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[1]Shevchenko S.M., [2]Shevchenko O.M., [3]Parlikokoshko M.S.

SOIL CONDITIONS AND GERMINATION CORN SEEDS IN THE STEPPE OF UKRAINE

[1]*Dnepropetrovsk State Agrarian-Economic University*
[2]*Institute of Agriculture of Steppe zone of NAAS of Ukraine*
[3]*Institute of Agriculture of Northern East of NAAS of Ukraine*

Abstract. In the field and in laboratory experiments, the dependence of seed germination of corn from the influence of his predecessors and their side of organic matter. It is proved that small primary tillage and plant biomass of winter wheat, maize and sunflower field leads to a decrease in germination and grain yield of corn.

Key words: seed germination, the precursor, tillage, corn, grain yield

Soil environment, which has around the seeds of maize after sowing, is characterized by extreme variability of agrophysical, hydrothermal, agrochemical and microbiological characteristics. As a result different ratios of positive and depressive factors in the seed layer of the soil field germination of corn seeds is significantly reduced compared with the laboratory germination. In the application of different methods of basic soil cultivation, which involve the use of organic residues as a stabilizing element of anti-erosion and nutrient regime of reliability, field germination is even more amplitude parameters [1-3].

In such circumstances, biological characteristics of seeds are a sensitive indicator of the quality of soil preparation and an important factor in determining the rate of growth and development of corn, as well as the formation of the level of yield.

Based on the fact that the technology of cultivation of maize becomes dominant soil conservation trends, the aim of research was to determine the influence of predecessors (winter wheat, corn, sunflower) and minimizing tillage on the corn seeds germination conditions and the formation of biometric grain productivity of this crop.

Field experiments were conducted at the Odessa Institute of agro-industrial production in 2009-2011. Experimental plots are located in the southwestern part of the Steppe zone of Ukraine. The soil cover is represented by the southern chernozem with a humus content in the soil layer 0-30 cm at the level of 2,69%.

The climate in the area of research - is temperate continental with annual precipitation 418 mm and average temperatures during the growing season of maize within 15,3-22,5º C. In the years of field experiments growing period has a higher (on 0,6-4,1ºC) temperatures and lack of rainfall compared to long-term norm, there were fewer in the 9-78 mm.

Agro-technical measures in the experiments carried out according to existing requirements for the area growing corn. The experimental setup included deep plowing to 25-27 cm and a shallow disk tillage by 12-14 cm, which was carried out after such predecessors as winter wheat, maize and sunflower.

Field experiments have shown that, due to the formation of specific soil environment for agrophysical, agrochemical and microbiological parameters such predecessors as winter wheat, maize and sunflower create different conditions for seed germination. In this case, it should be noted that an important factor in strengthening or weakening the role of predecessors serves basic tillage method. Therefore, predicting germination in the introduction of farming methods or the introduction of effective methods of its increase is the technological element of formation of optimum agrocenosis corn.

As can be seen (table 1), there is a significant difference between the performance of laboratory and field germination of seeds of hybrid maize Podolsky 274 SW and appears dependent on his predecessors and ways of the basic soil cultivation. The high seed viability and preservation of genetic potential indicators suggest laboratory germination, which reached 99% of maximum settings [4-5].

Table 1

1. Influence of predecessors and soil treatment on the germination of seeds of maize (2009-2011 years)

Tillage of soil	Predecessor	Germination, %		
		laboratory	cold test	field
Plowing	winter wheat	99	90	85
	maize	99	90	84
	sunflower	99	90	86
Disc tillage 25-27 cm	winter wheat	99	90	81
	maize	99	90	79
	sunflower	99	90	82

When germinated seeds in the laboratory at the lower limit of optimum temperature (10ºC) for germination of corn activity inhibited the growth processes and germination, respectively reduced to 90%. That is the definition the method of cold germination test on a number of environmental performance was close to the field.

With a high degree of uniformity of corn seeds germination performance of laboratory germination markedly different depending on predecessors and ways of the basic soil tillage. Thus, the most favorable conditions for germination evolved against the background of mouldboard plough where the field germination, depending on the precursor was 84-86%, and during the processing of fine figure drops to 78-82%.

It turned out that the more favorable soil environment for the germination of corn formed after the sunflower, and more uncomfortable conditions were after maize.

Among the factors that negatively affect the germination of corn while minimizing basic tillage, should first highlight the heterogeneity of the seed layer of soil on the specific indicators, the presence of a large number of plant residues, high phytopathogenic of danger, compaction of chernozem.

In order to broaden our understanding about the impact of factors on the germination of corn seed that occur in the background processing and minimize the main component of high-quality organic soil substrate, we conducted simulation experiments in pots with chernozem of weighing 8 kg . To this end, in the receptacles established a few basic modes associated with the impact on biotic situation of crop residues of the winter wheat, corn and sunflower. To control the selected soil without plant residues, while in the test receptacles chernozem stirred with crushed substrate in a layer 0-10 cm and a rate of 5 and 3 t/ha. At the same time for 2 months in the zone of decaying organic matter, soil moisture was maintained at 23% at a constant air temperature of 20°C. After this validation was performed seeding corn and evaluated its response to the conditions that have developed from the decomposition of residues of the winter wheat, corn and sunflower. The products of microbial degradation of organic residues, which have accumulated in the region of seed germination, caused an inhibitory effect on the early development of corn.

The germination of seeds corn on the 7 day after sowing in the experimental containers was 76%, while mulching 5 and 3 t/ha of organic intermediate crop rotation, respectively 58-66%.

The mass of maize plants that have reached the phase of the 2nd leaves, also differed: in the clean soil it reached 2,2 g/plant, and in mulch 1,8-2,1 g. That is, with the germination of corn seeds in at optimum receptacles air temperature 20°C and 23% soil moisture showed the negative impact of the products of decay, fermentation and oxidation of plant residues, which created a counterproductive phytopathogenic background and growth depression (table 2).

Correction direction agrochemical and microbiological processes by introducing into the soil substrate ammonium nitrate equivalent dose N 30 and 50 kg/ha of active substance to a certain extent leveled depressive phenomena associated with the germination of corn seeds. By improving the biotic chemistry of the outer and inner areas of background seeds increased nitrogen contribute to the growth indicators germination by 2-4% and the growth rate of corn.

According to the analysis of the initial stages of corn and condition the soil environment can be stated that the minimization of primary tillage germination is influenced by the negative effect of compaction of black earth, lowering the temperature in the area of its location and microbiological activity regarding the integrity of tissue residues.

Table 2

Effect of organic by-products agricultural crops on seed germination of corn (the vegetation experience) 2010 year

Variant	Germination, %		Plant weight g/plant
	7 days	12 days	
1. Without organic residues	76	91	2,2
2. Var. 1 + N 50 kg/ha	79	93	2,5
3. Residues of winter wheat, 5 t/ha	58	84	1,8
4. Var. 3 + N 50 kg/ha	63	88	2,0
5. Residues of corn, 5 t/ha	61	88	1,9
6. Var. 5 + N 30 кг/га	64	91	2,2
7. Residues of sunflower 3 t/ha	66	90	2,1
8. Var. 7 + N 30 kg/ha	70	92	2,4

Depressive effect of minimizing tillage on the seed germination of corn and during the early growth of the culture is also reflected in the rate of development in the next stages of organogenesis and the productivity of maize. So, given the direction of the physiological processes in the early phases of development of deterministic virtually all biometrics corn at the end of the growing season. According to indicators such as the height and area of assimilation surface, the number of productive plants, grain yield, fine processing inferior moldboard plowing.

The yield of maize grain were invested in a range from the maximum (4,32 t/ha) of winter wheat after plowing to a minimum (3,54 t/ha) due to the shallow treatment after sunflower (table 3). This subtracts the value factors were the precursors of both maize and sunflower, reducing the depth of tillage and the crop residues in the surface layer of soil within 2,34-4,17 t/ha. In dynamics, which enabled this level of grain yield, happening and formation of biological and morphobiological symptoms as plant height, photosynthetic area and generative productivity (number of ears per 100 plants).

Despite the fact that intensive tillage because of the rapid mineralization of organic soil is biased southern black soil degradation, yet, at the level of fertility, which today has developed plowing provide the best conditions for the germination of corn seed.

In this case, it should be noted that the direction of the evolution of the soil depend not only on the intensity of their processing, much of the organic matter to reversion.

Table 3

The conditions and factors of formation of a crop of corn grain after various predecessors (2009-2011 years)

	Plowing 25-27 cm			Disc fine 12-14 cm		
	1	2	3	1	2	3
Soil moisture in the 0-10 cm layer, %	22,7	22,0	23,0	23,4	22,5	22,6
The soil temperature at the depth of 6-8 cm,°C	10,6	10,9	10,6	9,9	10,1	10,4
The hardness of the soil in a layer 0-10 cm,kg/cm^2	9,1	9,8	9,0	10,7	11,0	10,2
Organic residues of predecessors t/ha	0,16	0,44	0,08	3,62	4,17	2,34
Height of maize, cm	1,95	1,90	1,88	1,91	1,86	1,85
Leaf surface area, m^2/stretch.	0,53	0,51	0,49	0,50	0,48	0,47
The number of ears per 100 plants pieces	106	103	101	102	99	99
Grain yield, t/ha	4,32	3,97	3,91	4,01	3,60	3,54

Note. Predecessors: 1 - winter wheat, 2 - maize, 3 - sunflower

This conclusion was prompted by the actual changes that have occurred in the circulation of organic matter and bio-energy in modern agriculture. Indeed, if throughout the 20th century, agriculture was based on the complete alienation of the organic matter produced from the system agrocenosis, now the high productivity of crops in the field allows you to leave a significant part of plant by-products. Under existing in modern agriculture the relationship between agriculture and animal husbandry crop residues are the main source of replenishment of bioenergy balance and regulation of soil fertility.

Thus, the growth process of corn during the growing season to a large extent depend on the conditions of seed germination after various predecessors on the main backdrop minimize tillage. The chernozem of soil and enhancing phytopathogenic hazard in the zone of the seeds on the background of minimizing tillage reduces the germination, biometrics and maize grain yield at 0,31-0,78 t/ha.

The resulting field experiment scientific finding are important from the point of view of making structural adjustments in the technology of maize and the use of mineral fertilizers. The principal technological solution should be a clear separation of the seed bed from the zone of increased concentration of crop residues and nitrogen fertilizers in rows of culture and in the layer of soil placed over the seed. This is an effective way to overcome many of the problems of conservation agriculture using anti-erosion plant mulch.

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O.B. Viunenko *, M.M. Ruban *, H.A. Smoliarov *, I.H. Smoliarov *, A.V. Tolbatov *, V.A. Tolbatov **, S.V. Tolbatov ***

IMPROVING THE INFROMATION SUPPORT OF MANAGEMENT OF AGRICULTURAL ENTERPRISES THROUGH INNOVATIONS

** Sumy National Agrarian University*
*** Sumy State University*
**** National Aviation University (Kyiv)*

Abstract. The article tackles the problems of forming the information support of the management in the agricultural sector, solution of which is suggested on the basis of new information technologies.

Key words: agricultural sector, information support, information technologies, innovative activities, monitoring.

Outline of the problem. The agricultural enterprises face the tasks of achieving sustainable development, increasing of agricultural production and food security of the population, which can be fulfilled through the modernization of production.

One of the tools for implementing the scientific and technological development of the agricultural sector is innovative approaches that have to be aimed at ensuring management efficiency in order to increase production volume.

The implementation of the innovative approaches determines the solution of topical problems connected with the information support of decision making processes using new information technologies in the agricultural enterprises management.

Analysis of recent research and publications. In the conditions of the agricultural market activity market the performance criteria are coming to the fore and the requirements for management methods are increasing. In this regard the need for information on the scientific achievements, innovations and technologies, financial and other resources is significantly increasing. Under present-day conditions management activities require considerable organizational and management changes, a comprehensive study on the establishment and operation of the information support of the sectoral management.

Topical problems of developing the information support of the agricultural sector management have been studied by a number of scientists: M.P. Denysenko, I.V. Kolos, V.M Zhuk, I.S. Kovalenko, V.M. Koshelev, M.F. Kropyvko, P.T. Sabluk, B.K. Skyrta, S.O. Tyvonchuk, V.V. Kharchenko.

The formation of the theoretical foundations of the information support of the agricultural sector management and their realization have been studied by academician of NAAS M.F. Kropyvko, who dwelled upon [1] the role of the scientific school of the academician of NAAS P.T. Sabluk and the achievements in solving the problems of the agricultural sector management and its information support.

The analysis of the publications shows that the experience of the agricultural sector information support is eventually broadening and improving. Thus in view of the problem under study the fact that new conditions require modern principles of the organization of agricultural sector information support becomes evident.

The issues of the innovation process organization are tackled in the works of a number of authors [2, 3, 5, 6], in which the issues of forming the information support at various stages of the innovative activity are dwelt upon. This suggests the possibility of structuring information processes, creating the systems of the decision-making information support and highlights the topicality of this problem.

In the publications [1, 4, 5] the certain issues of the innovative activity information support are considered, which necessitates generalizing the experience and elaborating the methodological principles of organizing the innovative activity information support in the agricultural sector at all stages of the decision making.

As a result of the research it should be noted that the current problems of forming the information support of the agricultural sector management on the basis of the new information technologies have not been considered in the publications.

Aims of the article: to describe the state of the informatization and form the approach to the developing the information support of the agricultural sector management on the basis of innovations.

Numerous publications are devoted to the problems of improving the information support or the agricultural sector management.

Implementing the information technologies in the agricultural enterprises, the automation of the accounting tasks, solving the optimization tasks of the resource planning, the tasks of zootechnics. The constraints of implementing the information technologies in the agricultural sector in past two decades were the lack of domestic technical means, their high price and the financial situation of the agricultural sector. Academician M.F. Krapivko notes that in early 2000 the discrepancies between the information support and demands of the time arose.

The main shortcomings of the information service system were:

- lack of the information resources, primarily the market and the scientific and technical information for production purposes;
- the dominant information flows were not aimed at servicing the industrial structures and the population;
- the system was based mainly on old paper technologies for collecting, organizing, processing and dissemination of information and did not provide the required efficiency;
- unestablished contacts and exchange of information with international and national research centres, centres of information and business activity;
- lack of one of the basic elements of the information system - reliable digital cartographic materials [6].

By request of the Ministry of Agrarian Policy the National Scientific Center "Institute of Agrarian Economy" and other institutions elaborated the programme for the agricultural sector informatization for 2001-2003 and the programme for the agricultural sector informatization for 2006-2015.

Academician M.F. Krapivko notes that the conceptions of developing the agricultural sector were not approved as state ones but the basic ideas of the programme were used for further developing the information systems of agricultural enterprises.

In Ukraine the information and consulting service for the agricultural producers is developing, the advisory services have been established in the regions at the departments of agriculture and agricultural higher educational institutions with leading scientists and practitioners involved in their work.

The innovation is the application of new information technologies [7] on the basis of which the technologies of the agriculture, the livestock farming, the organization and the management of production are modernized. Thus geoinformation technologies enable managing production and introducing innovative technologies for the automation of accounting the consumption of fuel, fertilizers, crop protection products etc.

The practice of recent years shows the growing needs of management in timely, reliable and differentiated information. Meeting the information needs is determined not only by the needs of the authorities, but also by the demands of agricultural economic entities and the agricultural scientific community. Nowadays the system of statistical indicators is the basis of information which is necessary for substantiating different solutions aimed at stabilizing agriculture production and overcoming its systemic crisis. It includes quantitative characteristics of phenomena and processes in agriculture (size, structure, dynamics of production and financial resources, the efficiency of production, etc.); materials of The Ministry of Agrarian Policy and Food of Ukraine; analytical reviews of national scientific organizations, publications of leading researchers, etc. The existing information base does not contain absolutely reliable information on the real state of agroindustrial production of regions, does not completely reflect its qualitative and quantitative changes. This fact does not enable to explore the dynamics and identify the tendency of changes of economic, property and production indicators of enterprises of certain agricultural spheres. The implementation of modern monitoring systems may contribute to solving these problems.

The monitoring of the agricultural sector has peculiarities that are associated with the specifics of the village as a socio-territorial subsystem of society and the specifics of the agriculture as a sphere of the economy. Thus the observation scope requires the inclusion of additional areas such as data on land relations, private land ownership, as well as information on local government development [8]. The monitoring in the agricultural sector is aimed at continuous observation of the agricultural sphere in order to identify tendencies leading to a decrease in production efficiency and development of agricultural industry. In general the information system of the agrarian sphere monitoring presupposes solving the following problems: identifying changes occurring in agriculture and the factors that determine them; the comparative analysis of dynamics of the main indicators of the agricultural sector and other sectors of the economy; monitoring of implementing the agricultural development programmes; assessing the effectiveness and completeness of the implementation of laws and regulations on agricultural development in the agricultural sector; studying and sharing the experience on the agricultural sector development; forecasting the processes of development in the social and labor sphere of villages; preparing analytical and information reports on the situation and tendencies of the agricultural development.

At present there is no common method of monitoring tendencies in region's development, economic stability at the regional level, as well as there is no system of indicators on the basis of which it is possible to adequately assess the current state of the observed object and intervene in time if the system fells into crisis [9].

Analysis of the agricultural sector information support shows that the level of its development is very low; the information flows are insufficiently organized and duplicated; information on the performance of enterprises and farms is submitted to the statistics agencies, tax authorities, agricultural departments. Despite the efforts of researchers and specialists the resources of modern information technologies and existing information support of the managerial decisions does not meet the requirements neither of state and executive bodies nor producers and is often insufficiently reliable and relevant.

Investigation of the innovative activities, main decision making stages and tasks shows that the innovation processes require the variety of information. This information is formed by multiple sources internal and external to a company and requires the use of various algorithms and methods for their implementation.

Peculiarities of the innovative activity in the agricultural sector determine the fact that its efficiency depends on the management system which depends on the quality of the decision making information support. This enables defining the components of the agricultural enterprises' innovative activity: scientific and technical, industrial (technological), organizational, economic, legal, investment components.

Activization of the innovative activities requires and results in improvement of business management based on the appropriate innovations. It is proved by the fact that there is a necessity to improve the information support of the management processes of an enterprise, especially in the sphere of its innovative activity.

The components of the innovative activity information support are mainly unattainable for enterprises due to various sources of forming. It limits the decision making process in the management of agricultural enterprises' innovative activity. As a result, there are problems connected with the implementing innovations in a certain enterprise, which is not possible to carry out by personnel and requires the involvement of invited specialists.

These problems may be solved through creating centers for the innovative activity support. The centers should provide entities with scientific-consulting and information services in implementing the profitable management methods. At the same time computer and telecommunication equipment and information technologies for the decision making support should be widely used.

As noted by researchers an important aspect of scientific consulting and information services for agricultural producers is the organization of the infrastructure for disseminating the agrarian scientific attainments.

Conducted research on the informatization of the agricultural sector shows that there are a number of problems of forming the information environment in agricultural sphere.

The main objective of forming the information environment of the agricultural sector is the integration of all components aimed at optimizing the information resources from various sources: government institutions, local governments, research institutions, educational establishments, trade unions and associations.

Conclusions. The problem of improving information support of the agricultural production management system in a market economy is becoming more urgent. Creating the information environment of the agricultural sector functioning is a necessary factor in the efficiency of the entire industry and separate companies. It enables not only accumulating the information resources of required extent but also significant reducing of the total extent of each possible source.

The innovation in this process is the use of new information technologies in the agricultural production on the basis of which the production efficiency increases, technologies of the agriculture and the livestock farming are upgraded, the management organization improves.

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I. P. Voiku

SYSTEM AND MECHANISMS OF MASTERING INNOVATIONS IN CROP PRODUCTION OF THE PSKOV REGION

Pskov Agricultural Research Institute, Pskov

The article outlines the theoretical aspects of the system of mastering innovations in agriculture, defines the basic premises of its formation. The process of mastering innovations presented in the form of a sequence of four interrelated stages. The list of the main participants of the system of mastering innovations in crop production of Pskov region and the interaction between them is presented.

Key words: *system, mechanisms, mastering, implementation, innovation, achievements of scientific and technological process, experimental mastering, crop production, large-scale mastering, allocation support matrix.*

New macroeconomic challenges, and the need to improve existing market relations requires new business forms, innovative approaches to managing the development of regional agro-industrial complex, based on innovation.

The stagnation of the main sectoral indicators, the deterioration of the competitiveness of agro-industrial enterprises in Russia is largely owed to a lack of sufficient flow of innovation and finance and investment support of their mastering. The solution of this problem lies in the activation of innovative processes at the Federal, regional and municipal levels.

In accordance with the Concept of long-term social and economic development of the Russian Federation until 2020 innovation is defined as the leading factor of economic growth in all sectors of the economy [1].

The implementation of this basic programming document requires the formation of a national innovative system, consisting of elements such as a system of scientific research and development, integrated with higher education, malleable to requests from economy, engineering business, innovation infrastructure, market institutions of intellectual property, innovations promotional mechanisms and others [2].

The main condition of formation of the national innovative system is ensuring the primary and large-scale mastering innovations – one of the five phases of the life cycle of both product and process innovations.

The primary (pioneer) mastering innovations is the implementation of the development results into production, which involves the following steps [3]:

1. Technological mastering – individual production of new products needed in single quantities, mastering of the mass production of new products, commissioning of new constructions, technological processes and managerial systems, the practical use of new methods;

2. Industrial mastering - achievement of the planned capacity and designed volume of the usage of innovations;

3. Industrial and technological mastering includes development and approval of technological and organizational project, prices, engineering specifications, standards, normals, norms for consumption of resources, and preparation of construction and construction and installation works, installation of new equipment.

Managerial and engineering support of production besides organizational and technical measures includes staff training and retraining, provision of consulting and implementation services.

Economic mastering – achievement of the final results of scientific and technical development, designed socio-economic efficiency of innovations.

Economic mastering ends with the achievement of the planned capacity and economic indicators: materials-output ratio, energy-output ratio, labor capacity, production cost, profitability, capital productivity ratio. At this stage of mastering the additional work on elimination of the shortcomings, revealed in the process of industrial and technological mastering is implemented, the activation of the human factor, the formation of the essential (corresponding) innovative climate are taken place.

Large-scale mastering – economic mastering on a large scale in enterprises, where it's effective, accompanied by dissemination of information, copying of documentation, materials and equipment, staff training and retraining [3]. At this stage the innovation is beginning to bear real effect.

The use of the systematic approach involves compensated accumulation and distribution of innovative potential, which includes material, labor, financial, information resources, at each stage of the process of mastering innovations. Furthermore, the basic principle of the systematic approach is the consideration of an open system with input and output, controlling and controlled subsystems.

The elements of the system of mastering innovations are innovative and productive structures, organizational and economic mechanisms of implementation, techniques and tools [4].

The mechanisms, presented as a set of forms and methods, sources, tools, and leverage, in particular, are the link of any system.

Economic mechanisms (financial security and taxation of the participants of innovation processes) are designed to create the conditions for expanded reproduction of agricultural production. Organizational mechanisms aim at the formation of adaptive and accurate organizational system of management of the innovation processes in industry [5].

All this are the general approach to the definition of system and mechanisms of the mastering.

The mastering innovations in crop production is to apply advanced agricultural technologies, varieties, fertilizers and crop-protection agents, new machines and mechanisms at each stage of cultivation of cultivated plants.

Pskov region is one of many regions of Russia, requiring innovative approaches to the solution of acute problems, including problems of the development of the crop production.

Despite the low commitment to innovation across the board in the crop production, the region already has the experience of the effective mastering innovations.

The yield index of the Limited Liability Company “Idavang” - one of the most innovatively active enterprises – is above the average not only on regional and Russian indexes, but also comparable to the yield indexes of the regions of chernozemic zone (fig. 1). It is interesting to note that the very yield index is the leading resulting indicator of innovative activity.

The enterprise produces crops on the area of more than 4.5 thousand hectares, using only 12 harvesters operated by 35 mechanizers, uses agrometers – specialized equipment for organic manuring of the soil with the hose method, which allow to exclude contact of nutrients with the air. At the stage of inception the enterprise has invested in the soil preparation to crop rotation 13260 rubles per hectare.

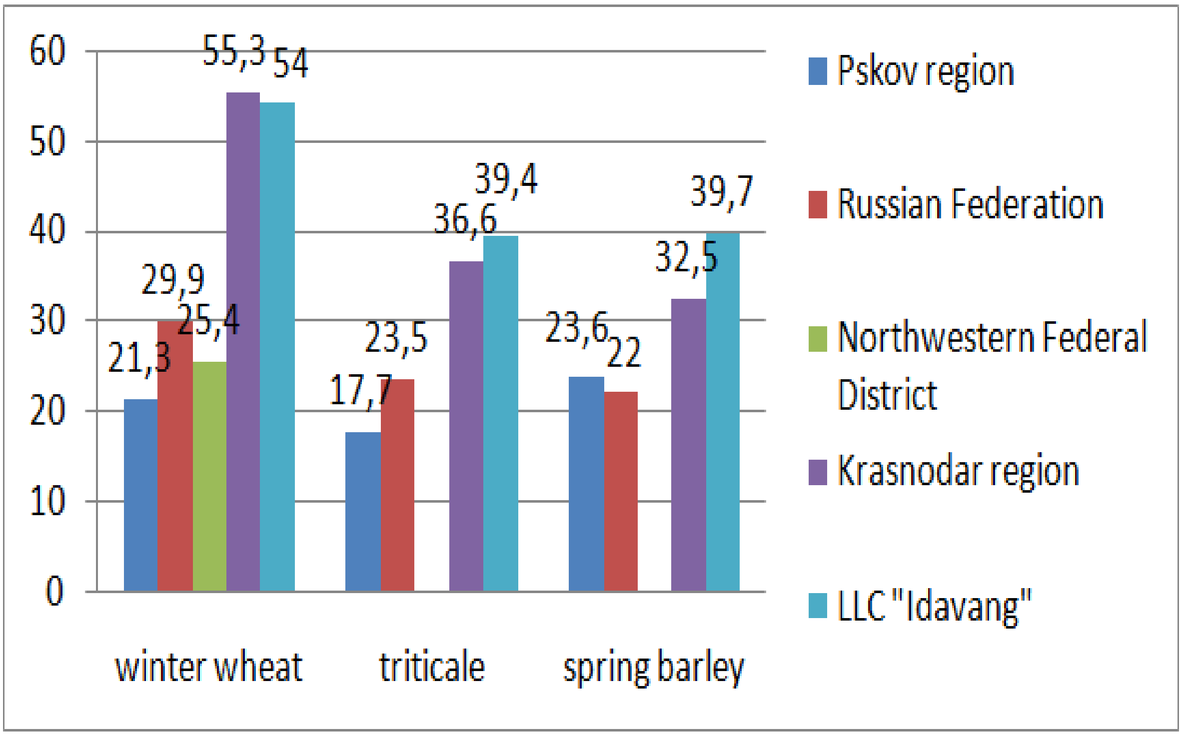

Fig. 1. The comparison of yield indexes of the major crops of the Limited Liability Company "Idavang" with similar indexes of the Pskov region, the Russian Federation, Northwestern Federal District and the Krasnodar region

In addition to the Limited Liability Company "Idavang", also the Peasant Farm " Prometey ", the Limited Liability Company " Pankratovskoye ", the Agricultural Production Co-operative " Svetoch " and the Agricultural Production Co-operative " im. Suvorova " are innovatively active enterprises of the region. These enterprises are actively implementing new crop varieties, use new types of fertilizers, new crop-protection agents, new machines and technologies.

The positive experience of innovatively active enterprises must spread on all agricultural enterprises of the region. The system of mastering innovations, model of which is presented further, is aimed to accelerate this process.

The proposed system is dynamic in nature, i.e. considering the process of mastering as a sequence of the certain stages. Besides, the system is goal-oriented, i.e. acting in accordance with goals, clearly defined by higher-order systems, and open using linear and nonlinear relationships between their basic elements (Fig. 2).

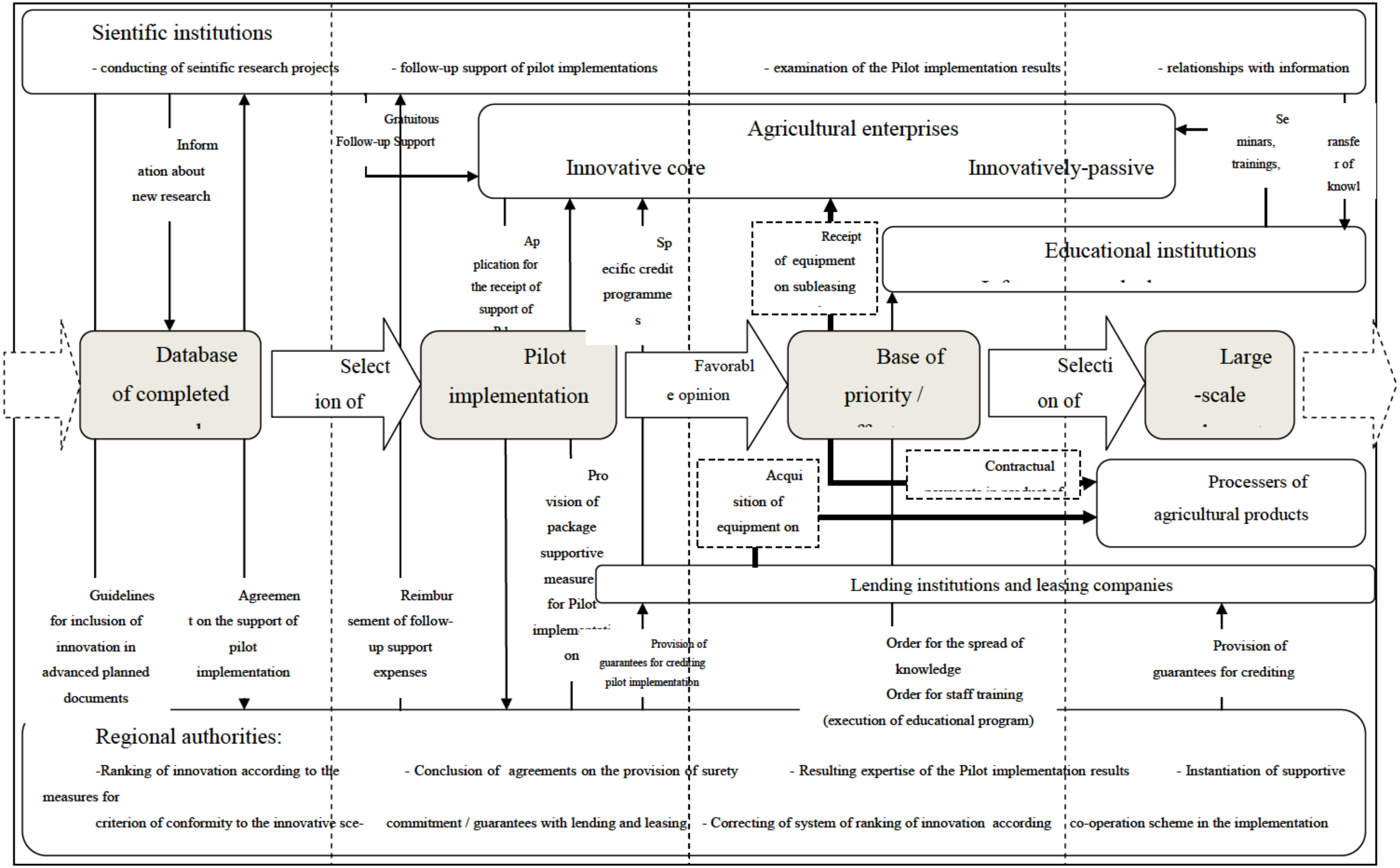

Fig. 2. The model system of mastering innovations in the crop production in Pskov region

Thus, figuratively, the process of mastering is divided into four stages [6]:

1. Formation of a database of completed research. The main task is periodic information sharing about the advanced innovations from sientific institutions of the regional authorities, preparation of sound recommendations on enabling innovation in the sectoral and subsectoral development programmes of crop production of the Pskov region. The recommended innovations should be ranked by the regional authorities according to the criterion of conformity to the innovative scenario of the development of sector or subsector.

2. Pilot implementation. Testing innovations under production conditions is conducted mainly by agricultural enterprises of the innovative core. The very agricultural enterprises have the maximum opportunity for implementation of innovative crop varieties, application of new means of protection and fertilizers, the purchase of new machinery, implementation of innovative technologies in the crop production.

3. Formation of the base of priority / effective innovation. Current control of the pilot mastering innovations is provided by a scientific institution, the final control - by the regional authorities. Then, the representatives of the regional authorities form a council of experts to make decisions about the effectiveness of the mastered innovations and the feasibility of the further large-scale implementation. Information about all the innovations that received a favorable opinion is sent to the Database of priority innovations – the alternate Database of the completed research, subjected to the selective treatment by the pilot implementation during the particular period of time.

4. Large-scale implementation involves the use of proven innovation which gives the guaranteed result. The long stage of the mastering innovations ends with a complete replacement of the previously implemented innovation by fundamentally new one.

Key economic mechanisms, allowing to link all the innovation, production and other structures in the proposed model, can be [6]:

- Provision of state guarantees on a competitive basis at the expense of the regional budget for investment projects approved by Administration of the region;
- Provision of tax advantages in the form of lower payment of the corporate property tax for implemented investments;
- Establishment of preferential rates on taxes (on property and profits of organizations) for investment projects approved by Administration of the region;
- Innovative grants for implementation of innovations;
- Subsidies on reimbursement of the part of expenses for the development and implementation of innovative technologies;
- Subsidies on reimbursement of expenses of the real estate lease or the use of unique equipment on a competitive basis;
- To compensate for sientific institutions expenses related to the provision of services to subjects of innovative activity;
- Others.

Model system of the mastering innovations also provides for a perfection of the organizational mechanism of innovation processes development [6]:

- Formation of cooperative relationships between financial institutions, processers and agricultural enterprises, involving the implementation of various innovations;
- Conclusion of contracts between regional authorities, sientific and educational institutions, information and advice services on the realization of special training programs, holding of seminars, other forms of replication of new knowledge;
- Formation of the principles of the distribution of volumes of state support for large-scale implementation of innovations in crop production.

Undoubtedly, the proposed model system and mechanisms of mastering innovations in crop production of the Pskov region have a number of significant assumptions and limitations. However, in general, they define the key participants of the innovative development of the industry and the prospects of their relationship.

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A.N. Kudriawytzka

AGROPHYSIOLOGY EVENTS ARE IN PRODUCTIONAL PROCESS CONTROL FOR GROWING OF FURIOUS WHEAT

National University of Life and Environmental Sciences of Ukraine
Kyiv, street of Heroes of defensive, 17,03041

Studies on the meadow chernozem is installed that systematic using the mineral fertilizers on background of the aftereffect organic, provides the gain of the harvest grain sort of the : spring wheat мironovskaya - bright on 1,73 t/he. The productivity and quality grain spring wheat increase when contributing rates of the mineral fertilizers on the meadow chernozem of the aftereffect organic, with accordingly high factor quality : collection protein -0,64 t/he and collection gluten 1,36 t/he.

Key words: spring wheat, productivity, fertilizers, dose, protein, raw gluten, sort, soil, crop rotation.

The rational use of fertilizers promotes the productivity of soil and creates favourable terms for a height and development of plants of furious wheat. Top-dressing is a basic factor that stipulates the accumulation of nutritives in soil and use of them in the process of forming of harvest of furious wheat [1-4].

A harvest of furious wheat is the result of difficult cooperation of plant with the terms of environment and determined mainly by correlation of two sizes are numbers of плодоносних stems on unit of area and mass of grain from one colossus. Each of these sizes in turn depends on other elements of structure of harvest [5-9].

Therefore question about influence of terms of growing, biological features of sort, agroecological ground, in relation to establishment of optimal doses of mineral and organic fertilizers on a harvest and quality of grain of furious wheat the practical.

<u>Materials and methodology of researches</u>. Researches were conducted in a crop rotation in the conditions of North Forest-steppe of Ukraine("Agronomical experimental station"). Soil of experience is a black carbonate soil on a loesslike loam. The provision of plants nitrogen and phosphorus is middle, by potassium subzero. Researches were conducted by the generally accepted methods.

Experience is stopped up in a triple reiteration, size of - 172 m^2,- 100 m^2. In experience used ammoniac saltpetre (34 %) granular superphosphate (19,5 %) and potassium chlorous (60 %). Fertilizers brought in according to the chart of experience. The field researches were conducted in a crop rotation on a chart:

1. Control (without fertilizers)

2 fteraction of 30 t/he - FON

3 Background+of P_{80}

4.Background+of $P_{80}K_{80}$

5 Background+of $N_{80}P_{80}K_{80}$

6. Background+of $N_{110}P_{120}K_{120}$

7. $N_{80}P_{80}K_{80}$

Soil of an experience area is a black carbonate, on a loesslike loam. The provision of plants nitrogen and phosphorus is middle, by potassium subzero.

The harvest of furious wheat was conducted separately on variants to direct.

Mass of straw was determined by the method of trial sheaf. Determination of structure of harvest of furious wheat was conducted by the method of Maysurana, the masses 1000 grains for 10842-89, to content squirrel in grain of furious wheat - by the method of infra-red spectroscopy, "raw" gluten - method of washing of substances. The mathematical processing of productive data was conducted by the method of analysis of variance after Dospehovum and with the use of computer technologies.

The results of researches testify that the protracted application of fertilizers in a crop rotation positively influenced on the height of plants of furious wheat Mironivska furious. It is set that middle length of plants of furious wheat in a variant control (without fertilizers) of - a 65,4 cm, on the fertilized variants this index hesitated - a 68,3-84,5 cm (table.1).

The analysis of data on the structure of harvest of furious wheat the Mirovivska furious testifies that the index of general bushyness on control equaled 2,5, productive - 2,4.

Higher were indexes of hall and productive bushyness on the fertilized variants and presented according to 2,6-3,0 general bushyness and 2,5-2,8 productive bushyness (table. 1).

1. Influence of the protracted application of fertilizers on the structure of harvest of furious wheat of sort Миронівська furious (2010-2012 years.)

Variant of experience	plants, cm	The bushyness		The bushynes			The bushyness 10 plants	The bushyness 1000 plants
		general	Gener productive	generaength, cm	generaproductive, cm	Generaproductive length, c		
Control (without fertilizers)	65,4	2,5	2,4	5,9	12,5	19,4	13,9	40,9
fteraction of 30t/he - FON	68,3	2,6	2,5	6,4	13,5	21,7	15,6	42,3
Background+of P_{80}	68,3	2,5	2,4	6,5	13,8	23,3	17,0	42,4
Background+of $P_{80}K_{80}$	75,8	2,7	2,6	6,8	14,1	26,9	19,1	43,4
Background+of $N_{80}P_{80}K_{80}$	83,0	2,9	2,8	7,2	15,5	30,5	20,6	44,5
Background+of $N_{110}P_{120}K_{120}$	84,5	3,0	2,8	7,8	16,3	32,7	22,0	45,1
$N_{80}P_{80}K_{80}$	80,1	2,7	2,6	6,8	14,8	30,3	19,9	44,0

The harvest of furious wheat depends on length of ear and his gap-fillingness grain. Top-dressing assists the improvement of diet of plants, promotes.

Length of ear on a 0,5-1,9 cm was anymore on the fertilized variants comparatively with control, where she presented a 5,9 cm. The results of researches testify that most length of - a 7,8 cm, amount of - 16,3 шт and amount of grains i-32,7 th in the plants of furious wheat marked at bringing of one-and-a-half norm of mineral fertilizers ($N_{110}P_{120}K_{120}$) on a background the afteraction .

These can explain the most high harvest of grain on this variant that presented 3,79 т/and, at a harvest on control - 2,06 t/he (table.2). On the fertilized variants considerably mass rose 1000 grains and presented 42,3-45,1 gs, at mass 1000 grains on- 40,2 gs, that assisted the receipt of higher harvest of grain of furious wheat on the fertilized variants (table.1).

The results of researches are set that systematic application of mineral fertilizers on a background the afteraction of 30t/he assists a pus to the increase of harvest of grain of furious wheat on 0,61-1,73 t/he, at a harvest on control according to 2,06 t/he (table. 2). The most high harvest is got at bringing of $N_{110}P_{120}K_{120}$ on a background the afteraction of 30 t/he leave to rot - 3,79 t/he grains of furious wheat.

The least increase of harvest is got on variants, where phosphoric and phosphoric-potassium fertilizers were brought in on a background the afteraction of organic, that presented according to 0,99, 0,81 t/he (table. 2).

2.Influence of the protracted application of fertilizers is on the productivity of grain of furious wheat and indexes of his quality (2010-2012 years)

Variant of experience	Productivity, t/he	Increase , t/he		Content					
				Albumen %			Raw" gluten %		
		before control	to the background	%	collection is a squirrel, т/he	increase to to control т/he	%	collection of "raw" gluten т/and	increase to to control т/he
fteraction of 30т/and - FON	2,06	-	-	14,8	0,3	-	31,9	0,66	-
Background +of P80	2,67	0,61	-	16,1	0,43	0,13	33,7	0,89	0,23
Background +of P80K80	3,05	0,99	0,38	15,6	0,47	0,17	32,4	0,98	0,32
Background +of N80P80K80	2,87	0,81	0,2	16,1	0,46	0,16	33,8	0,96	0,30
Background +of N110P120K	3,45	1,39	0,78	16,3	0,56	0,26	34,6	1,2	0,54

120									
N80P80K80	3,79	1,73	1,12	16,8	0,64	0,33	36,1	1,36	0,70
Variant of experience	3,21	1,15	0,54	16,2	0,52	0,22	34,4	1,09	0,43

HIP $_{05,}$ t/he *0,24*
S_X, % *0,12*

Content of albumen and "raw" gluten in grain of wheat depends on the size of the productivity of furious wheat.

Most content of albumen is got in a variant, where the one-and-a-half norm of mineral fertilizers was brought in on a background the afteraction of 30 t/he - 16,8 %, with the corresponding index of collection of - 0,64 t/he (table. 2). The obtained data testify that most content of "raw" gluten in grain of furious wheat is marked at bringing of $N_{110}P_{120}K_{120}$.on a background the afteraction of 30 t/he to the pus that presented according to -36,1%, from according to high the index of collection of "raw" gluten - 1,36 t/he. (table.2).

Some less content of "raw" gluten is marked in a variant, where the single dose of mineral fertilizers was brought in on a background the afteraction of organic- a 34,6 %, collection of "raw" gluten presented accordingly - 1,2 t/he, at content on control of "raw" gluten - 31,9 % and by the index of collection of "raw" gluten - 0,66 t/he.

Conclusions.

For the receipt of stable harvests of grain of furious wheat of sort Mironivska furious (3,5-4,0 t/he) from accordingly by the high indexes of quality of grain on middling provided with nitrogen, phosphorus and potassium black carbonate soil in grain - to the beet crop rotation agroecological - reasonable is application in the basic fertilizer of $N_{80}P_{120}K_{120}$ on a background the afteraction of 30 t/he leave to rot.

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Shmalii A.P., Polischuk T.V. , Pikula O.A.

AVERAGE DAILY MILK YIELD OF COWS UNDER DIFFERENT MILKING REGIMES AND FEEDING SCHEDULE

Vinnytsia national agrarian university
Vinnytsia, Soniachna St. 3, 21008

It was investigated that regular regime of milking cows needs feeding on schedule; it will result in milk yields increase for 3-4 months of lactation while forming lactation curve; breaking feeding schedule on one hour later or earlier causes deviation of stable curve. The regular regime of milking and feeding on schedule will increase milk yields from 15.8 kg to 17.9 kg per day in ten days; it is 13.3% (P<0.001).

Key words: cows, regular regime, variable regime, milking, feeding, forage, schedule, average daily milk yields.

Introduction. The modern world requires the milk of high quality and in sufficient amount from producers; it is very urgent factor of production. At the reorganized agricultural enterprises producing milk the regimes of cows milking and feeding as a rule do not meet the regulatory requirements adopted by administration norms of technological design and requirements of veterinary medicine [3].

The problem of the multiplicity of cows milking and length of intervals between milking has been discussed more than once in the field of dairy cattle-breeding. It was researched by many scientists such as E. Admin (1983), O. Borshch (2000) and L. Kosior (2009). Nowadays there is no consensus among scientists and practical workers.

The milking techniques and organization also influences on their milk productivity. The main problems connected with rational organization of milking are number of milking and the intervals between them.

It was proved that intensive milk supplying takes place when the udder is filled with milk. That's why we must consider udder capacity and intensity of milk production when determine the amount of the milking and the intervals between them [1,2,4].

According to the schedule all types of operations at the dairy farms must be done by defined milking frequency depending on the cows' productivity level and the frequency of milking depending on the 1 cwt of ration. Schedule breaking can cause sudden fall of animal productivity [5,6] .

Apart from the general technologies processes breaking the producers don't follow schedule of feeding. Following of milking cow schedule facilitate high milking yields. First of all, it is necessary to control if the intervals between milking and feeding are equal.

The purpose of research. Thus there are different views on productivity when the milking schedule is при дотриманні та порушені режимів доїння, the data about simultaneous breaking of milking and feeding regimes are not specified. That's why it is necessary to investigate productivity under both variable and constant milking regimes of cows when feeding doesn't follow schedule; this problem should be scientifically justified.

Materials and methods of research. The research was conducted at affiliate “Peredovyk” of closed join-stock company “Podillia” of the village Dovzhok, Yampil district, Vinnytsia region. The milking herd is kept tethered at the farm, the milking is done under various regimes, the feeding is done on schedule.

Three experiments were conducted for the investigation of this problem, six groups of 10 cows of Ukrainian red -and-white dairy breed of the 2nd lactation were formed on the basis of group analogues. The control and experimental groups were formed for the first experiment. The cows of the control group were kept under the adopted technology; the milking was done differently but the feeding on schedule. When the milking regime is variable the rules of milking doesn’t meet the standards, in particular the length and speed of milking, milk production are changed; there is an extra milking by hand. The cows of the second experimental group were milked regularly; the process meets all the standards and the feeding on schedule.

The control and experimental groups were also formed for the second and third experiment. The milking of cows control groups was made irregularly; the milking of cows of the experimental group was made regularly. In second experiment the feeding was done one hour earlier than on schedule, in the third one it was done one hour later.

The milk tests were taken every day for ten day period.

The experiments were conducted at the same level, feeding and diets.
Biometric analysis of the results was performed by the method of variation statistics by N.A. Plokhynskyi methodology (1969), where difference were reliable $P<0.05$ – $P<0.001$ compared to control $^*P<0.05$; $^{**}P<0.01$; $^{***}P<0.001$. Mathematical data processing was performed on a personal computer using the program MS «Excel- 97" for Windows.

The results of research. After the 1st experiment it`s proved when the feeding is on schedule, under the regular regime the milk yields (table 1) on the 10th day is 17.9 kg of milk, it is increased by 12 % ($P<0.001$) in comparison with 1st research day; it was 15.8 kg of milk. So if feeding is on schedule and the regime is regular the milk yield is increased by 10% in comparison with variable, where milk yield is 15 kg.

At the 2nd experiment the feeding was done one hour earlier than on schedule. So the reliable difference ($P<0.01$) is observed in the milk on the 6th day of the research between regular and variable regimes. On the 6th day the milk yield was 15.9 kg under regular regime; it is higher by 5.7 % than under variable regime.

At the 3rd experiment when feeding was done one hour later than on schedule the difference of milking regimes was determined on the first, second, fifth and eighth research days. The milk yields were respectively 16.0 kg, 15.7 kg, 15.2 kg and 14.5 kg on these days; they were higher by 5.6 ($P<0.05$); 6.4 ($P<0.05$); 4.0 ($P<0.05$) and 4.2 % ($P<0.05$) respectively than under variable regim

Table 1

Average Daily Milk Yield of Cows under Different Milking Regimes and Feeding Schedule

The days of experiment	Feeding on schedule (1st experiment)		Feeding on one hour earlier than on schedule (2nd experiment)		Feeding on one hour later than on schedule (3rd experiment)	
	Variable regime (control)	Regular regime (experimental)	Variable regime (control)	Regular regime (experimental)	Variable regime (control)	Regular regime (experimental)
First	15,5±0,17	15,8±0,18	15,9±0,24	16,3±0,13	15,1±0,17	16,0±0,24^
Second	15,1±0,09	15,6±0,14^	15,6±0,23	15,9±0,13	14,7±0,24	15,7±0,26^
Third	15,0±0,11	15,9±0,18^^	15,5±0,20	16,0±0,28	15,0±0,18	15,4±0,12
Fourth	14,8±0,13	16,0±0,21^^	15,4±0,13*	15,8±0,22	14,9±0,28	15,1±0,24*
Fifth	14,5±0,17	16,4±0,17^^^	15,5±0,22**	16,1±0,21	14,6±0,10	15,2±0,16***^
Sixth	14,2±0,14	16,7±0,23^^^	15,0±0,14**	15,9±0,19*^^	14,4±0,21	15,0±0,19***
Seventh	14,8±0,17	16,9±0,31^^^	14,8±0,18	15,2±0,22**	14,3±0,21	14,8±0,21***
Eighth	15,0±0,13	17,0±0,21^^^	14,4±0,21*	14,9±0,20***	13,9±0,19***	14,5±0,16***^
Ninth	15,4±0,24	17,5±0,24^^^	14,0±0,19**	14,5±0,13***	14,2±0,18**	14,7±0,17***
Tenth	15,8±0,17	17,9±0,14^^^	13,8±0,21***	14,0±0,16***	14,4±0,20***	14,8±0,23***

*Notes * P<0,05; ** P<0,01; *** P<0,001 – in comparison with feeding on schedule (1st experiment);*
^ P<0,05; ^^ P<0,01; ^^^ P<0,001 – in comparison with variable milking regime (control group).

It was determined, that daily milk yield of experimental cows under variable milking regime from control group was 15.5 kg; besides the feeding schedule will be followed. The milk yield of the second experiment control group was 15.9 kg, where feeding schedule was changed one hour earlier. The milk yield of the third experiment control group was 15.1 kg, where feeding schedule was changed one hour later. The reliable difference between experimental groups was not determined.

The group of cows with variable milking regime and feeding schedule was changed one hour earlier had milking yield of 15.5 kg, it increased by 10% (P<0.01) in comparison with regular feeding. On the 9th day of experiment the milk yield is higher by 10% (P<0.01) in the group with one hour earlier feeding than in group with simultaneous feeding and milking on schedule. On the 10th day of experiment the milking yield was 13.8 kg; it was by 14% higher (P<0.001). The milk yields have not changed by the fifth day under regular milking regime with one hour earlier feeding; they begin to decline from 15.9 kg to 14.0 kg or by 12% from the 6th day.

Comparing regular milking regime under different schedule, in particular on schedule and one hour earlier feeding, the reliable difference is observed on the sixth day. The average yield of the last five days of the experiment in the experimental group was 14.9 kg, it was 17.2 kg in the control group, so it was increased by 14 %.

As it is shown in the table the milking yields under variable milking regime and one hour later feeding decreased from 15.1 kg to 13.9 kg or by 8.6% from the first to seventh experimental days. So, the yields on the 8th, 9th and 10th days were respectively 13.9, 14.2 and 14.4 kg; it is lower by an average of 8 % in comparison with yields of cows milked on schedule. The yield of cows milked regularly and fed an hour later was 16.0 kg on the 1st day, but on the 10th day it was 14.8 kg; so it was lower by 7.5%. Under the regular milking regime and regular feeding the yield on the 10th experimental day was 17.9 kg; it was higher by 13% in comparison with the first experimental day.

Comparing two experiments with feeding on schedule and one hour later feeding and regular milking the reliable difference is observed from the fifth experimental day. On this experimental day the milking yield was 15.2 kg under one hour later feeding, it was lower by 9 % (P<0,001) than the same scheduled period.

Conclusions: The regular regime of milking and feeding on schedule will increase milk yields from 15.8 kg to 17.9 kg per day in ten days; it is 13.3% (P<0.001). The regular regime of milking and one hour earlier caused milk yield decrease from 16.3 kg to 14.0 kg or by 14.1 % (P<0.001), while one hour later feeding caused milk yield decrease from 16.0 kg to 14.8 kg or by 7.5 % (P<0.01). So it was proved that regular regime of milking cows needs feeding on schedule; it will result in milk yields increase for 3-4 months of lactation while forming lactation curve; breaking feeding schedule on one hour later or earlier causes deviation of stable curve.

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Teraevich, A.S[1]., Simanova I.N[2].,
Badeeva O.V[2]., Polyanskaya I.S[3].

BIO-ELEMENTS FOR DAIRY COWS

[1]Budgetary Educational Institution of Secondary Professional Education of the Vologda Region "Vologda Agrarian-Economic College", BOU SPO VO VAEK, Vologda, Gorkiy St., 40
[2]Federal State Budgetary Scientific Institution "All-Russian Institute of Experimental Veterinary Science named after Ya. R. Kovalenko", FGBNU VIEV, Vologda, Chekhov St., 10
[3]Federal State Budgetary Educational Institution of Higher Professional Education "Vologda State Dairy Farming Academy named after N. V. Vereshchagin", FGBOU VPO VGMKhA
Vologda, Molochnoye, Schmidt St., 2

Abstract. *The scientists in the field of veterinary medicine and zootechnics face great challenges for further improvement of feeding system for all kinds of farm animals. One of the ways for solving these problems is to switch to the classification of bio-elements taking into account the real symbols of the Latin prefixes. The article deals with a new classification of bio-elements in terms of its functionality and the prospects of getting new data concerning of bio-element nutritional role, in general, and dairy cows, in particular. The main contribution of the authors is to demonstrate the classification functionality when determining the nutritional role of silicon, fluorine, lithium, arsenic, vanadium, bromine, zirconium, tungsten, germanium, gallium, titanium, bismuth, thallium, and other bio-elements.*

Keywords: *bio-elements, microelements, milielements, macroelements, the nano-elements*

Introduction. As it was noted earlier, element classifying into micro- and macro elements or, essential and relatively essential ones, etc., is not functional. Clarification of consumption standards meets up-to-date specifications and prospects for dairy farming development. Classification of bio-elements subject to the real meaning of the Latin prefixes can become an important link in bridging the gap between emerging data on the role of bio-elements in feeds, water, premixes, etc., and the rapidly evolving analytic base of express-methods of bio-element determination in biological objects.

Literature Review. Bio-elements (from Greek *bios* – life) are vital elements; bio-elements reside in the body and play a leading role in life processes. In modern bioelementology vitamins and vitamin-like substances are usually referred to as bioelements.

Bioelementology is a scientific-practical course that studies composition, content, interconnection and interaction of bioelements in the human body. Bioelementology divisions are medical elementology, veterinary elementology and environmental elementology.

Microelement is generally defined as an element required in the range from several tens of micrograms to 1-2 mg daily; macroelement is an element required in the range from hundreds of milligrams to several grams daily. At the same time the use of the prefix *micro* in this classification does not correspond to its true value (10^{-6}g).

The main text. The real meaning of the prefixes *micro*-, *milli*-, and *nano*- is more functional in the names of biologically important chemical elements [Tabl.1].

Classification of bio-elements, depending on the required daily intake with food (feeds), water, drugs (premixes), etc.

Currently adopted	
Microelements	10µg - 2mg
Elements occupying an intermediate position between micro- and macroelements	10 - 20mg
Macrolements	100mg - 10g

Recommended, subject to the real symbols of the Latin prefixes	
Nanoelements	1 – 999ng
Microelements	1 - 999µg
Mllielements	1 – 999mg
Macroelements	1 and more than 1g

It is possible to make a further division of nanoelements, microelements, milielements and macroelements into the following orders (Tab.2): the first order – units, the second order - tens, the third order- hundreds (10-9, 10-6, 10-3, g, respectively).

Specified bio-element consumption rates allow to balance the rations of dairy cattle, in particular, the complex of nutritive elements, that is to result in a better ration adequacy, increased milking efficiency and a higher nutritional value of the milk produced. Methods of quantitative calculation of bioelement content in animal feeds and biotopes are being constantly improved and simplified, becoming more popular. Herewith, on the one hand, it is not possible to indicate the exact content of all bio-elements on every package with feeds or feed additives, on the other hand, the difference in the order limits is, in many cases, acceptable.

Classification of bio-elements, depending on the required daily intake with food (feeds), water, drugs (premixes), etc.

Nutrients	Daily Milk Yield (3,8-4,0%, kg Fat)			
	up to 10	11-20	21-30	Bioelement classification subject to the real symbols of the Latin prefixes
Raw protein, g	123	125-136	138-147	third-order macroelement
Sugars, g	62	70-90	94-106	second-order macroelement
Starch, g	93	114-138	142-156	third-order macroelement
Raw fat, g	24	25-31	32-35	second-order macroelement
Sodium Salt, g	5,5 -6,5			first-order macroelement
Calcium, g	5,5 - 6,5			first-order macroelement
Phosphorus, g	4,0 - 5,0			first-order macroelement
Magnesium, g	2,0 - 1,5			first-order macroelement
Potassium, g	average 6,0			first-order macroelement
Sulfur, g	average 2,0			first-order macroelement
Iron, mg	60 - 70			first-order milielement
Copper, mg	7,0 - 10			first-order milielement
Zinc, mg	45 - 65			second-order milielement
Cobalt, μg	500 - 800			third-order microelement
Manganese, mg	45 - 65			second-order milielement
Iodine, μg	600 - 900			third-order microelement
Carotene, mg	33	38	40	second-order milielement
Vitamin D, μg	average 22			second-order microelement
Vitamin E, mg	average 35			second-order milielement

Thus, bio-elements for dairy cows are/supposedly are the following:

Macroelements		
	first-order	Sodium, potassium, calcium, phosphorus, magnesium, sulfur, chlorine
	second-order	Sugars, raw fat / Silicon
	third-order	Raw protein, starch / Fluorine
Millielements		
	first-order	Copper/ Rubidium, strontium, bromine, lead
	second-order	Iron, zinc, manganese, carotene, vitamin E/ Aluminum, cadmium, boron, barium, tin
	third-order	/Nickel, molybdenum, silver
Microelements		
	first-order	/Caesium, gold
	second-order	Vitamin D
	third-order	Iodine, cobalt
Nanoelements		
	first-order	/Beryllium, bismuth
	second-order	/Uranium
	third-order	/Mercury

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For example, silicon plays an important role in the processes of growth and formation of bones, cartilaginous and connective tissues and skin. Although being rare, its deficiency is possible, for example, under uniformity of feeds.

Fluoride is believed to affect bone tissue, its strength and hardness, health and growth of hair and teeth, participates in the hematopoiesis process and maintains the immunity. Since fluorine, in case of a small concentration increase, is dangerous (like mercury, lead, cadmium, barium, beryllium, uranium, aluminum, etc.) it may be put in the classification with a special symbol, indicating, for example, "excess intake is toxic".

The reasons for and symptoms of rubidium deficiency are very little known, but there were experiments conducted on animals. Rubidium lack affected their reproduction ability, i.e. it resulted in poor fetus growth, abortions and premature birth. In addition, animals showed retard in growth and development in general, decreased appetite and life shortening.

Low-toxic natural non-radioactive isotope of strontium is used in osteoporosis treatment, as it slows down the rate of bone tissue destruction. Due to the fact, that boron normalizes the function of endocrine glands, it also helps improve the metabolism of magnesium, fluoride and calcium, and thereby strengthens and improves the skeleton structure.

Bromine is proved to increase the number of inhibitory processes in the central nervous system selectively, and lead affects the activity of some enzymes and metabolites associated with iron status in the body.

Aluminum is involved in the formation of phosphate and protein complexes; bone regeneration processes, connective and epithelial tissues and able to affect the function of the parathyroid glands.

Cadmium is found in the composition of the so-called “metallothionein”; it is a protein characterized by a high content of sulfhydric groups and heavy metals. *In vitro* cadmium activates several zinc dependent enzymes: tryptophan oxygenase, **δ-**ALA – dehydratase and carboxypeptidase.

Barium has a pronounced effect on smooth muscles: small concentrations relaxes muscles and large concentrations cause their contraction.

Tin is a gastric enzyme component; it affects the activity of flavin enzymes and intensifies growth processes, etc.

Nickel possibly activates some enzymes, it is also involved in functioning and structural organization of DNA, RNA and proteins; it is involved in the body hormonal regulation; it improves iron absorption and affects the process of blood formation, stimulating the hemoglobin synthesis, etc.

Molybdenum is a cofactor of many enzymes providing the metabolism of amino acids and a cofactor of the enzymes providing the metabolism of purines and pyrimidines; it increases the effectiveness of antioxidants and it is also an important tissue respiration component. It increases the synthesis of amino acids in the body. Probably silver acts as an inhibitor (retarder) of enzymes.

It is established that cesium has a stimulating effect on the circulatory function and the use of cesium salts is efficient in case of hypotension of various origins. In homeopathic (nano-) doses gold has a pronounced anti-sclerotic effect. Gold can be used in normalizing immune processes in the body.

Probably beryllium participates in regulating calcium and phosphorus metabolism and in maintaining the organism immunity.

Bismuth induces the synthesis of low molecular weight proteins and forms intracellular inclusions in the epithelium of the renal tubules. Although the physiological role of mercury is unclear, probably this element also plays a significant role in the body.

It is also necessary to find a classification place for lithium, arsenic, vanadium, bromine, zirconium, tungsten, germanium, gallium, titanium, thallium and other vitamins - in short terms and for the rest of bio-elements - in a more distant future.

When using the classification with the real meaning of the Latin prefixes, the name mili- or millielement seems to be a new and unusual one.

Milli- (μ) is a unit prefix in the International system of units (SI), meaning division of the basic measurement unit per one thousand (1000). The name comes from the Greek *mille* or a thousand. For example, a milliliter is a volume unit used alongside with SI units. 1 liter = $10^{-3} m^3$ = 1 dm^3 (cubic decimeter) = 10^3 cm^3 (cubic centimeters).

In addition to that, many units, meaning a thousandth part of something use the prefix *mili*- (with one l). A mile (English *mile*, Latin *milia passum* – a thousand of double Roman steps) is a unit of length. Thus, the words millielements and milielements are both correct.

Linguists are to ascertain the correct spelling of the names *mil(l)i*, and practicing livestock experts and veterinarians are to specify and improve the functionality of the proposed classification.

Summary and conclusions. The article deals with the previously proposed classification that accounts the real meaning of the Latin prefixes from the point of the prospects of its use for solving urgent problems of veterinary science and animal science development in general, and dairy cows, in particular, specification of biological (nutritional) role of bio-elements and standards of bio-element consumption with feeds or feed additives, water and drugs.

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Avdeeva V.N., Bezgina J.A.

WHEAT SEEDS PROCESSING BY OZONE FOR ITS SOWING QUALITY INCREASING

The Stavropol State Agrarian University,
Russia, Stavropol, Zootekhnichesky ln., 12

The findings of wheat planting preparation are presented in the article. Productivity of agricultural crops depends on a seed grass quality. In this article the results of seeds quality improvement tests are given, in particular, the germinating energy and germinating ability of seeds, by means of electro ozonization, as modern, ecologically safe method. Two-factorial test allows revealing optimum ozone doses and a seeds exposure, from ozonization to germination setting up. Doses equal 14, 0-17, 0 g·s/m3 of ozone are most optimal parameters for ozone stimulation of sowing qualities of wheat; 14 days is the recommended exposure period from ozonization to germination wheat seed setting up. Tests result, presented in the article, allow to make a conclusion that it is necessary to do further scientific researches in effective modes of processing definition of agricultural crops, by ozone-airy mixture for sowing qualities of seeds improvement.

Key words: *electro ozonization, the ozone doze, the binning, the germinating energy, the germinating ability of seeds.*

Working out of strict scientific bases providing environmental security, quality of foodstuff and society health, is a priority problem of each country. Creation of new update ecological technologies of getting in heavy yield is not less important. Productivity of agricultural crops depends on sowing quality of seeds. Now various technologies of seed treatment, however not all of them conform to the modern ecological safety standards and requirements.

Thus scientific and practical interest represents a search of ecologically safe methods of influence on yielding qualities of agricultural crops. And with the help of the scientific literature we can make a conclusion that ozonization is such a method.

The great attention is given to ozonization in Russia as to a way of sowing quality seeds increasing and disinfecting of agricultural crops. In particular, tt the Kuban state agrarian university have experimentally proved that at processing of corn seeds with an exposure till 15 minutes, the germinating ability of seeds considerably increases. Also from references it is found out that energy of germination and germinating ability of seeds processed by ozone, depend on the binning time after processing to germination seeds setting up. The best result can be reached at the binning time from 5 till 20 days.

In the Stavropol state agrarian university for a number of years we conducted researches on ozone influence on a sowing material in order to increase germination energy and the germinating ability of seeds. Tests and experiments have shown the three factors influence on yielding properties of seeds. This three factors are: ozone concentration, time of ozone- airy stream processing to the sample an and the binning time of seeds after processing. For working out of common approach to an estimation of ozone influence on wheat seeds, we have introduce a concept «a processing dose». It is calculated by formula:

$$D = c \cdot t,$$

Where :

D - a processing dose, g·s/m3

c - Concentration of ozone, g/m3;

t - Time of processing of seeds (exposure time)

Processing of seeds was spent on an ozonizer "Ozon-60P" ozone concentration equals 0,035g/m3. Ozone concentration was defined with the help of gas analyzer "Tsiklon-5.41". Researches have shown what germinating energy and the germinating ability of seeds considerably increase with the use of ozone doze from 9,0 till 19,0 g·s/m3.

By results of the test, that we had done a two-factorial experiment of ozone influence on sowing qualities of wheat seeds. The factor *x* is the doses of ozone processing. The doses got out with the account of the past results. As doses from 9,9 to 18,9 g·s/m3on have greatly influenced on germinating energy and the germinating ability of wheat seeds, and the decision to repeat processing of seeds in the given range was accepted. Doses have made: 8,4, 9,9, 10,5, 12,6, 14,7, 16,8, 18,9 g·s/m3. The processing was made by an ozonizer of "Ozon-60P", concentration of ozone was 35 of mg/m3. The factor *y* is an exposure of seeds from ozone processing to a germination setting up (0,7,14 days). The results of the experiments are shown in tables № 1 and № 2.

The dose (factor *x*) has made a significant influence on germinating energy of winter wheat seeds (tab. 1).

Table 1

Ozone Influence on germinating energy of wheat seeds, in %
(Control – 69,0 %)

Ozone doze, g·s/m3, x	The seeds exposure, 24 hours, *y*			Average value
	0	7	14	
2,1	72,0	72,5	71,3	71,9
8,4	82,0	81,0	84,0	82,3
9,9	83,0	81,0	84,0	82,7
10,5	83,0	81,0	84,0	82,7
12,6	87,0	87,0	88,7	87,6
14,7	87,0	87,0	90,0	88,0
16,8	88,0	88,0	91,0	89,0
18,9	88,0	88,0	91,0	89,0
19,8	72,8	73,5	73,3	73,2
Average value	82,5	82,1	84,1	-
$HCP_{xy,0,95}$=3,1				

At a dose 8,4 g·s/m3 the value of an indicator from 82,3 % that is considerable above control (69,0 %). The increase in a dose of processing has led to improvement of germinating energy, and at a dose 12,6 g·s/m3 there is an essential distinction between variants. The indicator reaches the maximum at a dose 16,8 g·s/m3 (89,0 %).

The seeds exposure (factor *y*) hasn't influenced greatly on germinating energy of wheat seeds. variability index of an indicator dependents on the binning time and had symmetric character: 82,5, 82,1, 84,1, the maximum value germinating energy has reached at the binning time equals 14 days (HCPB95=1,9 %). The germinating ability of the wheat seeds has also increased, according to increase of an dose of ozone-airy stream (tab. 2) increased.

Table 2

Ozone Influence on the germinating ability of wheat seeds, in % (Control – 75,0 %)

Ozone doze, g·s/m3, *x*	The seeds exposure, 24 hours, *y*			Average value
	0	7	14	
2,1	77,5	79,8	80,0	79,0
8,4	82,0	83,0	84,0	83,0
9,9	86,0	86,0	89,0	87,0
10,5	86,0	86,0	88,0	86,7
12,6	90,0	90,0	94,0	91,3
14,7	92,0	91,0	94,5	92,5
16,8	90,0	90,0	94,8	91,6
18,9	90,0	90,0	93,0	91,0
19,8	74,3	74,3	76,8	75,1
Average value	85,3	85,6	88,2	-
$HCP_{xy,\,0,95}$ =3,3				

The given indicator essentially changed, since an ozone dose of 9,9 g·s/m3, the germinating ability has reached the maximum value by ozone processing at a dose 16,8 g·s/m3. Thus the germinating ability in comparison with control value (75,0 %) has increased by 19,5 % and has made 94,8 % at seeds exposure during 14 days.

Thus, processing of wheat seeds by an ozone-airy stream allows to improve sowing qualities of seeds in comparison with control value, raw ozone seeds. It is necessary to consider as optimum parameters of wheat seeds sowing qualities ozone stimulation the doses of 14,0-17,0 g·s/m3; a recommended seeds exposure is the time from the moment of ozone processing by to a germination setting up . It takes 14 days.

Tests result, that had been done, allow to make a conclusion that it is necessary to do further scientific researches in effective modes of processing definition of agricultural crops, by ozone-airy mixture for sowing qualities of seeds improvement.

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Starodubtseva G.P., Avdeeva V.N., Molchanov A.G.

DAMAGED BY MYCOTOXINS CROPS AND FEEDS TOXIC LEVEL REDUCING EFFECTIVE METHODS RESEARCH

The Stavropol State Agrarian University,
Russia, Stavropol, Zootekhnichesky ln., 12

The main priorities in modern agriculture are: the safety of the production of agricultural raw materials and food products, protection of plants and animals, and increasing environmental processes. Ozonation is one of the newest innovative and environmentally safe ways of agricultural products disinfecting, also water and buildings. However, optimization of Ozonation to reduce the toxicity caused by products of vital activity of pathogenic microorganisms requires further studying and testing in the laboratories and in practice. In the article the results of ozone, biological preparation Biophyte-3 processing on grain and combined feed is presented, and also is shown the complex influence of this factors, leading to pathogenic micro-flora rejection and toxicity level reducing of the processed production. Under the influence of 370,0 g·c/m^3 ozone concentration combined with the biological preparation Biophyte-3 growth of fungi begin to reduce, for example fungi Fusarium on 50 %, fungi Aspergilus on 100 %, also considerably reduced such fungi colonies as Penicillium, Alternaria и Rhizopus. The conclusion from this experiment is that ozone and biological preparation Biophyte-3 processing dives the best results. Herewith the toxic level is reduced from T = 0,92 to T = 0,36 with optimal conditions, that means the toxic level is reduced from mild to allowable level.

Key words: wheat seeds, seeds mixture, toxicity, pathogenic fungi, sterilization, ozone, Biophyte-3.

The list of practical technologies on legal base of the Russian Federation Agricultural Ministry included in agricultural raw materials producing and processing works. Qualitative changes in this field are possible if the main effective measures of sterilization will be taken. While working out the newly update innovative measures of grain and feed sterilization it is necessary to take in account not only economic effect, achieved in process of its realization, as well as the rise of ecological development and also natural characteristics and biological value retention.

From the ecological point of view, ozone processing is one of the perspective ways of agricultural grain sterilization.

For years in learning practice research laboratory of Stavropol state agrarian university various test and experiments are conducted in order to reduce the grain and feeds toxic level, influenced by mycotoxins. For finding-out of an objective picture within several years researches on the general toxicity of winter wheat grain, collected from grain elevator of Stavropol Territory, selected according to the All-union Standards (GOST) 13586.3 – 83 and seeds mixture with combined feed factories, from economy of Stavropol Territory were conducted.

For general toxicity identification of agricultural raw materials by F.N. Naymova methodology , accepted by M.V. Topchy (2004) for device called “ Biotester – 2” is used. The quantitative estimation of parameter of the test reaction characterizing toxic level, was made by calculation of a parity of number of the infusorians observed in control and investigated tests. It is expressed in the form of dimensionless size – a toxicity index (T): an index admissible toxicity – 0,00 – 0,40; an index of moderate toxicity – 0,40 – 0,70; an index of high toxicity – 0,71 and above.

94 samples of grain-fodder of various structure have been processed for the general toxicity, from them 38 samples possessed admissible toxicity, 38 samples have the moderate toxicity and 18 samples with the higher toxic level. At check on toxicity of samples of winter wheat grain, taking the test in laboratory, it was found out that 52,0 % of samples possessed moderate toxicity.

Wheat grain and seeds mixture were processed by ozone in the ozone industrial generator «Ozon-60 П» for toxic level reducing with ozone productivity not less than 40 g/h. The essence of grain and grain mixture ozone processing consisted of ozone delivery in the processed weight of grain during certain time. Efficiency of processing is defined by the ozone dose of depending on ozone concentration and from the time ozone-airy stream processing under the test material. Ozone concentration was measured by device "Cyclone-5.41" that is an an optical gas analyzer of ozone. Processing of winter wheat grain was spent with ozone doses from 2,0 to 600g·s/m3 for the revealing of optimum doses.

Ozone-airy processing has appeared more effective with a ozone dose of 370,0 g·s/m3. As a result of processing of wheat grain in optimal mode the index of toxicity has decreased on 26,0 – 28,0 units. The ozone concentration increase (a mode with a ozone dose of 600,0 g·s/m3) does not make possible the further decrease of grain toxicity level. Results of optimum modes are presented in table №1.

Table 1

Influence of ozone-airy processing on toxicity level of investigated samples of winter wheat

Variant					
Control		Ozone doze: 370,0 g·s/m^3		Ozone doze: 600,0 g·s/m^3	
Toxic index	Toxicity	Toxic index	Toxicity	Toxic index	Toxicity
0,66	moderate	0,31	acceptable	0,31	acceptable
0,89	high	0,62	moderate	0,62	moderate
0,77	high	0,49	moderate	0,48	moderate
0,57	moderate	0,38	acceptable	0,37	acceptable

To sterilization by an ozone-air mix subjected also grain mixtures of different structures with high and moderate degree of toxicity. The most effective there was a processing with a dose of ozone 370,0 г with/m3. As a result of disinfecting the grain mixture toxicity level has decreased on 24 – 29 units, and the grain mixtures became suitable for cattle feeding.

One of the reasons of grain high toxicity and forages can be pathogenic fungi. In this connection, we spend a number of experiments on influence of ozone, a negative field coronal category and biological preparation the Biophyte-3 on decrease in contamination on winter wheat grain fungi infection. Samples of winter wheat grain were checked on presence toxic microorganisms. Grain without external signs of musty defeat was put by fungi on sprouting on a potato-glucose agar in cups of Petri at the temperature 25°C. After seven days the presence of pathogenic fungi which colonies promote the toxicity level raise, in particular, was found out. Penicillium, Aspergillus, Fusarium which presence even in insignificant quantity reduces food value of grain crops.

For suppression harmful micro flora processing of grain by ozone with a ozone dose of 370 г with/m3 in a combination to a biological product the Biophyte – 3 is spent, that contains microbes weight of live cultures of lactic bacteria and bacteria of sort Bacillus of a natural origin, doesn't contain a transgenic or is artificial the synthesized microorganisms. Containing in a preparation the Biophyte – 3 viable microorganisms develop antibacterial and biologically active substances suppressing development pathogenic bacterial and fungi micro biotic. Concentration of a preparation the Biophyte – 3 was made 1:500, 1:250, 1:125. Processing of grain by ozone concentration hasn't led to essential suppression pathogen.

Action of a preparation the Biophyte – 3 has led to essential decrease in contamination of grain by mushrooms pp. Fusarium and Aspergilus in comparison with control. Besides, modes the Biophyte – 3 (1:500) and the Biophyte – 3 (1:500 + ozone) allow to reduce considerably colonies of fungi Penicillium, Alternaria and Rhizopus.

Laboratory experiments on research of influence of an ozone-airy stream on decrease in toxicity of grain of wheat and grain mixtures allow to make a following conclusion: processing by ozone influences on toxicity reducing of wheat grain and grain mixtures in different degree in subject to dose of processing of an investigated material, ozone use in combine with a biological product at processing amazed mycotoxins grain and forages allows to lower their toxicity level to admissible, to suppress mycobiota, thereby to make their suitable for animal feeding.

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Skaletska L., Zavadska O., Ostrova T.

THE QUALITY OF FRESH AND DRIED BEET PRODUCTION

National University of Life and Environmental Sciences of Ukraine
Kyiv, Heroyiv Oborony, 13, 03041

Abstract. *Beetroot – the main vegetable crops, roots which store for a long time and are used for various kinds of processing. The authors present the results of studying the efficiency of the dry beetroot production, which has been grown up in conditions Ukraine's Forest-steppe, depending on a variety. An complex estimation of fresh and dried products of 5 different varieties and hybrids of beetroot for the content of the basic biochemical, biometric and technological parameters. Select the most suitable for drying. For complex parameters defined in the fresh and dried products beetroot were most suitable for drying roots sorts Nosovskii ploskui (control) and Cylindra*

Key words: *beetroot, varieties, roots, quality, biochemical, technological parameters, drying.*

Introduction. Beetroot for their flavoring and medicinal properties occupies a leading position among the vegetables. Area under this crop in Ukraine in recent years remains at 40 hectares [1,3]. His roots remain for a long time and are used for different types of processing. Dried products table beet is widely used for cooking soups, so research the suitability of different varieties to this method of processing is important [5].

Material and methods research. The study was conducted during 2011–2013 years in National University of Life and Environmental Sciences of Ukraine. For experiments selected 5 varieties and hybrids recommended for cultivation in the conditions of Ukraine's Forest-steppe [2]. Standards were determined variety of domestic grade Nosovskii ploskui, used in Ukraine.

Beetroot grown in the experimental field NUBiP Ukraine, which placed in the northern part Forest-steppe of Ukraine. Biochemical, commodity and organoleptic tests were performed in laboratory of storage, processing and product standardization Ya. prof. B.V. Lesyka by the generally accepted methods [4]. To use dryer drying "Sadochok-2M" (TU 23061103.001-98), which refers to convective air dryer chamber type.

Results of research. Results marketable beetroot assessment shown in Table. 1.

For biometric parameters and commodity assortment prevailed among the studied sort Nosovskii ploskui (control), the roots of which were most severe (374.9 g) had the greatest transverse diameter (114 ± 10 mm) were most stable in this indicator and form the most standard roots (91.8%).

Suitability of roots for drying significantly depends on the contents of the main biochemical parameters. The content of dry matter of roots variety Cylindra substantially prevailed control and other experimental variations. Most ascorbic acid accumulated root varieties Detroit F_1 – 15.2 mg / 100 g. The highest marketability established in root sort Nosovskii ploskui (91.8), and hybrids Detroit F_1 (89.4 %).

Table 1

Biometric, biochemical, commodity and organoleptic parameters assortment of beetroots, average of the years 2011-2013

Name of the variety	Diameter of commo-dity roots		Contents in roots		Marke-tability, %	Tasting estimate*
	g	S.F.	dry matter, %	ascorbic acid, mg/100 g		
Nosovskii ploskui (control)	114±10	1.18	12,8	12.2	91.8	8.5
Bordo kharkivs'kui	106±18	1.40	12,0	8.4	78.3	7.6
Detroit F_1	84±6	1.19	10,7	15.2	89.4	8.5
Egypets'kui ploskui	110±18	1.40	9,6	10.2	85.0	7.4
Cylindra	62±8	1.25	14,9	13.6	76.4	8.6

*9-point scale

For organoleptic characteristics were best roots sort Cylindra, Nosovskii ploskui and hybrids Detroit F_1. The consistency of roots varieties Bordo kharkivs'kui was tight, rough. The taste a variety of roots Egypets'kui ploskui was watery, insipid. Established direct correlation interrelation between the taste of roots and amounts of sugar ($r = 0.72 \pm 0.13$).

During the study established the most important technological characteristics of the studied varieties of roots to dry (Table. 2).

Significant difference between the experimental beetroot was by the quantity of waste in preparation for drying. Most of them are established in the roots of sorts Bordo kharkivs'kui and Egypets'kui ploskui – 24.8 and 23.2%, respectively. Least of all of waste was in control of a variety Nosovskii ploskui (control) – 13.0 %, which is characterized by the highest root marketability and uniformity of diameter.

The largest yield of dry products is installed in a sort Cylindra – 16.3 % on average over three years. According to this indicator established essential difference compared with the control in all the years of research.

To produce 1 kg of dry of products had an average to remake 7.2-11.5 kg of fresh root (including in the waste). Least of all they is spent if used for drying grade Cylindra – 7.2 kg, which is 12.2 % less than the control.

Quite effectively used for this type of processing roots of the variety Nosovskii ploskui (control). Considering least amount of waste for the production of dry of products had to to remake 8.2 kg of fresh roots.

As the dried beet are eaten only after cooking, the importance of having their culinary qualities that primarily depends on the contents of the main biochemical parameters (Table 3).

Table 2

Technological parameters assortment of beetroot, average of the years 2011-2013

Name of the variety	Quantity of waste, %	Quantity dry products from purified material, %				Quantity dry products from unprepared material, %	Quantity kg of fresh material to produce 1 kg of dry
		2011	2012	2013	the average		
Nosovskii ploskui (control)	13.0	13.8	14.4	14.0	14.1	12.2	8.2
Bordo kharkivs’kui	24.8	12.5	13.1	12.9	12.8	9.6	10.4
Detroit F_1	16.0	12.0	12.5	12.8	12.5	10.2	9.8
Egypets’kui ploskui	23.2	11.4	11.2	10.8	11.2	8.7	11.5
Cylindra	15.2	16.0	16.8	16.2	16.3	13.8	7.2
NIR* $_{05}$	2.8-3.2	1.5	1.7	1.3			

*the least essential difference

Table 3

Biochemical composition and tasting score dried products of beetroot depending on variety, average of the years 2011-2013

Name of the variety	The content of dry of products, %					Ascorbic acid, mg/100 g	Tasting estimate*
	dry matter	titrated acids	mono-saccha-rides	suc-rose	total		
Nosovskii ploskui (control)	86.9	0.67	3.8	62.6	66.4	22.4	8.4
Bordo kharkivs’kui	86.7	0.58	3.7	45.6	49.3	14.2	7.4
Detroit F_1	86.0	0.50	6.5	45.6	52.1	20.3	8.2
Egypets’kui ploskui	87.4	0.61	7.9	39.4	47.3	14.6	7.0
Cylindra	87.3	0.66	6.5	50.3	56.8	18.2	8.2

*9-point scale

Dry beet production is characterized by a high content of dry matter (86-87 %) and sugars (47.3-66.4%). Compared with fresh raw amount them increased at 9.10 times.

The content of dry matter in the dry of products essential difference between the variants have been identified. The largest amount of sugars in the samples was Nosovskii ploskui (control) – 66.4%, hybrids Detroit (52.1 %) and sort Cylindra (56.8 %).

Sugar content affect the taste of products. The highest scores during tasting the dry product got varieties Nosovskii ploskui (control), hybrids Detroit and sort Cylindra – 8.4 and 8.2 points. Production of have bright evenly color, pleasant characteristic aroma and taste, elastic consistency.

Dry beet production characterized by a high biological value – vitamin C content varies 12.3-18.4 mg% and is dominated by fresh produce. But after terms of Initial raw materials, it was found that during drying loss of this element significant and range between 65-74 %. The smallest loss of vitamin C during drying established roots in the variety Nosovskii ploskui (control) and hybrid Detroit F_1.

Conclusions. For organoleptic characteristics were best roots sort Nosovskii ploskui and hybrids Detroit F1. Established direct correlation interrelation between the taste of roots and amounts of sugar ($r = 0.72 \pm 0.13$). The largest amount of sugars in the samples was Nosovskii ploskui (control) – 66.4%, hybrids Detroit (52.1 %) and sort Cylindra (56.8 %). The highest scores during tasting the dry product got varieties Nosovskii ploskui (control), hybrids Detroit and sort Cylindra/

For complex parameters defined in the fresh and dried products beetroot were most suitable for drying roots sorts Nosovskii ploskui (control) and Cylindra.

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Bober A.V., G.I. Podpryatov

INFLUENCE OF CONDITIONS AND DURATION OF STORAGE FOR TECHNOLOGICAL PROPERTIES OF GRAIN WHEAT

National University of Life and Environmental Sciences of Ukraine
Kyiv, Heroyiv Oborony, 13, 03041

Abstract. *The results of the research study the effect modes and longevity to changing technological properties of wheat grain soft winter.*

Key words: *Wheat, corn, quality, variety, protein, gluten, falling number, nature, mode of storage.*

An important condition for each farmer to grow is not only products, but also to preserve its quality for consumer use. Grain store long period, preventing losses of quality indicators.

Preservation of grain to implement it - not an easy task, especially in recent years, when most farmers store it directly in the farms that are in lack of post harvest processing techniques and modern granaries.

Grain is entering the store, very varied in quality and other properties. The aim is to properly determine its condition and in any case prevent a decline in its quality during storage.

At the same time is very important to maintain high technological properties of grain for the period of use. This is possible only under condition of application modes for optimal storage. Latest determined resistance that depends on its chemical composition, physical structure, reaction to the impact of the environment and so on.

Grain is the final step in the process of production and is important in obtaining high quality products [1,3]. This is due to the fact that cereals as a complex biochemical system are constant physicochemical and biological processes, which, depending on storage conditions may lead to improvement or deterioration of grain quality [2,4,5,8].

According to a number of scientists, the main factor determining the direction and intensity of physiological and biochemical processes during storage of grain is its moisture. Since grain viability depends not only on humidity but also the temperature and aeration, it is the combination of these three factors ultimately determine its survival [1,3,6,7].

Thus, selection of mode of storage for each batch of grain depending on its initial quality and purpose is a very important technological operations.

Research methodology. The study was conducted in the laboratory of technology of storing, processing and product standardization Ya. prof. B.V. Lesik National University of Life and Environmental Sciences of Ukraine and Ukrainian laboratory of quality research institute examination of plant varieties.

Studied grain varieties of soft winter wheat Poliska 90, Nationalna, Smyglyanka, Podolyanka, Myronivska 65, Pearluna Lisostepy, Odeska 267. Wheat being stored for 12 months in an unregulated environment (in terms of storage space) and a regulated temperature conditions (at 5-10 □) in linen bags.

In studying this issue previously known and used frequently in industrial practice and research methods of quality assessment as required by applicable regulatory and technical documents as well as other existing in the world for more in-depth evaluation of quality wheat and refined products.

Results. The results of investigations wheat quality changes depending on the mode and duration of storage.

The main factor determining the direction and intensity of physiological and biochemical processes during storage of grain is its moisture.

In our studies, samples of wheat, which laid the deposit had 13,0-14,5% humidity which does not exceed the critical moisture within 12 months of storage.

One indicator definition class wheat is nature it depends on many factors: moisture, grain shape, debris, damage, etc. Pests. High weight better full of grain, the endosperm has more content, less shells. Under identical conditions with high weight get a higher yield of corn flour (although American experts claim that wheat, which has a natural weight 745 g/L, the output provides the necessary flour, which is configured mill).

Research has established that nature wheat somewhat varied depending on the mode and duration of storage (Table. 1).

1. Weight winter wheat grain depending on the conditions and duration of storage, g/l

Variety	**To the storing**	Unregulated temperature conditions (control), months					Adjustable temperature conditions (5-10 ^{o}C) months				
		1	3	6	9	12	1	3	6	9	12
Smyglyanka	783	784	784	786	783	787	786	786	786	781	778
Podolyanka	794	796	796	802	804	800	802	800	800	798	793
Poliska 90	751	753	757	756	756	757	748	754	750	742	737
Myronivska 65	768	768	772	770	772	772	766	770	762	758	754
Pearluna Lisostepy	771	772	767	767	770	770	766	766	775	770	770
Odeska 267	778	780	779	777	778	776	772	777	773	772	768

As can be seen from Table 1, a slightly higher figure of nature for 12 months of storage in the context of the studied varieties of wheat is observed during storage at unregulated temperature by an average of 4-20 g/l, compared with storage at a regulated temperature.

Established that grain moisture affects nature. Dependence of wheat from nature is confirmed by high humidity correlation coefficient, which is an average of 0.84.

In assessing class Full-scale grain weight is taken into account, so the calculations should take into account the effect on moisture nature.

In the world of major technological measure that determines class wheat protein content is. The last grain is determinant criterion baking quality of flour. For each class of wheat there is a minimum level of protein that guarantees satisfactory quality baking flour. On the other hand, the relationship between the protein and the technological quality specific to each type of wheat, flour quality in some varieties improved with increased protein content, while others may improve disproportionately compared with the growth of protein content, and in some even decline. That is, only the protein itself, does not explain the difference between the two parties flour of varying quality.

The protein content in wheat grain depending on variety and growing conditions varies widely from 8 to 25%, average - 13.5%.

Corn varieties studied differed quite significantly for the protein in a variety of Smyglyanka 11.25 to 14.7% in Poliska 90 (Table. 2).

2. The protein content in winter wheat grain depending on the conditions and duration of storage,%

Variety	**To the storing**	Unregulated temperature conditions (control), months					Adjustable temperature conditions (5-10 ^{o}C) months				
		1	3	6	9	12	1	3	6	9	12
Smyglyanka	11.25	11.25	11.10	11.10	11.20	11.30	11.15	11.30	11.20	11.30	11.30
Podolyanka	11.80	11.90	11.70	11.75	11.85	11.75	11.80	11.95	11.70	11.85	11.85
Poliska 90	14.70	14.85	14.70	14.75	14.80	14.90	14.75	14.90	14.85	14.95	15.00
Myronivska 65	11.95	11.90	11.85	11,85	11.85	11.90	11.90	11.90	11.85	11.90	11.90
Pearluna Lisostepy	13.35	13.30	13.20	13.30	13.25	13.35	13.60	13.35	13.35	13.30	13.45
Odeska 267	11.90	12.00	11.80	11.70	11.75	11.55	11.80	11.80	11.80	11.50	11.30

During storage units both in the regulated and unregulated in terms of protein content practically unchanged in all grades; the average difference was 0,1-0.6% maximum permitted error experiment.

The quantity and quality of gluten depend on variety and growing conditions (zone, soil, climate, predecessor, irrigation, fertilization). Class wheat standardized quantity and quality of gluten, though preferably protein content. There is a great diversity of views on the relationship between protein and gluten in wheat grain and flour. In this case, the correlation between these indicators is almost or units, or, alternatively, is close to zero. It depends on how different the quality of gluten samples studied sample (of course, and grain quality in general).

As shown by our study, the contents of wheat gluten samples differed sharply (Table. 3). The lowest it has been in the samples grade Smyglyanka - 21.3 and Myronivska 65 - 21.6; and the largest in Poliska 90 - 29.8%. In the studied samples during storage amount of gluten varies slightly: the average shelf life in controlled and uncontrolled conditions - to 0.3%.

Quality of gluten in Ukraine, unlike other regions of the world is essential. This is due to the fact that Ukraine is very common bug-harmful shell, which in some years, damaging 20% of grain. Maximum permissible degree of damage is within 2-3%.

3. The amount of gluten in wheat grain of different grades depending on the conditions and duration of storage,%

Variety	To the storing	Unregulated temperature conditions (control), months					Adjustable temperature conditions (5-10 ^oC) months				
		1	3	6	9	12	1	3	6	9	12
Smyglyanka	21.3	21.8	21.6	21.8	21.4	21.8	21.2	21.2	21.6	22.0	21.6
Podolyanka	23.2	23.7	23.8	24.6	23.8	23.6	23.4	23.6	23.9	24.0	23.8
Poliska 90	29.8	30.0	30.9	31.5	30.9	30.6	30.2	30.4	31.2	30.8	30.3
Myronivska 65	21.6	21.6	21.7	21.6	21.2	21.4	21.2	21.4	21.2	21.1	21.6
Pearluna Lisostepy	22.4	23.6	23.6	22.8	22.8	22.9	23.0	23.1	23.3	23.6	23.6
Odeska 267	22.4	22.2	21.6	21.4	21.4	21.4	22.8	22.6	22.4	21.8	21.6

The quality of gluten characterizes its physical properties - elasticity, extensibility, elasticity, and vodovbyrnu hazoutrymuyuchu resolution.

The quality of gluten samples studied varieties can be divided into 2 groups: group A samples (Smyglyanka, Poliska 90, Myronivska 65) (VDK 101-105)) and group B (Podolyanka, Pearluna Lisostepy, Odeska 267) (VDK 82-90)) group of quality during storage have changed the quality - in different ways (tab. 4).

4. Quality of gluten winter wheat grain depending on the conditions and duration of storage units. p.

Variety	To the storing	Unregulated temperature conditions (control), months					Adjustable temperature conditions (5-10 ^oC) months				
		1	3	6	9	12	1	3	6	9	12
Group – A (100-105 od. p. VDK)											
Smyglyanka	101	98	96	100	99	98	100	98	98	98	99
Poliska 90	105	97	97	98	98	99	100	98	95	96	96
Myronivska 65	100	98	98	98	100	98	100	98	100	98	98
Group – Б (82-90 od. p. VDK)											
Podolyanka	90	88	82	82	85	88	88	90	88	82	80
Pearluna Lisostepy	92	90	89	89	90	90	88	90	90	90	88
Odeska 267	82	74	72	70	72	74	80	78	76	70	69

Samples of grain varieties Group A strengthened during storage gluten in controlled conditions for 12 months by 4.7 units of the device (od.p.) in unregulated 9 months and further weakened in storage gluten 1,7-2,0 units. p. compared with the previous term storage. In samples of grain varieties grown stronger gluten Group B 9 od.p. for 12 months in controlled conditions; in unregulated gluten matured for 9 months, and further weakened in 2,0-3,7 od.p.

The quality of wheat gluten samples of Group B was good for baking bread, further storage is undesirable. The quality of weak gluten grain in the controlled conditions of storage respectively become stronger and its quality improved.

Quite important technological indicator of the baking quality of wheat flour is "falling number".

Avtolitychna activity of grain, flour depends on the starch in the grain and activity of α and β - amylase.

When harvesting corn and rainy weather it is possible germination. In this avtolitychna grain increased activity, especially α-amylase. Starch goes into dextrin, then sugar, thus worsening baking properties of flour. Bread from this flour with a sticky pulp cavities, dark - colored crust.

For wheat "falling number" must be not less than 200 s for 1; 2 and 3 classes; for 4 - 150 s for 5 - 80 seconds; rye Grade 1> 200 s; 2nd - 141-200 s; 3rd - 80-140 s, Class 4 <80 s.

The studies found that "falling number" that characterizes amylase activity of wheat in different grades, different (tab. 5).

5. The drop of grains fall winter wheat depending on the conditions and duration of storage, with

Variety	To the storing	Unregulated temperature conditions (control), months					Adjustable temperature conditions (5-10 ^{o}C) months				
		1	3	6	9	12	1	3	6	9	12
Smyglyanka	352	352	350	339	347	355	349	348	349	347	334
Podolyanka	259	264	266	282	292	302	258	264	269	278	278
Poliska 90	320	311	313	302	314	321	311	311	310	310	299
Myronivska 65	259	277	281	286	281	291	262	260	269	264	269
Pearluna Lisostepy	181	184	182	172	200	184	192	200	198	204	202
Odeska 267	384	392	390	386	388	401	388	388	386	382	388

The lowest "falling number" on average two years was in grade Pearluna Lisostepy - 181 s, and the highest - in a variety of Smyglyanka - 352 p. Because of such a high "falling number" Smyglyanka has low grade baking properties. Bread pale to strong heat, has low volume. This variety requires increased activity of amylolytic enzymes.

While storage is not detected by changing patterns of "falling number", the difference between the indexes does not exceed the tolerance standard for the definition of "falling number" (10%).

It should be noted that on average two years of research "falling number" when stored in uncontrolled conditions a little more than "falling number" when stored in controlled conditions, and an average of all samples increased by 7 seconds.

Findings

1. Keep wheat with humidity below critical and with good quality indicators can be under normal storage, as it is more cost-effective. In the first months of storage key quality indicators improved more rapidly in uncontrolled conditions than regulated, and 9 months of storage, they remain constant. With long-lasting storage of wheat advisable to keep refrigerated because more stable performance for one year.

2. Changes occurring in the grain during storage depends on the initial quality. Thus, in wheat varieties Smyglyanka, Poliska 90, Myronivska-65, which gluten weak during storage in uncontrolled conditions, it deteriorates and becomes weaker still after 6 months, leading to deterioration of baking properties, reduced absorption capacity, the dough liquefies. Such grains are best kept refrigerated, in which Quality VDK more stable throughout the year. Also wheat varieties Podolyanka, Pearluna Lisostepy, Odeska 267 with strong gluten also best kept refrigerated, there's biochemical processes occur slowly.

3. When storing wheat must be considered for what purpose it will be used. Grain wheat varieties Pearluna Lisostepy and Poliska 90, which contains a high content of protein (13-15%) of good quality after prolonged storage should be used for the production of bakery products. Grain wheat varieties Smyglyanka, Odeska 267, Podolyanka, Myronivska 65 low-protein (11-12%) after long storage in inappropriate use of bakery products. Best of such grain to produce flour confectionery or use for technical purposes.

4. Procure wheat varieties need for, as is done in civilized countries, as each variety has its varietal characteristics in terms of quality, which in many ways changed during storage. It is necessary to organize a rational system of harvesting grain, with the inclusion of monitoring the quality of grain during its growth.

5. Make sure when assessing the quality of wheat to consider, in addition to protein content, quantity and quality gluten flour as the definition of force is not yet possible, the company is not equipped alveohrafamy.

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Baliuk S.A., Zakharova M.A., Drozd E.N., Nosonenko A.A., Vorotyntseva L.I., Afanasyev Yu.A.

ASSESSMENT OF IRRIGATED AND HALOGEN SOILS STATUS AS THE BASIS OF RATIONAL USE

Abstract. *The article presents a brief characteristics of soils in Ukraine as a whole, irrigated soils and soils formed under the influence of halogen processes (different degrees, affected by salinization and alkalinity).The main degradation processes that can be developed in the soil under the influence of irrigation during adverse conditions are characterized. It is proposed the system of criteria and parameters for assessing the situation, the degree of degradation and evolution nature of soils. It is substantiated priority principles and measures on which it should be based the control fertility system of irrigated and halogen soils, aimed at forming of sustainable, environmentally* friendly *and economically viable farming.*

Key words: *irrigated and halogen soils, fertility, degradation, criteria, assessing, land improvement activities, farming systems.*

Introduction. Soil is considered a finite, non-renewable natural resource on the human time-scale since it does not regenerate at a significant rate within this time, and needs to be managed accordingly. Soil has various key functions that are important for agricultural, environmental, nature protection, landscape architecture and urban applications. However, inappropriate soil management practices, increasing population demand and inadequate governance, amongst others, have resulted in the degradation and loss of available soil resources in various parts of the world, reducing the ir capacity to perform essential ecosystem services. The protection and conservation of soil is therefore critical to the maintenance of a wide range of ecosystem services and compels land users to ensure its long term sustainability as natural resource.

Overview. The increasing degree and extent of soil degradation processes due to mismanagement and land use changes are threatening this resource and urgent action is needed to reverse this trend. At state level in many countries worldwide (and Ukraine as well) are coming up to understanding a necessity of undertaking all-planetary urgent actions to prevent the global environmental crisis resulting from destruction, pollution and degradation of soils. These ideas were evidenced by resolutions from the UN conferences dedicated to environmental problems in Stockholm (1972), Rome (1982, where the World Soil Charter has been adopted under auspices of FAO), Rio de Janeiro (1992) and Johannesburg (2002), where the Concept of Sustainable Development regarding agricultural soils, i.e., way of land management-policy capable of meeting the needs of contemporaries without compromising the interests of future generations, was verbalized and accepted to implementation by more than 200 countries, including Ukraine. Commitment to goals manifested by the World Summit-2002 on issues of sustainable development, have been confirmed in Rio-de-Janeiro-2012. Environmental policy of European Community is also based on the global goal of sustainable development. One of objectives of 6th EU Actions Program in field of environment is aimed at protection of soils against pollution, erosion, desertification and degradation. In September 2006, the European Commission has adopted its General Strategy for Soil Protection. Basic principle of this program is based on preventing the problems and keeping to this preventive principle, because the soil is a limited resource that undergoes a negative impact in environment [6,10]. In this regard and under conditions of Ukrainian land resource' optimization, the present-day informational support to status of soil cover becomes of urgent actuality, assuming for dynamics of soil properties' evolution and search of ways to improving soil fertility.

Materials and Methods.

The research were conducted in Forest-steppe and Steppe zones of Ukraine, where is disposed 98% irrigated and halogen soils. The Objects of our research were:

- irrigated soils, naturally saline soils and methods of its reclamation.
- irrigation water. For irrigation in Ukraine are used basically water of main river arteries and created on their base water storage's and ponds.

The main methods there were field, model, analytical and statistical research.

Results and Discussion.

The soil cover of Ukraine is essentially featured:

- a diverse variety of soils (up to 1,000 kind of soil);

-a unique exceptionality of soil cover (more than 60% chernozem soil-formation types). Ukraine is the 4 country in the world by total area of chernozem after Russia, USA and China. Per 100 residents of Ukraine accounts for 61 hectares of chernozem and per this index, Ukraine holds the 2^{nd} place next to Russian Federation [1];

- a significant dissemination of poorly productive and degraded soils (~ 30%).

More than half of the territory of Ukraine is located in the zones of insufficient and unstable moistening, furthermore, the protracted periods of droughts were increased in frequency. Food and resource support of the country, as many countries of the world, substantially depends on the availability, condition and efficiency of irrigated land usage. The soil cover of the irrigated lands is extremely complex. Practically all types of the soils of the Ukraine are represented in its structure, but chernozem and dark-chestnut soils predominate.

Irrigation leads to the transformation of soils, correction of natural soil processes. From the large number of soils evolution directions during the irrigation we separate: cultivation, without the changes and the degradation of soils. The direction of the evolution of soils depends on the joint influence of the natural and anthropogenic factors on their natural properties and regimes and of the direction of changes in the functions of soils and their fertility. Irrigation creates conditions for a considerable increase in the productivity of land-utilization. Nevertheless, amelioration frequently becomes the cause for appearance and development of a number of degradation phenomena [1].

Thus, under "degradation of soils" we understand the natural and anthropogenic processes of worsening in the natural properties and regimes of the soils, which produce steady negative changes in their functions, decrease stability and fertility. Under "Irrigational degradation", we mean the degradation of soils, which can be developed under the effect of irrigating ameliorations and causes an increase in the expenditures for the restoration of the project production level. We determine the degrees of irrigational degradation on the level of deviation from the optimum of the basic parameters of the soils, which are determining for the fertility formation [11]:

- the soils without degradation: the soils, the properties and regimes of which are not worsened, which fulfill functions inherent in it, but productivity corresponds its natural fertility (deviation from the optimum to 5 %);
- the soils with low degree of degradation: deterioration of properties and regimes, negative changes in the functions, reduction in the productivity do not exceed 20 %;
- the soils with average degree of degradation: the average degree of the manifestation of negative changes in the soil properties and regimes, functions, reduction in the productivity in the range 20- 50 %;
- the soils with strong degree of degradation: the strong degree of the manifestation of unfavorable soil changes in the soil properties and regimes, functions, reduction in the productivity are more than 50 %.

Integral estimation according to the degree of irrigational degradation is developed (table 1). With the carrying out of this estimation were used data of ecological-amelioration monitoring and own results of long-term field, micro-field, greenhouse and model experiments, and previously obtained data, presented in a number of papers [5, 6, 7].

Table 1

The integral estimation of the irrigated soils according to the degree of the degradation

Indices	Soil without degradation	Degree of degradation		
		Low	Average	Strong
Salinization, 0-50 cm				
Toxic salts content, eCl^-, meqv/100 g of soil	less than 0,3	0,3-1,5	1,5-3,5	more than 3,5
Ca:Na in water extract	more than 2,5	2,5-1,0	1,0-0,5	less than 0,5
Solonetzization, 0-30 cm				
Na^++K^+, % from sum of cations, clay soils	less than 3	3-6	6-10	more than 10
Na^++K^+, % from sum of cations, sandy soils	less than 5	5-8	8-12	more than 12
$aNa/\sqrt{aCa}$	less than 1	1-3	3-7	more than 7
Factor of dispersivity by Kachinsky, %	less than 10	10-20	20-30	more than 30
Alkalinization, 0-30 cm				
pH_w.	less than 7,8	7,8-8,5	8,5-9,0	more than 9,0
HCO_3^--Ca^{2+}, meqv/100 g of soil	less than 0,5	0,5-1,0	1,0-2,0	more than 2,0
CO_3^{2-}, meqv/100 g of soil	less than	0,1-0,3	0,3-0,9	more than

	0,1			0,9
pH-pNa	less than 4,0	4,0-5,0	5,0-5,5	more than 5,5
Humus state, 0-50 cm				
Decreasing of humus content, % from initial	0	0-10	10-20	more than 20
Agrophysical state, 0-30 cm				
Content of air-dry aggregates 0,25-10 mm	more than 70	60-70	40-60	less than 40
Content of water-proof aggregates > 0,25 mm	more than 45	35-45	25-35	less than 25
Equilibrium density of composition, g/sm^3, clay soils	less than 1,3	1,3-1,4	1,4-1,6	more than 1,6
Equilibrium density of composition, g/sm^3, sandy soils	less than 1,3	1,3-1,5	1,5-1,7	more than 1,7
Pollution, 0-100 cm				
Heavy metals content, in zinc equivalents, mg/kg of soil	less than 25	25-50	50-100	more than 100
Water-soluble fluorine, mg/kg of soil	less than 6	6-10	10-20	more than 20

Saline soils of Ukraine are mainly formed in the Subboreal zone in the Forest-Steppe and Steppe natural zones. Conventionally they can be divided into two types - naturally saline and secondary saline.

Natural salinity – is a natural accumulation of salts in the soil due to evaporation of ground water, salinity of soil-forming rocks or under the influence of biogenic and / or other factors. Naturally saline soils are confined to the two tectonic cavities - the Dneprovsko-Donetskaya (Forest-Steppe zone) and the Black Sea (Steppe), where the total lack of areas drainage creates favorable conditions for the accumulation of salts According to the soils classification of Ukrainian, they are presented by chernozems saline and solonetzic, chernozem meadow, meadow - chernozem, meadow-chestnut, meadow, alluvial - meadow, dark -brown and brown alkaline soils, solonetzes and salt marshes.

Manifestation of secondary salinity is often the environmentally negative consequence of irrigation. Most often, secondary salinity in Ukraine occurs in conditions of inadequate drained low-lying areas by the absence of the collector-drainage network and / or by using for irrigation of saline water (more than 1 g / l) Herewith it is set a positive salt balance in excess of accumulation of salts over their removal [2,3,4].

Area of saline lands without morphologically marked solonetzic horizon is 1,92 million hectares, with morphologically solonetzic horizon (saline - solonetzic) – 2,8 million hectares. Among the irrigated lands, there are about 200 thousand hectares of secondary saline soils. Most saline soils of Ukraine are plowed, excluding highly saline species and salt marshes. For today on the basis of the long-term comprehensive study of the soil processes dynamics and regimes in saline soils there are identified common landscape-zonal patterns and spatially differentiated features of orientation, and the prevalence rate of soil processes [9].

National Scientific Center «Institute for Soil Science and Agrochemistry Research named after O.N. Sokolovsky» (NSC ISSAR) created a regulatory framework for the monitoring of saline soils, developed agro-environmental criteria, parameters and diagnostics of saline soils (using thermodynamic parameters - the activity of hydrogen ions, calcium, sodium, magnesium). To establish the degree of alkalinity, including the processes of secondary alkalinization, it is used a set of criteria: the amount of absorbed sodium and potassium cations, the ratio of the absorbed sodium and potassium cations to the sum of all cations, the ratio of the activity of sodium ions to the square root of the activity of calcium ions, as well as indicator of thermodynamic potential (pNa - 0,5pCa). The system of irrigation water quality assessment is developed and put into effect, which includes agronomic criteria (evaluation on salinity risk, alkalinization, alkalinity) and ecological criteria (soil pollution by heavy metals and fluorine), taking into account their buffer properties. There are developed also the diagnostic criteria of soil degradation both on individual, and for on composite indicator.

A necessary condition for highly effective, environmentally safe of irrigated land usage is the working out and implementing the complex of measures to manage the fertility of irrigated land, improve their agro-ecological condition and level of use. This complex must constantly adapt to the variability of natural and anthropogenic factors in order to obtain the highest possible profit subject to the requirements of resource conservation, soil protection and maintain of natural processes balance both within agromeliorative landscapes and in the biosphere as a whole. Such complex of measures is worked out in NSC ISSAR. The main elements of this complex of measures:reconstruction and modernization of irrigation systems, taking into account their environmental and reclamation condition; conversion of irrigated agriculture on the adaptive-landscape environmentally safe (compensatory) agriculture systems; rational structure of sowing areas and crop rotation oriented on market economy with the obligatory inclusion in crop rotation the perennial legume grasses; restoration of works with chemical reclamation of irrigated land and irrigation water, on the fundamentally new provisions; usage of internally soil reserves of calcium salts (soil self-reclamation) through the reclamation plantage plowing on the area about 500 thousands of hectares; a complex of engineering, agromeliorative and preventive measures nominated the composition of which for each region should take into account the occurrence causes and the development features of flooding processes; soil replenishment with organic matter by plant residues, organic fertilizers, crop rotation with perennial legume grasses; effective application of fertilizers.

Depending on the genesis and properties of different types of saline soil for conditions of Ukraine, a differentiated set of measures to improve their fertility was developed. Herewith the reclamation was carried out in the following directions: chemical reclamation (soils and irrigation water), ameliorate plantation plowing, flushing, creating drainage systems, phytomelioration).

Reclamation of saline soils should be considered together, in a single system of interrelated soil fertility management practices. Planning reclamation measures should be focused on integrated management of the factors of plant life. Technological processes of growing crops on reclaimed soils need to be developed taking into account the need of adaptation to the functioning of biological systems, they also should be included harmonious and ecologically in agricultural landscapes on the basis of respect for modern economic and environmental requirements, maximally used in creating and functioning agrolandscapes of crops biopotential. [9].

Chemical reclamation should be carried out on saline and alkaline soils, which lend themselves well to this reclamation measure. Positive effect of gypsum on the properties of natural solonetzes of Ukraine can be seen in the next 5-7 years. Continuous chemical reclamation is recommended to replace by the sample (contour) application of meliorant on solonetzes stains or by local application of gypsum in rows during sowing. For the reclamation of secondly saline soils it is recommended to apply the gypsum directly into the soil or with irrigation water.

In the dry conditions of Steppe, where the chemical reclamation in unirrigated conditions is ineffective, it is recommended the use of reclamation plantage plowing. With the research, conducted by NSC ISSAR it was determined that the result of the aftereffect of reclamation plantage plowing is the formation of highly environmentally sustainable agro transformed soils that are able to provide high fertility in agro-climatic conditions of the Steppe zone of Ukraine. Its single conducting provides positive aftereffect in the soil properties and crop productivity for over 50 years. Gain yields are 20-25% in unirrigated conditions and up to 40% under irrigation.

Saline soils with not deep mineralized groundwater with adequate natural drainage of areas are recommended for usage under rice systems. For reclamation of slightly saline soils it is recommended to use technical measures: application of organic and mineral fertilizers, the introduction of perennial grasses in crop rotation, phytomelioration.

Conclusion. On the basis of generalization and systematization of long-term research there were highlighted the issues of the genesis of irrigated and saline soils in Ukraine, the main directions of research, the main approaches to their rational use and fertility management. Scientific approaches to the saline soils assessment and integral estimation of the irrigated soils according to the degree of the degradation are characterized. The criteria of evaluation of the development of soil processes are worked out on the basis of our observations, the levels of their ecological danger and unprofitability are determined, the preventive and straight anti-degradation methods of using the ameliorated soils are proposed. Thus obtained results will serve as a State-owned tool which would subsequently facilitate the use and protection of soil resources all over the country, to be involved in a united global soil-information scope.

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Starodubtsev V.M., Aniskevich L.V., Urban B.V.

ON ESTIMATION OF SOIL COVER SPATIAL HETEROGEINITY IN PLAINS OF FOREST-STEPPE ZONE

National University of Life and Environmental Sciences of Ukraine,
Kyiv, Heroiv Oborony st., 15

Annotation. Soil cover spatial heterogeneity of plain lands with the typical chernozems (black earth) in the Right Bank Forest-Steppe of Ukraine was estimated. Results of the field research of the carbonate horizon depth in the soil profile were used for its study. The location of research points was identified with GPS-receiver. For cartographic representation of these results the software Surfer was used, interpolation of values was produced by kriging. The concept of "heterogeneity index» (In) and a method of its calculation were provided for practical use of soil cover heterogeneity estimation. Practical use of "index of heterogeneity" of soil cover will be especially effective in precision farming, long-term agronomic researches, as well as for detailed soil maps update.

Key words: soils cover, heterogeneity, microdepressions, carbonate, geostatistics, forest-steppe, typical chernozem.

Introduction (State of the problem). Microdepressions with different depths play unique role in shaping landscapes and soil cover in the forest-steppe zone with a predominantly flat relief. Their nature and characteristics of functioning is still insufficiently investigated [1], and the value in the formation of soil cover and its agricultural use is underestimated [6-10]. It is particularly important to consider the role of microdepressions in fields where perennial agronomic, agrochemical and soil research are held.

In soil science preferential attention someone pays to microdepressions ("saucer") that are clearly visible in the relief and have depth from tens of centimeters to 1-2 meters. They investigate the redistribution of precipitation moisture in such microdepressions, various wetting of them and the surrounding plain area, and filtering into groundwater. The complication of agricultural production in these fields due to prolonged waterlogging of bed and slopes of such depressions, as well as due to different soil properties on their morphological elements is subject for studying too [6-8].

Such microdepressions are widespread in the Left-bank forest-steppe of Ukraine, forming a complicated soil cover from complexes of hydromorphic, alkaline, saline and solodized soils, which are already well studied [2,5]. However, our research shows that microdepressions are widespread in Right-Bank Forest-steppe zone of Ukraine also, including in the research farms of our University [6]. And here soils of microdepressions are formed mainly under the influence of excessive wetness due to atmospheric precipitation redistribution in the relief with the participation of the eluvial-illuvial process [4]. The size of such microdepressions are typically from a few tens or hundreds of square meters to 1-2 hectares. In spring in years with average or high water content they are flooded with melt and rain waters, and during the growing season groundwater descends to a depth of 3-5 m. That is, the soils of depressions are formed in a flushing water regime, which affects their properties, morphological features and fertility [6-8].

However, soils of plainland areas without a clearly visible microdepressions, which are shown in the "classic" soil maps as a typical chernozem (black soil), were completely heterogeneous in the water regime and, consequently, by their properties. Our reconnaissance studies have shown that in the flat areas of the forest-steppe zone even nanorelief essentially transforms the water regime of soil, resulting in such microdepressions and microelevations various soil formed on the classification level of species, genus and sometimes – of the subtype or the type [9, 11]. And this forces for a different evaluation of existing detailed soil maps of plain areas of forest-steppe zone and the possibility of their use in agriculture, and especially - in stationary agronomic research.

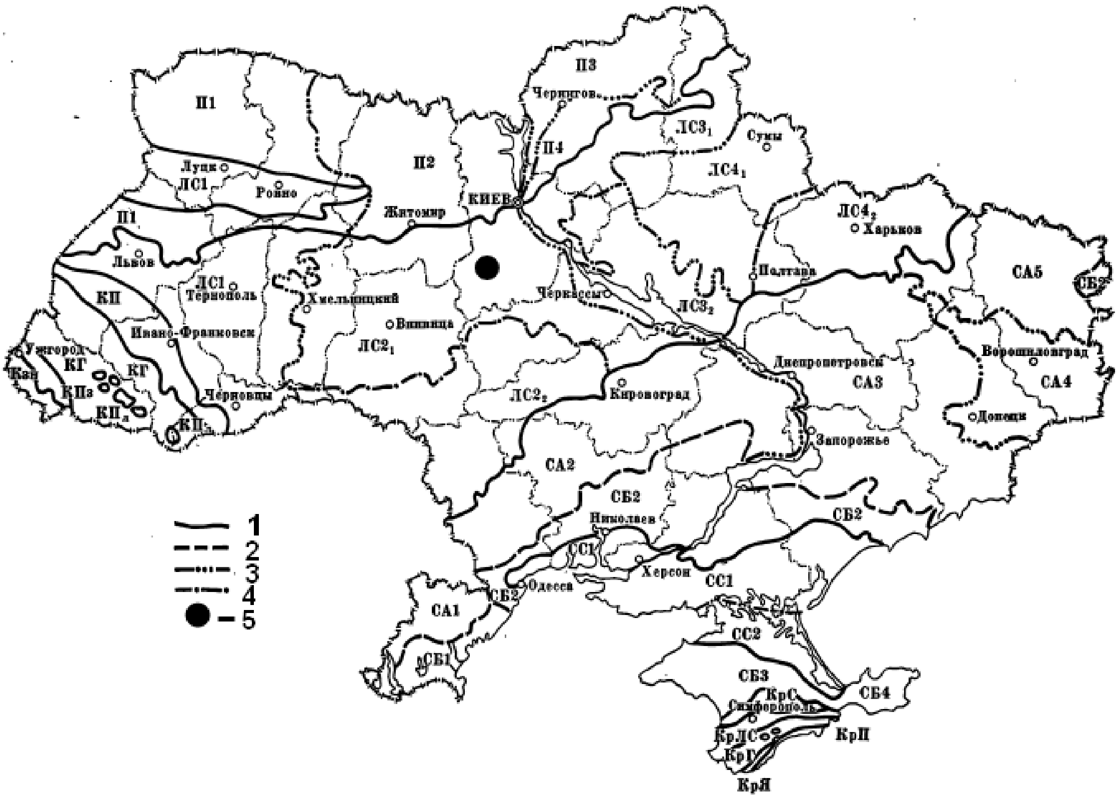

Fig. 1. Location of the pilot area on the map of agronomical and soil zoning of Ukraine (borders on the map: 1-zones, 2-subzones, 3-provinces, 4-subprovinces: 5-location of the pilot area)

Input data. The pilot field without any expressed microrelief is selected for the study at the research farm "Velikosnitynskoe" in Fastovsky district of Kiev region, Ukraine (Figure 1 and 2-A)**.** There long-time agronomic and soil tests were carried out during last decades. We used the determination of the depth of the carbonate horizon for the study of soil cover heterogeneity. These soils are shown at the detailed soil map as "typical chernozem" or "typical black earth," and the depth of carbonate horizon is a major diagnostic feature for mapping soils of forest-steppe zone, which affects many properties of soils, including their variability [9]. Moreover, the depth of the carbonate horizon is undoubtedly an integral indicator of soil water regime in the long-term aspect. Points of investigation were placed on the research area of 17 hectares in the form of a grid (Figure 3-A) with the distances between points on average 50 m. The geographical coordinates of these points were determined using a GPS-receiver. Soil samples were taken with the manual drill every 10 cm to a depth of 200 cm, the presence of carbonates in the soil was determined by effervescence the soil from 10 -% - hydrochloric acid. Cartographic analysis of the results of research we carried out on a PC using the program Surfer, which allowed us to show the heterogeneity of soil cover more objectively than in our previous publication [9, 11].

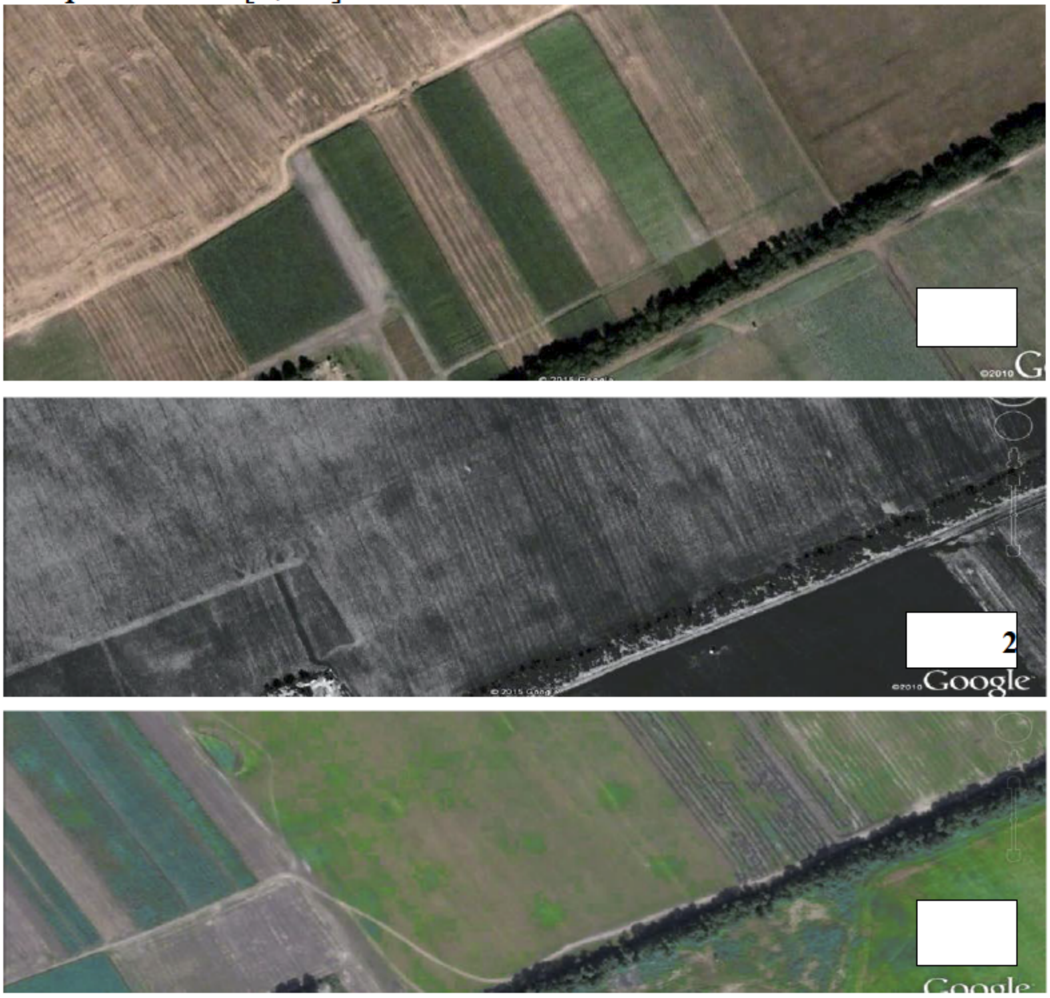

Fig.2. Satellite images of the experimental field during the growing season (2-A), before a seedbed period (B-2) and after harvesting (2-B). Google Earth mapping service is used.

Results. Discussion and analysis.. The typical chernozems (black soil), which are shown on the existing soil map of the study area, are usually characterized by depth of the carbonate horizon of 40-60 cm. However, the depth of carbonates in soil profile determined by us at the experimental plot fluctuated in the range of 35 to 200 cm, and at two points they were not found even below 200 cm (our previous studies have shown that in shallow, but well-defined microdepressions, carbonates can be washed out even to the depths 3-5 m or more [8]). It is important to bear in mind that excess of the heights of individual elements of nanorelief at this area were within 20-30 cm. Although it can be assumed that in preparing this field to conduct agronomic and agrochemical long-years research a certain alignment of the surface could be perform.

Results are displayed in a contour plan of the carbonate horizon depth in the soil

(Fig.3-A), as well as in three-dimensional images according to the soil legend (Figure 3-Б) with the Surfer computer program use. As such, the results provide a clear understanding of the spatial heterogeneity of soil cover both in this indicator, and - on a set of properties characteristic of these soils. The last assumption requires clarification, but our material testify of the reliability of such a diagnosis. Special attention needs the explanation why we replaced the earlier used method of graphic presentation of the results in the form of spatial cartograms using Q-GIS [9, 11]. Target of spatial interpolation – receiving (with the lowest possible error) values of spatial variable (in this case - the depth of the carbonates in the soil profile) at arbitrary points of a field area based on the processing and analysis of the values measured in a limited number of selected points. To estimate the value of the variable at the point where it is not measured different methods for spatial interpolation use. It is accepted to distinguish two main approaches to interpolation: deterministic and geostatistical. Deterministic interpolation methods approximate the unknown variable of parametric function, the shape of which is defined explicitly (e.g., polynomial) or indirectly (the condition of minimum curvature). The parameters are chosen so as to optimize some criterion of best approximation in points of the sampling (e.g., least squares). Geostatistical techniques (kriging) use the statistical properties of the measured data, assessing spatial autocorrelation and taking its into account in interpolation. Deterministic interpolation methods are not well suited for the construction of cartograms of the soil agro-biological properties on the basis of field data of a limited number of sampling points. For example, the method of "inverse distance" in a mode of precision interpolator often has the effect of so-called "ox-eye" - cartograms with concentric contour lines around the sampling points.

In our case, so-called "cross-checking" was performed at the choice of the interpolation method. The essence of its is that one observation removes from the initial data set randomly and then using the remaining data and the selected interpolation algorithm, evaluatet the analytical value of the sampling and residual in the point of this observation. This process is repeated a predetermined number of times, and generates a predetermined number of interpolation errors. Based on the analysis of these errors we can draw conclusions about the accuracy of interpolation. . Cross-checking can be considered as an objective way of assessing the quality of interpolation methods, as well as be used to compare the quality of the selected methods.

For the construction of cartograms of the carbonate horizon depth in this case it is used geostatistical method – kriging. Fig. 3-A shows such a cartogram with presentation of soil cover that is diagnosed by the depth of the carbonates (in accordance with the following legend), as well as the location of sampling the soil. Figure 3-Б presents a perspective view of the cartograms. Soils with a depth of carbonate horizon of more than 100 cm are diagnosed on the basis of our previous studies of microdepressions of this farm [6-8] as the meadow-chernozem, although it needs further clarification on the water regime, morphological characteristics and physical and chemical properties. It is important to note that the typical chernozems or black earth (reference) occupy only about 14% of the total field area (Fig. 4), ie there is a large-scale soil map does not present the real soil cover of the territory.

The results on the spatial heterogeneity of soil cover, obtained in this experimental plot detailed studies, in the production fields of other farms (published still only partially) in different parts of Kiev and Cherkasy regions, as well as analysis of detailed satellite images of fields in the different phases of the growing season allows us to conclud that the spatial heterogeneity of soil cover is an integral feature of its formation and operation on the plains of the Right-bank Forest-steppe in Ukraine. And the existing large-scale soil maps present only schematically the dominant soil-forming process in a particular field.

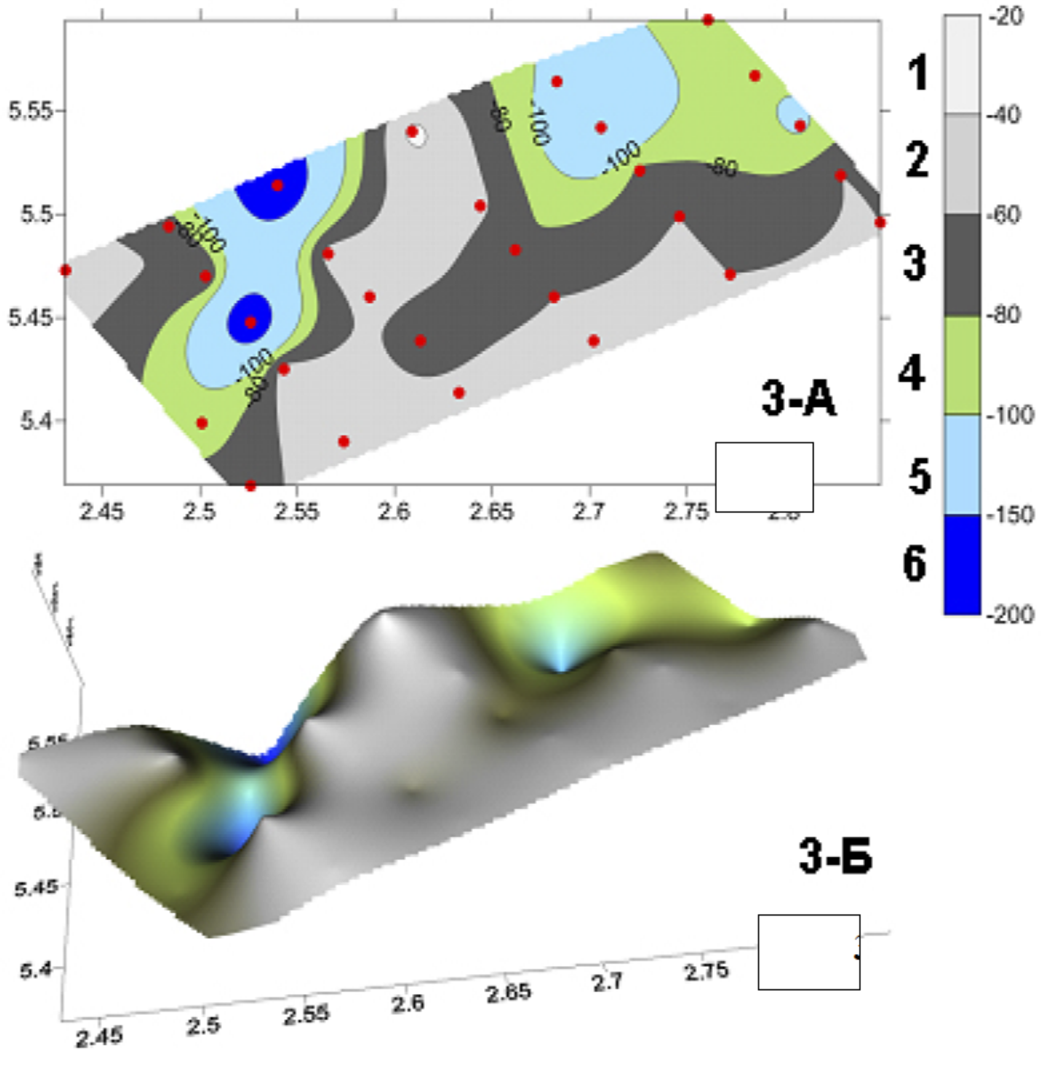

Figure 3. The soil cover of the investigated area, diagnosed at the depth of the carbonate horizon: 3-A - two-dimensional image, 3-D - three-dimensional image. Soils: 1 – typical chernozems with high carbonate horizon, 2 - typical chernozems (modal or reference), 3 – typical chernozems with deep carbonate horizon, 4 - leached chernozems, 5 – meadow-chernozem soils, 6 – meadow-chernozem soils on carbonate-free loess.

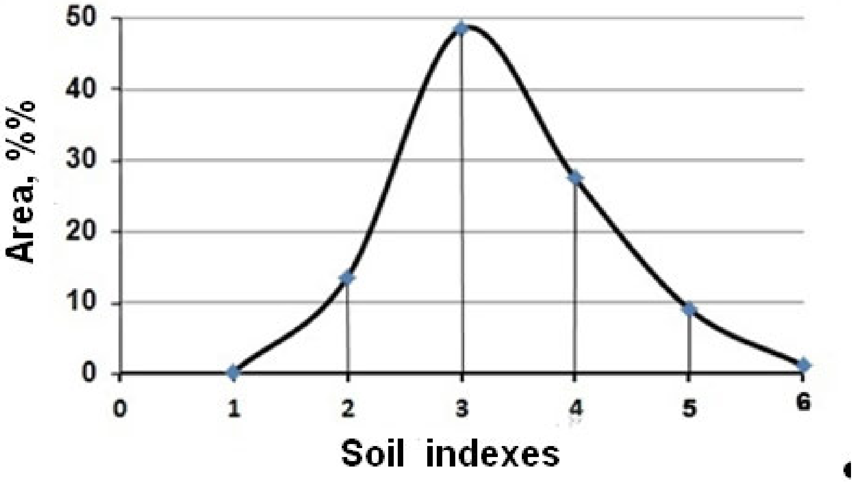

Fig.4. Distribution of soil' areas at experimental plot in percent (index of soils are indicated in Figure 3).

Such a conclusion is essential for the agricultural use of land in the region, especially - for precision farming. At the same time it is extremely important to clarify the methods of organizing and conducting long-term stationary agronomic research. Ignoring such a spatial heterogeneity of soil will lead to a significant reduction in the reliability of long-term investigations. In this regard, we propose to introduce the concept of "index of heterogeneity of soil cover» (In) and define it in relation of the area of the dominant soil to all evaluated areas of the site. In the simplest case (when only two soils are allocated at the area) it will vary in the range from 0.99 to 0.51. In more complicated cases, when there are several distinguished soil units at the area, the index may be much lower. But mathematically correct method of its calculation for such situations yet to be found.

Conclusions and recommendations. The studies show that the soil cover of the plain territories of Forest-steppe zone is heterogeneous not only because of the well-expressed in the relief microdepressions with semi-hydromorphic and even hydromorphic soils, but also because of the great heterogeneity of cover on flat areas due to nanorelief. The redistribution of atmospheric moisture on the surface areas with relief leads to a concentration of moisture in the subtle nano-depressions, its filtering deeper into the soil profile, leaching of carbonates and other products of pedogenesis at a significant depth of soil. As a result, at relatively flat areas very complex soil cover are formed, presented not only the typical chernozems (black earth) with different depth of the carbonate horizon, but the leached chernozems, and even the meadow-chernozem soils. To characterize the identified heterogeneity of soil cover, we propose to introduce the concept of "index of heterogeneity - In», which is determined by the ratio of the dominant soil area to the total area of the studied elementary section. In the simplest case (when only two soils are allocated at the area) it will vary in the range from 0.99 to 0.51. In more complicated cases, when there are several distinguished soil units at the area, the index may be much lower. But mathematically correct method of its calculation for such situations yet to be found.

In connection with the identified heterogeneity of soil cover it is necessary to clarify the existing large-scale and detailed soil maps, especially for the areas where they grow valuable crops or embedded the "precision farming system". Of great importance the problem has at carrying out long-term stationary agronomic research, where the accuracy of the results will depend significantly on account of the spatial heterogeneity of soil cover.

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Skaletska L.F, Zavadska O.V.

SELECTION OF CARROTS VARIETIES FOR STORAGE AND PROCESSING

National University of Life and Environmental Sciences of Ukraine
Kyiv, Heroyiv Oborony, 13, 03041

Abstract. The results of the study of trade, biochemical and organoleptic indexes of fresh carrot roots, which has been grown up in conditions of Ukraine's Forest-steppe, depending of varieties. Allocated varieties whose roots have the highest marketability, accumulate most dry matter, sugars, carotene etc. Select the most suitable for long term storage and processing.

Key words: carrot, varieties, roots, storage, processing, quality, biochemical, technological parameters marketability

Introduction. Carrot – one of the main vegetable crops, which root's store for a long time and processing. Sometimes, the storage period much higher than the period of cultivation. Of all root vegetables carrots characterized lowest keeping quality. Root it with a thick layer of well-developed cortex, which contains a lot of nutrients, but little cellulose, which explains the sensitivity to injury. Tissue contains many intercellular spaces, because quite breathable, which leads to rapid wilting.

Storage time determined by a number factors cultivation, including the crucial varietal characteristics, ripeness, the quality of raw materials and so on. Known that most suitable for long term storage is the standard root is high in biochemical parameters [1]. The objectives of our study was to evaluate different varieties of fresh raw carrots on a set of indicators - biochemical and organoleptic, trade - in order to highlight most suitable for long term storage. In connection with that that more than 90 % of the vegetables grown in the Ukraine in individual private agriculture, we studied keeping quality of carrot in a stationary underground storage (without artificial cooling).

Carrot – one of the main vegetable crops, which is used for juices. In Carrot juice contains large amounts of vitamins A, B, C, D, E, K, PP, and vitamin A (carotene) in natural form it is much more than in any other product. Carrot juice is a kind of preventive means colds. It is phytoncides – substances that destroy disease-causing bacteria and viruses [4].

Material and methods research. The study was conducted during 2011–2013 years in National University of Life and Environmental Sciences of Ukraine. For experiments selected seven varieties and hybrids recommended for cultivation in the

conditions of Ukraine's Forest-steppe. Standards were determined variety of German origin Karlena purpose, used Ukrainian, registered in 1995 [2]. Standards were determined variety of grade Karlena, used Ukrainian.

Carrot grown in the experimental field NUBiP Ukraine, which placed in the northern part Forest-steppe of Ukraine. Biochemical, commodity and organoleptic tests were performed in laboratory of storage, processing and product standardization Ya. prof. B.V. Lesyka by the generally accepted methods [3]. Standard roots kept depth in a stationary storage at a temperature of +7-8 in the fall and spring and winter is +1-2 ^{0}C and relative humidity of 90-95% in unregulated conditions (without artificial cooling).

Results of research. Results marketable carrot assessment shown in Table. 1.

The largest mass marketable root crop was in hybrids Santa Cruz F1 (146,1 g) and Elegance F1 (142.3 g), which was 21.4 and 17.6 g, respectively compared with control. The smallest roots formed plant a variety of China – 33.5 g less compared with the control. For most of root mass of marketable were aligned Elegance F1 hybrids and Santa Cruz F1.

The content of dry matter of roots hybrid Elegance F1 essentially dominated control and other experimental variations in both years of research. Its advantage over two years, compared with controls was 1.6 %. Most sugars found in root hybrid Elegance F1 and variety Royal Chanson – 7.1 and 6.6 %.

Most β-carotene accumulated roots grades Autumn Queen, Royal Chanson and hybrid Elegance F1 – more than 13 mg / 100 g. Most of marketable root mass was in sort Santa Cruz (146.1 g) and hybrid Echiv F1 (145.3 g), which was 21.4 and 20.6 g respectively more than in with the control. The content of dry matter of roots hybrid Echiv F1 substantially prevailed control and other experimental variations in both years of research.

Table 1

Biometric, biochemical, commodity and organoleptic parameters assortment of carrots, average of the years 2011-2013

Name of the variety	Weight marketable of root		Contents in roots		Marke-tability, %	Tasting estimate, score*
	г	S.F.	dry matter, %	β-carotene, mg/100 g		
Karlena (control)	124.7	1.18	10.5	11.2	86	6.2
Elegans F_1	142.3	1.02	12.1	16.2	95	7.0
Vitaminna 6	131.9	1.32	9.6	9.0	83	5.5
Chinese	91.2	1.26	10.0	3.4	78	5.6
Autumn Queen	111.9	1.14	10.3	13.0	86	7.0
Royal Chanson	129.1	1.13	11.1	15.4	85	5.8
Santa Cruz F_1	146.1	1.10	10.6	12.2	93	6.8

*9-point scale.

Established that root length has a direct significant impact on the dry matter content (r = +0.72), and weight – their marketability (r = +0.81). The highest marketability established in root hybrids Echiv F1 (95 %) and sort Santa Cruz (93%), which formed the biggest root.

For organoleptic characteristics were best roots hybrid Echiv F_1 and sort Autumn Queen, who received while tasting the highest score – 7 points.

To study the suitability of roots for storage research was performed up examinations were at 2, 4 and 7 months (end of storage). The results shown in table. 2.

After 2 months of storage research varieties characterized by different keeping quality. Best during this period been preserved roots hybrid Echiv F1 and sort Santa Cruz (their keeping quality was 100 %)the worst thing – Vitamin sort 6 (65.8%).

Table 2

Keeping quality of different varieties carrot's for seven months of storage (average for 2011-2012),%

Name of the variety	Natural mass loss*	Losses from illnesses and withering	The total loss	Quantity marketable products	
				%	± to control
Karlena (control)	15.7	46.1	63.8	36.2	-
Echiv F1	12.5	36.9	51.4	48.6	+12.4
Vitamina 6	25.4	59.6	87.0	13.0	-23.2
Chinese	21.5	57.9	81.0	19.1	+17.1
Autumn Queen	19.3	50.7	72.0	28.0	-8.2
Royal Chanson	17.2	48.7	67,9	32.1	-4.1
Santa Cruz	13.3	44.3	59.6	40.4	+4.2

*regulatory of natural loss of carrot for seven months of storage in stationary storage without artificial cooling is 10.5%

After 4 months of storage masse began to sprout roots sort Chinese (64 %). It should be mentioned that even varieties of keeping quality in the first two months was high during this period rapidly lose moisture. Quantity flabby roots, which removed from storage was 17–41%, and the keeping quality the maximum was at 62.3% (sort Autumn Queen).

After 7 months of storage keeping quality all research roots was low and ranged between 19.1 to 46.6%. The greatest number of absolute shortages (root amazed or more than half, or completely) found in samples roots sort Chinese 27.5%, was not at such roots in a variety Karlena (control).

Thus, the preservation of root crops in underground stationary storage depends largely on varietal characteristics. Most suitable for long term storage in these conditions were roots sort Santa Cruz and Karlena (control). However, the root of all experimental variants were characterized by low keeping quality in terms of deepening the usual repository (without artificial cooling). In the absence of cold storage carrot, especially those that have a mass less than 140 g, preferably use within two months after harvesting.

Yield of juice of roots of the studied varieties was in the range of 41.8 to 53.2% (Table 3). Most of juice received from a variety of roots Autumn Queen – 53.2%.

Least of juice received from a hybrid of roots Elegance – 40.8%. There was no significant difference between this indicator and root crops varieties Vitaminna 6 and Chinese (42.7 and 42.8 %); also the Royal Chanson and Santa Cruz (46.7 and 47.1 %).

Table 3

Quantity and quality of carrot juice with different varieties

Name of the variety	Quantity, %		Content of dry soluble substances, %	Taste the juice	Quantity of dry mass of marc		The dry weight per 10% humidity, %
	juice	marc			%	humidity, %	
Karlena (control)	49.0	47.5	7.1	8.0	14.5	7.2	16.9
Elegans F_1	41.8	59.2	10.1	9.0	17.7	5.0	22.7
Vitaminna 6	42.8	57.2	7.0	6.0	13.4	10.5	12.9
Chinese	42.7	57.3	7.0	4.0	14.5	6.0	18.5
Autumn Queen	53.2	46.8	8.0	9.0	17.4	8.3	19.1
Royal Chanson	46.7	53.8	8.8	9.0	16.0	5.4	20.6
Santa Cruz F_1	47.1	52.9	7.0	9.0	17.3	11.2	16.1

Best rich sweet taste of juice was obtained from of roots hybrids Elegans and varieties of Santa Cruz, Autumn Queen and Royal Chanson – 9 points. The bitter flavor the juice was derived from of roots Chinese (4.0 points); watery, savourless - a of roots varieties Vitaminna 6.0 – 3.5 points. Established a strong direct correlation between the amount of soluble dry matter in roots and taste the juice. Not detected significant relationship between the mass of roots and yield of juice.

Blend juice with grape juice varieties Isabella in good taste by mixing 3 parts carrot and two parts grape, or 1:1.

Solid parts obtained after squeezing juice, dried in the dryer to dryness. To drying use "Sadochok-2M" (TU 23061103.001-98), which refers to convective air dryer chamber type.

These husks can be used to obtain a powder, rich in carotene and other biologically valuable substances that remain in the solid part.

Quantity marc, which can be obtained after drying the solid part, that remained after squeezing juice was 12.2–22.7 % (calculated at 10% humidity). Most of all them can be obtained from the root of the hybrid Elegance – 22.7 %.

The highest number of points for complex organoleptic received dry husks obtained after squeezing the juice of roots of hybrid Elegance and varieties Royal Chanson. They had a nice rich flavor, bright orange a uniform color.

Conclusions. The highest scores for organoleptic characteristics of roots were hybrids Elegans F_1 and Santa Cruz F_1, as well varieties Autumn Queen. The highest marketable of roots hybrids Elegans F_1 (95 %) and Santa Cruz F_1 (93 %), which formed the the hardest roots. The highest estimates received tasting produce hybrid Elegance F_1 and varieties Autumn Queen.

The preservation of root crops in underground stationary storage depends largely on varietal characteristics. Most suitable for long term storage in these conditions were roots hybrid Santa Cruz F_1 and Karlena.

For the production of carrot juice is appropriate to use varieties of root Autumn Queen, Royal chanson and Santa Cruz as well hybrids Elegans F_1. Unsuitable for this root varieties Chinese and Vitaminna 6.

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Bober A.V., Komar V.A.

DYNAMICS OF GRAIN QUALITY MAIZE HYBRIDS DEPENDING ON THE CONDITIONS AND DURATION OF STORAGE

National University of Life and Environmental Sciences of Ukraine
Kyiv, Heroyiv Oborony, 13, 03041

Abstract. The results of the research study the effect modes and longevity on the dynamics of quality indicators of grain corn hybrids. Highlight hybrids are characterized by better quality during storage.

Key words: Corn, grain quality, quality, hybrid, storage time, storage modes.

Corn is one of the most highly-purpose cereal crops, which are grown for food, feed and technical use. Grain maize under normal conditions is able to provide excellent raw material for food and feed purposes. Often the grain is of poor quality due to breach of postharvest handling and storage [4.5].

During storage, changes occur in the grain as physiological and biochemical. There worsening food properties [2]. When the humidity is increased respiration rate, increased passage of microbiological processes, leading to significant losses in weight and quality of grain. [3] Therefore, establishing optimum conditions and terms of storage of grain corn to be used for various purposes is an urgent task today.

Research Methodology. Research conducted during the 2012-2014 biennium. Based storage technology department laboratories, processing and product standardization Ya. prof. B.V. Lesik from corn grown in areas of stationary experiment chair breeding and seed that placement in NUBiP of Ukraine "Agronomic Research Station".

To study the effects of longevity and corn was investigated seven hybrids compared with standard Pustovarivskyy 280 SV. Corn samples were stored for 12 months in uncontrolled temperature conditions (in terms of storage space) (control), and a regulated temperature conditions (at +5 ... + 10 ^{o}C) in linen bags. Before laying on storage and grain samples every 1, 3, 6, 9 and 12 months for all variants defined quality parameters specified in the table. 1. The data were treated statistically using the computer program "Agrostat" method variance and correlation analysis for B.A. Dospyehovym.

Results. The main mode of storage of grain weight in the dry state based on lowering the physiological activity of most components of the grain mass with a shortage of water. In grains of moisture within the critical physiological processes occur only in the form of slow breathing. Grain corn hybrids laid on the storage of moisture 13.1–13.9% (Table. 1). Prototypes were stored in identical conditions usual repository that after 12 months of storage led to increased grain moisture. This is due to the properties of grain to absorb moisture from the air environment. Adjustable temperature conditions ensured a smooth fluctuations in moisture. After 12 months of storage compared to the initial terms of moisture content decreased on average by 0.1–0.4%.

Index – essentially humidity can affect the nature of grain. Our Research confirms this pattern – wet grain was significantly lower compared to the nature of grain dry. When storing corn in the unregulated nature temperature conditions change according to the change of moisture environment. Analyzing the data can be noted that after 12 months of storage compared to the initial indicators are not substantially reduced nature, an average of 0.3% (relative), and ranged from 738-756 g/l (Table. 2). For controlled storage mode indicator corn nature changed gradually, and provided at the end of storage no lower performance compared to the original, with a difference within 1–4 g/l. Dan difference can be explained by the accuracy studies which allowed fluctuation within a 5 g/l.

Table 1

Moisture dynamics of maize hybrids depending on the conditions and duration of storage, % (average for 2012–2014)

Hybrid	The duration of storage, months					
	Before storage	1	3	6	9	12
Unregulated temperature operation (storage) (control)						
Pustovarivskyy 280 SV (control)	13.4	13.7	13.0	12.9	13.1	13.4
176×43	13.1	13.1	13.2	13.1	13.5	13.4
176×67	13.6	13.6	13.8	13.3	13.4	13.7
176×69	13.7	13.5	13.3	13.3	13.5	13.8
176×78	13.1	13.1	12.9	12.8	13.1	13.3
177×43	13.5	13.5	13.4	13.3	13.7	13.8
177×58	13.9	13.7	13.2	13.0	13.2	13.5
177×69	13.6	13.5	13.3	13.1	13.7	13.9
Adjustable temperature conditions (t +5 +10 ^{o}C)						
Pustovarivskyy 280 SV (control)	13.4	13.6	12.9	12.7	13.0	13.2
176×43	13.1	13.0	13.1	13.1	13.3	13.3
176×67	13.6	13.5	13.3	13.0	13.1	13.2
176×69	13.7	13.5	13.1	13.0	13.3	13.5
176×78	13.1	13.0	12.6	12.9	13.1	13.3
177×43	13.5	13.5	13.4	13.3	13.2	13.2
177×58	13.9	13.6	13.4	13.2	13.4	13.5
177×69	13.6	13.4	13.1	12.8	13.0	13.4
NIR_{05} Factor A	0.08	0.09	0.09	0.11	0.13	0.05
Factor B	0.12	0.11	0.11	0.14	0.16	0.07
Factor AB	0.14	0.15	0.16	0.20	0.23	0.15

Weight of 1000 grains like and natural, helps determine the value of the grain. These high natural weight and weight of 1000 grains show full of advantages and small grain. Grain corn laying on storage with high weight of 1000 grains. The highest weight hybrids have Pustovarivskyy 280 SV – 289.02 g and 176×69 – 289.87

g smallest mass of 1000 grains were hybrids 177×43 – 260 g and 177×69 – 255.71 g. After 12 months of storage, the figure, compared to the initial data, decreased by 0.13–5.99 g. The most significant decrease occurred in the mass of the hybrid 177×58 to 5.99 g (Table. 3). A similar pattern of change in the mass of 1000 grains of corn storage for 12 months and found storage in controlled temperature.

Analyzing vigor corn can be noted that throughout the storage period investigated samples increased vigor (tab. 4). According to the research noted a pattern, which indicates increasing vigor due to the duration of storage. There is no significant relationship between temperature control and energy storage germination.

Table 2

The dynamics of nature grain corn hybrids depending on the conditions and duration of storage, g / l (average for 2012–2014).

Hybrid	The duration of storage, months					
	Before storage	1	3	6	9	12
Unregulated temperature operation (storage) (control)						
Pustovarivskyy 280 SV (control)	757	759	760	762	758	756
176×43	745	747	743	744	738	736
176×67	746	747	749	751	748	745
176×69	751	753	755	755	753	750
176×78	747	749	750	751	747	746
177×43	743	744	746	749	742	739
177×58	738	741	742	747	743	742
177×69	740	742	743	745	741	738
Adjustable temperature conditions (t +5 +10 ^{o}C)						
Pustovarivskyy 280 SV (control)	757	758	762	763	759	758
176×43	745	746	744	744	740	737
176×67	746	746	751	755	753	750
176×69	751	753	759	760	755	751
176×78	747	748	753	750	747	745
177×43	743	744	746	749	743	739
177×58	738	740	745	749	745	742
177×69	740	741	744	748	744	739
NIR_{05} Factor A	4,77	3,24	3,67	4,65	4,67	3,0,2
Factor B	6,88	4,20	4,49	5,69	5,82	1,07
Factor AB	7,32	7,35	6,35	7,05	7,31	1,48

After 12 months of storage the highest figure recorded in vigor hybrids Pustovarivskyy 280 SV – 94% 177×43 – 93% 176×69 – 93% 176×78 – 92 %. Somewhat less performance in hybrids 176×67 – 91% 177×69 – 90% 176×67 – 89%

177×69 – 87 %.

This change in the pattern of energy germination of seeds of different hybrids of corn in storage for 12 months marked by a regulated regime.

Most practical value resembles that for hybrids, varieties and maize lines should be in the lab at least 92 %, with the exception of reproductive seeds with 87 % similarity. For technical grain according to current standard rate is normalized at 55% [1].

Table 3

The dynamics of the mass of 1000 grains of corn hybrids depending on the conditions and duration of storage, g (average for 2012–2014).

Hybrid	The duration of storage, months					
	Before storage	1	3	6	9	12
Unregulated temperature operation (storage) (control)						
Pustovarivskyy 280 SV (control)	289.02	290.64	290.76	292.51	291.65	289.13
176×43	279.40	281.12	279.03	280.61	276.77	276.00
176×67	284.82	286.04	286.55	288.28	287.08	280.58
176×69	289.87	290.13	290.60	289.40	288.72	285.82
176×78	275.81	281.77	281.82	280.57	278.77	274.51
177×43	259.54	259.88	260.58	261.03	258.19	257.14
177×58	281.53	281.77	282.82	281.57	278.77	275.54
177×69	255.71	256.40	256.76	257.43	256.05	252.01
Adjustable temperature conditions (t +5 +10 ^{o}C)						
Pustovarivskyy 280 SV (control)	289.02	291.00	290.94	293.45	292.46	288.12
176×43	279.40	281.89	279.56	281.97	277.11	277.45
176×67	284.82	286.93	287.32	289.61	287.94	283.66
176×69	289.87	292.13	291.46	290.60	289.97	284.98
176×78	275.81	281.97	260.87	282.43	278.69	275.87
177×43	259.54	260.81	260.76	262.79	259.76	256.83
177×58	281.53	282.12	282.12	281.86	279.36	276.78
177×69	255.71	256.98	257.02	257.78	256.31	254.99
NIR_{05} Factor A	0.94	1.09	1.15	1.03	2.12	0.50
Factor B	1.04	1.33	1.41	1.20	2.60	0.70
Factor AB	1.36	1.89	1.99	1.87	3.67	1.43

The highest initial similarity hybrids had 176×96 – 97% Pustovarivskyy 280 SV – 96 % 176×78 – 96 %. The lowest similarity 177×58 – 86 % 177×69 – 85 %. For unregulated storage mode indicator increased similarity to 6 months of storage on average 4.1 – 8.6 %.

After 12 months of storage units of different corn hybrids average germination was 91–98 %. The highest similarity noted in hybrids 177×43 – 99 % Pustovarivskyy 280 SV – 98 % 176×69 – 98 % (tab. 5).

During controlled temperature conditions also there is increasing similarity to 11.3 %. At the end of storage similarity was within 93–99 %. Constant lowered positive temperatures provide higher grain crop characteristics. The lowest similarity was noted in hybrid 177x69.

Table 4

Dynamics vigor grain corn hybrids depending on the conditions and duration of storage, % (average for 2012–2014).

Hybrid	The duration of storage, months					
	Before storage	1	3	6	9	12
Unregulated temperature operation (storage) (control)						
Pustovarivskyy 280 SV (control)	92	94	96	97	93	94
176×43	86	90	91	90	91	89
176×67	87	89	90	91	92	91
176×69	90	92	95	95	93	93
176×78	91	93	96	95	91	92
177×43	84	88	90	94	95	93
177×58	80	83	87	89	90	90
177×69	81	82	85	88	87	87
Adjustable temperature conditions (t +5 +10 ^{o}C)						
Pustovarivskyy 280 SV (control)	92	95	96	97	95	95
176×43	86	91	93	92	91	94
176×67	87	89	93	94	95	95
176×69	90	95	97	97	96	94
176×78	91	94	96	97	97	96
177×43	84	91	94	97	96	95
177×58	80	85	90	92	94	94
177×69	81	87	91	93	92	90
NIR_{05} Factor A	1.15	1.36	1.21	1.36	1.25	0.98
Factor B	1.47	1.68	1.53	1.67	1.86	1.36
Factor AB	2.14	2.40	2.24	2.36	2.67	2.77

Table 5

Dynamics germination of grain corn hybrids depending on the conditions and duration of storage, % (average for 2012-2014).

Hybrid	The duration of storage, months					
	Before storage	1	3	6	9	12
Unregulated temperature operation (storage) (control)						

Pustovarivskyy 280 SV (control)	96	97	100	100	99	98
176×43	92	93	96	95	94	94
176×67	91	94	95	96	96	95
176×69	97	97	100	99	98	98
176×78	96	97	98	98	97	97
177×43	91	92	95	99	100	99
177×58	86	88	90	95	95	96
177×69	85	87	90	93	93	91
Adjustable temperature conditions (t +5 +10 ^{o}C)						
Pustovarivskyy 280 SV (control)	96	98	99	100	100	99
176×43	92	95	96	96	95	95
176×67	91	95	97	98	98	99
176×69	97	100	100	99	99	98
176×78	96	98	100	99	100	99
177×43	91	95	97	100	100	99
177×58	86	90	94	97	98	98
177×69	85	93	94	95	94	93
NIR_{05} Factor A	1.58	1.78	2.18	1.37	1.72	0.88
Factor B	2.02	2.18	2.70	1.68	2.09	1.22
Factor AB	2.89	3.08	3.85	2.37	3.27	2.48

Conclusions:

1. Save mode have immaterial impact on grain moisture of different hybrids. Humidity index fluctuated within 0.6 %, which is insignificant with an average humidity of storage of 13.3 %.

2. After 12 months of storage compared to the initial indicators nature has decreased on average by 0.3 % (relative), and ranged from 738–756 g/l. For controlled storage mode indicator corn nature changed gradually, and provided at the end of storage no lower performance compared to the original, with a difference within 1–4 g/l. Dan difference can be explained by the accuracy studies which allowed fluctuation within a 5 g/l.

3. During storage of significant changes in the mass of 1000 grains of corn hybrids were found. Weight of 1000 grains ranged from 0.5–2.5 %. Best showed themselves control option, and among the most studied hybrids fluctuations in weight was found in the hybrid 177×69.

4. Storage units in terms of unregulated regime vigor highest rate after 12 months was observed in hybrids Pustovarivskyy 280 SV – 94 %, 177 × 43 – 93 %, 176 × 69 – 93 %, 176 × 78 – 92 %. Somewhat less performance in hybrid 176 × 67 – 91 %, 177 × 69 – 90 %, 176 × 67 – 89 %, 177 × 69 – 87 %. For controlled storage mode after 12 months of storage germination energy was higher by 3 % in hybrid

Pustovarivskyy 280, 8 % – 176 × 67, 4% – 176 × 69; 5% – 176 × 78; 11% - 177 × 43; 14% -– 177 × 58; 9 % – 177 × 69 compared to the original value.

5. After 12 months of storage units of different corn hybrids in unregulated conditions the average germination was 91–98 %. The highest similarity noted in hybrids 177 × 43 – 99 %, Pustovarivskyy 280 SV – 98 %, 176 × 69 – 98 %. The similarities end storage was higher compared to the original and thus all hybrids meet the requirements of the standard. During controlled temperature conditions also there is increasing similarity to 11.3 %. At the end of storage similarity was within 93–99 %.

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J21509-015

Bondareva L.M., Chumak P.Ya., Kovalchuk V.P.

TROFHIC COPULAS AND CHANGEABILITY OF SOME PROPERTIES *TETRANYCHUS URTICAE KOCH* (*ACARIFORMES: TETRANYCHIDAE*) IN TERMS OF CLOSED SOIL

** National University of Life and Environmental Sciences of Ukraine str. Heroes of Oborony, 15, Kyiv, 03041 Ukraine,*

*** Botanical Garden Acad. A.V.Fomina str. Petliura, 1, Kiev, 02036 Ukraine*

Abstract. Investigated range of variability of traits Tetranychus urticae Koch on different types of food plants. Life strategy of this kind of education metapopulational structure contributes to avoiding inbreeding in closed soil.

Key words: closed soil, Tetranychus urticae Koch, variability, metapopulation.

Introduction. The problem of survival of acary and insects in greenhouses agrocenosis not new. Observations suggest that the greenhouses penetrate both native and adventive species. Many of them are eliminated, and some give outbreak that causes unsuccessful use of various tools to manage their density at a level below the economic threshold number. Common spider mite (*Tetranychus urticae* Koch, 1836) penetrates in greenhouses from open soil in the amount of a few individuals, or even - a single fertilized female. Under favorable conditions for the development of trophic and gigrotermic conditions are generally observed an exponential increase in its population.

Considered (Li, 1978) that the known genetic regularities in isolated colonies formed from several individuals, the probability of progressing population is very low. In small, isolated colonies gene frequency deviates randomly from their values, and therefore the majority of genes randomly fixed, or eliminates, forming random combinations. And since most of these randomly fixed combinations of genes do not belong to types that favored the selection, and since small populations genetic plasticity is completely absent, as a result they are become extinct.

As the penetration of ordinary spider mites in closed soil elimination is not observed, and the outbreak, we have suggested that one possible reason for this phenomenon may be next. P. Dzhiller (1988) believes that the plants, whether at the individual, population or species level of the organization can be seen as the host of the island for herbivorous insects and parasites of plants, and therefore they are quite suitable theory of island biogeography. Since ordinary polyphagous spider mite feeds on many species of plants can be assumed that in the greenhouses, where a small area focused a lot of different species, varieties and forms of plants, feed factor may contribute to the formation of many of the micropopulations of this phytophage.

Therefore, the aim of our research was to study the signs variability of spider mites feeding on different food plants.

Materials and methods. Ordinary spider mites collected in greenhouses of the Botanical Garden named by acad. A.V. Fomin (2011–2012) on *Rosa* sp., *Chrysanthemum indicum* L. and on *Adenium obesum* Roem ef Schult. Collected specimens were placed in a drop of glycerol on a glass slide and covered with a cover. To measure the characteristics mite used microscope with ocular micrometer with an accuracy of 0.001 mm and a microscope «Primo Star» with a corresponding measurement program. For statistical analysis the data length (L), width (H) and the ratio of length to width (L / H) of the body of at least 300 individuals of the common spider mite. Quantitative indicators analyzed with using the software package Statistica Ph 6.0 and Microsoft Exel.

The main resarch resulrs. Indoors Botanical Garden ordinary spider mite (*Tetranychus urticae* Koch) registered by us on the 174 plant species from 75 families and two classes - *Magnoliopsida* and *Liliopsida* (Chumak, 2004). The exponential increase in the number of *Tetranychus urticae* was observed only in certain types of plants - rose (Rosa sp.), Chrysanthemum (Chrysanthemum indicum L.). When mites feeding on Adenium obesum Roem ef Schult phytophage mass reproduction were observed**.** According to the statistical analysis, the obtained parameters studied attributes in absolute length, width and ratio of body *Tetranychus urticae*, individuals of the phytophage on different types of food plants are significantly different (Fig. 1 - 3). Analysis of variability (CV,%) parameters signs *Tetranychus urticae* shows that compared samples differ (Tabl. 1).

Tabl. 1

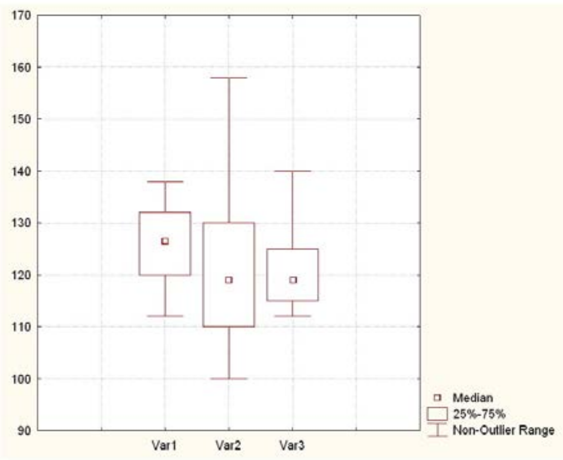
Variability (CV,%) parameters signs Tetranychus urticae Koch on different types of food plants

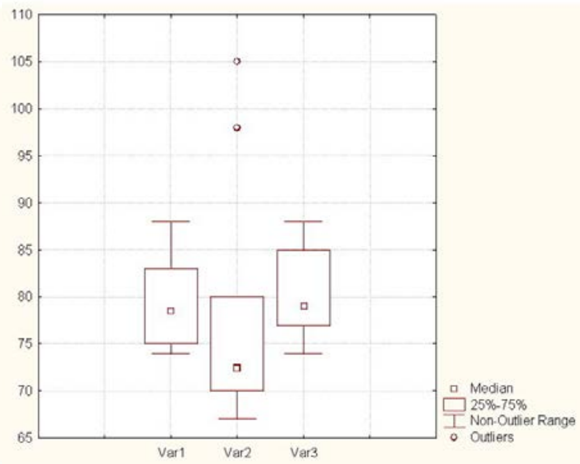
Plant	Length (L.)	Width(H)	Attitude (L/H)
Rosa sp.	6,16	6,87	10,49
Chrysanthemum indicum L.	13,9	12,89	8,55
Adenium obesum Roem ef Schult	8,51	6,51	6,24

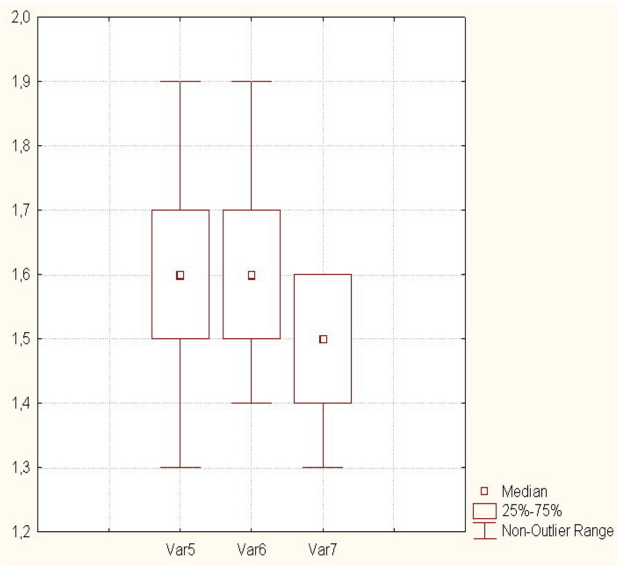
Cluster analysis of the data also shows that the set of individuals of *Tetranychus urticae*, feeding on different plant species are morphologically divided into two ecotypes (Fig. 4).

The data mathematical analysis parameters studied attributes, allow visually distinguish certain groups of individuals ordinary spider mites on different types of food plants. However, the results are quite expected. It is known that the ability of some species of herbivorous insects and mites polyphages develop of new types of host plants indicates their high ecological plasticity.

Polyphages for each new species, varieties and forms of plants - a new quality of environmental protection, which is characterized by a certain quality feed, morphological, physiological and biochemical features (Shapiro, 1986). And in the new ecotypes have certain advantages that presents a regular change of the phenotypic structure of the population (Mayr, 1973). Morphometric differences what we identified on local groups of ordinary spider mites suggest that the population structure in the greenhouses of the Botanical Garden is not uniform - it consists of separate micropopulations. It is known that the life strategy of focusing on education metapopulyatsionnoy structure is, in many cases, the only saving them from extinction (Gilpin, 1989).







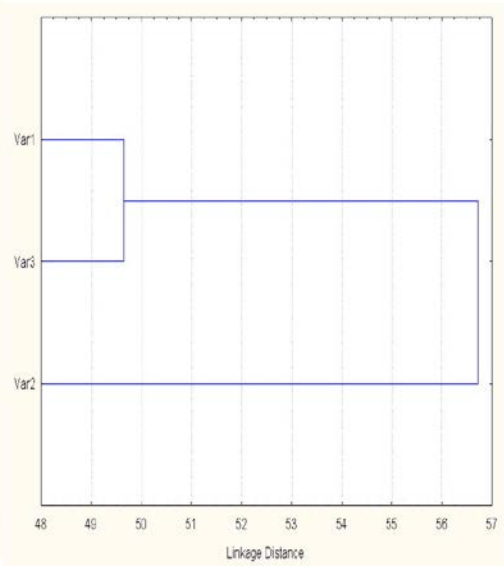


Fig. 1. Statistical indicators of absolute body length *Tetranychus urticae Koch* on different types of plants: Var1 - *Rosa sp.*; Var2 - *Chrysanthemum indicum* L.; Var3 - *Adenium obesum* Roem ef Schult

Fig. 2. Statistical indicators of the absolute width of the body *Tetranychus urticae Koch* on different types of plants: Var1 - *Rosa sp.*; Var2 - *Chrysanthemum indicum* L.; Var3 - *Adenium obesum* Roem ef Schult

Fig. 3. Statistical indicators of the ratio of the width of the body of Tetranychus urticae Koch on different types of plants: Var5 - Rosa sp.; Var6 - Chrysanthemum indicum L.; Var7 - Adenium obesum Roem ef Schult

Fig. 4. Dendrogram of the relative similarity of the studied samples of Tetranychus urticae Koch: Var1 - Rosa sp.; Va2 - Chrysanthemum indicum L.; Var3 - Adenium obesum Roem ef Schult

Metapopulyatsionnaya strategy common spider mite through the exchange of individuals between local groups contributes to the transition from inbreeding ot outbreeding .

Conclusions. For each of the local groups found common spider mite peculiar characteristic ratio morphotypes. The direction of this process favors the hypothesis that the formation of structure in metapopulational species polyphages. Contrary to the doubts the survival of tick polyphages in greenhouses is due metapopulyatsionnoy structure, which in turn saves them from inbreeding (Lee, 1978).

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O.V. Zavads'ka, Kravchenko O.V.

SUITABILITY FOR LONG TERM STORAGE OF BEETROOTS DIFFERENT VARIETIES CULTIVATION IN THE CONDITIONS OF UKRAINE'S FOREST-STEPPE

The authors present the results of studying the efficiency of the dry beetroot production, which has been grown up in conditions Ukraine's Forest-steppe, depending on a variety. An complex estimation of fresh and dried products of 5 different varieties and hybrids of beetroot for the content of the basic biochemical, biometric and technological parameters. Select the most suitable for long term storage

Beetroot, varieties, roots, quality, biochemical, organoleptic, indexes, storage

Introduction. Beetroot for their flavoring and medicinal properties occupies a leading position among the vegetables. Area under this crop in Ukraine in recent years remains at 40 hectares [1]. Thanks to the the original set of nutrients and food components are necessary food for people of all ages. His roots remain for a long time and are used for different types of processing [5].

Production of vegetables in Ukraine, including beet, is a seasonal business and provide consumers with quality products necessary during the year. In their keeping quality is affected by many factors, among which are important varietal characteristics, the content of the basic biochemical components. Suitable for long term storage, as the literature, there are varieties with cylindrical root late sowing [1,4]. The objective of our research was to identify the most suitable for long term storage and processing of different types of varieties of this crop [4,5].

Material and methods research. The study was conducted during 2011–2013 years in National University of Life and Environmental Sciences of Ukraine. For experiments selected 5 varieties and hybrids recommended for cultivation in the conditions of Ukraine's Forest-steppe [2]. Standards were determined variety of domestic grade Nosovskii ploskui, used Ukrainian.

Beetroot grown in the experimental field NUBiP Ukraine, which placed in the northern part Forest-steppe of Ukraine. Biochemical, commodity and organoleptic tests were performed in laboratory of storage, processing and product standardization prof. B.V. Lesyka by the generally accepted methods [3].

Root preserved in conditions of deepening stationary storage at temperatures of +4 to + 0- 10C, relative humidity 85-90% [5].

Results of research. For biometric parameters and commodity assortment prevailed among the studied sort Nosovskii ploskui (control), the roots of which were most severe (374.9 g) had the greatest transverse diameter (114 ± 10 mm) were most stable in this indicator and form the most standard roots (91.8 %).

Suitability of roots for drying significantly depends on the contents of the main biochemical parameters. Results research biochemical parameters beetroots shown in Table. 1.

Table 1

Biochemical parameters assortment of beetroots, average of the years 2011-2013

Name of the variety	Contents in roots						
	dry matter, %				sugar, %		ascorbic acid, mg/100 g
	2011	2012	2013	the average	sucrose	total	
Nosovskii ploskui (control)	12.4	13.2	12.8	12.8	6.6	7.0	12,2
Bordo kharkivs'kui	12.0	12.8	11.8	12.0	4.8	5.7	8,4
Detroit F_1	10.6	11.0	10.4	10.7	5.7	6.4	15,2
Egypets'kui ploskui	9.4	10.8	8.6	9.6	4.4	5.2	10,2
Cylindra	13.7	15.8	15.2	14.9	7.9	9.0	13,6
NIR_{05}	1.2	1.3	1.1				

The content of dry matter of roots variety Cylindra substantially prevailed control and other experimental variations. The lowest dry matter content installed in root Egypets'kui ploskui – 10.7%, which evident affected the taste of them. Established a direct correlation between the taste of root crops and sugar (r = 0,72 ± 0,13). In total sugars sucrose significantly prevailed in comparison with monosaccharides (4-6 times depending on the version).

Most ascorbic acid accumulated root varieties Detroit F_1 – 15.2 mg / 100 g. The highest marketability established in root sort Nosovskii ploskui (91.8 %), and hybrids Detroit F_1 (89.4 %).

Thus, the greatest dry matter and sugars accumulated roots grade Cylindra – 14.9 and 9.0% respectively. The highest biological value have roots hybrid Detroit F_1 (15.2 mg% vitamin C).

For organoleptic characteristics were best roots sort Nosovskii ploskui and hybrids Detroit F_1. Established direct correlation interrelation between the taste of roots and amounts of sugar (r = 0.72 ± 0,13).

The duration of storage depends largely on how efficiently expended at solids remain healthy roots. Most economical dry matter and sugars during storage period spent roots variety Cylindra.

The highest biological value after storage have roots hybrid Detroit F_1 – vitamin C content was 8.0 mg% and the loss of its seven months of storage – 39.4%. The smallest losses (35.4 %) this element installed in root variety Bordo kharkivs'kui. Найбільші втрати маси встановлено у найкрупніших та найменших коренеплодів.

The duration of storage depends largely on how efficiently spent at dry matter roots. Our studies shown that the roots have different spending dry matter and sugars during storage period (tab. 2).

Most economical dry matter and sugars during storage period spent roots sort

Cylindra. Losses of these elements in eight months of storage were 21.6 percent relative to the initial content. Found that eight months of storage roots table beet lose 35.4-40.5% ascorbic acid (the initial amount).

During the period of storage significantly decreased weight roots. The greatest weight loss found in the largest and smallest roots.

Table 2

Changing the biochemical composition of roots beet storage for eight months, the average for 2011-2013

Name of the variety	Contents in roots								
	dry matter			sugar, %			ascorbic acid, mg/100 g		
	at the beginning of storage	at the end of storage	loss (the relative %)	at the beginning of storage	at the end of storage	loss (the relative %)	at the beginning of storage	at the end of storage	loss (the relative %)
Nosovskii ploskui (control)	12.8	8.8	31.0	7.0	5.4	22.8	12.2	7.4	39.3
Bordo kharkivs’kui	12.0	9.2	25.8	5.7	4.5	21.1	8.4	5.0	40.5
Detroit F_1	10.7	8.1	25.0	6.4	5.3	17.2	15.2	9.4	38.2
Egypets’kui ploskui	9.6	7.1	29.7	5.2	4.1	21.1	10.2	6.5	36.3
Cylindra	14.9	11.6	21.6	9.0	7.5	16.7	13.6	8.2	39.7

Root preservation research results in different periods of storage are given in the Table. 3.

Table 3

Dynamics preservation of beetroots different varieties, %

Name of the variety	After 5 months of storage				After 8 months of storage			The natural weight loss *, %
	entire healthy	of which		flabby	entire healthy	flabby	decayed	
		unsprouted healthy	healthy germinated					
Nosovskii ploskui (control)	98.0	50.8	6.8	40.4	55.4	28.2	8.5	12.5
Bordo kharkivs’kui	94.5	57.5	7.7	29.3	50.8	19.2	24.0	9.8
Detroit F_1	100.0	66.1	6.6	27.3	68.5	20.5	0	7.8
Egypets’kui ploskui	95.6	51.1	44.4	0	30.2	6.6	12.2	11.4
Cylindra	100.0	69.2	6.4	25.4	64.8	18.2	10.4	9.1

* normative the natural weight loss of beetroots eight months storage constitute 6.1%

After five months of storage roots of all experimental variants were characterized by high keeping quality - sound of roots in this period was keeping within 94.5-100 %. However, in this period showed a lot of healthy germinated and flabby. Least germinated Root five months of storage found in samples of a variety of cylinders (6.4%) and hybrid Detroit (6.6%).

Highest keeping quality after eight months of storage roots have hybrid Detroit

F_1 and varieties Cylindra – 68.5 and 64.8 % of healthy root crops respectively, 13.4 and 9.4% compared with the control. In the samples varieties Bordo kharkivs'kui 24% of roots were impressed tail rot. Most resistant to the disease were roots hybrid Detroit F_1.

The actual natural losses in all research variants far superior normative. Most of them are found in a variety of Nosovskii ploskui (control) – 12.5 %. Least on respiration during the storage period spent roots hybrid Detroit F_1 – 4.7 % less compared to the control.

Conclusions. Storage beet roots deepening in terms of fixed storage without the controlled conditions it is advisable not more than five months. Keeping quality of this period is at 94,5-100 %. For long term storage roots were most suitable roots hybrid Detroit F_1 and varieties Cylindra – 68.5 and 64.8% respectively healthy roots after eight months of storage.

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Bober A.V.

EVALUATION OF QUALITY OF GRAIN CORN HYBRIDS BY COMMODITY AND CROP INDICATORS

National University of Life and Environmental Sciences of Ukraine
Kyiv, Heroyiv Oborony, 13, 03041

Abstract. The results of studies assessing the quality of grain corn hybrids for sowing and commodity indices. Highlight the best corn hybrids for sowing complex product performance and quality.

Key words: Quality, grain, corn, hybrid, commodity indices, sowing rates.

The role of grain is due solely to its value directly important for making a highly food. A crop of grain cereals dense characterized by a high content of organic substances such as carbohydrates, fats, proteins, and vitamins and minerals, making it an indispensable raw bakery, confectionery and cereals industry. In addition, grain production serves as a powerful source of productive livestock, including the production of meat, milk, eggs. Grain products belong to the most common domestic and world agricultural market [1].

For scientific and reasonable long-term concept of development of agriculture Ukraine predicted grain production by 2020 is expected to reach 65-70 mln. T. Solving this problem will be towards increasing production grain forage cultures, a new generation of varieties and hybrids to improve their seed further improvement technologies cultivation, post harvest handling, storage and processing, establishing economic independence of producers and grain processing enterprises and development of market relations at different levels [3].

Based on the fact that corn is a common cereals-purpose, high-quality products can be obtained only if the use of certain breeding corn varieties (hybrids), due to the peculiarity of their biochemical composition. To select the available varieties (hybrids) of maize best for a particular purpose, you need to have this sort of (hybrid) sufficiently large comprehensive bank of objective characteristics.

In this regard, there is a problem condition-depth study investigated the issue.

Research Methodology. Research conducted during the 2012-2014 biennium. Based storage technology department laboratories, processing and product standardization Ya. prof. B.V. Lesik from corn grown in areas of stationary experiment chair breeding and seed that placement in NUBiP of Ukraine "Agronomic Research Station". 7 studied maize hybrids compared with standard Pustovarivskyy 280 SV. To assess the quality of corn used frequently in a production environment and research methods of quality assessment as required by applicable regulatory and technical documents [6].

Results. All investigated hybrids meet the requirements of the standard and can be attributed to the indexes of all classes of quality [2]. Each hybrid maize differ in their physical and chemical composition.

Humidity before collecting grain moisture significantly affects the final result of its economic output. In the cost structure of the cost of corn post harvest handling, including drying (payment services) 30-40% [4]. So creating a hybrid structure of crops on the farm should be considered an indicator the giving moisture grains during maturation, preferring hybrids that are able to generate high yield and quickly give the moisture.

In the collection studied corn hybrids have higher rates of humidity. According to the standard rate of humidity normalized to 15% [2]. The highest humidity marked the hybrid 176x43 - 29.4% 176x78 - 22.5% and Pustovarivskyy 28 SV – respectively 22.3% moisture content exceeding by 14.4, 7.5 and 7.3%. The lowest humidity at the time the collection was a hybrid 177x69 18.1% respectively. Humidity other hybrids was within 19,5-20,0%. Indicators harvest grain moisture corn hybrids are given in Table 1.

Grain moisture corn dried 13.1-13.9%. Highest the giving moisture during drying marked in hybrid 176x43 - 5.8% / h and 177x58 - 5.7% / year. The lowest the giving moisture marked in hybrid 176x69 – 176x67 and 1.6% - 2.95% / year. In control variant the giving moisture was 4.5% / hour. In other hybrids the giving moisture was: 177x43 - 4.7% / year, 177x69 - 4.3% / year, 176x78 - 3.9% / year.

Table 1

Comparative evaluation harvest moisture corn hybrids studied (2013-2014 biennium).

№ p / p	Hybrid	Humidity,%	To +/- standard humidity 15%
1	Pustovarivskyy 280 SV (control)	22.30	+7.3
2	176x43	29.40	+14.4
3	176x67	19.50	+4.5
4	176x69	19.50	+4.5
5	176x78	22.50	+7.5
6	177x43	21.40	+6.4
7	177x58	20.00	+5.0
8	177x69	18.10	+3.1
NIR_{05}		0.12	-

On morphological characters the greatest impact on the rate of return moisture grain is grain size, its mass and shape. From a purely physical point of view can be explained the giving moisture good grain, which is inherent to its large index of the surface (body surface index - the ratio of surface area to its mass). That is a small grain mass, or round cylindrical shape gives moisture faster than coarse grains. Type of grain, its anatomical features (grains form, endosperm texture) also play a role in the the giving moisture. Corn hybrids with dent form grain shape and loose, powdery endosperm moisture gives relatively better compared with grain that has similar siliceous solid endosperm. About speed the giving moisture corn to some extent be judged by ear structure [5].

Typically, the hybrids are not tightly wrap covers cabbage stalk and part of it is open, the best the giving moisture compared with hybrids, which plugs closed tight wraps. The structure also has a private cob indirect influence on the speed the giving moisture grain during ripening. In particular, the important role played by the core plug, size, texture and density stacking seeds on the cob. With smaller diameter, mass and density of the core, the lower grain moisture during threshing. Similarly, if placed loosely corn on the cob, most grain gives moisture during maturation [4].

Out of the first grain corn and yield are given in Table 2.

For grain yield exceeded studied hybrids control option. The largest output of the first grain of corn hybrids: 176x43 - 82.8% 177x43 - 82.4%. The lowest output - Pustovarivskyy 280 SV - 80% 177x69 - 80.4% 177x58 - 80.8%. The largest yield of 11.68 t / ha of the hybrid 176x78 that, 28.09% higher than control option. The high yield of hybrids 177x85 - 9,92 t / ha 176x43 - 9,79 t / ha. The least productive hybrid was 177x69 - 7,19 t / ha.

Technological quality indicators of different hybrids of corn given in table 3.

Thus, the greatest figure of nature had control option (hybrid Pustovarivskyy 280 SV) who made 757 g / l, and the lowest figure in hybrid 177x58 - 738 g / l. The highest weight of 1000 grains accordingly have a hybrid: 176x69 - 289.87 g Pustovarivskyy 280 SV - 289.02 g 176x67 - 284.82 g The standard normalized similarity not less than 55% for the use of corn for the production of baby food and starch and molasses industry. And in terms of similarity of corn can be used for all appointments.

Table 2

Grain yield and yield corn hybrids (2013-2014 biennium).

№ p / p	Hybrid	Output of grain, %	+/- To control	Productivity, t / ha	+/- To control
1	Pustovarivskyy 280 SV (control)	80.0	–	8,87	–
2	176x43	82.8	+2.8	9.79	0.92
3	176x67	81.2	+1.2	8.87	0.00
4	176x69	81.8	+1.8	11.68	2.81
5	176x78	81.9	+1.9	6.75	-2.12
6	177x43	82.4	+2.4	9.43	0.56
7	177x58	80.8	+0.8	9.92	1.05
8	177x69	80.4	+0.4	7.19	-1.68
NIR $_{05}$		3.11	-	4.56	-

Table 3

Technological quality indicators of different hybrids of corn (2013-2014 biennium).

№ p / p	Hybrid	Nature, g / l	+/- To control	Mass of 1000 grains, g	+/- To control
1	Pustovarivskyy 280 SV (control)	757	–	289.02	–
2	176x43	745	–12	279.40	–9.62
3	176x67	746	–11	284.82	–4.2
4	176x69	751	–6	289.87	+0.85

5	176x78	747	–10	275.81	–13.21
6	177x43	743	–4	259.54	–29.48
7	177x58	738	–19	281.53	–7.49
8	177x69	740	–17	255.71	–33.31
NIR $_{05}$		6,88	-	1.04	-

Drilling performance in hybrid high. The greatest similarity hybrid corn was 176 × 69 - 97%, and the lowest 177 × 69 - 85% (tab. 4).

Table 4

Sowing of various indicators corn hybrids (2013-2014 biennium).

№ p / p	Hybrid	Germination%	+/- To control	The energy of germination,%	+/- To control
1	Pustovarivskyy 280 SV (control)	96	–	92	–
2	176x43	92	–4	86	–6
3	176x67	91	–5	87	–5
4	176x69	97	+1	90	–2
5	176x78	96	–	91	–1
6	177x43	91	–5	84	–8
7	177x58	86	–10	80	–12
8	177x69	85	–11	82	–10
NIR $_{05}$		1.47	-	2.02	-

The highest vigor hybrid control has Pustovarivskyy 280 SV - 92%. Also strong performance in hybrid 176x78 – 176x69 and 91% - 90%. The lowest germination energy of hybrid 177x85 - 80%.

Conclusions:

1. At the time of harvesting grain corn hybrids studied have high humidity compared with a standard that is standardized to 15%. The highest humidity 176x43 marked in hybrids - 29.4% 176x78 - 22.5% and Pustovarivskyy 280 SV - 22.3%. The lowest humidity at the time the collection was a hybrid 177x69 18.1% respectively. Humidity other hybrids was within 19.5-20.0%.

2. The highest the giving moisture during drying marked in hybrids 176x43 - 5.8% / h and 177x58 - 5.7% / year. The lowest the giving moisture 176x69 marked in hybrids - and 176x67 1.6% - 2.95% / year. In control variant (hybrid Pustovarivskyy) the giving moisture was 4.5% / hour. In other hybrids the giving moisture was: 177x43 - 4.7% / year, 177x69 - 4.3% / year, 176x78 - 3.9% / year.

3. The highest grain yield was observed in the first of maize hybrids: 176x43 - 82.8% 177x43 - 82.4%. The lowest output - Pustovarivskyy 280 SV - 80.0% 177x69 - 80.4% 177x58 - 80.8%.

4. The greatest yield of 116.79 kg / ha installed in hybrid 176x78 that, 28.09% higher than control option. The high yield of hybrids 177x85 - 99.21 kg / ha and

176x43 - 97.90 kg / ha. Least proved fruitful hybrid 177x69 - 71.95 kg / ha.

5. Drilling performance in hybrid high. The greatest similarity hybrid corn was 176×69 - 97%, and the lowest 177×69 - 85%. The highest vigor was controlling hybrid Pustovarivskyy 280 SV - 92%. Also strong performance in hybrid 176x78 – 176x69 and 91% - 90%. The lowest germination energy marked the hybrid 177x85 - 80%.

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Yashchuk N., Shambara J.

TARGETED USE OF GRAINS OF WINTER RYE DEPENDING ON THE VARIETAL FEATURES AND MODE OF STORAGE

National University of Life and Environmental Sciences of Ukraine
Kyiv, Heroyiv Oborony, 13, 03041

Abstract. A study changes of technological indicators of winter rye different varieties during storage at different regimes. Grain rye of variety Intensive 95 can be used for the production of flour and variety Nausin – for processing into malt and seminal purposes. High seminal and technological indicators of grain rye were at storage in cooled mode.

Keywords: targeted use, grain of rye, storage mode, term, technologic indicators

Seeds of rye incorporates proteins, starch and others components. This grain of rye used for various purposes. The main purpose of rye is to provide providing the population with high-quality rye bread. Thus, in nutrition of our population rye is second only to wheat. A seed of rye is of great economic importance, especially in the Polesie and Forest-steppe [1, 5].

Grain of rye when storing may have quantitative and qualitative losses. The most crucial factors of technological changes and seed quality indicators are humidity, temperature and oxygen. Therefore, one of the most important for increasing the country's grain stocks is compliance regimes grain storage. Only when seminal and technological indicators meet the requirements of the standard can be said about the high cost and realizable consumer product quality [2, 3, 4, 5].

Materials and methods. Study was conducted within 2014-2015 in the laboratory of department of storage, processing and standardization of plant products after name prof. B.V. Lesika of National University of Life and Environmental Sciences of Ukraine with samples grain of winter rye of varieties Intensive 95 and Nausin.

Grain was grown in terms of production units NULE of Ukraine "Agronomic Research Station". The scheme included the research of rye grain storage for three modes: dry state in cloth bags; refrigerated at a temperature of + 5 – + 10 ^{0}C in cloth bags; without air in sealed plastic sleeves.

Quality assessment was carried out before storing grain (control), after one, three, six, nine and twelve month’s storage of grain winter rye.

Results. While laying on of rye grain storage had low indexes of humidity, below the critical – 12-13%. This moisture allows long-term storage of grain without loss of quality.

Natura of variety Intensive 95 was 706 g / l, corresponding to 1st class quality, variety Nausin Indicator "falling number" to storage a variety Intensive 95 was 102 s in variety Nausin – 84 s. This indicator is not allowed realize the grain varieties studied above 3rd grade quality 698 g / l respectively 3 class qualities (Table. 1).

During storage indicator increased slightly: after 1 month for the dry condition and after three months under refrigerated condition and without air. However, the changes of natura were minor, within the error experiment.

Indicator "falling number" to storage a variety Intensive 95 was 102 s in variety

Nausin – 84 s. This indicator is not allowed realize the grain varieties studied above 3rd grade quality (Table 2). After three months of storage units studied variants indicator "falling number" significantly increased. In grain varieties Intensive 95 rose to 140-145 s, which allowed realizing its 2 class. In the variety Nausin although there was an increase to the studied parameters 98-99 s, but the grain is not passed to the class. After six months of storage only refrigerated and only 95 Intensive grain varieties with those "falling number" 143 s belonged to 2 class qualities.

Table 1

Change of natura grain of winter rye during storage at different regimes

The variety of winter rye	Mode of storage	Before storage (control)	Term storage		
			1 month	3 months	6 months
Intensive 95	Dry state (control)	706	710	706	707
	Cooled state	706	706	708	709
	Without air access	706	707	709	709
Nausin	Dry state (control)	698	700	698	699
	Cooled state	698	699	701	701
	Without air access	698	701	700	700

Table 2

Change of "falling number" grain of winter rye during storage at different regimes

The variety of winter rye	Mode of storage	Before storage (control)	Term storage		
			1 month	3 months	6 months
Intensive 95	Dry state (control)	102	129	140	128
	Cooled state	102	120	145	143
	Without air access	102	127	142	134
Nausin	Dry state (control)	84	94	98	92
	Cooled state	84	92	99	96
	Without air access	84	92	98	93

Before storage the ability to germinate in a variety of Intensive 95 was 80 %, and variety of Nausin – 93%. This indicator allowed grains of varieties Nausin used for processing into malt. After the first month storage capacity for germination by increased dryness grains and 2-5% after the third month of the refrigerated and without air for 2-6%. Due to the passage of post-harvest ripening grain more slowly for refrigerated and without air. However, the growth rate of germination capacity for a variety of Intensive 95 though happened and did not reach the 92% that did not allow the use of grain for malting.

Before storage grain rye varieties Intensive 95 characterized similarity of 86% and grade Nausin respectively – 95% (Table. 3).

In connection with passage of post-harvest ripening during the first three months indicator germination more grew noticeably in the variety Intensive 95 at 5-6%. However, significantly higher seed indicators characterized variety Nausin – 97-98% compared to 90-93% in the variety Intensive 95. After 6 months of storage for grain rye dryness slightly reduced germination rates, and for refrigerated and without air remained almost unchanged.

Table 3

Change of germination grain of winter rye during storage at different regimes

The variety of winter rye	Mode of storage	Before storage (control)	Term storage		
			1 month	3 months	6 months
Intensive 95	Dry state (control)	86	92	90	87
	Cooled state	86	86	93	92
	Without air access	86	87	91	90
Nausin	Dry state (control)	95	98	97	95
	Cooled state	95	96	97	97
	Without air access	95	95	97	96

Conclusions

1. The supreme indicators natura and "falling number" throughout the storage period is characterized by grain rye the variety Intensive 95. This grade can use it for flour production.

2. Grain of rye varieties Nausin has high rates of capacity for germination and germination. This variety can be used for processing into malt and seed purposes.

3. The best mode of storage was cooled state. It is during storage ensure the safety of the crop quality indicators and allowed to sell grain of varieties intensive 95 2 class quality.

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Kutovenko V.B., Inosemzeva V.A.

INFLUENCE OF PHOTOSYNTETICALLY ACTIVE RADIATION ON THE PRODUCTIVITY OF VEGETABLE BEANS UNDER THE CONDITIONS OF FOREST-STEPPE OF THE UKRAINE

National University of Life and Environmental Sciences of Ukraine, Kyiv, Heroyiv Oborony 15, 03041

Potential capacities of vegetable bean sorts and actual harvest losses are elucidated depending on summarized photosynthetically active radiation during vegetative period in Forest-Steppe Zone of the Ukraine.

Key words: vegetable beans, sorts, photosynthetic active radiation, potential productivity, and actual productivity.

Introduction. Biological potential of vegetable cultures might be high theoretically, however hard to achieve under practical conditions. Potential capacities of any certain culture are determined not only by biological peculiarities, but also by the environmental factors and financial possibilities of every farm. Optimization of growth conditions using technological measures during critical growth phases of any vegetable culture helps to reach its biological potential.

Even small climatic changes lead to big harvest losses. Solar radiation is one of the key factors affecting the yield. However, the plants don't absorb the whole spectrum of solar energy but only its photosynthetic active radiation (PAR). PAR efficiency is closely related to the biology of vegetable cultures, geographical location of the region and field conditions of every given plantation. Average PAR efficiency for different vegetable cultures is ca. 2% in Forest-Steppe zone of the Ukraine, lesser in Polissya and greater in Steppe [1, 5, 6, 8].

Practically the coefficient of PAR (K_{PAR}) can reach 3%, but under modern conditions this value can not regulated by farmers. Currently its value is just 1% under usual growth conditions. For example, cucumber plants use PAR only for 1.14% in the Forest-Steppe zone of the Ukraine, including the first fruiting for just 0.25% [5,6].

The aim of our research was the study of the influence of photosynthetic active radiation on potentially possible productivity of the sorts of vegetable beans under the conditions of Forest-Steppe of the Ukraine.

*Materials and methods***.** Research were conducted during 2013-2014 in NDP "Fruit and vegetable orchard" in NUBiP of the Ukraine, which is located in the northern part of Forest-Steppe of the Ukraine on sod-mediumpodzolic soils, following the method of research in vegetable production [4] and method of field experiments edited by B.A. Dospekhov [3].

Four sorts of vegetable beans including Karadag (control) were the objects of study. Four repetitions with plot randomization were made. Surface of study spots was 5 m^2. Fourty plants were sampled – 10 for each repetition. Beans were grown as in commercial production [1,7]. The records were taken for such stages of vegetation: final seedlings, buttons, flowering, start of technological maturity and biological maturity of beans. Duration of vegetative period was calculated started with the day of seedling appearance above ground to the biological maturity. The plantating scheme was 70 x 20 cm. Height of the plants was measured before the harvest using measuring ruler in five equally remoted locations of the plot.

Summarized PAR for the whole vegetative season, value of potential yield according to actual PAR, biomas output regarding standard moisture and potential, and actual yield of the sorts of vegetable beans were determined after harvest.

Summarized PAR changes insignificantly each year. This value was calculated for the whole vegetative period – from fully appeared seedlings to the last harvest. For Kyiv oblast the average monthly PAR in April contained 22.2; May – 30.2; June – 32.3; July – 32.3; kJ/cm^2 [5, 6,].

The value for potentially possible production (PP, t/ha) was calculated using formula:

$$PP = К_{PAR} \times \sum Q_n : q,$$

were: $К_{PAR}$ – coefficient of PAR utilization; $\sum Q_n$ – summarized PAR during the vegetative period for each sort; q – calories per one unit of dry organic matter of the vegetable culture. Energy value of the main production of vegetable beans for the absolute dry matter (q) is 15072 cal/kg.

Biomas yield was calculated accounting the standart water conent using the formula:

$$P_c = 100 \times (PP: (100 - M_c) \times a), \text{ where}$$

PP – value of potential productivity (t/ha); M_c – standard moisture content (80% for vegetable beans); a – ratio of main production to side production (1:1,5 for vegetable beans).

Having biomas productivity and knowing the ratio between main and side production, we determined the potential productivity for the sorts of vegetable beans using the formula:

$$PP_к = P_c : a,$$

where P_c – biomas productivity (t/ha); a – ratio between main and side productivity [5, 6, 8].

Results and discussion. Our results show that seedlings of all studied sorts appeared above ground uniformly. However, their biological maturity occured one-two days later comparing to the control sort Karadag. Date of biological maturity influenced the summarized PAR income (table 1) during vegetative period. The highest summarized PAR was calculated for the sort Winzor and the lowest for the sort Karadag. Biological maturity of the sort Karadag occured two-three days earlier as in other sorts.

Potential productivity for the sorts of vegetable beans was dependent on the summarized PAR during the vegetative period. The potential productivity of all sorts was 0.26-0.41 t/ha higher than control using PAR value.

Regarding the ratio between main and side production, potential productivity of the sorts of vegetable beans was 57.25 – 59.30 t/ha (table 2). The highest productivity was recorded for the sort Winzor – 2.05 t/ha higher than in control.

Actual productivity was the highest for the sorts Bartoli – 26.93 t/ha and Winzor – 26.07 t/ha, which is higher on 11.15 and 10.29 t/ha comparing to the sort Karadag (control). Actual productivity for the sort Karestino was 0.72 t/ha higher than in the sort Karadag.

Table 1

Potential productivity of the sorts of vegetable beans for sumarized PAR (the average for 2013-2014).

Sort	Appearance of full seedlings	Sumarized PAR for vegetation period, kJ/cm^2	Potential productivity of PAR, t/ha
Karadag (control)	21.04	86.3	11.45
Bartoli	21.04	88.3	11.71
Winzor	21.04	89.4	11.86
Karestino	21.04	88.3	11.71

Table 2

Potential and actual productivity of the sorts of vegetable beans for 2% of PAR use.

Sort	Biomas productivity to standart moisture content, t/ha	Potential productivity of beans, t/ha	Actual productivity of vegetable beans, t/ha	Actual loss of producti-vity, t/ha
Karadag (control)	143.13	57.25	15.78	41.47
Bartoli	146.75	58.70	26.93	31.77
Winzor	148.25	59.30	26.07	33.23
Karestino	146.75	58.70	16.50	42.20

The lowest actual loss of productivity we observed in the sort Bartoli – 31.77 t/ha, which is 9.7 t/ha lower as of the sort Karadag. Relatively small loss of productivity we found in the sort Winzor – 33.23 t/ha, which is 8.24 t/ha smaller than in the control. The highest actual loss of productivity we calculated for the sort Karestino – 42.2 t/ha, which 0.73 t/ha higher than in control.

Conclusions

Potential productivity of the sorts of vegetable beans accounting possible 2% of PAR use was 57.25 – 59.30 t/ha, which is 2.2 – 3.6 times greater comparing to their actual productivity. The smallest loss of actual productivity were recorded for the sorts Bartoli and Winzor (in 2.2 – 2.3 times). Lowest productivity was recorded in the sorts Karadag and Karestino– 3.6 times smaller comparing to their potential productivity.

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