus of carbonate considerably reduces the

availability of phosphoric fertilizers for plants, and here it must be marked, that the deficiency of phosphorus mostly displayed at high norms of nitric and potassic fertilizers. The long-standing permanent experiments on studying the effectiveness of fertilizers in cotton-alfalfa crop rotation and at monoculture, conducted at the chair of agrochemistry of (2001-2022) show, that on the soils with large content of carbonates the chemical absorption of available phosphorus increases at the absence of introduction of organic fertilizers, at monoculture and one-sided introduction of only phosphoric fertilizers [4, 5, 13, 15].

The availability of phosphorus out of fertilizers, and their fixing in the soil is mostly determined by the form of phosphoric fertilizers, the content of water-soluable and citrate-soluable phosphates as well as methods and terms of introduction of fertilizers.

It is ascertained by research, that the form of fertilizers, methods of their introduction not only influence on the coefficient of application of phosphoric fertilizers, but also influence on the coefficient of application of phosphorus from the soil and change the fractional composition of phosphorus in the soil.

It is ascertained by the separate laboratory and vegetational experiments the dependence of assimilation of phosphoric fertilizers by plants (cotton-plant, corn, potatoes, wheat) from the content of carbonates and bicarbonates of calcium and magnesium in the soil [1, 3, 9, 10, 14].

At present the chemical industry of Uzbekistan produces phosphoric and complex fertilizers and phosphorites of Kizilkum deposit which serve as a raw material.

There phosphorites differ with rather low content of P_2O_5 and in this connection there is conducted their dressing up to 18-20 % and it is considerably lower, than in the composition of phosphorites of Kara-Tau. The reserves of Jeroy-Cardara deposit of Kizil-Kum phosphorites are elaborated on the base of large investments of Navoi mining-metallurgical plant and reserves of phosphorites valued up to 303,6 mln t of ore or 57,7 mln t of P_2O_5. For extending of application of phosphorites of Jeroy – Sardara deposit and increasing the quality of raw materials for chemical industry in 2006 there were begun on dressing natural phosphorites. The complex scheme allowed to get 400000 t of washed and burned concentrate and 200000 t of washed dry concentrate. In the future it is planned to obtain up to 800000 t of dressed concentrate [6 - 8].

The chemical plants of Samarkand, Navoi and Fergana produce a number of complex fertilizers of nitrophoses,

superphoses, nitroammophoses type on the base of phosphorites, which are distributed under the names NPhF (nitric-phosphoric fertilizers), CPh (calcium phosphate), CAPh (calcium ammo-phosphate), NCPhF (nitro-calcium phosphate fertilizers), PhSLS (phosphoric suspense liquid saltetre).

These fertilizers, by the content of phosphorus, nitrogen, the degree of availability of these elements for plants and also the content of other elements and ballast considerably differ from traditional ammophose, nitrophoses, nitroammophoses and carboammophoses, at present in agriculture of Uzbekistan the managing of phosphate regime of the soil is very important in connection with considerable lowering of the coefficient of the returning of carrying out this element. In this connection the special role belongs to the searching of ways of raising the effectiveness of introduced fertilizers. We conducted laboratory and field experiments on the study of influence of separate new complex fertilizers on the soils with carbon-magnesium salting on the growth, development and yield-capacity of cotton-plant, change of phosphate regime of the soil and availability of phosphoric fertilizers during different periods of plant vegetation.

MATERIALS AND METHODS

The experiments were conducted between Akdarya and Karadarya rivers (Miancal), which are the tributaries of the Zarafshan river. Under these conditions there was studied the content of mobile (available under conditions of carbonate soils) phosphates in the soil, the changing of fractional composition of soil phosphates.

There was studied the influence of fertilizers on the growth, development and yield-capacity of cotton-plant, determined the parameters of optimum conditions of phosphoric feeding, which ensure better conditions of feeding and raising the coefficient of application of phosphoric fertilizers.

The experimental plot is situated on the meadow soils with the content of humus 1,3 %, total nitrogen 0,1 %, gross phosphorus 0,16 %, potassium 2,42 %. Before conducting the experiment – N-NH_4 – 22,4 mg/kg, N-NO_3 – 15,4 mg/kg, P_2O_5 – 20,8 mg/kg, K_2O – 320 mg/kg. in the arable layer of the soil the total content of carbonates is 18,7 %, and among them carbonates of calcium – 14,1 %, the capacity of absorbtion of cations 14,2 mg equivalent per 100 g of soil and out of them 10,3 mg equivalent Ca^{2+} and 3,3 mg equivalent Mg^{2+}.

During field experiments there were 11 variants. The experiment was carried out in fourfold repeatedness; the length of

the plot is 30 m, width – 7,2 m, the square – 216 m^2 the record square of the plot comprises 108 m^2.

Variants are located in the systematic order in one layer. During the experiment there were used mineral fertilizers such as: ammonia saltpetre (NH_4NO_3-34,6 % N), chloride potassium (KCl–60 % K_2O), ammophose ($NH_4H_2PO_4$ – 11-12 % N, 46 % P_2O_5), nitric-phosphoric fertilizers (NPhF - 10 % N, 10 % P_2O_5), nitro-calcium phosphate fertilizers (NCPhF - 6 % N, 16 % P_2O_5).

In soil sample analysis's are organized on the following methods: Humus - on Tyurin; The general nitrogen, phosphorus and potassium on Malicev-Gricenko; The nitrate nitrogen on Grandvald- Lie; ammonium nitrogen with reagent Nessler with the following determination on KFK-2; movable phosphorus and exchange potassium on method B.P.Machigin with the following determinations K_2O on fiery photometer; pH - an potentiometer; the factious composition of phosphorus on method Chang-Djhekson, in variant Aksinazi Ginsburg; organic phosphorus on method Meta; the amount absorbed катионов by method Shmuk; factor capacity and intensities of phosphorus by methods R.Scofield and S.Olsen.

RESULTS AND ANALYSIS

During our experiments the introduction of phosphoric fertilizers on the base of phosphorites of Kizilkum ensured some increase of the content of mineral phosphates in the soil, mainly water and citrate soluable ones. At the same time there has taken place the changing of absolute content of different fractions of phosphoric compounds. The greatest changes have taken place in the content of water soluable phosphates, and in addition, it happened proportionally to the increasing of the norms of phosphoric fertilizers (picture 1).

The less change has taken place in thrice-replaced phosphates of calcium. Comparatively stable on the soils of neutral and feeble alkaline and especially with high content of carbonates, phosphates of aluminium and iron in significantly increased at the application of NPhF (nitric-phosphoric fertilizers).

At application of nitrocalciumphosphate fertilizers (NCPhF) on the contrary there is marked the reduction of the content of fraction of aluminium – iron – phosphates apparently it is connected with pH of given fertilizers.

It should be marked that at introduction of NCPhF - nitrocalciumphosphate fertilizers the content of one and two replaced orthophosphates of calcium in the soil has increased. The application of both complex fertilizers (NPhF and NCPhF) contributes to some increase of

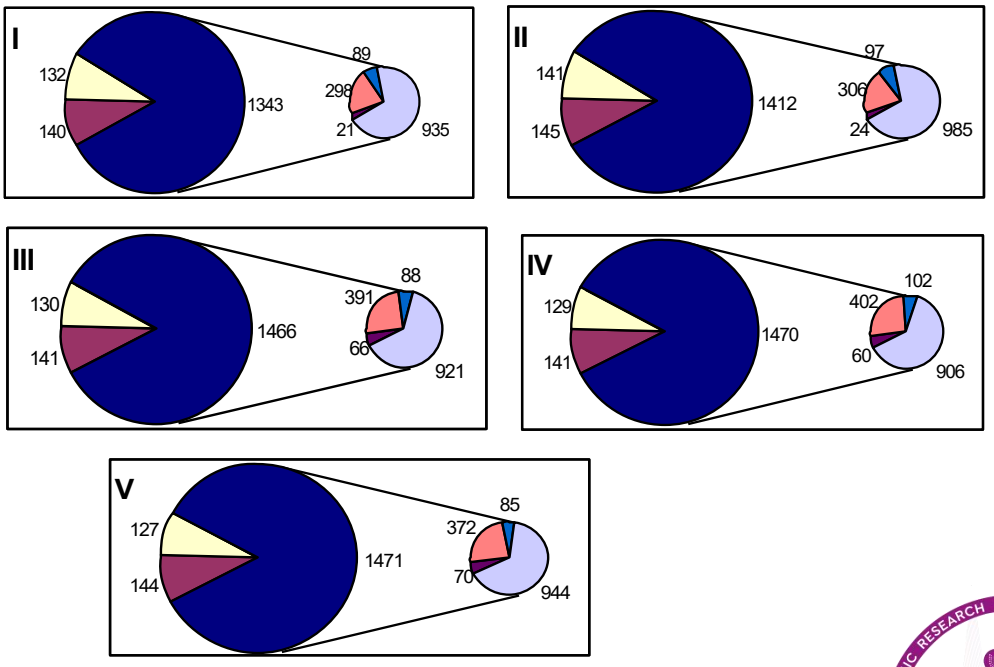
available phosphates in the soil. This difference is marked in comparison with variants, where there was used ammonia and a part of phosphates of which mostly moved to less available compounds. In our opinion it is connected with more active chemical absorbtion of carbonates calcium and magnesium of phosphates from the composition of ammophose.

In the variant with application of NCPhF there marked the improvement in supplying the plants with phosphorus in comparison with application of NPhF. In variants, where there were used 175 kg/ha of P_2O_5 in the forms of ammophose the content of monocalceum phosphate comprised 66 mg/kg, which is 6 mg/kg more than the application of nitrogen phosphorus fertilizer and is on the level of application of NCPhF.

It should be marked, that with the increasing the norm of introduction of phosphorus in the form of NPhF there is also observed the increase of the content of monocalceum phosphates up to 55 mg/kg, at introduction of 125 kg/ha of P_2O_5 and up to 64 mg/kg, at introduction of 200 kg/ha of P_2O_5. At the same norms of P_2O_5, in variants, where there was used NCPhF, the content of monocalceum phosphates was considerably higher.

As a whole it can be marked the considerable increasing of mono and dicalceum of phosphates at introduction of both new fertilizers.

At the same time at introduction NPhF there was marked insignificant increase of aluminium and iron phosphates and at introduction of NCPhF-more significant increase of the content of dicalceum of phosphates (picture 1).



I. The control without fertilizers, II $N_{250}K_{125}$ – Background, III Background + Pam 175,

IV Background + Pnphf 175, V Background + Pncphf 175

Organic phosphorus, Unsoluable remains, Mineral phosphorus,

In that: Ca_I – P, Aℓ – P, Fe – P, Ca_{II} – P.

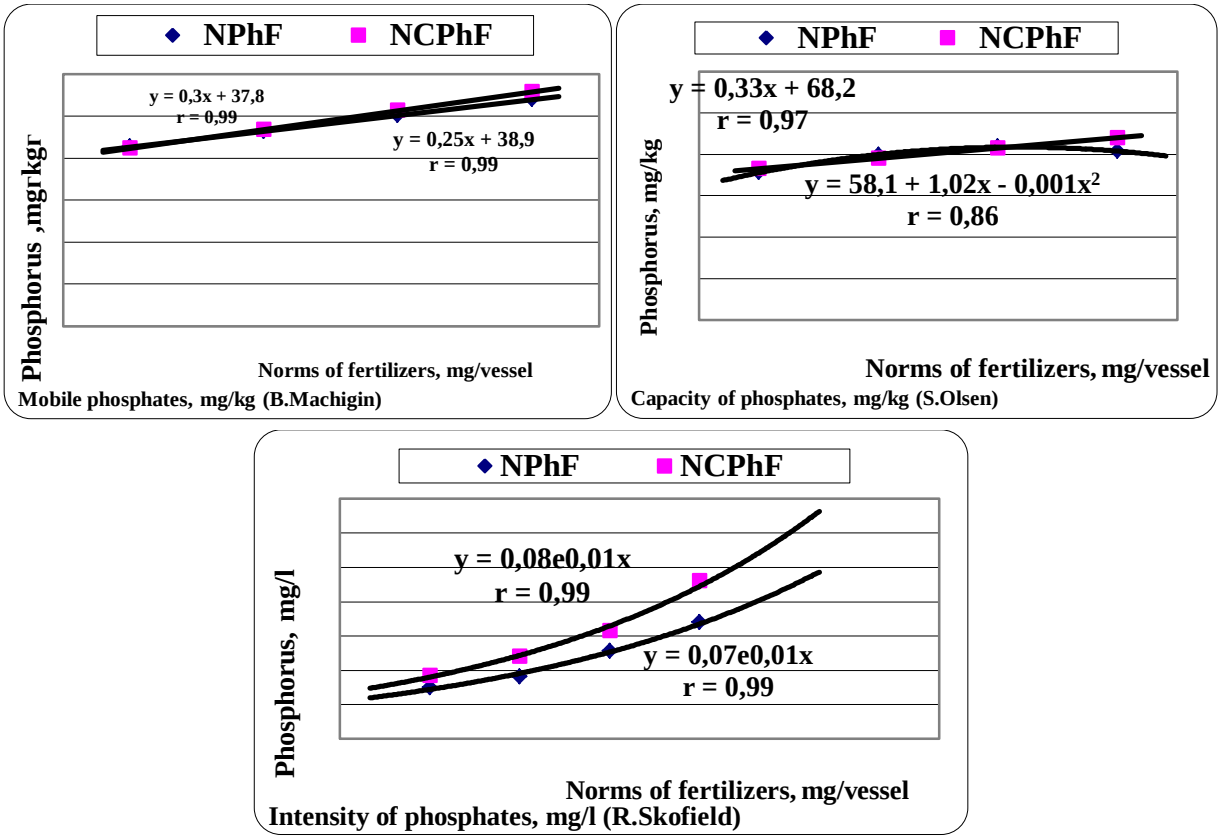
Picture 1. Fractional composition of phosphates.

The study of correlation dependence of the content of phosphorus by method of (B.Machigin) showed that there exists the direct dependence on the norm of fertilizers y= ax+b in the equation of regression of both types of fertilizers, and the coefficient of correlation comprises r=0,99, which proves the dependence of the content of mobile phosphorus not only on the norm, but on the type of fertilizer.

The study of the influence of fertilizers on the content and capacity of phosphates by method of S.Olsen, at introduction of NPhF and NCPhF showed that the absorbtion of phosphorus from these fertilizers considerally differ.

The curve of dependence of the capacity of content and capacity of phosphates at introduction of NPhFcorrespond the equation of regression according to formula $y=58,1+1,02X-0,01X^2$, and coefficient of correlation r=0,86, which is statistically proved by proportional increasing capacity with the increasing of the norm of fertilizers. The dependence of available phosphates on the carbonate soil at changing of the norm of introduction NCPhF corresponds to the equation of regression y=0,33X+68,2 and the coefficient of correlation r=0,97, and there is the capacity of available phosphates at introduction of NCPhF is higher than at NPhF, which indicates the absorbtion of phosphates of NCPhF mostly changeably (picture 2).

During laboratory researcher there was studied the intensity of transition into soil solution of phosphates introduced in composition of fertilizers of NPhF and NCPhF by method of R.Scofield. Every vessel with 1 kg capacity was filled with 15-60 mg/kg of P_2O_5. In 120 days after the beginning of composting of different types of fertilizers it was ascertained that the line of regressing of transferring phosphates to the soil solution from the fertilizer NPhF $y=0,07e^{0,01X}$, and NCPhF $y=0,08e^{0,01X}$. The coefficient of correlation of fertilizers comprised r=0,99 (picture 2).



Picture 2. The dependence of mobile phosphorus, capacity of phosphates and intensity of phosphorus and changing the norm of phosphoric fertilizers.

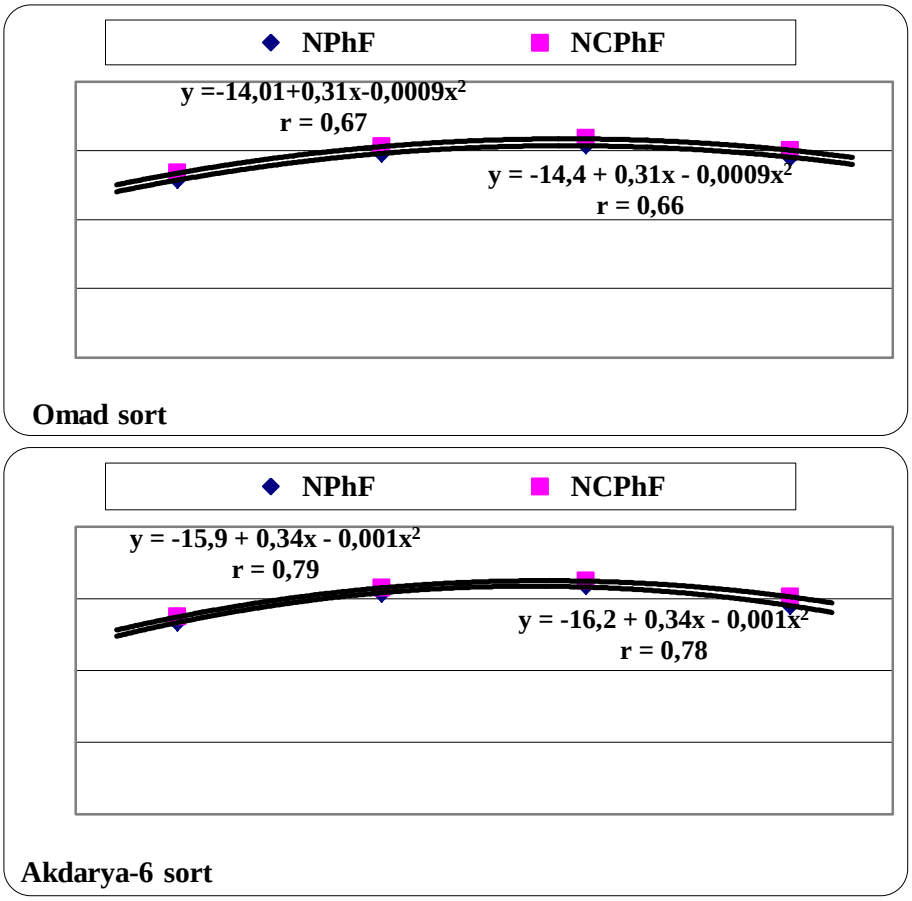
During field experiments on the meadow carbonate soils of the valley of the Zarafshan river and inter river of Miyankal the coefficient of application of phosphoric fertilizers fluctuated from 10,8 % to 13,3 % at cultivation of cotton – plant of Omad sort. In variant of introduction of 175 kg/ha of P_2O_5 in the form of ammophose, but at introduction of NCPhF and NPhF in the same norm of P_2O_5, it comprised 13,2 %.

While increasing the norm of phosphoric fertilizers the dependence of coefficient of application of phosphorus from fertilizers on the norm of fertilizers was determined by the equation of regression $y= b_1X+b_2X^2$. There was ascertained, that before the norm of fertilizers 175 kg/ha of P_2O_5, the coefficient of application of phosphorus was the highest, but the further increase has led to the reduction of application of phosphoric fertilizers for plants.

The study of the dependence of application of phosphoric fertilizers by cotton-plant of Omad sort at introduction of NPhF has shown, that the correlation coefficient comprised r=0,66 and NCPhF r=0,67.

In the experiments with Akdarya-6 sort the correlation coefficient at introduction of NPhF comprised r=0,78 and NCPhF

r=0,79, that is the dependence on the norm of coefficient of application of phosphorus from fertilizers of Akdarya-6 sort is higher than that of Omad sort (picture 3).



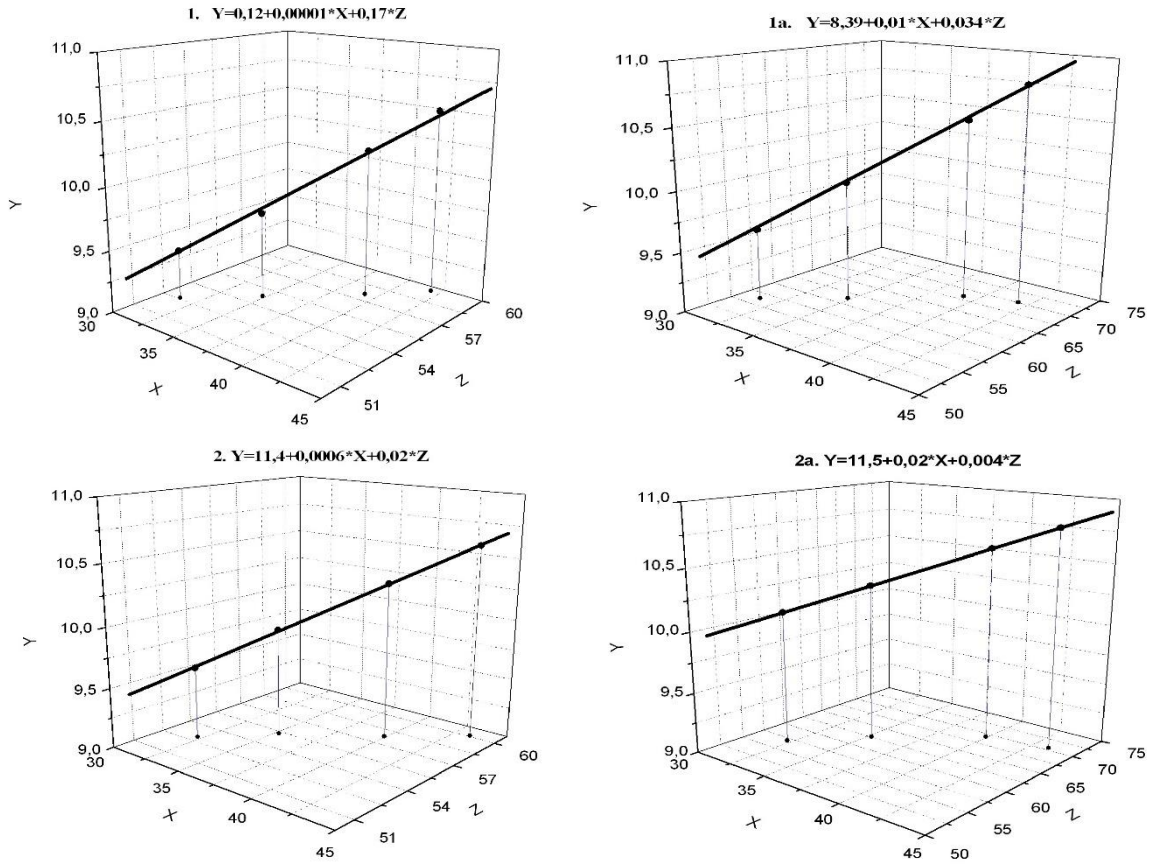
Picture 3. The dependence of application of phosphoric fertilizers of cotton-plant Omad sort and Akdarya-6 sort on the norm of phosphorus.

The study of the dependence on the norm of fertilizers and the content of available P_2O_5 for plants in the soil during blossoming (X), formation of fruit branches (Z) and height of the main stem (Y) is shown in the equation of regression $Y=a+b_1X+b_2Z$. The coefficient of correlation of Omad sort at changing the norm of introduction P_2O_5 in the form NPhF $r_{XY(Z)}=0,95$; $r_{XZ(Y)}=0,97$; $r_{YZ(X)}=0,99$, and NCPhF $r_{XY(Z)}=0,94$; $r_{XZ(Y)}=0,95$; $r_{YZ(X)}=0,99$. At the sort of Akdarya-6 $r_{XY(Z)}=0,83$; $r_{XZ(Y)}=0,97$; $r_{YZ(X)}=0,69$ and $r_{XY(Z)}=0,94$; $r_{XZ(Y)}=0,70$; $r_{YZ(X)}=0,85$ (picture 4).

CONCLUSION

On the base of conducted laboratory and field experiments with sort of cotton-plant Omad and Akdarya-6 on meadow soils, subjected to carbonate-magnesium salting there can be made a

conclusion that introduction of NPhF and NCPhF in the norm 175 kg/ha P_2O_5 ensures the most optimal phosphate regime and allows getting the highest yield of good quality.



Picture 4. The dependence of the growth and development of plants on the norm of phosphorus in the form NPhF and NCPhF. 1-NPhF. 2-NCPhF, sort Omad. 1a-NPhF. 2a-NCPhF, sort Akdarya-6.

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CHEMICAL COMPOSITION OF CYNARA SCOLYMUS L. AT DIFFERENT VEGETATIVE PHASES

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ABSTRACT

C. scolymus L. is used as nonconventional valuable medicinal and food plant in Uzbekistan. Chemical composition of green and dry biomass was identified at the beginning of growth, budding, flowering, and fruiting periods of the plant.

Keywords: chemical composition, forage plants, growth, development, yield.

INTRODUCTION

Exploration and introduction of any new forage plant into a new regionfirst of all requires studying its fodder qualities, i.e. chemical composition of green biomass and nutritional potential of organic substances of the plant. C. scolymus L. is used as nonconventional valuable medicinal and food plant in Uzbekistan. Liquids extracted from its inflorescences, flowers, leaves and roots can be widely used for treatment ofnumerous diseases connected with kidney, digestive system, liver pathology (hepatitis, cholecystitis and others), diuretic problems [Lavrenov and Lavrenova, 2006]. The plant is also reported rich in nitrogen (2.5%) and sugar (1.0-2.2%) substances, dextrin (2%), fiber (1.3%) and ash (1.3%) which indicates on its high potential as a forage plant. In this paper I present the results of research on studying the fodder properties of Cynara scolymus L. introduced in the condition of Samarkand region in Uzbekistan.

MATERIALS AND METHODS

Cultivation of C. scolymus was performed in the condition of no irrigation in sierozem soils in Samarkand region. Chemical composition of green and dry biomass was identified at the beginning of growth, budding, flowering, and fruiting periods of the plant. Nitrogen,

protein, carotene, inulin, fiber, fat and ash were determined according to Alikaev et al. [1982]. To study the amount of phosphorus and micro and macro-element was conducted using the method proposed by Lukashik and Tashilin [1976].

RESULTS AND DISCUSSION

As experimental results showed that in the condition of no grazing C. scolymus contains relatively high amount of crude protein (16.0%) at the budding and fat (3.20-4.14%) at flowering stage. In contrast to this, low amount of crude protein (12.10-11.3%) was observed at the beginning of growth and fruiting period, and fat (2.11%) at flowering period.

Amount of primary vitamin A – carotene occurs mostly in the leaves of the plant. Accumulation of carotenein chloroplasts varies depending on the chlorophyll content and actively takes part in photosynthesis. Accumulation of the carotene with an amount of 115.47 gr. in its dry biomass was observed in Tajikistan [Sinkovskiy et al., 1974]. In case of Uzbekistan. I identified that amount of carotene content is variable during the growth period. Highest amount of carotene (378.1 mg/kg) was recorded at flowering period and the least amount (136.7 mg/kg) at the beginning of the growth period. The dynamic of sugar had identical trend being high at flowering (11.5%) and low (6.01%) at the beginning of growth period.C. scolymusis frost tolerant and thus its leaves stay green under the snow. Accumulation of high amount of carotene and sugar in leaves formed in late autumn increases frost tolerance of the plant.

Results on the content of mineral element in C. scolymus showed that highest amount of calcium (14.6-17.2 gr/kg) and phosphorus (1.29-1.12 gr/kg) was observed during budding and flowering periods, but at the beginning of the growth their content is decreased being 10.32 gr/kg of calcium and 0.62 gr/kg of phosphorus. High amount of magnesium (10.1 gr/kg) and potassium (21.4 gr/kg) was also recorded at the fruiting and flowering periods, respectively. The amount of sodium was highest during budding and flowering periods (4.20-6.15 gr/kg) and decreased during fruiting period (1.55 gr/kg). As results showed that high content of micro and macro elements in the composition of C. scolymus clearly indicate on its high fodder qualities.

Experimental results also showed that C. scolymus contains important microelements as Cu, Fe, Mn, Zn for organisms of livestock. Highest amount of copper was 16.20-16-50 mg/kg at flowering and fruiting and the lowest (8.25 mg/kg) at the beginning of growth period.

Accumulation of manganese (73.5 mg/kg)at flowering, and zinc (46.6-51.7 mg/kg) at flowering and fruiting periods was observed.

CONCLUSION

Based on the obtained results we can conclude that C. scolymus in term of its chemical composition can be considered as perspective fodder plant with high nutritional value along the conventional rangeland plants. Thus, cultivation of this plant is of high economic importance in the condition of Uzbekistan.

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THE EFFECTS OF DIFFERENT SOIL PROCESSING DEPTHS ON THE DISTRIBUTION OF WEEDS THROUGH SOIL LAYERS IN IRRIGATED LAND

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ABSTRACT

This article present, under the conditions of typical gray soils of the Samarkand region In the areas of onion cultivation, the main tillage is 30-35 cm, and the tillage on the soil surface (hollowing) is 18-22 cm.

When tilling the soil to a depth of 30-35 cm, 61.0-70.7% of weeds fall into the layer of 25-35 cm, losing fertility, which leads to their reduction and creates favorable conditions for the growth and development of crops.

Keywords. Tillage, plowing, chiselling, minimum, no tillage, weeds.

INTRODUCTION

Today, in order to restore the fertility of lands and protect soil resources in agriculture, resource-saving technologies in various soil climatic conditions - surface tillage, "direct sowing" - No-till zero technologies are widely used in tillage in many countries. A number of scientists have come to different conclusions in this regard in their studies on deep, surface and zero tillage of the soil [8; 64-67 p .; 5; 19-21 p .; 3; 7-14 p.]

Many years of research in Canada have shown that No-till processing technology has led to the proliferation of certain types of annual and perennial weeds. However, farmers who continued to use the technology after 5–10 years observed a decrease in the population of these weeds [10; 29-37 p.]. The reason is that many seeds of weeds die when they remain on the ground. In mechanical tillage, on the other hand, it is thought that the seeds are buried deep in the soil and retain a certain amount of germination.

V.V. Kulintsev, V.K. Driediger and others [4; p. 9-11]. In a study of the economic efficiency of tillage conducted in Russia, the increase in economic efficiency in the cultivation of crops was achieved through the methods of minimum and zero (No-till) tillage, while the economic efficiency of traditional (deep plowing) tillage was 21.7%, minimum surface processing 23.1% and zero processing 45.9%, Baertuev A. A., Filatov A. M. [1; 19-21p.], Sh.Kh. Rizaev [7; 186-188p.], Sh. Rizaev, A. Makhmatmurodov, A. Joraev, K. Sharifov [9; 551-558p.], while in the fight against weeds their seeds depend on the depth of the driving layer, weed seeds 0-5; Given that it is difficult to germinate quickly from layers of 5-10 and 10-15 cm, it is recommended to till the soil to a depth of 30-35 cm in areas infested with weeds.

MATERIALS AND METHODS

Considering the above, we have carried out studies to study the effect of different depths of tillage on the distribution of soil weediness indicators in onion growing areas under conditions of typical irrigated gray soils of the Samarkand region. In our field experiments, we studied the main tillage of 30-35 cm and the surface (minimum) 18-22 cm chisel agricultural technologies. Soil samples were taken every 5 cm (0, 5, 10, 15, 20, 25, 30, 35) layers of 3 points of each studied variant and the number of weed seeds was determined in them according to I.N. Shevelev [12]. ; 76p].

The results obtained and their analysis. The results of field experiments show that the main tillage is plowing (30-35 cm) and minimal (chisel, 18-22 cm) in cultivated variants in a layer of 0-35 cm, mainly from annual monocotyledons weeds - Avena fatua (L.), Echinochloa crusgalli (L.), Hordeum leporinum, Setaria qlauca (L.), dicotyledonous Stellaria media (L.), Chenopodium rubrum (L.), Amaranthus retroflexus (L.), Xanthium strumarium (L.), Artemisia annua (L.), Capsella bursarastoris (L.) Medik and perennials such as Rumex acetosella, Convolvulus arvensis (L.), Cynodon dactylon (L.) Pers seeds (Table 1).

The distribution of weed seeds on the studied soil layers is high in annual biennials, in which the main tillage is plowed by 30-35 cm, and the surface (chisel) by 18-22 cm, respectively, by 0-35 cm - Chenopodium rubrum (L.)-119-195, Artemisia annua (L.) - 134-151, Amaranthus retroflexus (L.) - 114-141, Stellaria media (L.) - 108-127, Xanthium strumarium (L.) - 44-33, Capsella bursarastoris (L.) Medik - 57-68, Monocotyledons – Echinochloa crus-galli (L.) – 117-143, Setaria qlauca (L.) - 96-122, Hordeum leporinum - 92 - 113, Avena fatua (L.) - 77-94 grains. According to the data

obtained, the spread of weeds in the soil layers is directly dependent on the depth of tillage. For example, in a layer of 5-10 cm there are 45.6-67.8% of seeds of annual weeds, in a layer of 15-20 cm - 16.1-27.5%, in a layer of 25-35 cm - 2.1-13, 5% (Table 1).).

The fight against perennial weeds in agriculture requires a lot of money and labor. When analyzing our field experiments with deep and surface tillage, the distribution of perennial weeds in the thickness of the arable layer was revealed, respectively: Rumex acetosella - 91-103 pieces, Convolvulus arvensis (L.) - 74-86, Cynodon dactylon (L.) Pers - 73-81. units, processing 18-22 cm. in these options, 42.7-58.0% of weeds are placed in the soil layer of 5-10 cm, 17.3-27.2% in the layer of 15-20 cm, on the surface of the arable layer observed.

Regardless of the surface tillage (chiselling 18-22 cm), annual and perennial weeds in the 25-35 cm layer of the arable layer are 2.1-13.5 and 7.8-12.3%, or 1 in 35 cm, respectively 2-3.9 (Table 1). This is due to the biological properties of weeds, which indicate that their seeds retain a certain germination capacity for many years, regardless of whether they fall into deeper layers of the soil.

Table 1

The effect of tillage on the distribution of weed seeds along the soil layers at a depth of 18-22 cm above the soil surface (chiseling), (2018-2019)

Weed species	Soil layer, cm								Total, pieces
	0	5	10	15	20	25	30	35	
Avena fatua (L.)	8 * (8,5)**	27 (28,7)	31 (33,0)	11 (11,7)	7 (7,5)	7 (7,5)	3 (3,2)	0	94
Echinochloa crusgalli (L.)	11 (7,7)	54 (37,7)	43 (30,1)	24 (16,8)	8 (5,6)	3 (2,1)	0	0	143
Hordeum leporinum	4 (3,5)	31 (27,4)	38 (33,6)	21 (18,6)	10 (8,9)	6 (5,3)	3 (2,7)	0	113
Setaria qlauca (L.)	0	48 (39,3)	27 (22,1)	18 (14,7)	13 (10,7)	9 (7,4)	4 (3,3)	3 (2,4)	122
Stellaria media (L.)	28 (22,0)	28 (22,0)	32 (25,2)	14 (11,0)	10 (7,9)	8 (6,3)	5 (3,9)	2 (1,6)	127
Chenopodium rubrum (L.)	31 (15,9)	53 (27,2)	48 (24,6)	33 (16,9)	20 (10,2)	13 (6,7)	7 (3,6)	3 (1,5)	195
Amaranthus retroflexus (L.)	23 (16,3)	43 (30,5)	25 (17,7)	18 (12,8)	13 (9,2)	9 (6,4)	8 (5,7)	2 (1,4)	141

Xanthium strumarium (L.)	2 (6,1)	10 (30,3)	11 (33,3)	3 (9,1)	3 (9,1)	1 (3,0)	2 (6,1)	1 (3,0)	33
Artemisia annua (L.)	38 (25,2)	43 (28,5)	31 (20,5)	22 (14,5)	13 (8,6)	4 (2,6)	0	0	151
Capsella bursarastoris (L.) Medik	21 (30,9)	18 (26,5)	13 (19,1)	6 (8,8)	5 (7,3)	3 (4,4)	2 (2,9)	0	68
Rumex acetosella	27 (26,2)	20 (19,4)	24 (23,3)	17 (16,5)	7 (6,8)	4 (3,9)	0	4 (3,9)	103
Cynodon dactylon (L.) Pers	13 (16,0)	27 (33,3)	20 (24,7)	8 (9,9)	3 (3,7)	3 (3,7)	4 (4,9)	3 (3,7)	81
Convolvulus arvensis (L.)	22 (25,6)	23 (26,7)	16 (18,6)	14 (16,3)	4 (4,6)	3 (3,5)	3 (3,5)	1 (1,2)	86
Note: * - Weeds in units ** - Weeds in percentage									

Also, in our field experiments, as a result of surface tillage (18-22 cm), the bulk of annual and perennial weed seeds accounted for 86.5-97.9% of the soil in a 0-20 cm layer, growth based on our experimental results, weed infestation has been proven once again.

The main task of tillage is to increase soil fertility. As a result of timely and quality processing, the plowed layer is fine-grained, which creates conditions for the accumulation and storage of moisture in the soil, improving its air and nutrient regimes. However, such treatment is one of the most important agrotechnological measures to prevent infection of crop areas [2; 152-155 b .; eleven; Pages 22-25; 6; 3-5 b.].

In our field experiments, we studied the effect of weeds in an onion field on the degree of soil pollution at a depth of 30-35 cm, the data are presented in Table 2. Our data show that during the main tillage of 30-35 cm with a PYa-3-35 plow, it was noted that the main part of the weed seeds was located on 44.5-54.4% of the plowed bottom soil layer. 30-35 cm, almost no weeds were observed in the surface layer of soil (2.1-4.6%). The spread of weeds in the corral layer starts from 5-10 cm, and annual and perennial plants in this layer, respectively, 3.5-15.9; 9.4–12.1%, 18.2–28.1% in the 15–20 cm layer; 20.8-24.3%, while the main part of the weeds 61.0-70.7; 62.2–67.1% were found to be distributed over 25–35 cm.

CONCLUSION

The results of our field experiments show that surface tillage (chiselling 18-22 cm) in agriculture leads to contamination of areas where 86.5-97.9% of the seeds are scattered in a layer of

0-20 cm of the surface and germinate quickly under such conditions. conditions, absorbing a large amount of water, nutrients and light from the soil during the season, damaging crops, leading to a sharp decrease in yield and crop quality, and worsening the phytosanitary condition of the sown area due to the formation of a large number of seeds.

When carrying out the main tillage to a depth of 30-35 cm, 61.0-70.7% of the main part of the weeds falls into the layer of 25-35 cm and loses fertility, the water regime will improve, favorable conditions for irrigation and good absorption of precipitation, as well as for the growth and development of crops.

Table 2

The effect of tillage on the main layers of soil to a depth of 30-35 cm, the distribution of weed seeds across the soil layers, (2018-2019)

Weed species	Soil layer, cm								Total, pieces
	0	5	10	15	20	25	30	35	
Avena fatua (L.)	0	3* (3,9)**	7 (9,1)	8 (10,4)	12 (15,6)	12 (15,6)	17 (22,0)	18 (23,4)	77
Echinochloa crusgalli (L.)	3 (2,6)	4 (3,4)	4 (3,4)	10 (8,5)	17 (14,5)	24 (20,5)	26 (22,2)	29 (24,8)	117
Hordeum leporinum	0	3 (3,3)	5 (5,4)	8 (8,7)	11 (11,9)	19 (20,7)	21 (22,8)	25 (27,2)	92
Setaria qlauca (L.)	2 (2,1)	4 (4,1)	6 (6,2)	9 (9,4)	12 (12,5)	16 (16,7)	21 (21,9)	26 (27,1)	96
Stellaria media (L.)	5 (4,6)	4 (3,7)	7 (6,5)	11 (10,2)	14 (13,0)	17 (15,7)	23 (21,2)	27 (25,0)	108
Chenopodium rubrum (L.)	0	4 (3,4)	9 (7,6)	12 (10,1)	18 (15,1)	23 (19,3)	28 (23,5)	25 (21,0)	119
Amaranthus retroflexus (L.)	3 (2,6)	4 (3,5)	7 (6,1)	11 (9,6)	15 (13,2)	21 (18,4)	24 (21,1)	29 (25,4)	114
Xanthium strumarium (L.)	0	5 (11,4)	2 (4,5)	3 (6,8)	5 (11,4)	8 (18,2)	9 (20,4)	12 (27,3)	44
Artemisia annua (L.)	3 (2,2)	6 (4,5)	9 (6,7)	13 (9,7)	18 (13,4)	22 (16,4)	35 (26,1)	28 (20,9)	134
Capsella bursarastoris (L.) Medik	0	2 (3,5)	0	5 (8,8)	11 (19,3)	8 (14,0)	13 (22,8)	18 (31,6)	57
Rumex acetosella	0	5 (5,5)	6 (6,6)	8 (8,8)	11 (12,0)	18 (19,8)	20 (22,0)	23 (25,3)	91

Cynodon dactylon (L.) Pers	0	3 (4,1)	5 (6,8)	6 (8,2)	11 (15,0)	15 (20,5)	15 (20,5)	18 (24,7)	73
Convolvulus arvensis (L.)	3 (4,0)	4 (5,4)	3 (4,0)	8 (10,8)	10 (13,5)	10 (13,5)	17 (23,0)	19 (25,7)	74
Note: * - Weeds in units ** - Weeds in percentage									

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THE CULTIVATION OF SEEDLINGS, PLANTING DENSITY AND YIELD OF NEW VARIETIES OF SWEET POTATO (IPOMEA BATATAS LAM.)

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ABSTRACT

The article presents the results of research on the germination of seedlings from tubers and the density of sweet potatoes. New varieties were evaluated by seedling yield, early maturity, rate of crop formation, productivity and yield, as well as features of cultivation technology.

Keywords: New varieties, sprouts, early maturity, rate of crop accumulation, marketable yield, planting density.

INTRODUCTION

The most important task of crop production is the introduction of food plants. Meeting the needs of the population of the republic occupies an important place tuber crop. Among the tubers, sweet potatoes or sweet potatoes (Ipomea batatas Lam.) are important. Sweet potato is widely distributed in China, Japan, India, the USA, Korea and European countries as a food, industrial and fodder crop. Sweet potato is one of the new food crops for the Zarafshan valley of Uzbekistan. Sweet potato belongs to the bindweed family (Convolvulaceae L.). This family includes over 400 species, of which one species I.batatas cultivates. Sweet potato is a perennial, tropical plant. The most favorable temperature for the growth and development of sweet potato is + 25 ... + 35 ° C. [1,2,3,6]. Therefore, in the dry, hot climate of Uzbekistan, sweet potato is cultivated as an annual crop - by seedling method [2,4].

It is a starchy sugar root crop. The main taste of sweet potato is its high sugar content, especially after long-term storage. The sugar content determines the characteristic sweetness of the sweet potato, which is why it acquired its name - sweet potato [1,5,6]. In tropical countries, the importance of sweet potato in national nutrition is great and is equated to potatoes. However, despite this, sweet potato cannot displace it, since in

terms of taste, most varieties of sweet potato have a different use in cooking. The aboveground part of the plant is a valuable food [5,6,7].

The purpose of our research is a comprehensive assessment of new sweet potato varieties in terms of early maturity, growth, development, intensive reproduction, crop formation, compactness of tubers in nests, productivity, yield, and keeping quality of tubers as well as the development of methods of agricultural technology for obtaining high yields for given conditions.

MATERIALS AND METHODS

Field experiments were carried out in the conditions of old-irrigated meadow-serozem soils of the Raykhon farm, Tailyak district and in the field experiment station of Samarkand branch of Tashkent state agrarian university, Samarkand region. The mechanical composition of the soil is medium loamy with groundwater at a depth of 4-5m. The agrochemical parameters of the arable horizon are characterized by low content of humus (0.98-1.11%), nitrate nitrogen (8.41-10.67 mg/kg), mobile phosphorus (25.43-27.61 mg/kg), exchangeable potassium (189-216 mg/kg) of soil.

The object of the study was new varieties of sweet potato Khazina, standard, Sochakinur, Toyloki. Selected variety samples were studied at row spacings of 70 cm with a pattern of 70x25, 70x30 cm, and 70x35 cm. The area of the plot is 28 m^2, the repetition is four times.

All records, observations, analyzes, care and harvesting were carried out according to generally accepted methods and agro-recommendations.

RESULTS

The results obtained and their analysis. Seedling production technology and evaluation of sweet potato varieties by seedling yield. For this, 40 tubers were taken from each variety of sweet potato and planted on February 25 in a film greenhouse at a temperature of 15-18 ° C, planting to a depth of 2-3 cm, maintaining soil moisture at a level of 65-70%. After 7-10 days after planting, the buds began to germinate, and after 43-48 days, seedlings with a height of 12-15 cm are formed, which are ready for planting in the field.

After planting seedlings for 15-18 days in the field, planting care begins. Care includes - inter-row cultivation (cultivation), weeding, weed control, top dressing, and watering. Harvesting at the end of September, at the beginning of October with the help of potato diggers. Store sweet potato crops in storage or cellars.

Table 1. Influence of cultivation of varieties of sweet potato with different methods of planting schemes on productivity

№	Planting schemes, cm	Harvest from one bush, g	Yield, t/ha
In Khazina variety			
1	70x25	1044	43,6
2	70x30	950	36,8
3	70x35	902	32,5
			LSD_{05}=1,9-2,4 t/ha
In Sochakinur variety			
4	70x25	1108	46,1
5	70x30	965	37,6
6	70x35	923	34,2
			LSD_{05}=1,9-2,4 t/ha
In Toyloki variety			
7	70x25	1108	45,3
8	70x30	965	37,6
9	70x35	923	34,2
			LSD_{05}=2,5-3,1 t/ha

The results of the research showed that the yield of seedlings from 1 seed tuber varied from 14.6 to 21.5 pcs. The highest yield of seedlings was observed in varieties Sochakinur (21.5 pcs.), Toyloki (16.9 pcs.) and the smallest yield of seedlings was in samples of Khazina, (14.6 pcs.).

Early maturity in the studied varieties, the growing season ranged from 121 to 140 days. The earliest maturing (121-129 days) varieties of sweet potato Sochakinur, Toyloki and for the standard variety Khazina, it was 140 days.

The yield of sweet potato varieties per hectare varied from 32.5 to 46.1 t/ha (Table 1). The highest yield (44.5-46.1 t/ha), of which an increase in yield of 9.4-11.0 t/ha or 126.8-131.3%, was obtained from the varieties Sochakinur, Toyloki. At the same time, these varieties had the highest yield of marketable tubers and amounted to 43.2-45.2 t/ha or 97.1-98.0% (Table 1).

When studying the planting of seedlings with a row spacing according to the scheme 70x25 and 70x30 in sweet potato varieties Sochakinur and Toyloki, it was found that the highest productivity (45.3-46.1 t/ha) obtained when planting seedlings according to the scheme 70x35 cm.

CONCLUSION

In the conditions of old-irrigated meadow-serozem soils, the widespread cultivation of new varieties of sweet potato Sochakinur, Toyloki, and Khazina according to the planting schemes of 70x25 and 70x30 cm provide the possibility of obtaining a sustainable high yield (36.8- 46.1 t/ha) with good marketability.

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THE IMPORTANCE OF A SMART IRRIGATION INTRODUCTION SYSTEM BASED ON DIGITAL TECHNOLOGIES IN AGRICULTURE

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ABSTRACT

The article discusses the introduction of water-saving technologies in irrigation, information on the composition of land and soil, the implementation of optimal agrotechnical measures and other scientific and innovative achievements and best practices. The implementation of irrigation systems based on digital technologies in the use of water resources and their efficiency is demonstrated.

Keywords: drip irrigation, IOT- Internet of Things, ARM microcontroller, Arduino Uno board, Zig-Bee, temperature sensor, humidity sensor, light sensor, rain sensor.

Irrigation systems remain an integral part of crop production in some regions of the world. The reaction of the irrigation system is irrigated in the traditional way, which in turn leads to a lot of water being wasted. Today, the closure of the drip irrigation system plays an important role in eliminating the wastage of water as a result of evaporation and leakage in irrigation. Drip irrigation is a drip of water that flows near the root part of a plant.

Irrigation of arable lands in the country is carried out at the expense of 80% of the country's water resources. Seventy percent of irrigation branches does not have an anti-filtration coating in the Republic, as a result a portion of the water being lost during delivering in the field.

The agricultural land in the country is 20,236.3 thousand hectares, of which irrigated land is 20.7%. At the same time, as a

result of population growth, the transfer of agricultural land to another category and climate change, the amount of irrigated land per capita in the last 10-15 years has decreased by 24% from 0.23 hectares to 0.16 hectares.

"The situation is exacerbated by the continued use of traditional irrigation methods due to the high dependence of agriculture on irrigation and the sharp increase in drought as a result of climate change. According to the forecast of the World Resource Institute, by 2040 Uzbekistan will become one of the 33 countries with the highest water shortages. The decline in productivity has had serious negative consequences for food security and the balance of payments, which has led to a decline in the use of resource-saving technology in the management of water resources and in the cultivation of agricultural crops "[1].

In recent years, special attention has been paid in our country to increase the efficiency of agricultural lands by using water-saving technologies. In 2021, water-saving technologies have been introduced on 433,000 hectares of arable land.

Resolution of the President of the Republic of Uzbekistan No. PP-144 of March 1, 2022 "On measures to further improve the introduction of water-saving technologies in agriculture" was approved. According to this resolution, by the end of 2022, it is planned the adopt drip irrigation at least 230,000 hectares, sprinkler irrigation on 28,000 hectares, discrete irrigation system on 2,000 hectares and laser equipment on 218,000 hectares.

This year, Samarkand region plans to introduce drip irrigation on 18,875 hectares out of 21,328 hectares, including 11,800 hectares of cotton, 3,900 hectares of orchards, 2,900 hectares of vineyards and 275 hectares of other areas. preparation for a discrete irrigation system by laser leveling is planned [2].

"On the implementation of the tasks set in the strategy of agricultural development of the Republic of Uzbekistan for 2020 - 2030 in 2021" February 26, 2021, number PQ-5009 "to improve the use of water resources in the online mode, to equip the hydrological post with automated equipment on the basis of advanced technologies, to close the water-saving technologies in irrigation, Regular provision of fertilizers and protection of the soil protection system, the use of pesticides and fertilizers in the field, and the use of chemicals on a scientific basis "[1]. Based on these tasks, it can be said that the introduction of smart irrigation systems based on digital technologies in agriculture plays an important role in the optimal use of water resources.

The smart irrigation system will facilitate the efficient use of fresh water resources in agricultural areas, while the automated

technology will help to increase its efficiency in the optimal use of water resources.

The modern drip irrigation system does not significantly reduce the water level compared to the traditional method. In the automated drip irrigation system, when the mobile pump is closed, it first takes the image of the plot, calculates its moisture content and transmits the data to the microcontroller. Microcontroller does not start the irrigation system based on the data and sends the field status to fermer's mobile phone.

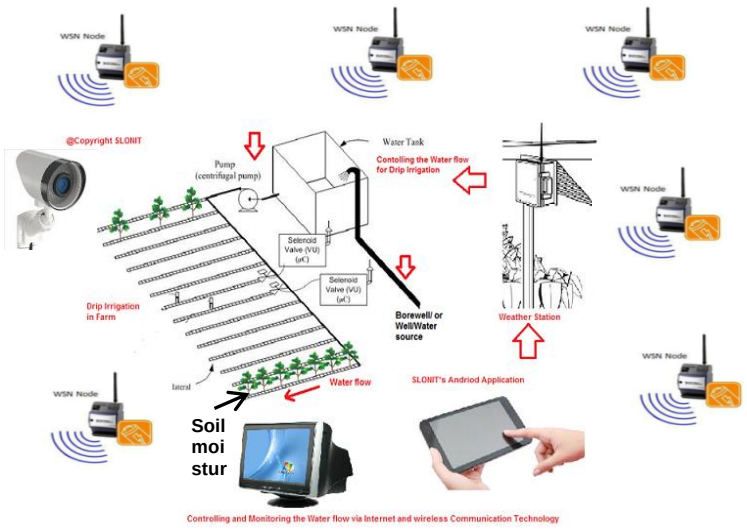

Figure 1. Sensors nodes placed in the field at various points

In the drip irrigation system, water and fertilizer are used efficiently. The concept of this irrigation system is to irrigate only the root zone of the plant. Drip irrigation allows water to slowly seep into the plant roots. Such a system is especially suitable for cold, hot and windy places. Applying water to the root zone of the plant has the potential to reduce the disease and improve the yield.

The data from the sensor is constantly loaded into the cloud technology, which is placed in the drip irrigation system. This system also provides information for administrator and for the user. The irrigation system can be operated automatically in the mobile app or by the user (ON-OFF). By closing the data analysis algorithm, this system optimizes water use and allows for increased product development.

In the horticulture of Uzbekistan, a wireless sensor detection system based on the Internet of Things (IoT) has been designed as follows.

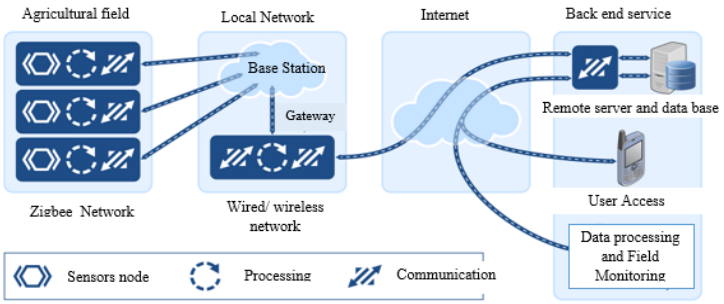

Figure 2 System architecture for IoT based Wireless Sensor network system

In this method, which is proposed for use in horticulture, a knot of different sensory nodes is placed in a bran place. This node collects the data and transmits the wireless module to the base station or sepvep that collects the data. The stored data is processed and transferred to a smartphone, tablet or laptop where the data can be multiplied. During the cultivation of the crop, a weather station is set up to record the environment parameters.

Provision of communication architecture and monitoring system for IoT-based wireless sensing detection system is given in step 2.

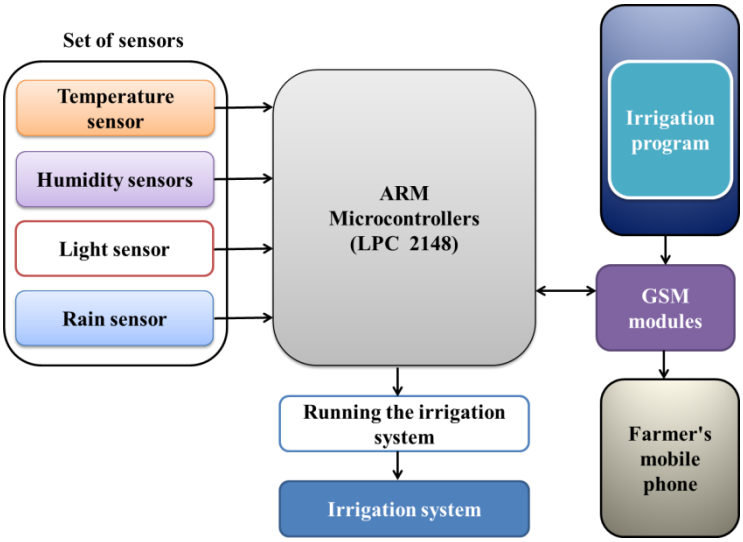

Figure 3 Automated irrigation system

Natural parameters from sensors installed in agricultural areas are measured and the collected data is sent to the ARM microcontroller (Arduino Uno board) and Zig-Bee module via the Internet (IoT) cloud system.

Using a mobile device or computer, the user receives and monitors data remotely. In the final stage, the farmer carries out the work that needs to be done (irrigation, resource management, crop control, etc.) through the data collected.

The proposed irrigation system consists of a microcontroller, a mobile phone, a GSM module, a set of sensors and a water pump control unit, as shown in step 3. The set of sensors consists of a temperature sensor, a humidity sensor, a light sensor, and a rain sensor, which is used to monitor field conditions, such as air temperature, soil moisture, sunlight, and precipitation. An irrigation program has been developed to determine soil moisture from the image captured by the camera mounted on the smartphone, and a rectangular device with a Transparent Anti-Reactive Glass (TARG) medium on one side of the camera is mounted on the ground and captured from this device by the camera on the smartphone. The software installed on the smartphone analyzes the ground condition using the captured data. The mobile communication (GSM) module in the proposed irrigation system is used to send and receive messages between the microcontroller and the smartphone. The ARM microcontroller receives data from various sensors and the data analyzed by the software installed on the smartphone and controls the irrigation system by adding or removing the water pump based on this information. Through the ARM microcontroller (GSM) module, it sends information about the irrigation status to the farmer and the farmer is aware of the entire irrigation status. The ARM microcontroller receives data from various sensors and the data analyzed by the software installed on the smartphone and controls the irrigation system by adding or removing the water pump based on this information. Through the ARM microcontroller (GSM) module, it sends information about the irrigation status to the farmer and the farmer is aware of the entire irrigation status. The ARM microcontroller receives data from various sensors and the data analyzed by the software installed on the smartphone and controls the irrigation system by adding or removing the water pump based on this information. Through the ARM microcontroller (GSM) module, it sends information about the irrigation status to the farmer and the farmer is aware of the entire irrigation status.

In summary, the use of traditional irrigation systems in agriculture in recent years has required a lot of water consumption. In addition, the level of rainwater and groundwater is declining day by day, thereby increasing the demand for new systems for the efficient use of water resources for agriculture. In order to use water efficiently in agriculture, there must be a system that supports farms. A smart irrigation system not only reduces water consumption, but also saves the time that farmers spend on controlling the irrigation system and increases efficiency in agriculture.

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INNOVATIVE APPROACH TO IMPROVEMENT OF ARID PASTURES IN UZBEKISTAN

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ABSTRACT

This paper presents the main results of field experiments to identify the effectiveness of traditional and innovative technologies for improving pastures in Uzbekistan. During the field experiments, field germination, survival, growth dynamics and yield of phytomeliorants were determined in various experimental options. In addition, the impact of the depth of tillage on field germination and plant survival was determined as well.

Keywords: phytomelioration, improvement, shrubs, subshrubs, herbage, strip tillage, resource saving, degradation, combined implement, agrophytocenosis, tillage depth, ratio.

INTRODUCTION

The management system of degraded pastures is one of particular important for present. These soils have low fertility and unsatisfactory agrophysical properties. In order to increase the productivity and improve the condition of these pastures, they some forms of science-based approaches are needed. In the conditions of limited material and technical resources of the arid zone, it is important to use them rationally through the introduction of techniques that would provide the greatest return on costs, help preserve and increase the plant yields, and prevents desertification respectively [1]. Recently, the creation of most acceptable method of phyto-melioration is considered as combined tools for the improvement of pastures, generating agrophytocenoses for different seasons of use based on surface, minimum or strip tillage [2, 3, 4, 5].

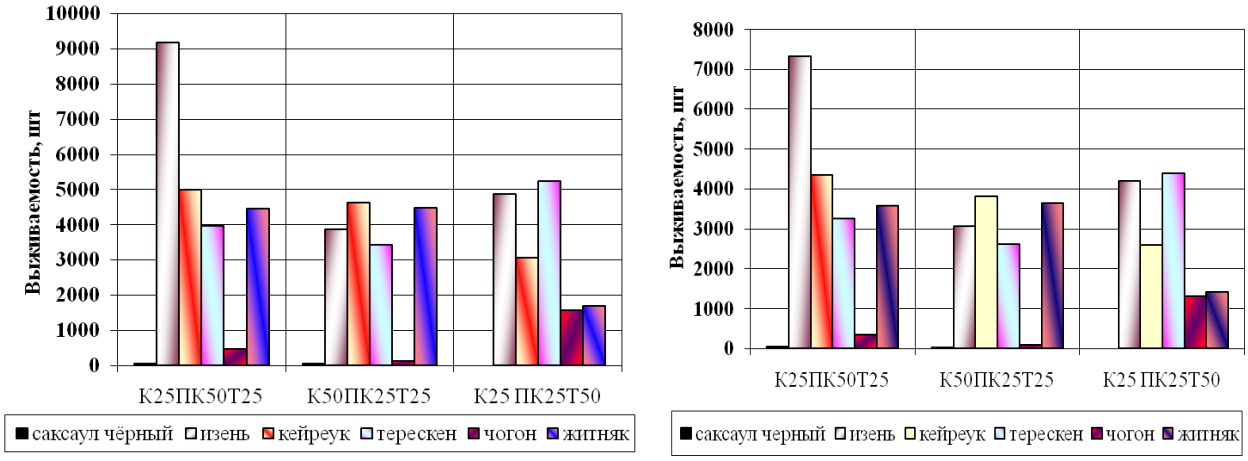
In this context, the research proposed to develop a resource-saving, environmental technology based on the minimum tillage of degraded pastures using phyto-ameliorative plants (shrub, semi-shrub, grass) that enable to prevent pasture degradation and increase the crop yields.

MATERIAL AND METHODS

For the improvements - a degraded area was chosen in the experimental farm of UzNIIKEP, where experimental studies were carried out on the effect of different depths of tillage, the study of various options for creating pasture agrophytocenoses from among shrubs (K), semi-shrubs (PK) and grasses (T). For sowing process - the seeds of shrubs (black saksaul), semi-shrubs (keyreuk, izen, teresken, chogon) and grasses (wheat grass) were sown in various ratios using the developed combined tool based on minimal (strip) tillage and sowing seeds.

RESULTS AND DISCUSSIONS

According to the results of the field experiments, elaborated in (Fig. 1) that the largest number in the community was obtained in the variant of the experiment where the share of participation of shrubs was 25%, semi-shrubs - 50% and grasses - 25%. At the same time, the largest number of plants (9.1-4.9 thousand/ha) falls on the share of such species as Izen, keireuk, teresken. The highest survival rate (98%) is noted in the experimental variant, where shrubs make up 25%, semi-shrubs 25% and grasses 50%.



a) b)

Figure 1. Field germination (a) and survival of phytomeliorants (b) in pasture agrophytocenoses created from various life forms of plants.

The results of the survival of seedlings on the example of Izen was considered. Under the K25PK50T25 variant, plant survival in the first year of vegetation was 80%, while under the $K_{50}PK_{25}T_{25}$ and $K_{25}PK_{25}T_{50}$ options, it did not exceed 79 and 86,5%, respectively, i.e. the best survival rate was obtained at ratios $K_{25}PK_{25}T_{50}$.

The sowing of seeds of desert phytomeliorants against the

background of various tillage indicates that the depth of tillage significantly affects the indicators of seed germination and plant survival.

As the data described in Table 2, the largest initial abundance and its preservation were noted when tilling the soil to a depth 20 cm, while according to the background of tillage to a depth of 10 and 15 cm, these figures are found somewhat lower.

Table 2 Field germination and survival of phytomeliorants at different depths of tillage with a combined implement. The first-year vegetation period of plants.

Depth of tillage, cm	Phytomeliorant	Seedlings received	preserved plants
10	Black saksaul	0	0
	Keyreuk	720 / 100	591.1 / 82
	Izen	4672 / 100	4064 / 86.9
	Zhitnyak	972 / 100	667 / 68.7
15	Black saksaul	0	0
	Keyreuk	1900 / 100	1634 / 86
	Izen	4854 / 100	3834.6 / 78.9
	Zhitnyak	180 / 100	163.8 / 91
20	Black saksaul	0	0
	Keyreuk	2413 / 100	1792.8 / 74.2
	Izen	5320 / 100	4692.2 / 88.1
	Zhitnyak	231 / 100	182.9 / 81.5

Note: numerator - pcs/ha, denominator - % of preserved plants

The table shows that the survival rate of izen at a tillage depth of 20 cm was 88.1%, and at a tillage depth of 10 and 15 cm, 86,9 and 78,9%, respectively. The highest survival rate of 91% wheatgrass is observed at a processing depth of 15 cm, while in other variants it

was 68,7 and 81,5%. In all variants of the tillage depth, black saksaul sprouts were not observed, obviously, due to the poor quality of this batch of seeds.

Most important issues in pasture improvement technology is obtaining a full-fledged herbage of sown phytomeliorants for estroarid desert conditions.

The study of the field germination of phytomeliorants from among shrubs, semi-shrubs and herbs at different depths of their incorporation is the main indicator. In this regard, we conducted research in order to determine the depth of seed placement for their field germination. As evidenced by the data results, relatively high (44-56%) in relation to the control indicators of field germination were obtained in Figure 3.

Figure 2. Seedlings of Izen at a depth of tillage of 20 cm

Seedlings of izen at a soil tillage depth of 20 cm (keyreuk, izen, wheatgrass) of pasture plant species when their seeds are planted to a depth of 1 cm. Somewhat low (30-38%) seed germination rates are noted when seeds are planted to a depth of 2 cm (Figure 2). Due to the low quality of seeds, seedlings on the crops of black saksaul were not recorded.

Among the tested species, the highest field germination of seeds of phyto-ameliorants was highlighted in izen (56%) when planted to a depth of 1 cm, while in other variants it was observed 40-38%.

Let us also consider the influence of various ratios of plant life forms on the growth and development of agrophytocenosis. During the first year of vegetation, the different ratio of life forms of plants did not have a significant effect on the dynamics of their growth. While the height of plants when sowing K_{50}-PK_{25}-T_{25} was: black saksaul - 15.1 cm, izen - 8.6, keireuk - 7.6, teresken - 10.4 cm in May. The same values when sowing K_{25}-PK_{50}-T_{25} and K_{25}-PK_{25}-T_{50} amounted to 13,3 for black saksaul, 10,7-8,9 for izen, 11,2-9,6 for keireuk, 117-10,1 cm for teresken, respectively. (Table 3). It should be noted that the largest period of plant growth falls on the month of July.

However, due to the depletion of moisture reserves plant growth significantly decreased in the future.

Table 3 Growth dynamics of pasture plants in the experiment on creation of pasture agrophytocenoses (sowing at a working depth of 20 cm).

Variant of agrophytocenosis	Plant	Growth dynamics, cm		
		15.05.05	20.07.05	12.09.05
K_{50}-PK_{25}-T_{25}	Black saksaul	15,1	36,2	46,9
	Izen	8,6	27,4	30,8
	Keyreuk	7,6	29,2	34,2
	Teresken	10,4	30,8	36,1
	Chogon	7,7	26,7	38,9
	Zhitnyak	16,2	36,5	46,1
K_{25}-PK_{50}-T_{25}	Black saksaul	13,3	35,6	42,7
	Izen	10,7	29,7	30,8
	Keyreuk	11,2	27,3	34,2
	Teresken	11,7	30,6	36,1
	Chogon	7,2	33,8	38,9
	Zhitnyak	11,8	33,4	43,2
K_{25}-PK_{25}-T_{50}	Black saksaul	0	0	0
	Izen	8,9	25,2	27,3
	Keyreuk	9,6	23,1	26,5
	Teresken	10,1	27,3	29,7
	Chogon	8,3	29,8	30,8
	Zhitnyak	12,3	32,1	44,7

The value of the product obtained per unit area and its quality is the main criterion for the effectiveness of the technology used. Based on this, we will consider the results of studying the yield of fodder mass when creating agrophytocenoses from various life forms of plants.

The yield of plant mass is determined by the density of plant standing, the power of development and the mass of individuals that make up this herbage.

In our experiments, the highest yield (6,77 c/ha) falls on the crops of $K_{25}PK_{50}T_{25}$, while at the ratios of $K_{50}PK_{25}T_{25}$ and $K_{25}PK_{25}T_{50}$, the total yield of forage mass was 5,06 and 4,9 c/ha, respectively (Fig. 3). At the same time, the share of izen was 2,8 c/ha or 41,3% of the total yield.

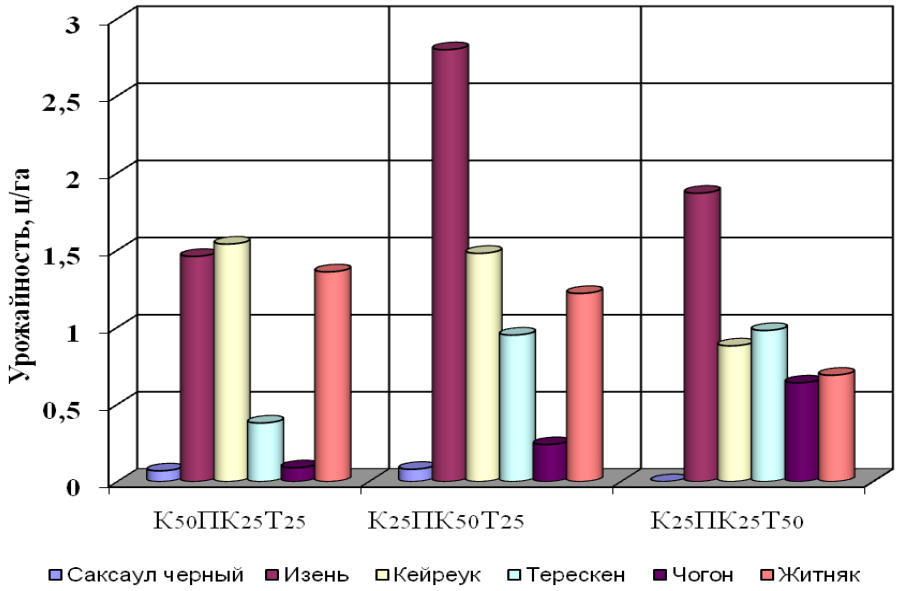


Figure 3. Productivity of fodder plants under the different options of pasture agrophytocenoses

CONCLUSION

Thus, the results of the experiments made it possible to establish that the best indicators of field germination, survival and growth dynamics of pasture plants occur when they are sown at a processing depth of 20 cm. The best field germination of seeds of the phytomeliorants tested by us is observed when their seeds are planted to a depth of 1-2 cm. The yield of fodder mass of each phytomeliorant and in general for the plant community was the largest in the experimental farm of UzNIIKEP – 6,77 c/ha at K_{25} + PK_{50} + T_{25} (shrubs - 25%, semi-shrubs - 50% and grasses - 25%). This is 2-5 times higher than the yield of unimproved natural pastures.

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РАССТЕНИЙ. Ответственный редактор: Сукиасян Асатур Альбертович, кандидат экономических наук, доцент. В состав редакционной коллегии и организационного комитета входят: Алиев Закир Гусейн оглы, доктор философии аграрных наук, 134.

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EVALUATION AND ACCOUNTING OF MATERIAL WORKING CASH IN AGROCLASTERS AS AN OBJECT OF ACCOUNTING

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ABSTRACT

This article examines the economic nature, types and accounting of working capital in agro-clusters as an object of accounting on the basis of national and international accounting standards, compares and evaluates their differences and conducts accounting on the basis of international standards. aspects are explained.

Keywords: Cluster, agrocluster, working capital, material working capital, value, valuation, accounting, active account, FIFO, LIFO, AVECO.

INTRODUCTION

In recent years, liberalization of foreign trade, tax and financial policies to support the economy, entrepreneurship and ensure the inviolability of private property, the organization of deep processing of agricultural products, food security of the population and the rapid development of the regions effective measures have been taken to ensure development.

At the same time, the most important tasks of the agricultural sector of the country today are: “Specialization of districts for the cultivation of certain types of products. Expand government support for agriculture and introduce new insurance mechanisms. 464,000 hectares of new and decommissioned land will be developed and allocated to clusters on an open basis. Reduction of 200,000 hectares of cotton and grain fields and given it to citizens to long-term lease on an open basis. Growing export-oriented crops and developing fruit and vegetable production, increasing the area of intensive orchards by 3 times and greenhouses by 2 times, and increasing the export potential by another $ 1 billion. Improving the system of science and innovation-based agricultural services.One of the urgent tasks is to provide agro-industrial enterprises with raw materials and increase production by 1.5 times."

To achieve these goals, the State Program for the Implementation of the New Uzbekistan Development Strategy for the Year of "Human Dignity and Active Neighborhood" will increase incomes by at least 25% by 2022 through intensive development of agriculture on a scientific basis. Reducing the cost of production by 30-35%, achieving an average yield of 37 centners of cotton and 70 centers of grain, replacing biologically obsolete varieties with 8 high-yielding, early-maturing, high-fiber and high-quality cotton and expansion of the area of 12 grain varieties;

To establish 110 fruit and vegetable cooperatives and 35 grain clusters in the regions. At the same time, the clusters will increase the volume of production of fruits and vegetables and finished products with high added value, as well as their share in exports by 2 times and creating new jobs by 3 times".

In carrying out these tasks and measures, it is important to increase the efficiency of accounting and control and use of available funds in agro-clusters, in particular, working capital. In the practice of agro-clusters, the majority of current assets are working capital. At the same time, the share of working capital in the cost of production is high, and their effective use in reducing the cost of production leads to a reduction in the cost of production.

The large share of working capital in current assets, their diversity and the seasonal nature of their use make the process of classifying, accounting for and controlling them labor-intensive and complex. In addition, working capital is a relatively highly liquid asset, with clear, timely accounting and effective control over them and their effective use, prevention of inefficient costs, ensuring full safety, quality of audit of working capital, the issues of conducting and providing management with accounting information are of particular importance.

MATERIALS AND METHODS

The normative and legal documents implemented in the country, the scientific work of economists, the area of land attached to the existing agro-clusters, including arable land, crop yields and livestock productivity, statistical data reflecting the gross yield of agro-clusters and materials of scientific research results were used. Observation, grouping, analysis, and other methods were used in research.

ANALYSIS AND RESULTS

Uzbekistan has a new approach to the establishment of agro-clusters, based on the institutional and structural changes in agriculture, which require the continuous improvement of legal,

organizational and economic relations between business entities and the industry, the implementation of the new ways are becoming one of the important tasks of agrarian policy today.

"Agrocluster is the integration of agricultural production, processing and sales processes into a single chain and the use of high-tech innovations, as well as increasing the competitiveness of agricultural products in the domestic and foreign markets, the formation and development of infrastructure in rural areas. It consists of business entities working to increase employment and income, as well as to improve the quality of agricultural products and the environment in the future".

The total number of clusters established in the country is 463, "in the aim of creating a favorable agribusiness environment and value chain including 25 cotton-textile (106 thousand hectares), 80 grain (801 thousand hectares), 13 rice farms (17,000 ha) and 2 drug clusters have been established. As a result, in 2021, 122 cotton-textile, 157 grain-growing, 146 fruit-and-vegetable growing, 29 rice-growing, and 9 medicinal plant clusters operated. As a result of the introduction of science, innovation and advanced technologies in the industry, agro-clusters have grown 3.4 million tons of cotton and about 7.8 million tons of grain. A total of 118 projects worth 8.4 trillion soums were launched by cotton and textile clusters, 42 by grain clusters worth 783.7 billion soums, and 22 by fruit and vegetable clusters worth 328 billion soums. 24,000 new jobs have been created".

Accounting for working capital, which is an important object of accounting, is regulated by the National Accounting Standard (BHMS) No. 4 "Inventories". Inventories are tangible and intangible assets held in the ordinary course of business for the purpose of subsequent sale and available in the production process, as well as in the production of goods, works or services or for administrative and socio-cultural functions. The share of working capital in the cost of goods produced by enterprises, which has a high share in the structure of assets, varies from 45% to 80%, depending on the area of activity of enterprises. In agro-clusters, the share of working capital in the cost of production is 40-60%.

The effective use of working capital in agro-clusters is directly related to the organization of accounting, the main purpose of which is to properly document the movement of current assets in the primary documents and ensure their internal control, as well as to be effective in spending. The formation of the cost of the product on an economic basis as a result of the application of the desired valuation methods.

Warehouses will be set up in agro-clusters to ensure material storage. The head of the enterprise is responsible for the organization of the warehouse and equipping it with appropriate equipment. The warehouse manager is the materially responsible person for the stocks and products stored in the warehouse. The warehouse manager keeps track of the warehouse. According to the document flow schedule, the warehouse manager submits a "Report on the movement of inventories" to the accounting department, accompanied by receipts and disbursements.

The availability and movement of raw materials, materials, fuel, spare parts, components, purchased semi-finished products, structures, details, packaging materials, inventory, farm equipment and similar values belonging to agroclusters which are the generalization of the information is carried out in the synthetic accounts in the accounting plan, consisting of 1000 "Accounts for materials" in the chart of accounts.

Materials are accounted for at the lowest of two prices in the accounts - at actual cost (purchase price or cost of production) or at market price (net realizable value). If necessary (when the range of materials used is large, the movement of materials within the enterprise is intensive, in agricultural production, etc.), the inventory of materials can be kept at book value. The estimated cost includes the plan cost, average purchase price, wholesale price, etc. When accounting for materials at cost, each month, the amount and percentage of the difference between the actual cost and the stated value are calculated.

In the agro-cluster "Kamalak Invest" there are accounting entries on the receipts and disbursements of working capital. The main links to these accounts are:

1. When working capital is earned by transferring money from suppliers:

Debit 1010 - 1090 Credit 6010;

2. When paying for working capital purchased by money transfer from suppliers:

Debit 6010 Credit 5110;

3. Upon receipt of working capital from the liquidation of fixed assets;

Debit 1090 Credit 9210;

4. When working capital is spent on basic production

Debit 2010 Credit 1010-1090;

5. When working capital is spent on ancillary production:

Debit 2010 Credit 1010-1090;

6. When working capital is used for general production needs:

Debit 2510 Credit 1010-1090;

7. When working capital is used for administrative needs:

Debit 9420 Credit 1010-1090;

In accordance with BHMS 4, the value of inventories and inventories that are disposed of (as well as for production) is determined using one of the following methods:

a) at the identified cost of the unit;

b) by weighted average value (AVECO);

d) Initial cost of inventories at the time of acquisition of inventories (FIFO).

In international practice, the LIFO method is also used.

Line 020 of Form 2 of the Financial Statement "Statement of Financial Results" shows "Cost of goods sold (goods, works and services)". the cost of inventories is deducted and the cost of materials under BHMS is found using the FIFO method and the AVECO method.

Only one method of determining the value of each group (type) of working capital during the reporting year. The use of one of the methods of determining the value of a group (type) of inventories is based on the admissibility of the accounting policy sequence.

At the end of the reporting period, the cost of inventories is determined based on the method used to determine the cost of inventories at the time of their disposal.

The method used to determine the value of inventories in the disposal of inventories should be reflected in the entity's accounting policies.

We conduct calculations using the above methods based on data from the “Kamalak Invest” agro-cluster below. The following materials (Table 1.1) were purchased in the agro-cluster during the year:

Table 1.1 Cost of working capital in the agro-cluster "Kamalak Invest"

Date of purchase	Quantity, kg	One unit of material value, soum	Total value, thousand soums
20.09.2021	10000	4500	45000
04.10.2021	17000	4800	81600
26.10.2021	15000	5200	78000
Total	42000	x	204600

As can be seen from Table 1.1 above, in 2021, the Kamalak Invest agro-cluster purchased a total of 204,600,000 soums of working capital.

Table 1.2 Evaluation of materials by the FIFO method

Consumption of materials	Quantity, kg	One unit of material value, soum	Total value, thousand soums
1st party	10000	4500	45000
2nd party	17000	4800	81600
3rd party	10000	5200	52000
Total spent:	28000	x	178600
Balance in the warehouse	14000		26000

When we look at the procedure for evaluating materials by the FIFO method in Table 1.2, we see that in 2021, 178,600,000 soums of working capital were spent, and by the end of the month, 26,000,000 soums worth of goods remained in the agro-cluster warehouse.

Table 1.3 Evaluation of materials by the AVECO method

Consumption of materials	Quantity	One unit of material value, soum	Total value, thousand soums
1st party	10000	4500	45000
2nd party	17000	4800	81600
3rd party	10000	5200	52000
Total spent:	28000	4871,4	136399,2
balance in the warehouse	14000	4871,4	68199,6

When we evaluate the materials in the agro-cluster "Kamalak Invest" by the AVECO method (Table 1.3), it is known that in 2021, 136399.2 thousand soums of working capital were spent, leaving 68199.6 thousand soums in stock.

The average unit cost is determined by the AVECO method as follows:

(204600: 42000) = 4871.4 soums.

Using the above methods, we determine the cost of materials consumed and the costs allocated to inventories at the end of the year:

By FIFO method:	
Revenue from sales	325000
Total material cost	204600
Balance at the end of the reporting period	26000
Cost of materials used	178600
Gross profit	146400

By AVECO method:	
Revenue from sales	325000
Total material cost	204600
Balance at the end of the reporting period	68199,6
Cost of materials used	136399,2
Gross profit	188600,8

From these calculations, it can be seen that the overall benefits of the agrocluster varied when different methods of evaluating materials were used.

It is advisable to use the FIFO method when compiling balances in agro-clusters, as the value of working capital is closer to the current price at the end of the reporting period and more accurately reflect agro-cluster assets.

CONCLUSION AND RECOMMENDATIONS

Based on the above, the following suggestions are made to improve the accounting of working capital in agro-clusters:

-in the process of receiving, storing, transferring to inventory and accounting for finished products, the accounting documents are categorized, and instead of duplicating documents, documents are proposed to ensure the completeness of the information;

-accounting entries for the movement of working capital are made on the basis of applicable regulations. In order to streamline and simplify these records, it is necessary to open a synthetic account in agro-clusters entitled "Transportation and procurement costs" and take into account the costs associated with the purchase and production of all working capital. We offer to write off and make accounting entries (postings) depending on the weight of production costs;

- we propose to use the FIFO method in the assessment of working capital and reflect it in the "Accounting Policy of the enterprise".

In general, we believe that the proposals developed by us to improve the accounting of working capital, if implemented in the practice of agro-clusters, will lead to effective management decisions on them.

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EFFECTS OF SOWING CULTIVATION DIFFERENCES ON THE FORMATION OF DIFFICULT WHEAT ROOT SYSTEM IN RAINFED LAND

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ABSTRACT

The article describes the impact of sowing norms on the formation of the root system of hard wheat varieties ‘Mingchinor’ and ‘Yakut-2014’ in the conditions of the hilly region of rainfed land.

Keywords: rainfed land, hilly region, durum wheat, sowing norm, variety (‘Mingchinor’, ‘Yakut-2014’), root system.

INTRODUCTION

It is known that the main function of the root system is to provide the plant with the necessary amount of water and nutrients during the period of growth and development. This is because a number of scientific studies have shown that the development of the root system and its activity have a significant impact on the formation of the crop of all cultivated plants, as well as winter wheat [5; 363-s, 8; 14-s, 7; 432].

The level of development of the root system of wheat planted in autumn depends on its depth of penetration into the soil, indicators such as root mass, plant type, variety, planting dates, norms, nutritional regime [3; 64-s.].

The formation features of the root system of hard and soft wheat varieties included in the State Register for planting on rainfed and irrigated lands of Uzbekistan are poorly studied. In particular, the effect of planting norms on the development of durum wheat root system is not sufficiently covered in the literature.

MATERIALS AND METHODS

Field experiments were carried out on the basis of the program in the conditions of the farm "Yashin-Yamin" in the rainfed region of Yakkabag district of Kashkadarya region.

New ‘Mingchinor’ and ‘Yakut-2014’ varieties were tested which included in the State Register of durum wheat in the conditions of the hilly region of rainfed lands.

In the experiment, the sowing norm of winter wheat was 2.0 per hectare; 2.5; 3.0 and 3.5 million. were studied at the expense of seeds. The experiment was designed as following: 4 replications each one 50 m^2 in 2 tiers. In the experiment, plant care was carried out on the basis of agro-techniques adopted for the region. All phenological observations and biometric measurements made in the field experiment were used in the methodological manuals of the Uzbek Cotton Research Institute "Methods of conducting field experiments" [1; p. 145].

Root weight was determined in monoliths with a soil shear surface of 50x15 cm. Physiological evaluation of the root system of durum wheat planted in autumn was evaluated on the adsorption of methyl zinc on the general and active surface of the root absorbing in relation to the sowing norm as the absorbing organ [6; 311-b.].

Analysis of variance of data obtained on productivity B.A. Dospekhov [2; 356-s].

RESULTS AND DISCUSSIONS

Our research shows that planting norms have a significant impact on the surface mass and root system of durum wheat sown in the fall. The development of root system and surface mass was highest in durum wheat varieties when the sowing norm was 2 million germinated seeds per hectare (Table 1).

Table 1. Influence of planting norms on the development of surface mass and root system in the accumulation phase (2018-2020 years)

Sowing norm mln. germination ability seeds	Dry mass of 100 plants, g		Root rate, %
	Root	Upper part	
‘Mingchinor’			
2,0	11,5	24,5	47,7
2,5	11,0	23,7	46,4
3,0	10,7	23,6	45,2
3,5	9,0	20,9	43,1
‘Yakut-2014’			
2,0	11,2	23,9	46,9
2,5	10,5	22,9	45,8
3,0	10,4	23,6	44,1
3,5	8,7	20,7	42,0

At the sowing rate of 2.0 million per hectare, before wintering in the ‘Mingchinor’ variety of durum wheat, the root mass of 100 plants was 11.5 g and the surface mass was 24.5 g. The root rate of the plant was 47.7%. This is the case with the ‘Yakut-2014’ variety

the indicator is 11.2 accordingly; 23.9 g; the root coverage rate was 46.9%. With the increasing of planting norms, the indicators of root, surface mass, root rate were decreased. In general, in all planting norms, the above figures were higher than in the thousand 'Mingchinor' varieties.

Table 2 Influence of sowing norms on development of surface mass and root system during the last phase of ripening (2018-2020 years)

Sowing norm mln. germination ability seeds	Dry mass of 100 plants, g		Root rate, %
	Root	Upper part	
'Mingchinor'			
2,0	55,1	490	11,2
2,5	54,4	488	11,1
3,0	53,5	485	11,0
3,5	51,0	480	10,6
'Yakut-2014'			
2,0	54,1	485	11,1
2,5	53,5	483	11,0
3,0	52,6	480	10,9
3,5	50,1	477	10,5

Studies conducted by N.U.Alimbekov et al. in the rainfed hill land of the Tashkent region show that in the ripening phase of wheat sown in autumn on irrigated lands, the length of the roots is 215-233 cm. roots were 76-80 cm, and in non-irrigated backgrounds were 67-73 cm and 40-45 cm, respectively.

The secondary roots of wheat can sometimes penetrate to a depth of 60-80 cm, while the primary roots can penetrate to a depth of 200-220 cm into the soil [9: pp. 227-233, 4; 311-b.].

By the time of the last stage of ripening phase of wheat, the root, surface mass sowing rate of 100 plants in the 'Mingchinor' variety was 55.1 when sowing 2.0 million germinated seeds per hectare; 490 g, root rate was 11.2%. With the increase in planting norms, this has led to a decrease in rates. A similar pattern was observed in the 'Yakut-2014' variety (Table 2).

CONCLUSION

Based on the results, it can be concluded that the root system of 'Mingchinar' and 'Yakut-2014' varieties of durum

wheat grown on rainfed lands is mainly distributed in the tillage layer of the soil and, although relatively small, accumulates more mass in the deeper layers of the soil.

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THE SELECTION OF AUSPICIOUS CULTIVAR AND HYBRID BROCCOLI

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ABSTRACT

In this article highlights of the significance of broccoli, its biological characteristics, technology of cultivation, as well as the auspicious cultivars and heterozygous hybrids grown in Uzbekistan, which included in the state register.

Keywords: Broccoli, hybrid, vegetation period, non-traditional crop, succulent, fleshy stem, core, bright Italian cauliflower.

INTRODUCTION

Broccoli cabbage (Brassica botrytis subsp) is a one of the types of cauliflower Italica (Plenck) Lisa (bright Italian cauliflower.). Many cultivars belong to the Italian evergreen species. There are also varieties and species with head florets of other colors, however they spread less.

Broccoli cabbage is related to annual plants like cauliflowers. Its homeland is southern Italy. Broccoli cabbage is used in food as a cabbage head consisting of florets. Broccoli cabbage is used in a variety of salads, dishes, garnishes and it is consumed fried, boiled, stewed and steamed. Broccoli could also be marinated, frozen and canned. It differs from cauliflowers with its slightly bitter taste and sweetness. It is more easily digested. The young leaves of broccoli are also used in food and not less than spinach in taste and nutritional value.

Broccoli cabbage is becoming more popular in Uzbekistan, and the demand for it is increasing among the population of our country. In addition, as it is an export product, the demand for it in foreign markets is growing. This is due to the fact that broccoli cabbage has high nutritional, dietary and medicinal-prophylactic properties. The presence of carbohydrates, proteins, vitamins, mineral salts, enzymes, antioxidants, pectin, lignin and cellulose in broccoli heads further increases its value.

Cultivar and heterozygous hybrids. Despite the fact that broccoli is a new vegetable crop, in this era about 10 heterozygous hybrids are included in the state register. Including

Fiesta F1, Marathon (2009), Ironman (2010), Tiburon (2011), Heraklion (2014), Naksoe (2015), Agassi F1 (2016), Atlantis F1, Quantum (2018).

In addition, cultivars of broccoli such as Beoumont F1, Lucky F1, Coronado F1, Hallmark F1, Belstar F1, Strombili F1, Partenon F1, Batavia F1, Malibu F1, Covina F1's seeds are grown and high harvest are taken by landowners, farmers and farmland in Uzbekistan, which are not included in the state register.[8].

Biological properties. Broccoli cabbage is a frost-resistant vegetable crop. Broccoli seeds begin to sprout at a temperature of 5 - 6 ° C. The optimum temperature for its germination is 18 - 20 ° C [7]. The moderate temperature for its growth and development is 16-25 ° C, and the plant can withstand short-term temperatures of -7 -10 ° C [4]. At high temperatures, heads of broccoli grow quickly, but their taste is not tasty as they have. When the temperature rises to + 35–40 ° C, the plant does not produced head at all. In Uzbekistan, when broccoli cabbage is planted in the medium term in early summer, its growth period coincides with the high summer temperatures and grows without the formation of cabbage, at the same time, the stem grows strongly and reaches a height of 40-50 cm. The formation of floret heads begins only when the autumn frosts. The temperature for flowering and seed ripening should be 18 - 20 ° C. When the average daily temperature exceeds +25 ° C, flower buds are not produced and pollen loses its fertilizing properties. So that it is much more difficult to grow broccoli cabbage seeds in the southern regions. Broccoli cabbage, like other types of cabbage - is a moisture-loving plant, so the lack of moisture in it during the formation of cabbage heads causes negative conditions. For comfortable growth and development of broccoli, soil moisture should be around 70-80% and relative humidity should be around 80-95% [3].

Broccoli cabbage is less demanding on soil fertility than cauliflower, but the demand for nitrogen is higher and more demanding, especially at the end of the growing season. Broccoli cabbage grows excellently in well-cultivated heavy and moderately sandy soils rich in high organic and nutrient content and gives abundant yields. Broccoli cabbage does not grow well in sour soil environments [5]

RESEARCH RESULTS

In order to develop the technology of growing broccoli in Samarkand region, which is a non-traditional and fresh vegetable crop, researchers of the Department of "Plant biology and Horticulture" of the Samarkand branch of Tashkent State Agrarian University are conducting experiments to select varieties and hybrids suitable for soil and climatic

conditions. The auspicious Fiesta F1, Agassi F1, Batavia F1, Malibu F1, Covina F1, which are included in the state register of broccoli cabbage, were obtained. The experiment compared the regionalized Fiesta F1, and Agassi F1 hybrids with Batavia F1, Malibu F1, Covina F1 hybrids, which are not included in the state register The results of the experiments showed that Malibu F1, Batavia F1, Covina F1 hybrids prevailed in terms of seed germination, seedling viability and rapid growth, as well as the quality of cultivated cabbage. In particular, the Malibu F1, the hybrid, gave the best results in all respects. In particular, after sowing the seeds of broccoli, the beginning of germination was recorded in 7-9 days, and full germination in 11-14 days. The yield of broccoli cabbage hybrid seeds studied in the experiment ranged from 85.0 to 98.0 percent. At the time of planting in the open field, the prepared seedlings had an average of 4.0 - 5.1 true leaves, the leaves were 10.2 - 13.8 cm long and the leaf width was 5.3 - 6.9 cm.

Picture 1. The process of checking the quality level of floret heads of cabbages.

Among the broccoli cabbage hybrids studied in the experiment, during the period of full growth, an average bush formed 4.5-11.3 side branches, 78.5 - 134.4 leaves, the leaf weight of one bush was 1082.7 - 1514.7 g, fully formed. leaf length was 20.9–33.4 cm and leaf width was 8.9–12.9 cm. In the studied hybrids, the main stem cabbage head diameter was 12.7 - 22.8 cm, weight was 378.2 - 452.8 g. The weight of small heads formed from side branches ranged from 98.7 to 132.8 g between average hybrids. In general, the yield of broccoli hybrids studied in the experiment was 18.7 - 25.7 tons per hectare.

CONCLUSION

To conclude, main and secondary crops in the conditions of farms of soil climate of Samarkand region, the cultivation of auspicious hybrids of broccoli cabbage such as Batavia F1, Malibu F1, Covina F1 provide high-quality cultivation of cabbage.

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THEORETICAL BASIS OF THE EFFECTS OF AIRPORT ACTIVITIES TO THE ORGANIC FARMING

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ABSTRACT

This article aims to show the negative impact of airport activities on organic farming and food production in Uzbekistan and to show modern solutions to preventive measures and to define the methodology of the study of the industry. The study examines the results of research on key areas of the system based on a comparative analysis, and provides appropriate methods and practical recommendations for research in this area.

Keywords: Greenhouse gas emissions, Harmful toxins in the soil, Airliners, Environmental pollution, Ecology.

INTRODUCTION

Various pollutants emitted from aircraft and trucks have a negative impact on agricultural production and organic farming. Aircraft engines also emit gases, noise, and particles into the atmosphere, like various factories fumes pollute the atmosphere[1]. As a result of such harmful effects, the negative impact on global and local air quality is leading to environmental pollution. Airliners are one of the biggest subjects which pollute atmosphere and the surrounding soil with heavy metals[1]. Pollutants produced by vehicles are carbon monoxide, carbon dioxide, hydrocarbons, nitrogen oxides, sulfur oxides, and various heavy metal particles[2]. The radiation exposure of the aircraft is estimated to be 1.3-1.4% of CO_2, excluding the induced cirrhosis cloud[3]. In 2018, global commercial operations accounted for 2.4 percent of CO_2 emissions. Scientific studies show that from 1967 to 2007, jet liner fuel savings increased by 70%, and today CO_2 emissions per kilometer are 48% higher than in 1990. More precisely, CO_2 emissions now average 88 grams of CO_2 per passenger per kilometer. The aviation industry is evolving over time, engines are being improved, and their fuel economy is increasing. However, as air traffic increases, the total amount of harmful gases and emissions is increasing. By 2021, aviation emissions are projected

to increase by 70.3% compared to 2005, and by 2050, their volume is projected to increase by 300%[4].

Over the years, our economy has been developing and living standards have been improving. Of course, these changes are respectable. However, there is a second issue related to development, which is the negative impact of development on the environment and ecology. However, the development of the economy - heavy and light industry causes, various services, agriculture and all other sectors, directly affecting the environment, enriching the soil with harmful wastes and toxins, and the atmosphere with gases. In the near future, the number of flights in our country is growing every year. If we compare the number of airport flights in Samarkand today with the last 5 years, we can see that it has increased 4 times.

This research is a study of the negative effects of transportation in the country on agricultural production and organic farming, as well as a scientific assessment of the damage to the soil around the airport. Before conducting scientific analysis, we analyzed the scientific studies to determine the level of study of this problem in our country and the harmful effects of transport on the soil.

The following is a theoretical analysis of the negative effects of CO_2 emitted from vehicles on the environment, atmosphere and organic farming, comments on the results of scientific experiments of foreign scientists and the trajectory of scientific abstraction.

The ecological situation in the world and the advantages of organic farming

Looking at the impact of global energy consumption and industrial performance, global CO_2 emissions are set to reach their annual peak in 2021. Based on a detailed analysis by the International Energy Agency in France by region and by each type of fuel, the latest official national data and open energy, economy and weather-based data show that by 2020 in 2021 its total emissions reached 36.3 gigatons, an increase of 6 per cent. We can see that the growth trend of CO_2 in the last one year alone is equal to the amount of growth in 1900-1950 (Figure 1).

Compared to the types of fuels, CO_2 emissions have dropped dramatically during the Covid-19 pandemic. During the pandemic, traffic was restricted and most flights were canceled. Oil consumption has fallen, and as a result, demand for oil has fallen to more than 6 million barrels per day. In 2021, international aviation-related CO_2 emissions are estimated to be only 60 percent (370 Mt) of pre-pandemic levels. In 2021, transport activity returned to pre-pandemic levels, leading to a further increase in global CO_2 emissions to 600 Mt. As a result, oil emissions have reached the level of 2019 and CO_2

emissions have increased by 7.8%. This is the highest level in recent times (Figure 2).

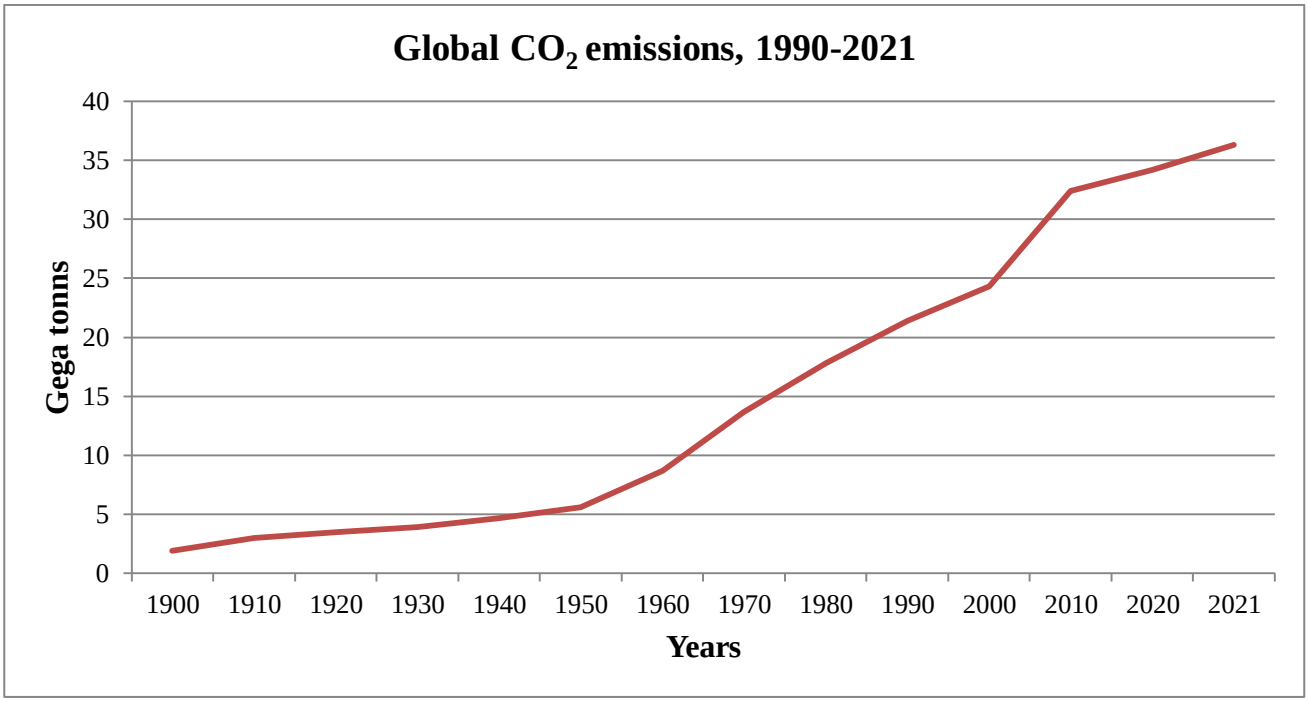

Figure 1. Dynamics of CO_2 atmospheric changes due to global energy consumption and industrial impact[5].

Airliners have a direct effect on the atmosphere, resulting in various harmful gases (carbon dioxide, water vapor, nitrous oxide or carbon monoxide - bound to oxygen and converted into CO_2) into various particles (incompletely burned hydrocarbons, sulfur oxide, black carbon)[6]. However, aerial liners make up the bulk of greenhouse gas emissions into the atmosphere.

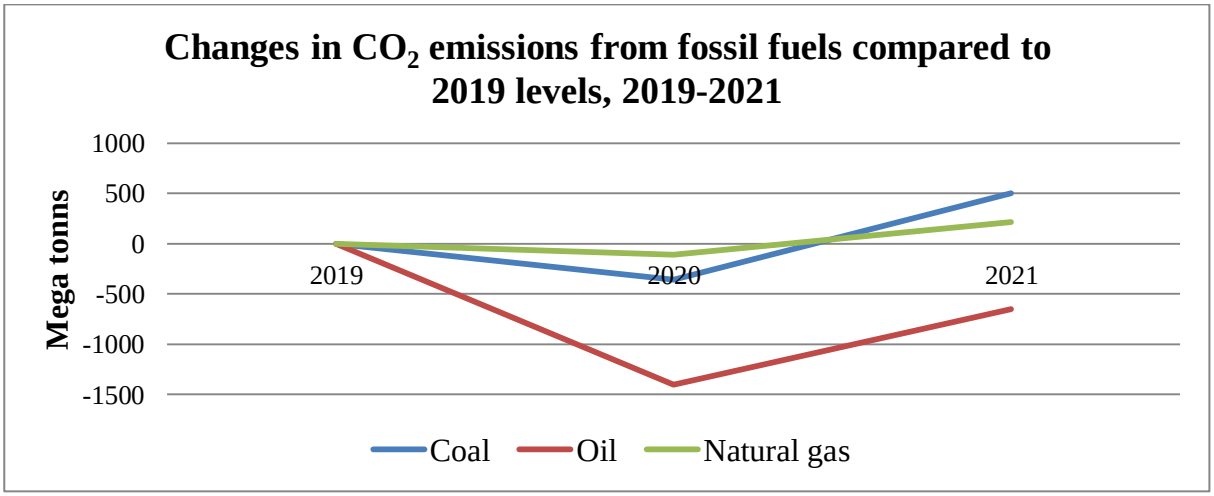

Figure 2. Changes in CO_2 emissions from fossil fuels compared to 2019, 2019-2021[7].

Typically, soil microplastics, oil spills, mining and other heavy industry activities, acid rain, intensive farming, agrochemicals, such as pesticides, herbicides and fertilizers, petrochemicals, industrial accidents, road wastes, soil contaminated surface water drainage, chemicals and waste disposal. The greatest damage to the soil by these harmful substances is the damage caused by burning oil products. Heavy metals and other soil contaminants adversely affect the activity of soil microorganisms, species composition and quality, as well as soil functions such as the biochemical changes of carbon and nitrogen[8].

As the ecology and environment deteriorate, the use of chemicals in agricultural production is increasing. As a result, the composition of agricultural food products is changing and the production of consumer goods is increasing. Organic farming is actually an agricultural system that uses organic fertilizers such as animal manure, green manure, and bone meal, and is a part of the agricultural production culture that focuses on crop rotation methods[9]. Organic farming is now being developed by a variety of farmers. Biological control of pests, crop rotation, is designed to allow the use of natural substances while banning or strictly restricting synthetic substances in organic standards[10].

Organic products usually require less energy, but require more land to produce enough[2]. According to scientists conducting research on organic farming, organic agriculture is a closed food cycle, mitigating the effects of biodiversity and climate change and even restoring climate change to its original state, and extracting oil and natural resources. gas can reduce fuel emissions[11].

LEVEL OF UNDERSTANDING OF THE PROBLEM

Harmful substances from airlines have a negative impact on organic farming. It is estimated that by the end of the twentieth century, air transport in Europe and America was estimated at 250 million a year. tons of fuel are known[8]. Combustion of this amount of fuel has led to the release of large amounts of exhaust gases into the atmosphere, including solid particles, hydrocarbons, nitrogen oxides, sulfur, lead and other harmful compounds. The scientists found an increase in heavy metals and possible changes in the amount of heavy metals in the agricultural lands around Hatay Airport in Turkey. Pb), cadmium (Cd), nickel (Ni), chromium (Cr), carbon monoxide (Co), (Al), (Fe), (Cu), (Mn), (Zn) and other substances were found in the soil[7].

A study around India’s Indira Gandhi International Airport, a major component analysis and isomer pair ratio, found a 2.58-

fold increase in polycyclic aromatic hydrocarbons in the soil around Indira Gandhi International Airport[12]. In another study, Jordan assessed the level of metal contamination and damage in urban soil around Queen Alia Airport. The results of the analyzes showed that the POV, Cd, and Cu samples from the ANOVA test showed significant differences between the samples, i.e., increased around the airport, but the amount of other metals in the analysis did not show significant differences. Factor Impact Analysis Contaminated soil occurred mainly in areas around steel mills.

To date, many studies have been conducted by local scientists on the composition of soils and the conditions of their damage. In particular, NV Kimberg, A.Z. Genusov BV, Garbunov, N.I. Shuvalov, V.G. Popov, M.A. Pankov, M.B. Bokhadirov, A.M. Rasulov, H.M. we can list. Although many positive results have been achieved in their research, soil structure, organic farming, and environmental risks have increased in recent years.

Indeed, today the ecological condition of the planet is of great concern to many developed and developing countries. Various environmental contaminants have been observed during air transport, including flight and airline maintenance, airport operations, and aircraft repair operations. We have discussed the negative consequences of this in the scientific conclusions and recommendations of scientists.

CONCLUSION

The key to sustainable economic development is to ensure a favorable ecological balance and the constant protection of nature and the environment, as well as organic agriculture and food security. Our theoretical analysis shows that in recent years there has been an increase in the use of petroleum products in the economy and many negative effects of environmental pollution.

The analysis of the soils around the highways used for road transport was carried out from the studied literature. However, the analysis of soil changes around the airport has been neglected by our scientists.

In subsequent studies, we believe it is important to study the areas around the airport, identify harmful cosines in the soil, and draw appropriate conclusions for the implementation of organic farming.

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PRODUCTIVITY AND ECONOMIC EFFICIENCY OF POTATO VARIETY-SAMPLES

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ABSTRACT

The research provides an economic analysis of the most profitable varieties of potatoes.

INTRODUCTION

A number of laws have been implemented to develop the industry, including; Resolution of the President of the Republic of Uzbekistan No. PQ-4704 of May 6, 2020 "On measures to expand potato growing and further development of seed production in the country" to increase consumption and production of seed potatoes in the country. Particular attention is paid to the creation of value chains in the industry, meeting domestic market demand, expanding its exports, cultivating super-elite and elite generations of seed potatoes in 50% of arable land, the widespread introduction of advanced technologies, innovative solutions and scientific advances. Potatoes are the main food of our people throughout the year, and they contain all the nutrients necessary for the human body - starch, protein, sugar, fiber, various vitamins and minerals. Potatoes are one pf the most important crops in the world after wheat, rice and corn. Potatoes are the second largest crop by area. That is why it is rightly called the "second bread." The finished biochemical composition consists of 75% water and 25% dry matter. 70-80% of the dry matter is starch, the content of which is 13-20%, protein - 2-3%, fiber - 1%, fat - 0.2-0.3%, sugar - 1%, ash - 0.8%-1.0%. It is also a source of vitamins (S, B1, B3, PP, K and carotenoids) and mineral salts, useful elements.

Especially young, unripe tubers store up to 40 mg of vitamin S or ascorbic acid. The amount of vitamin S decreases during ripening and storage. Mineral elements (calcium, iron, iodine, sulfur, phosphorus, potassium, etc.) play an important role in keeping the bones and muscles of a young person strong. Potato protein contains a lot of essential amino acids (lysine, leucine, valine, tyrosine, isoleucine, methionine, tryptophan) and is more biologically important than other plant proteins. If egg protein is

100% absorbed by the human body, 64% of wheat protein and 85% of potato protein are absorbed. It was found that the end of the potato contains 26 elements of the Mendeleev periodic table.

Therefore, fried potatoes in vegetable oil, according to medical scientists, increase the body's resistance to heat. It is used in more than 500 dishes and is the second bread [4]. Productivity depends on crop variety, soil and climatic conditions, place of cultivation, planting scheme, irrigation scheme and technology. Each new variety or technology was first evaluated by its effectiveness. Productivity and crop quality are the basis of this effect. Potato yield is determined by the number and mass of tubers in each tuber [1]. Ecological and agro-technological conditions have a significant impact on seed quality. Therefore, it should never be forgotten that quality seeds are formed only in productive plants [1].

When we analyzed the yield variance from the results of our research in 2021, we obtained the following. (Yield in Table 1 was calculated in full according to the planting scheme).

Table 1 Analysis of yield variance of potato varieties (2021year)

Variants	By iterations (X)				V-sum	Average
	I	II	III	IV		
1. Sante (St.)	31.6	32.4	32	31.9	127.9	31.9
2. Arizona	50.2	51.5	51.4	50.6	203.7	50.9
3. Evolution	49.2	47.2	45.6	45	187	46.7
4. Picasso	34.6	35.8	34.8	35.5	140.7	35.1
5. Bogizagon	41.7	40.	41.	41.7	164.4	40.9
Sum, R	207.3	206.9	204.8	204.7	ΣX = 823.2	41.1

An important task of variance analysis is to assess the reason for the difference between group averages. At the same time, all agro-technological processes were carried out in the same way in the local and imported varieties, as in Table 1, in the variants and iterations. Low yields compared to other varieties are variant 1 in the Sante variety (31.6; 32.4; 32.0; 31.9 in repetitions) and 4 in the Picasso variety (34.6; 35.1; 34.8; 35.5;) was observed. The highest yields were in Arizona (203.7s), Evolution (187s) and Bogizagon (163.9s).

It is known that during the storage of potatoes, they are exposed to various fungal and bacterial diseases, which lead to many deaths. These diseases are especially dangerous when storing seed potatoes in piles, sometimes causing the whole potato to rot. Wet rot is especially

dangerous and widespread among rot. In our experiment, both types of rot were considered separately. Among the studied varieties, both rot-resistant varieties were observed in Bogizagon variety. For example; Wet rot was only 0.4% in the Bogizagon variety, while dry rot was not observed.

Similarly, the Picasso variety had a wet rot of 1.2% and a dry rot of 0.5%, while the Arizona variety had a wet rot of 1.4% and a dry rot of 1.7%. Sante and Evolution varieties have a rate of 1.2-0.5%. and 0.6-1.8%, respectively. Seed stems of the studied varieties were stored for 6 months. Seeds of Bogizagon (92.8%) and Picasso (90.0%) were stored for more than 90%. In the standard Sante, Arizona, and Evolution varieties, the rate was 89.2-88.0%.

Table 2 Preservation indicators of studied potato varieties (2021 y)

№	Varieties	Natural fading%	Tumor formation, %	By illness		total loss	Consumption of healthy standard ends after storage, %
				wet rot %	dry rot, %		
1	Sante (st)	7.7	1,2	0,4	0,7	11,0	90.0
2	Arizona	7.7	1,2	1,4	1,7	9,0	88.0
3	Evolution	8.6	0,8	0,6	1,8	10,8	88,2
4	Picasso	7,6	1,5	1,2	0,5	10,8	89,2
5	Bogizagon	5.6	0,8	0,4	0	7,2	92.8

When the study is evaluated as an economic efficiency indicator, it becomes clear that it is an effective variety or measure. Therefore, we set ourselves the goal of determining the cost-effectiveness of growing potato varieties based on our field experiments. In practice, all work were done in time: land preparation, planting, care, digging, etc. The following indicators were used to determine the effectiveness.

When we analyzed the data in Table 3, it became clear that the biggest net income among the studied varieties was obtained from the cultivation of seeds of the Arizona (84,750,000 soums) Picasso variety (83050,000 soums) and the local Bogizagon (76,600,000 soums) variety. When the same varieties are planted, the highest is 202.6%, 196.6% and 173.5%, respectively.

It was also found that planting Evolution and Picasso varieties can provide high economic efficiency.

Table 3 Economic efficiency of growing different varieties of potatoes (2021)

Nav nomi	Total cost per hectare, in 1000 soums	Average yield per hectare, s / ha	Cost of 1 centner of potatoes, soums	Selling price of 1 centner of potatoes, soums	The cost of potatoes sold per hectare in 1000 soums	Net profit from 1 hectare, in 1000 soums	Profitability rate,%
Sante (st)	28000,0	303,5	90614	250,000	75875,000	47875,000	170,9
Arizona	28000,0	339,0	82595	250,000	84750,000	56750,000	202,6
Evolution	28000,0	332,2	84337	250,000	83050,000	55050,000	196,6
Picasso	28000,0	275,3	101818	250,000	68825,000	40825.000	145,8
Bogizagon	28000,0	306,4	91383	250,000	76600,000	48600,00	173,5

CONCLUSION

The study found that the Arizona and Evolution varieties had the highest net returns (56,750,000 and 55050,000) due to their high yields. This, in turn, led to high levels of profitability (202.6 and 196.6%). When we determined the degree of preservation of the specimens, wetting by cultivars was 1.2% in the Picasso variety and 1.7% in the Arizona variety, with the highest losses being observed in the Evolutionary and Picasso varieties at 10.8%. The conservation rate and yield of sown stalks in the bozoga variety was found to be 92.8%, which is higher than in other studied varieties.

As a result of experiments, we recommend the local Bogizagon variety in terms of conservation, and Arizona and Evolyushen varieties in terms of high yields.

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DEPENDENCE OF WHEAT PHYSYNTHETIC ACTIVITY IN RAINFED LAND ON SOWING STANDARTS

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ABSTRACT

The article describes the dependence of photosynthetic indicators of Mingchinor and Yakut-2014 varieties of durum wheat on the sowing norms in the hilly conditions of rainfed farming.

Keywords: rainfed farm, hilly region, durum wheat, sowing norm, variety (Mingchinor, Ruby-2014), leaf surface, photosynthetic potential, dry matter, pure photosynthetic productivity.

INTRODUCTION

All green plants are distinguished by their photosynthetic activity, which is characterized by the continuous accumulation of organic matter and the release of oxygen into the air throughout its life. This, in turn, determines the growth and development of plants and, most importantly, their productivity.

The initial process of organic matter formation is the basis of photosynthesis-plant nutrition. During photosynthesis, 80-90% of the dry mass reserve of biological product is formed. Therefore, the growth, development, yield of the plant is directly related to the transition process of photosynthesis.

In agriculture, most measures will be aimed at the efficient and effective use of the photosynthetic apparatus in all its work. The timing and rate of sowing from agrotechnical methods are important in creating conditions for the smooth passage of the process of photosynthesis. Optimization of sowing times and norms is of great importance in obtaining high yields from all agricultural crops, including wheat sown in autumn.

Field experiments were carried out on the basis of the program in the conditions of the farm "Yashin-Yamin" in the rainfed land of hill region (Yakkabag district of Kashkadarya region).

MATERIALS AND METHODS

New Mingchinor and Yakut-2014 varieties included in the State Register of durum wheat were tested in the rainfed land of hill regions. Yokut-2014 variety was the object of experiments.

In the experiment, for the sowing norm of winter wheat was applied 2.0; 2.5; 3.0 and 3.5 million seed per hectare. Field experiments were performed in the following ways: 4 replications and each one was 50 m^2 and 2-tier were planted. In the experiment, plant care was carried out on the basis of agro-techniques adopted for the region. All phenological observations and biometric measurements made in the field experiment were used in the guidelines of UzPITI "Methods of conducting field experiments" [1; p. 145]. V.Orlov's method was used to calculate the leaf surface. The photosynthetic potential of crops (EFK), the net productivity of photosynthesis was determined by the methods of A.A. Nichiparoich [3; 135-s.]. Analysis of variance of data obtained on productivity by the B.A. Dospekhov method [2; 356-s].

RESULTS AND DISCUSSION

Leaf surface and photosynthetic potential. One of the main indicators of photosynthetic activity of wheat is the size of the leaf surface and the dynamics of its formation. High yields can be obtained only from a crop that dynamically forms the optimal leaf surface, can work for a long time, during the entire growth period. For this purpose, in the conditions of specific growth for each plant, the optimal bush thickness, feeding regime is created in order to have the most favorable growth, development, photosynthetic potential during the growth period. In this case, all agro-technical methods should be aimed at creating an optimal leaf surface on the plant, as well as the formation of a crop with photosynthetic capacity, which is active for a long time.

In irrigated lands, the surface area of durum wheat varies depending on many external factors, including planting norms. In our experiments, the leaf surface of durum wheat increased with increasing planting norms. When sowing 2.0 million seeds per hectare during the solid wheat accumulation phase, the leaf area per 1 hectare is 1 m^2 at 0.69 leaf surface was formed.

In the later stages of plant development, the leaf area per 1 m^2 increased in all planting norms. This figure was the highest in the sprouting phase. In plant development phases, the largest leaf surface was observed in the sprouting phase. In the germination phase, the sowing rate was 5 m^2 with 2.0 million seeds per hectare, while the sowing rate was 5.54 m^2 when the sowing rate was increased to 3.5 million seeds. The largest leaf surface area was observed in 3.5 million planted crops per hectare.

In the field, the leaf surface of 1 m^2 of plants decreased in the flowering, milk, become hard ripening phases due to the early

yellowing of the leaves in the lower part of the plant. Depending on the planting norms, the leaf area of 1 m^2 changed from 0.95 to 1.99 during the hard ripening phase. The leaf surface and foliage of the plant do not always indicate the size of the crop. V.S.Sheveluxa, Vaska P.P. such authors emphasize that photosynthetic potential and productivity are closely related. For most cereals, including wheat, the optimal surface area of leaves per 1 hectare has been determined, 40-50 thousand sq/m, and the optimal photosynthetic potential should not be less than 2 million sq/m per day [6; 107-s.].

In our experiments, the photosynthetic potential of wheat varied according to planting norms. In durum wheat, the greatest photosynthetic potential was observed in the germination phase of the plant. From the spring accumulation to the flowering phase, the photosynthetic potential increased.

Accumulation of dry matter. The productivity of the growing organs of plants is strongly influenced by external environmental factors: light, heat, humidity, lack of nutrients. Lack of these factors reduces the rate of accumulation of dry matter in the plant, which reduces crop yields [8; 18-s, 3; 135-s., 9; 227-233-s.].

During the growth process, the yield of plants is determined by the accumulation of dry matter. The accumulation of dry matter during the day according to the phases of plant development varies depending on the leaf surface and the net productivity of photosynthesis.

According to many researchers, the maximum dry matter accumulation of wheat corresponds to the germination phase. In our experiments, the accumulation of dry matter before the flowering phase also increased with the increase in planting norms. By the time of the flowering phase alone, the sowing rate had dropped from 50.6 to 54.1 ts / ha when 2.0 million seeds were sown per hectare. This is mainly due to the strong accumulation of sparsely planted plants, thickening of the stems and yellowing of the lower leaves [6; 30-s, 10; 62-b, 4; 265, 5; 432.].

In our study, the highest accumulation of dry matter in the durum wheat crop coincided with the becoming hard ripening phase of the grain at all norms. Then there was a decrease in the accumulation of dry matter due to drying and falling of the leaves, as well as the leakage of plastic, nutrients from the surface organs to the roots.

Pure productivity of photosynthesis. Pure productivity of durum wheat photosynthesis depends not only on the size of the plant assimilation apparatus, but also on the duration of its operation and the intensity of leaf work
[3; 135-s.].

During the growth, the net productivity of photosynthesis varies in plants to plants. At the beginning of plant development, it was not high, and then gradually increased to the flowering phase. From the flowering phase to the become hard ripening phase, photosynthetic net productivity decreased.

Table 1. Pure productivity of wheat photosynthesis, g/m² (2018-2020 years)

Sowing rate is one million seeds.	Phases of development						Average vegetation
	Tillering	Stem elongation	Heading	Flowering	First stage of ripening	Last stage of ripening	
				‘Ming chinor’			
2,0	-	4,70	3,82	6,83	4,51	3,10	4,59
2,5	-	4,65	3,70	4,76	4,01	2,23	3,87
3,0	-	4,57	3,51	4,25	3,81	2,00	3,63
3,5	-	3,41	3,30	3,91	3,52	1,82	3,19
				‘Yakut-2014’			
2,0	-	4,50	3,69	6,62	4,44	2,97	4,44
2,5	-	4,42	3,56	4,51	3,90	2,10	3,69
3,0	-	4,34	3,34	4,01	3,62	1,82	3,42
3,5	-	3,20	3,13	3,52	3,40	1,65	2,98

In the heading phase, the largest leaf surface was observed in the area planted with durum wheat. However, during this period, the net productivity of photosynthesis decreases relative to the stem elongation phase (Table 1). As the plant bush thickness increased, the net productivity of photosynthesis decreased. Pure photosynthesis yield of durum wheat in ‘Ming chinor’ and ‘Yakut-2014’ varieties, sowing norm is 2.70 million seeds per hectare, according to varieties, 4.70; At 4.50, the sowing rate was 3.41; 3.20 g/m^2 with 3.5 million seeds.

The highest photosynthesis net yield in the germination phase was observed when 2.0 million seeds were sown per hectare. With increasing planting rates, the net productivity of photosynthesis decreased. The highest photosynthetic net productivity in the flowering phase was 6.83, depending on the variety, when the sowing rate was 2.0 million seeds/ha; 6.62 and 2.5 million seeds/ha, respectively, 4.76; 4.51 g/m^2. An increase in the sowing rate of 3.0 and 3.5 million seeds/ha per hectare led to a decrease in the net productivity of photosynthesis. In the next developmental phase, the net productivity of photosynthesis in first stage and last stage maturation decreased.

In our experiments, the net productivity of photosynthesis varied from 4.59 to 2.98 g/m^2 during the growing season of durum wheat.

CONCLUSION

Based on the results obtained, it can be concluded that the photosynthetic activity of ‘Ming chinar’ and ‘Yakut-2014’ varieties of durum wheat grown in rainfed conditions depends significantly on the planting norms.

In the mountainous region of rainfed lands, high-quality grain of durum wheat varieties ‘Ming chinar’ and ‘Yakut-2014’ was sown in the third day of October, when 2.5 million seeds were sown per hectare. In this case, the net productivity of photosynthesis, leaf surface, photosynthetic potential was thousand m^2/day.

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EFFECTIVENESS OF THE *CHRYSOPIDAE* ENTHOMOPHAGY AGAINST APHID SUPERFAMILY (APHIDIDAE) ON APPLE TREES

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ABSTRACT

The following species of leaf aphid are found on apple trees: mealy plum aphid (Hyalopterus arundinis F.), leaf curl plum aphid, (Brachycaudus helichrysi Kltnb.), aphis infuscata koch (Rhopalosiphum infuscata Koch.), waterlily aphid (Rhopalosiphum nymphaezaira L.) causes damage. Against them, the effectiveness of drugs was studied using oltinko'z entomophagy.

Keywords: Aphid, pest, aphidophagous, oltinkoz, winged.

1. Introduction.

In order to ensure food security in Uzbekistan, it is necessary to conduct in-depth research on the protection of agricultural crops from pests. That is why our government considers the cultivation of environmentally friendly products and the improvement of the environment as a priority in ensuring food security.

Aphid superfamily keeps the trees from growing, deprives them of vigor, twists the branches, and curls the leaves; The trees severely damaged by aphid do not bear good fruit. Young saplings in nurseries, as well as saplings on young apple trees, are particularly vulnerable. Young trees are damaged by leaf curl plum aphid as well as waterlily aphid and often die.

The length of aphis infuscata koch is 2.0-2.6 mm. The color of the wingless aphid is greenish brown or reddish brown; The body is broadly egg-shaped, the apical tubes are slender, cylindrical, dark brown in color. The head and chest of the wingless aphid are thick.

The wingless mealy plum aphid is light green, with a thin stream of waxy powder; it is elongated oval in shape, sometimes very elongated, 2.5-3 mm long; There are two rows of discharge spots on the chest and abdomen. The head and breast of the winged aphid are black, with a grayish powder; the

abdomen is green and has two rows of streamy spots; the apical tubes of winged and wingless aphids are green in color.

The length of the leaf curl plum aphid is 1.2 mm. The wingless aphids are elongated pale green or orange in color, and sometimes a large black spot appears on the abdomen. The aphid tubes are dark green, the mustache is flowing, the head and middle breast of the sap are dark, the abdomen is light green or orange. Often there is a large green spot, the color of the apical tubes and mustache is dark.

The color of the waterlily aphid wing is yellow-green or green, the whiskers are blackened, and the upper half of the aphid tubes is slightly thickened. The color of the winged aphid is green and has dark green transverse paths. Sometimes these paths are not noticeable or are added as a single common spot. The tips of the whiskers, calves, thighs, and paws are black, the apical tubes are dark, cylindrical, and sometimes slightly curved. The size of the wingless aphid is 1.4-2.5 mm; winged aphid 1.4–2.0 mm. The eggs of all aphids are black, elongated.

The way of living. Aphid superfamily, which damages seeded fruit trees, lives on the branches, especially at their ends, near the buds, at the ovary stage.

2. Materials and methods.

Research in orchards, special observations on the species composition of pests, developmental bioecology, dynamics were carried out by the methods of B.P.Adashkeekich, Sh.T.Khojaev, the degree of damage criteria V.I. Tansky.

Apple aphid control measures are carried out taking into account the dangerous number of pests and the ratio between pest and beneficial insects. If beneficial insects are attracted to the apple orchards and they are protected from extinction, the amount of apple aphids will be significantly reduced.

If it is observed that there are 10 sets of apple aphids per 100 branches after flowering of the trees, they will be controlled. However, even then, the number of naturally occurring entomophages must be taken into account.

During the growing season, the oltinko’z entomophagy against apple green aphid was used in the apple orchards "Bilol mevazorlari" of Samarkand region on the basis of methodical manuals VIZR (1986) UzUHQITI (2004). For the experiment, oltinko’z egg from entomophagy was used in a ratio of 1:10 / ha.

3. Research results.

There is a theory of biological and nutrient linkages between plant species in nature and insects that accumulate in the

biocenosis. This is due to the fact that the number of insects in the biotope at the bioecological level exceeds 126.9, and the number of swarms exceeds 300.0. In places where the number of pests started from 22.0-29.0 pieces, apple leaves were cut off, depending on the number of fully ripe fruit base decreased by 4.3-10.9 grams, the criterion of damage was taken into account.

Because mealy plum aphid biology has the property of rapid reproduction, it has been taken into account that apricots can cause damage by migrating to other nearby crops, including more vegetable and melon species. Therefore, the emergence of the pest on the leaves of apples allows you to control the development of future generations by taking control measures. In this regard, it was found that the dynamics of development of the insect and the degree of damage caused by the influence of air temperature and relative humidity from external environmental factors.

It is noted that the maximum level of development is an insect with the characteristic of developmental dynamics, which begins in the second decade of May, the period of summer dormancy, and again in the autumn to go to winter. When oltinko'z egg was applied in a ratio of 1:10 / ha, it showed the following effectiveness in apple against mealy plum aphid. On the 3rd day of the study, the biological effectiveness of the control against apple aphid reached 14.3%, while on the 7th day it was 57.2% and on the 14th day it was 71.4%. It was observed that the population of other pests found on apples in the experimental areas also decreased.

Conclusion

Apricot - mealy plum aphid has a unique bioecological, dynamic nature of development in the conditions of Samarkand, and in recent years the area of spread, the rate of damage is increasing.

In these agro-climatic biotopes it is proved that they overwinter in the egg phase, emerge from the winter when the temperature rises to 5 ° C in the spring, develop into a mature seed phase, lay eggs on apple buds, reproduce live by parthenogenetic methods from flower and leaf production. mealy plum aphid continues to grow and cause damage to nearby vegetable and melon crops in late May, June, in the form of clusters, with the maximum increase in the number of reeds, mainly in apples.

The early spring years continue to develop from the third of March, the late years from April, the apple and vegetable crops grow until the end of May, from the second decade of June to the summer dormancy phase, and in September and October the reeds develop and go

into winter. With the emergence of the pest on the leaves of apples to eliminate these criteria of development and damage, their development is eliminated using chemicals that are allowed to use in orchards. When oltinko'z egg was applied per hectare at a ratio of 1:10 against mealy plum aphid, a decrease in other types of pests found in the same agrobiocenosis was observed along with apple aphid.

Table 1 Application of *"oltinko'z"* entomophagy in the biological control of apple aphid. Production experience, 2021.

№	Entomophagy type	Phase and number, pcs	Number of pests on 1 branch, pcs	Number of pests that survived after entomophagy application, days			Efficiency of entomophagies, days%		
				3	7	14	3	7	14
1	*Oltinko'z*	Eggs, 2 thousand	7	6	3	2	14,3	57,2	71,4
2	Control	-	8	-	-	-			

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INCREASED PERFORMANCE EFFICIENCY OF AGRICULTURAL ORGANIZATIONS ON THE BASIS OF RESOURCE-SAVING TECHNOLOGIES

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ABSTRACT

Water resources are of great value for the whole world and the economies of all countries, the stock of which has significantly decreased in recent years. Most (about 70%) of all drinking water reserves are used for irrigation in the agricultural sector. This indicator varies depending on the intensity of consumption in different countries, an increase which indicates an acute shortage of water. Reducing the number of available water resources encourages the use of resource-saving technologies that can significantly reduce water waste. World experience shows that over the past decades there have been qualitative changes in resource-saving technologies that allow collecting, storing, and recharging water resources. Also important is the option of using alternative water sources, which have already become a replacement and the reason for the increase in traditional water sources.

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SURVEY OF THE FOOD SECURITY LEVEL METHODOLOGY

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ABSTRACT

On the agenda of the meeting with the participation of UN member states in September 2015, the global Millennium Development Agenda and the 2030 Sustainable Development Goals were adopted. One of the objectives of this program is to “end hunger, ensure food security and improve nutrition, and promote sustainable agriculture ". In particular, since 2020, the issue of growing and delivering the main types of agricultural and food products for consumption by the population is considered the most urgent task on a global scale in the context of epidemiological risks, that is, in connection with the COVID-19 pandemic. This article discusses the methodology for determining the level of food security at the global and regional levels. The review of international experience in determining the level of food security, as well as indicators of food security. A comparative analysis of food security indicators used at the global level was also carried out. As a result, it can be concluded that the indicators cannot fully reflect the food security situation. Based on the above provisions, indicators were presented that could form the basis of a new methodology for determining food security at two levels: regional and / or national.

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INSTITUTIONAL AND ECONOMIC FRAMEWOK FOR THE DEVELOPMENT OF GLOBAL VALUE CHAINS IN FOOD AND AGRICULTURE

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ABSTRACT

The article deals with the processes of exchange of agricultural products, which are carried out in several different countries. Also, the types of formation of the value chain are considered: forward and backward participation in trade of other countries, ways of delivering of the added value created within the framework of the GVCs to the final demand, Due consideration was given to the role of services in agro-food production, as well as their share in value chains. Some factors that may influence the increase or decrease in the flows of international trade in agri-food products are analyzed

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ASSESSING THE DETERMINANTS OF CROP DIVERSIFICATION AT FARM LEVEL: AN EMPIRICAL STUDY

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ABSTRACT

Since independence, the government of Uzbekistan has implemented the number of agricultural policies such as making some crucial structural reforms at the farms, comprising different institutions and enhancing diversity of agricultural production in order to stabilize the agricultural sector of the country. Therefore, crop diversity has an important role in sustainable agriculture. The main objective of this study is to analyse the status of crop diversification and its determinants in Uzbekistan. Using unique cross-sectional data from Samarkand region of Uzbekistan, we calculated the diversification index based on the Simpson Diversity Index method. Then we incorporated the diversity index into Tobit in order to examine the main determinants of diversification index.

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ORGANIZATIONAL AND ECONOMIC MECHANISM FOR PROVIDING THE POPULATION WITH LIVESTOCK PRODUCTS

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ABSTRACT

The main trends in the provision of the population of Uzbekistan with livestock products have been identified. An analysis was made of the volumes of production of livestock and poultry meat and the volumes of meat consumption. An organizational and economic mechanism for the interaction of participants in the system of providing the population with livestock products is proposed.

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ASSESSING THE IMPACT OF SOIL SALINITY ON THE YIELD GRAIN CROPS UNDER CLIMATE CHANGE

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ABSTRACT

Climate change has been a problem recently in many aspects. The average temperature has been in increasing over years, comparing to preindustrial period. As climate change proceeds in water shortage areas, soil salinization is progressing dramatically. This paper analyzes impact of soil salinization on agricultural production in north part of Uzbekistan from 2010 and 2017. This study estimates district level fixed effect (FE) panel model for agricultural production using seasonal climate variables and other input variables. The results show that soil salinization significantly impacts on crop yield with negative correlation in the model.

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TRENDS IN THE DEVELOPMENT OF THE FOOD INDUSTRY IN UZBEKISTAN

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ABSTRACT

The food industry is a complex industry that processes mainly agricultural raw materials and produces food and flavor products. The paper presents an analysis of the development of the food industry in Uzbekistan. The role of the food industry in ensuring the food security of the country is revealed. Suggestions and recommendations for the development of the food industry are given.

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TRANSITION OF LARGE THERMAL COAL-OIL POWER PLANTS TO ALTERNATIVE FUEL – BIOMASS

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ABSTRACT

In world practice, the technology of mixing coal with biomass for combustion in power plants is used. It is widely practiced to create special plantations of fast-growing trees of poplar with further wood chipping for processing pellets. The area around the Novo-Angrenskaya's Heat power plant in Uzbekistan, operating low-quality brown coal is the preferred area for planting energetic plantations. Biomass energy plantations prevent soil erosion and improve the ecology of environment near HPP.

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THE POTENTIAL OF APRICOT GROWING IN SAMARKAND

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Abstract

Apricot is an important edible stone fruit with early ripening and sweet tasty in Uzbekistan. This article was discussed the main plantation areas and reliable varieties of apricot. Materials of this article were used which Samarkand regions Stat information. Observed information results showed that almost following varieties of apricot plantations were used, which those, ‘Mayskiy’, ‘Berton’, ‘Vengerka’ and ‘Ispolenskiy’. The total land of apricot was 177 ha and the most planted variety of apricot is ‘Berton’ and ‘Mayskiy’, also ‘Vengerka’. Moreover, Jambay district apricot plantation areas were top in the region otherwise Paxtachi district was a leader with their plantation arees. The above data results explain that these varieties should be analyzed which variety will be stable with their taste, custom demands and other quality requests.

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IMPROVING THE CONDITION OF DEGRADED PASTURE LANDS AND OBTAINING BIOMASS BY PHYTOMELIORATION

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Abstract

In the world, the leading place is occupied by the use of energy-resource-saving and high-performance seedling tools for improving pastures. Considering that arid lands occupy about 1/3 of the earth's surface area and make up more than 36% of the land area all over the planet, an important task is to introduce high-performance energy-resource-saving tools with high quality of work into the practice of improving the condition of pastures. In this regard, it is important to use a combined tool that will simultaneously perform tillage and planting seedlings of phytomeliorative plants while improving degraded pastures.

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BIORESOURCES IN UZBEKISTAN AND WAYS OF THEIR EFFECTIVE USE

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ABSTRACT

Today, the world`s population growth and the rapid growth of the consumer goods industry are leading to a sharp increase in demand for natural resources. This is causing various problems such as resource scarcity and environmental pollution. However, the European Union and other developed economies are incorporating measures for the efficient use of bioresources into their development strategies, both to reduce such problems and to promote sustainable economic growth. This article is focused on to give the reader a better understanding of bioresources and ways to use them more effectively in Uzbekistan.

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WAYS TO IMPROVE CULTIVATION OF ORGANIC AGRICULTURAL PRODUCTS

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ABSTRACT

The article investigates the prospects for cultivating organic agricultural goods in Uzbekistan. The global market has a high demand for eco-friendly and organic food products. A SWOT analysis of organic agricultural production in the region was carried out. Innovative ways of growing organic agricultural products have been developed in Uzbekistan.

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FUTURE PROSPECTS OF BIOECONOMY IN BUKHARA REGION

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ABSTRACT

The rise of the bioeconomy is usually associated with increased sustainability. However, various controversies suggest doubts about this assumed relationship. The objective of this paper is to identify different visions and the current understanding of the relationship between the bioeconomy and sustainability in the scientific literature by means of a systematic review. Bioeconomy and sustainability differ substantially. There is considerable attention for sustainability in the scientific bioeconomy debate, and the results show that the bioeconomy cannot be considered as self-evidently sustainable. Furthermore, it is stressed that the bioeconomy should be approached in a more interdisciplinary or trans-disciplinary way. The consideration of sustainability may serve as a basis for such an approach. The article highlights the future prospects of bioeconomic in Bukhara through recycling.

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THE DEVELOPMENT OF GREEN TECHNOLOGIES IN LOGISTICS

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ABSTRACT

Currently, the concept of ecological (green) logistics as a factor of sustainable development in the economic, social and environmental spheres of society is increasingly being discussed in scientific circles. The main objective of the scientific paper is to analyze the main trends of logistics in the concept of sustainable development, following which reduces the negative impacts of the company on the ecosystem, reduces the burden on the environment and reduces costs throughout the supply chain. Green logistics will be one of the most dominant trends in business logistic in forthcoming period.

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