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J11609-001

Paliy A.P.

INFLUENCE CONTAMINATION OF THE MILKING EQUIPMENT ON THE QUALITY MILK

Kharkov Petro Vasylenko National Technical University of Agriculture

Livestock farming is one of the largest and the leading sectors of agricultural production. In this regard, the decision of food problems depends greatly on its effective development, namely the development of dairy farming which is one of the strategic sectors of animal husbandry in Ukraine. It determines the country's food security, the nutrition quality of population and has a high export potential.

In most countries, dairy farming is the leading branch of animal husbandry. The leading role of cattle due to its biological properties: the ability to consume large amounts of coarse and green fodder and with minimal use of concentrate feed to have relatively high productivity [1, 2].

Milk production in Ukraine belongs to the leading agricultural sector, due to the favorable conditions for the development of dairy animal husbandry and a high proportion of milk and dairy products in food consumption.

Integral factor of the efficiency of dairy cattle is to provide high quality products, with great importance of equipment, pipes and milk containers sanitization process. Due to its high nutritional value, milk is a favorable environment for the development of many types of microorganisms, some of which cause spoilage of milk, while others may be hazardous to the health of consumers, and only strict observance of milk production hygiene is an important factor in the prevention of food poisoning [2 – 5].

Milking equipment sanitary care question remains open, because demands on the quality of milk, which should be at the level of the highest grade are growing [6]. Search of technological methods for the timely prevention and detection of violations of the factors to maintain milking equipment and the study of problems of risk analysis in the process of production and processing of milk, causing a need for scientific substantiation and evaluation of a method for exterior sanitary conditions of milking equipment, and the introduction of new and safe methods of reducing its total bacterial contamination to ensure, in the end, getting high-grade milk [7].

The prospect of finding ways for simplified evaluation of sanitary and hygienic state of milking equipment and forecasting of production quality is an important problem and is both scientific and practical interest [8, 9].

The purpose of research is to develop a simplified method for predicting the grade of milk, which will reduce the time to conduct research, to quickly and accurately assess the milking equipment of various technological performance inside surface sanitary conditions.

The studies were conducted in the laboratory of the Department Technical Systems and Technologies livestock them. B. P. Shabel'nika ERI of Technical Service HNTUA them. P. Vasylenko on a fragment the milking plant. In experimental researches, standard and original testing, measuring equipment were used.

To determine the quality of milk we were guided by the requirements of the existing regulations and sampling by State Standard (DSTU) ISO 707: 2002; the number of microorganisms was determined by counting the colonies at 30 °C in GOST IDF Standard 100B: 2003.

To quantify the visual quality of cleaning of milking equipment, research was conducted under the same conditions that are suitable for comparison.

Existing methods for monitoring the purity of milking equipment, which provide the ability to forecast the grade of milk received, do not provide a quick and accurate assessment. They have difficulties in the implementation, require significant resources to conduct such analyzes.

The problem is solved in that a method for predicting the grade of milk is carried out on the contamination of the inner surface of milking equipment.

Method for predicting milk grading is as follows: before milking filter elements are contacted with the inner surface of the milking equipment. [GOST 12026-76 Laboratory filtering paper. Specifications].

Then the elements are distributed in color and extraneous blotches, and the resulting performance is determined in the points.

At the end of the milking process the bacterial contamination of milk is determined, and in accordance to the color of the filter element appropriate grade graduation is made.

The interpretation of the data is carried out according to the table 1.

Table 1

Prediction grade milk

Point	Microbiological indicators * CFU/cm^3	Grade milk	Color filter element
I – flawlessly	–	«Extra»	white
II – excellent	up to 300 thousand inclusive	Superior	white
III – good	from 301 to 500 thousand inclusive	First	white with some inclusions
IV – satisfactory	501 thousand up to 3 million inclusive	Second	grayish hue with inclusions
V – unsatisfactory	more than 3 million	No varietal	polluted gray with lots of inclusions

* The total number of microorganisms (bacterial contamination, including mesophilic aerobic and facultative anaerobic microorganisms).

In order to predict the grade of milk offered the following classification of milking equipment cleanliness level:

I point – flawlessly (white filter element) – absence of microorganisms in milk, an «Extra» class milk provided;

II points – excellent (white filter element) – the presence of microorganisms in the milk in an amount up to 300 thousand CFU/cm^3, a superior quality milk provided.

III points – good (white filter element with some inclusions) – the presence of microorganisms in milk in an amount from 301 thousand to 500 thousand CFU/cm^3, a first class milk provided.

IV points – satisfactory (filter element has a grayish hue with inclusions) – the presence of microorganisms in milk in an amount from 501 thousand to 3 million CFU/cm^3, a second-class milk provided.

V points – unsatisfactory (filter element has polluted gray color with lots of inclusions) – the presence of microorganisms in milk is more than 3 million CFU/cm^3, the resulting milk – no varietal.

Conclusions. 5-point scoring of sanitary conditions of milking equipment by color of filter element with a value of bacterial contamination of milk is set, allowing by the above parameters to predict the grade of milk.

On the developed method a patent for utility model of Ukraine is get [10], the advantages of which is that it provides a real opportunity to improve the quality of milk by preventing its high bacterial contamination.

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J11609-002

Shabaldas O. G. Agafonov O. M. Bekmurzaeva R.

YIELD OF SOYA DEPENDING ON TREATMENT OF SEEDS WITH BACTERIAL PREPARATIONS

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Annotation. In this experiment is studied the influence of using of soya seeds treatment with bacterial fertilizers: Nitrofiks P, Nitrofiks Zh in pure form and with the addition of film-forming agents in the zone of an unreliable moistening.

Key words: soya, productivity, experience, variant, nitrogen-fixing activity, authenticity experience.

Introduction.

Currently, essential for improving the processing methods of cultivation of soy gets not only the correct determination of the timing, dosage use of fertilizers and plant protection from harmful objects, but also bacterial drugs that stimulate the activity of nitrogen-fixing plants.

Literature review.

Many studies have shown a significant nitrogen-fixing ability of soya, allowing to some extent to meet the increased demand for nitrogen.

V. M. Penchukov et al. [1] write that under favorable conditions the soya captures from the air from 50 to 70% of the required nitrogen accumulating with 30 - 50 kg / hectare in the soil.

P. E. Gubanov et al. [2] show that the nodule nitrogen fixation by soybean plants microorganisms can cover 1/2 - 2/3 of the flow of nitrogen to build organic matter.

Most soybean plants need nitrogen confirmed by a large number of researchers and this is due, above all, a high protein content in soybean seeds. To satisfy this need by mineral nitrogen during all phases of development is impossible [1, 2, 3].

Many authors have noted that the most efficient and cost-effective options with a bacterial inoculation of seeds fertilizers [4, 5, 6].

In experiments of the VNIIMK noted that when inoculation of seeds with nitrogin addition to yield increase of 0.6 -Up to 3.7 t / ha (an average of 1.7 t / ha), there is an additional accumulation compared to the control from 0.1 to 6, 7% (average 2.3%) of protein in seeds [7].

Input data and methods.

Due to the importance of the process of reception – incrustation soybean seeds before planting our task was to study the effects of promising new drugs that stimulate the activity of nitrogen-fixing plants soybeans on its productivity.

We have under the Armavir Experimental Station VNIIMK conducted a study on the effectiveness of Rhizobium preparations and technologies for their using in the preliminary treatment of soybean seeds.

Soils plot area is ordinary powerful low humus content loam chernozem formed on loess clay loam. Proceeded in experiments - winter wheat, repeated experience of four-time placement options - rendomizirovannoe. Mechanized sowing is carried out drills HRC-6 (with aisles of 70 cm) with a seeding rate of 500 thousand plants per 1

hectare soybean variety Duniza. The total area of the plot - 44.1 m2, the discount - 29,4 m2.

The experiments were conducted in accordance with the requirements imposed on them. [8]

Results. Discussion and Analysis.

The research results are presented in table 1.

Table 1.

Influence of seed treatment with Rhizobium agents on productivity of soybean varieties Duniza (2013- 2015).

	Variants of experiment	Yield, t/he			
		2013	2014	2015	middle
	Control (without treatment)	2,63	1,12	1,04	1,59
	NitrofiksP – 2 kg/t of seeds+ 6 l of water/t of seeds	2,73	1,21	1,17	1,70
	NitrofiksZh – 2 l/t of seeds+ 6 l of water/t of seeds	2,80	1,19	1,10	1,69
	NitrofiksP – 2 kg/t of seeds +membrane former (KPIS technology) – 6 l/t of seeds	2,90	1,28	1,21	1,79
	NitrofiksP – 1,5 kg/t of seeds + membrane former (KPIS technology) – 6 l/t of seeds	2,78	1,25	1,18	1,73
	NitrofiksZh– 2,5 l/t of seeds + membrane former (adyugrain) – 1 l/t of seeds + 5 l water/t of seeds	2,82	1,27	1,19	1,76
$HCP_{05t/he}$		0,17	0,09	0,08	0,11

The studies found that the highest seed yield of soybean in the studied cases was recorded in 2013 - 2.63 - 2.90 t / ha. In 2014 and 2015 are unfavorable environment for the growth and development of soybean plants, and therefore the yield was lower in almost 2 0 - 2.3 times.

The study of bacterial fertilizers used for processing soybean seeds showed that the Agriculture contributes soybean yield increase in the range of 0.06 -0.27 t / ha, the average yield increase was 0.14 t / ha. In embodiments using a film-forming - Technology KPIS Adyugreyn and it was awarded the highest gain. and it was on average over three years of research 0.17 - 0.20 t / ha.

Summary and conclusions.

Options were considered with Rhizobium products and application technologies: Nitrofiks P, Nitrofiks F, NitrofiksZh together with the film former (technology KPIS) Nitrofiks F together with the film former (adyugreyn). Results were obtained, indicating that the use of film-forming seed treatment promotes bacterial preparations yield increase in these cases 6.2 -12.5%.

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J11609-003

Shabaldas O. G. Agafonov O. M. Mikheeva Y.

THEUSINGOFTHEBACTERIALFERTILIZERSANDGROWTHING STIMULANTSON SOWING OF SOYA

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Annotation. In this experiment is studied the influence of the using of treatment of soya seeds and foliar feeding growth promoters: Albit, Nagro bioenergy and bio-organic fertilizer universal Nagro on yield of soya in the zone of an unreliable moistening.

Keywords: growth factor, soya, yield, re-experience option.

Introduction.

Modern high-performance plant growth stimulants are significant reserve in raising crop yields in the intensive technologies of cultivation.

Growth promoters contribute to the improvement of vital processes, accelerate plant growth and development, increasing their resistance to high temperatures, harmful organisms, it is especially in a zone of an unreliable moistening.

Literature review.

It is found that plant growth regulators - is a natural or synthetic organic compounds, which in small amounts cause big changes in the growth and development of plants, suspension control these processes. A specific feature of growth regulators - their ability to influence the processes that cannot be governed by ordinary-governmental agronomic methods of cultivation of plants, such as irrigation, use of fertilizers, and others. [1; 2; 3].

Many studies indicate that growth factors enable us to obtain a significant increase in yields while reducing the economic costs and the complex application of growth promoters in combination with inoculation bacterial drugs has the greatest positive impact on the formation of the soybean crop [4, 6].

Input data and methods.

In terms of Armavir Experimental Station VNIIMK conducted research on the impact of the application of seed treatment bacterial preparation Nitrofiks F, growth of seeds and vegetating plants in the seed yield of soybean varieties Duniza

Soils pilot area - an ordinary powerful low humus content loam chernozem formed on loess clay loam. Preceded in experiments - winter wheat, repeated experience of four-time placement options - rendomizirovannoe. Mechanized sowing is carried out drills HRC-6 (with aisles of 70 cm) and NW-5.4 (with aisles of 15 cm) with a seeding rate of 500 thousand plants per 1 hectare soybean variety Duniza. The total area of the plot - 44.1 m2, accounting - 29.4 m2

The experiments were conducted in accordance with the requirements imposed on them. [5]

Results. Discussion and Analysis.

The results are given in Table 1.

Table 1.

The effect of applying a seed treatment bacterial preparation Nitrofiks F, growth of seeds and vegetating plants on yield and seed quality of soybean varieties Duniza (2013 - 2015.).

	Variants of experiment	Yield, t/he							
		Sowing method							
		2013		2014		2015		middle	
		Wide- row planting	Planting in lines	Wide- row planting	Planting in lines	Wide- row planting	Planting in lines	Wide- row planting	Planting in lines
	Control(without treatment)	2,58	2,00	1,06	0,84	1,01	0,81	1,55	1,22
	Nitrofiks Zh – 2,5 l/t of seeds	2,71	2,06	1,14	0,89	1,10	0,87	1,65	1,27
	Nitrofiks Zh – 2,5 l/t of seeds + Albit – 50 ml/t of seeds	2,75	2,08	1,20	0,91	1,16	0,89	1,70	1,29
	Nitrofiks Zh – 2,5 l/t of seeds + Nagro bioenergy – 0,7 l/t of seeds	2,75	2,08	1,24	0,95	1,20	0,96	1,73	1,33
	Nitrofiks Zh– 2,5 l/t of seeds + Biorganic fertilizer Nagro universal –0,7 l/he	2,79	2,16	1,22	0,97	1,18	0,94	1,73	1,36
	Nitrofiks Zh – 2,5 l/t of seeds + Nagro bioenergy – 0,7 l/t of seeds + Nagro universal 0,7 l/he	2,78	2,23	1,26	0,96	1,22	1,03	1,75	1,41
HCP_{05}		0,14		0,10		0,11		0,12	

The effect of applying a seed treatment bacterial preparation Nitrofiks F, growth of seeds and vegetating plants on yield and seed quality of soybean varieties Duniza (2013 - 2015.).

Summary and conclusions.

Options were considered with the study of the impact of the application of seed treatment bacterial preparation Nitrofiks F, growth stimulants seeds - the album and iNagro bioenergy and bio-organic fertilizer plant vegetative Nagro universal on seed yield of soybean varieties Duniza.

Results were obtained, indicating that the additional application to the seed treatment of bio-fertilizers growth stimulants, as in the treatment of seeds and vegetating plants increases the seed yield.

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ShabaldasO.G. GudievO. Y. StepinP

INFLUENCE OF CHEMICAL AND BIOLOGICAL PRODUCTS OF PLANT PROTECTION ON THE DEVELOPMENT THE DISEASE IN SOYBEANS

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Annotation. In this experiment is studied the influence of the using of soybean seed treatment with fundazol, Nagro triple bioenergy and bio-organic fertilizer processing plant Nagro universal on the development of disease in a zone of an unreliable moistening.

Keywords: pathogens, biological efficiency, growth factor, soybean, repeated experience, option.

Introduction.

The main objective is to increase the agricultural productivity of field crops, a further increase grain production through science-based farming systems and improve protective measures against harmful organisms.

Currently, soybean diseases such as peronosporosis, Fusarium, askohitoz, pustulny Bacteriosis, angular spotting are common and harmful. Yield losses from them may reach 20-30%. Combating these diseases requires the mandatory use of protective measures during the growing season. However, the chemicals are environmentally unsafe and costly plant protection. Therefore, necessary and urgent transition to a combination of growing resistant varieties and the use of biological products in the vegetation period, which will reduce the pressure on pesticide agrobiocenosis soybeans and reduce the cost of treatment plants.

Literature review.

The technology of cultivation of soybean seed treatment provides a variety of crops with fungicides, which is an effective measure in the fight against soil and seed infection. At present, it is safe to assert that no matter what techniques are not designed to protect the plants. seed treatment takes and will take a firm place in the systems of plant [2, 4].

GV Mironov (2010) noted that seed treatment agents TMTD, benlatom significantly improves the phytosanitary condition of soybean seeds with weak infecting them, and completely destroy pathogens on the surface. Etching reduced the prevalence of soybean seeds and Fusarium bakteriosis 50 - 70%.

However, a reasonable alternative to chemical methods of plant protection, is a set of preventive, agronomic and biological activities. Previously developed system for the protection of soybeans were based on intensive prophylactic use of chemical fungicides. Under present conditions, such a system can not be implemented due to environmental constraints [2, 4]. (N.S.Fedorinchik, 2010; VM Lukomets and dr.2013). Fungicidal and insecticidal basis of biological products are useful species of bacteria, viruses, protozoa, fungi and actinomycetes.

They are incorporated into the structure of agro-ecosystems, are part of the biological process of functioning of populations of organisms to ensure the distribution of the flow of energy materials and information on trophic levels or tiers

of these systems [1, 5] .In recent years a number of new biologically active substances and mixtures thereof, affecting the productivity and product quality. It bioglobin, albite, bischofite, Emistim C and others. They differ in their origin and mechanism of action. But all share one feature - to stimulate plant growth and development, improving germination and resistance to adverse environmental factors and disease.

Growth promoters having fungicidal action - are organic substances that interfere with the growth and development of plants. Due to a growth factor in the plant reduces the amount of nitrates, they help speed up the ripening. But most importantly, increased soybean yields (from 0.46 to 0.52 t / ha) [3, 6].

Input data and methods.

In terms of Armavir Experimental Station VNIIMK we conducted a study on the use of soybean seed treatment fundazol, Nagro triple bioenergy and bio-organic fertilizer processing plant Nagro universal on the development of disease in a zone of an unreliable moistening grade Duniza.

Preceded in experiments - winter wheat, repeated experience of four-time placement options - rendomizirovannoe. Mechanized sowing is carried out drills HRC-6 - row spacing of 70 cm., The seeding rate of 500 thousand plants per 1 hectare soybean variety Duniza. The total area of the plot - 44.1 m2, the discount - 29,4 m2 The experiments were conducted in accordance with the requirements imposed on them. [7]

Results. Discussion and Analysis.

The results are given in Table 1.

Results of counts and observations to determine the stability of soybean plants to disease manifestations depending upon plants and seed treatment with fundazol and biological agents are presented in Table 1.

Table 1

Stability of soybean plants to the manifestation of the disease, depending on the treatment of seeds and plants and biological fundazol

Preparations on disease development (Armavir OS VNIIMK, 2014).

The results of researches are given in Table 1.

Variant	Askohitoz		Bacteriosis	
	prevalence, %	Development of disease, %	prevalence, %	Development of disease, %
1.Control(without treatment)	54,4	27,1	31,3	19 ,8
2.Fundazol,3kg/t; Fundazol,3kg/he	24,2	12,5	20,5	8,4
3.Fundazol,3kg/t; Nagro bioenergetics, 0,7 l/t	20,9	9,5	28,5	12,4
4.Fundazol,3kg/t; bioorganic fertilizer Nagro universal, (triple	26,9	13,0	15,0	7,2

treatment),0,7l/he				

Accounting prevalence and development of disease has shown that in the study, the most common were askohitoz and sheet form bacteriosis. Considering options for the experience, it should be noted that the use of fundazol seed treatment before sowing of the plants and vegetation reduced the development and dissemination of established disease as compared to the control variant 1.5 - 2.0 times, and the disease is reduced by 11,4-14 6%. It should be noted that the treatment of seeds before sowing fundazol advance and Nagro bioenergetics before sowing allowed the most actively suppress the development and dissemination of askohitoz compared with other options (prevalence - 20.9% and development - 9.5%), but less likely this option Bacteriosis destroyed.

Summary and conclusions.

Options were considered with the study of the impact of the use of soybean seed treatment fundazol, Nagro bioenergy and triple processing plant bio-organic fertilizer Nagro universal on the development of disease in a zone of unstable moustening. It was studied that the fungicidal component of bioorganic fertilizer «NAGRO» effective against leaf and stem diseases

The results were testifying embodiment where carried foliar application of soybean plants in phase 2 - 3 this trifoliate leaf in a period of 3 - 4 true leaves before budding and a phase of loading the seeds, development of bacteriosis was lower than with control of 12.2%, as compared with the embodiment where the chemical is used fundazol 1.2%.

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Shabaldas O. G. Tsesar V. Sheykina V.

PRODUCTIVE OF VARIETIES OF WINTER WHEAT IN CONDITIONS OF ARID ZONE

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Annotation. In this experiment is studied the productivity of winter wheat varieties, determined yield and grain quality of winter wheat breeding of various research institutes, cultivated in the arid zone.

Keywords: variety, yield, grain quality, re-experience option.

Introduction.

Variety - one of the leading factors in raising productivity, the share of which now accounts for a significant level of growth in the gross grain harvest. Productivity is formed during the interaction of genotype with environmental conditions, the nature of which in most regions does not allow realizing the potential of released varieties with a low potential of the latter.

Literature review.

According to the Krasnodar Agricultural Research Institute named. Lukyanenko in pe¬riod development of intensive technologies, the contribution of the variety in yields reached 20-27%, fertilizers - 20-25% protection chemicals - 15-18%; mechanization and tillage - 12-15%, semenovods¬tva - 5%, institutional arrangements - 4, other factors - 14-20% [1, 2].

The current state of the economy AIC - the main reason snizhe¬niya effectiveness of mechanization, so the role of high-quality features increases along with the precursors and crop rotation. Ho¬zyaystvam economically advantageous to use the potential of varieties than doro-gostoyaschie of chemicals [3, 4].

The impact on the formation of the crop has a scientifically sound selection of varieties, characterized by a stable and relatively high yields in a certain soil-climatic zone [3, 5].

One of the main components of the new high-quality policy based on the principle of "mosaic" precision placement of a large number of genetically diverse varieties is consistent multi. The theoretical justification for this approach is presented in detail in the works of Academician A. A. Zhuchenko (2004).

Input data and methods.

The objectives of the study was to investigate the influence of soil and climatic conditions of the zone in the growth, development and productivity of plants of winter wheat through surveys and observations of the elements of the structure of crop plants, taking into account the definition of productivity and quality of grain.

Preceded in experiments - winter wheat, repeated experience of four-time placement options - rendomizirovannoe. Area accounting plot of 250 m2. Repeated fourfold. Seeding mechanized, held drill NW-3.6. The experiments were conducted in accordance with the requirements imposed on them. [6]

Results. Discussion and Analysis.

The results are given in Table 1.

According A. A. Romanenko (2005), the main task is the selection of the full use of the aggregate of certain biotypes varieties and lines, which can improve its

ecological plasticity and get high-quality grain, regardless of weather conditions from year to year. Plasticity of new varieties, although quite demanding growing conditions, makes it possible to cultivate them in different soil and climatic zones.

In assessing the varieties of field crops account for the different indicators of growth and development. However, the main of which are indicators of productivity and quality of the manufactured products. They largely depend on soil and climatic conditions of cultivation, mineral nutrition and biological features varieties. Data from these counts are given in Table 1.

Table 1.

Yields of winter wheat KFK "Sushko", 2014

Variant	Yield, t/he	Increase to control	
Don 95(standart)	4,2	-	-
Irishka	6,2	2,0	47,6
Zustrich	4,5	0,3	7,1
Tanais	3,5	-	-
Petrovchanka	3,9	-	-
HCP $_{05}$	3,1		

It should be noted that in a 2014 reliable grain yield increase compared to the standard varieties obtained practically. The studies found that the yield increase was observed in varieties Zustrich - 0.3 t / ha and Irishka - 2,0t / ha. Grades Petrovchanka and Tanais, inferior in yield compared with Don 95 (standard), they stood at 3.5 - 3.9 t / ha, respectively.

Analysis of Table 2 shows that in the dry zone at a relatively low level of technology of cultivation of winter wheat, protection against diseases, pests and weeds in the experiment in 2014 have been received quite good indicators of the quality of grain.

Table 2.

Indicators of the quality of grain winter wheat, KFK "Sushko", 2014

Variant	Mass of 1000 seeds, g	Protein content, %	Gluten content, %
Don95(контроль)	39,0	14,6	26,8
Irishka	46,0	15,3	26,6
Zustrich	40,0	12,9	26,0
Tanais	36,0	14,2	25,4
Petrovchanka	37,0	11,5	25,0

The protein content in wheat varieties differed in most high protein content observed in grades Irishka - 15.3% and -14.6% 95 Don.

More gluten different sort of Don 95 and Irishka. In these grain varieties contain gluten 26.6 - 26.8%, whereas in cv Petrovchanka Tanais and only 25%.

More gluten different sort of Don 95 and Irishka. In these grain varieties contain gluten 26.6 - 26.8%, whereas in cv Petrovchanka Tanais and only 25%.

Summary and conclusions.

Options were considered with the study of the productivity of winter wheat, determined yield and grain quality of winter wheat breeding various research institutes, cultivated in the arid zone.

It was found that the yield increase compared to the standard cultivar Don 95 observed in cultivars Zustrich- 0.3 t / ha and Irishka - 2,0t / ha. Grades Petrovchanka and Tanais, inferior in yield standard, their yield was 3.5 - 3.9 t / ha.

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BACKGROUND OF APPLE SAWFLY HARMFULNESS IN A NORTHERN FOREST STEPPE OF UKRAINE

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Abstract. There are given results of research on hazard of apple sawflies, and also crop losses caused by female offspring of a pest. It is established, that in years with a big amount of flowers and intense fruit forming, damage by maggots of apple sawflies to 32% of the ovary does not cause yield reduction because the ovary, which has remained on the tree has the best conditions for growth and compensates the reduction of fruits quantity by increasing of their mass.

Key words:apple sawfly, ovary, harmfulness, yield.

Raising of the question. Harmfulness of insects - is one of the results of their interaction with forage plants at level of organism and population. But not always influence of herbivores reduces the productivity (yield) of plants. It depends on damaged plants and the extent of their damage. Insects that damage plants generative organs, what is the most valuable agricultural products, as a rule, tend to be the most dangerous. But at level of individuals, some (sometimes very significant) compensation of losses is possible in case of damage these organs at the beginning of their development (buds, flowers, ovary). At many plants there laid more reproductive organs than they are able to bring to maturity (extra buds or ovary fall). Damage of loss-making organs does not affect the crops [2]. According to some authors [1], a small number of herbivores in the garden does not cause significant damage to plants, and sometimes even increases the yield and improves the quality of the product, for example, grade of harvest, normalizing the number of flowers, ovaries and fruits. Thus, in years with lots of flowers on apple and good forming of fruits, damage by blossom weevil to 50-60% of buds are not reflected negatively on productivity. Thereby pests as if given the opportunity to norm their number. Excluding some insecticide treatments against the first generation of codling moth normalize the actual volume of the ovary. As the result, there are less fruits on the tree while harvesting, but they are larger and of higher grade.

In order to determine the need for garden insecticide spraying and exclusion of unnecessary treatments against apple sawflies, we conducted special studies aimed at establishing the harmful effects of this type of crop. This is an important, yet time-consuming process, because the ovary, damaged by herbivores, falling together with physiologically abnormal.

Materials and methods of research. Harmfulness of apple sawflies was determined by modeling the damage. With this aim in the apple orchard of Idared sort planted in 1998 (planting scheme 4 x 2,5 m) there were selected model trees with the same degree of development. At each of them at the beginning of sawflies fly we left 350 fruits for records. All these trees were sprayed against sawflies by zolon 35% c.e. (3.0 l / ha) in two periods - before flowering and at the transition of larvae from the first to the second fruit. From the model fruits in terms that correspond to the transition of sawflies larvae in uninhabited fruits, we plucked some of them, which

together accounted for 10 to 40% of the ovaries (at some trees 10%, on the other - 15, 20 and so up to 40%). Later on at each of model trees we counted number of ovaries after plucking of certain percentage and the number of fruits at harvesting. Also we selected control - without removing the fruits. Against other pests and diseases in the area of research were conducted sprayings by pesticides with the addition of carbamide (0.5%, 1000 l / ha). These measures safely protected the trees from damage by other pests and diseases, while treatment by carbamide remained ovary, preventing it's falling. During harvesting it was determined the average weight of a fruit, the yield from one tree and plantings in general.

In addition, it was studied the harmfulness of the offspring of one pair of apple sawflies. For this at model trees of the sort Golden Delicious of 1994 planting were installed gauze insulators in the middle of which was a hundred of fruits (including maximum actual fertility of females 90 eggs). In each isolator were placed a pair of sawflies (female and male) after their exit from the pupae. Later in isolators were counted the number of ovaries damaged by larvae of the first age, and the number of physiological windfall. In autumn we determined the average weight of a fruit, harvest from a tree and calculated crop losses from the offspring of a pair of sawflies. Experiments were performed in the apple gardens of Agricultural Complex "Tarasivskiy" Kiev Sviatoshynsky district, Kyiv region.

It was found (Table. 1), that harmfulness of apple sawflies under favorable meteorological conditions (during flowering) for fruit appearing at sort Idared appears in average at removing 32% or more ovaries.

Thus, at the control plot (without modeling of damage) preserved whole ovary and the yield was 31.3 kg from one tree, and the total yield of fruits - 3130.0 kg / ha, with an average mass of an apple 95 g, so fruits sizes were small. At variants where there were artificially modeled pest extermination of ovaries from 10 to 30%, yield from one tree ranged from 31.8 to 33.0 kg and was higher than the control. The total yield was 3180.0 - 3300.0 kg / ha respectively. But in the variant of the destruction of fruit by 10-20%, the average weight of apples was small, but slightly higher than in control - 105-115 g. In other variants it was higher (120-135 g).

A significant reduction in yields is occurring at the destruction of 35% of ovaries by insects, when in average there were harvested 30.0 kg of apples from one tree, which is 1.3 kg less than at the control variant, with the total yield decreasing to 130.0 kg / ha. At the damage by herbivores of 40% of ovary the total yield has decreased in comparisson with the control to 300.0 kg / ha.

It was marked single damage of fruits by apple moth, but it is not affected significantly the total weight and the yield.

Consequently, the damage by apple sawflies larvae with a large number of ovary does not reduce yield because the ovary, which remained on the tree has the best conditions for growth and compensate the reduction of the number of fruits by their mass increasing. As a result, the cost of the received crop may be higher because there were not spend money on plant protection.

Table 1

The yield of apples based on the number on ovary at the tree (Agricultural Complex "Tarasivskiy 'Idared sort, planting scheme 4 × 2,5 m)

Variant of experiment*	Total number of ovary in accounting, pcs.	Plucked ovary after blossoming		The average weight of fruit during harvesting, g	Yield from a tree, kg	Yield of plantings, kg/ ha
		pcs.	%			
Control	350	0	0,0	95,0	31,3	3130,0
1	350	35	10,0	105,0	33,0	3300,0
2	350	52	15,0	110,0	32,7	3270,0
3	350	70	20,0	115,0	32,5	**3250,0**
4	350	77	22,0	120,0	32,7	**3270,0**
5	350	84	24,0	122,0	32,4	**3240,0**
6	350	91	26,0	125,0	32,4	**3240,0**
7	350	98	28,0	128,0	32,2	**3220,0**
8	350	105	30,0	130,0	31,8	**3180,0**
9	350	112	32,0	131,0	31,2	**3120,0**
10	350	122	35,0	132,0	30,0	**3000,0**
11	350	140	40,0	135,0	28,3	**2830,0**
HIP_{05}				4,09	1,19	

*Comment: * - number of model tree*

To predict the possible loss of harvest from apple sawflies, the portion of losses caused by the offspring of one pair of imago pest has practical importance. To establish the possible loss of apple crop in gauze insulators was laid one pair of adult sawflies after their exit from the pupae.

As a result, it was noted (Table. 2), that the larvae of the first age have damaged in average 53.7 ovaries and one false caterpillar caused falling of 4.2 fruits. These figures show that the offspring of a female may damage 226 fruits (53,7 × 4,2 = 225,5).

Table 2

Harmfulness of posterity of one pair of apple sawfly (Agricultural Complex «Tarasivskiy»)

Number of isolator	Quantity of fruits in isolator, pcs.	Quantity of fruits, damaged by larvae of first age, pcs.	Average fruit damage one larva, pcs. (during 2001-2003)	Total number of fruits damaged by one female's offspring, pcs.	The average mass of a fruit, g	Calculated Losses of fruits weight, kg
1	73	54,0	4,2	226,8	85,0	19,3
2	71	48,0	4,2	201,6	90,0	18,1
3	80	62,0	4,2	260,4	84,0	21,9
4	79	53,0	4,2	222,6	86,0	19,1
5	68	45,0	4,2	189,0	92,0	17,4
6	76	60,0	4,2	252,0	94,0	23,7

Total	447	322,0		1352,4	531,0	119,5
Average in experiment	74,5	53,7	4,2	225,5	88,5	19,9

During the harvesting the average weight of apple of sort Golden Delicious was 88.5 g. Thus, in the average larva of one pair of sawflies can destroy 19.9 kg of fruits from one tree (88,5 × 225,5 = 19,9). fruit maggots sawflies to 32% of the ovary does not cause yield reduction because the ovary, which has remained on the tree has the best conditions for growth and compensates the reduction in the number of fruits by increasing of their mass. The loss of crop from one tree caused by one female's offspring, in average is 19.9 kg. This figure is advisable to consider at forecasting the possible loss of yield caused by herbivores.

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CALCULATION OF THE THRESHOLD APPLE SAWFLIES QUANTITY DEPENDING ON PRODUCTIVITY AND THE SCHEME OF APPLE TREES PLANTING

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Abstract. It was determined the threshold of apple sawflies quantity, depending on the planned yield of apple and various schemes of planting.

Key words: apple sawflies, quantity, threshold, productive ovary, productivity.

Raising of the question. Determination of the threshold of quantity is an obligatory step in the development of protecting measures against any pest. The threshold quantity - is the beginning of the insect's damage display. The economic threshold of harmfulness (ETH) – is a crop losses, preventing of which are economically and environmentally justified by use of active measures of plant protection.

It should be noted that the economic threshold of herbivores harmfulness depends on a number of environmental and economic factors. On its fluctuations affect weather conditions, the level of the yield, varietal characteristics of plants useful entomofauna, safety measures and other factors. Therefore, it is not a constant figure [2].

As for the threshold of apple sawflies quantity, in the foreign literature can be found interesting information. In the Netherlands believe that harmfulness of herbivores depends on the sensitivity of the sort to frost during flowering of apple trees and the weather during this period. Thus, in years with generous fruit forming may be 15 to 30 eggs of sawflies, and during frost at flowering - from 5 to 10 eggs per one hundred blossoms [6]. To determine the feasibility of using chemical

methods to protect the garden in some european countries it is proposed to replace labor-intensive counts of pest quantity on plants for insects catch in traps. For example, in Switzerland it is defined the threshold quantity of sawflies, which is 20-30 imago per one white adhesive plate, and in the Czech Republic tthis figure is somewhat lower - 18 insects [4, 5]

In domestic literature it is suggested ETH of sawflies, which is 2-4% of damaged ovaries [1]. But the application of chemical treatments by this criterion of feasibility is leading to significant loss of yield (Table. 1).

Thus, at the yield of 10 t / ha and use of ETH 2-4% possible losses are 200-400 kg of fruits, at 40 t / ha - 800-1600 kg respectively. This threshold was calculated on the base of estimated fruits damaged by pest during their harvesting. However, this does not include weight gain of undamaged fruits, that was occured by reducing the number of ovaries on the tree. A major shortcoming of rates expression in percentages is that in depending on the size of the yield, the same percentage characterizes different absolute values of losses. In addition, the calculation of the ovary, damaged by sawflies, is not suitable as a method of forecasting, because at that time the processing will be too late.

Table 1

Estimated apple yield losses during harvesting caused by sawflies ovary damage at ETH at 2 and 4%

Yield	Possible yield losses at damaging of 2% fruits, kg	Possible yield losses at damaging of 4% fruits, kg
100 kg/tree	2,0	4,0
1000 kg/ha	20,0	40,0
10 t/ha	200,0	400,0
40 t/ha	800,0	1600,0

Some authors suggest [3] to consider as ETH the presence of 10 mago per a tree during the fly of sawflies, herewith it is not specified the volume of the crown, yield, planting scheme, although these figures play an important role in making the decision to use chemical treatments against herbivores.

Materials and methods. Data on the sawflies harmfulness enable us to calculate the threshold of this herbivores quantity in gardens with various planting schemes and depending on the planned productivity of a garden 20, 32.5 and 40 t / ha. For the calculation we should have the following: a planned yield, the necessary amount of productive ovary per a tree, the maximum actual fertility of females, pest sex ratio and set (experimentally) the allowable amount of ovaries damage by the pest, and also to conduct such calculations: the number of productive ovary (pcs. / tree) required to obtain the planned yield, multiplied by the set allowable amount of damaged ovaries (in percentage) and divide by 100. We will get a number of the ovary, the possible destruction of which would not affect the yield. Dividing this amount by 90 (the maximum actual female fertility), we obtain the number of female offspring are able to damage the amount of productive ovaries within acceptable. Knowing the sex ratio of insect, we calculate the threshold quantity of herbivores.

Results of the researches. Ratio of sawflies females and males in average during years of researches in our experiments amounted 1 : 0.9, is ten females accounted for nine males. It is known, that one female of herbivores can lay 90 eggs maximum [1]. Quantity of productive ovary at planned yield was calculated in spring. Based on these data, we calculated the threshold of apple fruit sawflies quantity at the planned yield 20.0; 32.5 and 40.0 t / ha with different schemes of trees planting. For this it is necessary to multiply the required quantity of productive ovary by 32 and divide by 100 and we got permissible damage of productive ovary by sawflies. Dividing this amount by 90 (the maximum actual fertility of females), we have received the number of females, offspring of which are capable to damage 32% of productive ovary. Knowing the sex ratio of insects it is easily to set the threshold of herbivores quantity.

As a result of occured calculations it was set (Table. 2), that in the Northern steppes of Ukraine threshold of apple sawflies quantity at planting scheme 8 × 6 m and planned yield of 100 kg per a tree (20.0 t / ha) there are 8 pieces of females and males per a tree (1250 x 32 ÷ 100 = 400; 400 ÷ 90 = 4.4 pcs. females). Taking into account the sex ratio, we receive the threshold 8 imagos / tree. At yield 156.0 kg / tree (32.5 t / ha), this figure is 13, at 192.0 kg / tree (40.0 t / ha) - 16 imagos. The threshold at apple planting at 8 × 4 m is 5; 8 and 10 females and males on the plant, and at scheme 6 × 4 m -3; 6 and 7 ind. / tree respectively. Availability of 2-6 insects of both sexes on the apple tree at the planting scheme 5 × 4 m is a threat to future yield. In more dense planting, namely 4 × 2 m the threshold of pest population is reduced to 1-2 individuals per tree.

At populations of plantations below the threshold the protection measured may not apply, but at a higher yield reduction is significant.

Threshold of pest quantity is necessary to specify depending on weather conditions, that affect herbivores female fertility (rainy, dry or moderately warm weather during flowering), number of fruits that formed, productivity, pomology sort, trees planting schemes in the garden and other factors.

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INFLUENCE VARIETAL CHARACTERISTICS AND GROWING SEASON TERMS ON ALPHA-ACIDS IN HOP CONES

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Abstract. The effects of the varietal characteristics and conditions of the vegetation on the content of alpha acids in hops cones. Established that the content of alpha acids in hops varieties of aromatic type affect more features than the variety of vegetation weather conditions.

Key words: Varieties, hop, alpha acids, hop cones, vegetation conditions.

For many years to hop Ukraine has been highly profitable specific culture, which is an advanced production able to satisfy demand brewing industry and other sectors of the economy unique raw materials. Ukrainian varieties of hop aroma and bitter groups, thanks to favorable agro-climatic conditions for growing them, and have long been famous for high quality breweries.

Using biochemical composition of plant breeding to identify varieties of great importance in the hop. Breeding hop varieties differ in morphological features. However, the production of varieties cultivated row with the same phenotype, which differ only on the biochemical composition of components of hop cones. Therefore, you must conduct biochemical research hop varieties for their accurate identification [1,4].

The formation of the crop and intensity of biosynthesis in the cones of hop bitter substances, essential oil, polyphenol compounds affect weather a period of growth and development of plants hops. Some authors have suggested that the maximum

number of common tar accumulates in the hop cones when the period of flowering and forming the average temperature does not exceed 16-19 ° C. The existence of a close relationship between the process of accumulation of bitter substances and providing moisture plant hops [3]. Established that there is a relationship between the amount of active temperatures (temperatures higher amount + 10 ° C) and the total content of resins and alpha acids in different varieties of hops. The maximum number of common resins and alpha acids accumulated in the years when the start of plant growth to a phase of technical maturity cones sum of active temperature was 1800-2000 °C [2].

GIVEN THAT THE EXISTING LITERATURE DATA ON THE EFFECT OF WEATHER CONDITIONS ON THE FORMATION OF COMPLEX SUBSTANCES IN HOPS CONES VARIED AND VERY LIMITED, SO THE RESEARCHES WE PAID ATTENTION TO THE STUDY OF THE SUBJECT CONTENT OF ALPHA ACIDS GIVEN VARIETAL CHARACTERISTICS.

The aim of research was to study the impact of agro-climatic conditions and varietal characteristics of the content of alpha acids in hops cones.

Material and methods of research. Research carried out during 2014–2015 years the department has storage technology, processing and product standardization Ya. prof. B.V. Lesik NUBiP Ukraine and certified laboratory in the Department of Biochemistry hops and beer Institute of Agriculture Polissia NAAS of Ukraine. Research conducted with the most common varieties in terms of production of hop aroma type: Slavyanka (control), National, Zagrava that were grown at the Institute of Agriculture hopsfield Polissia NAAS of Ukraine.

Results. The content of alpha acid hop is one of the most important characteristics that determine the value of the raw hops. Acids contained in hops have a certain level of bitterness. This level depends on the varietal characteristics, weather and climate, the timing of collection, storage and others.

As a result of studies found that the formation of hop cones as domestic varieties of the aromatic type as raw materials for beer production, is based on the characteristics of the variety of vegetation and weather conditions (Fig.).

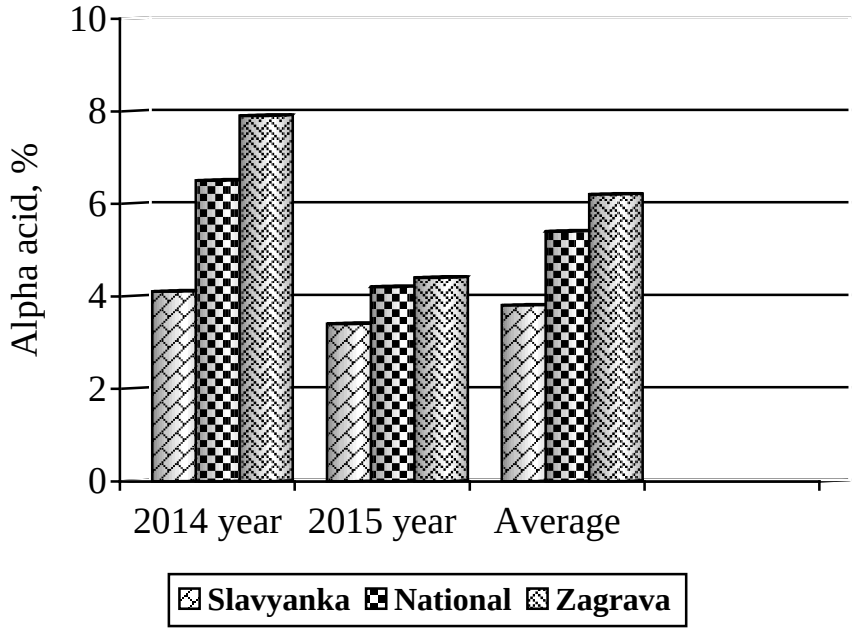

Fig. The content of alpha acids in hops cones% for the 2014-2015 biennium.

Depending on the particular variety and agro-climatic conditions in the accumulated hop cones from 3.4% (in Slavyanka grade control) to 7.9% (Zagrava) alpha acids. Fewer alpha acids was observed in 2015 in varieties Slavyanka - 3.4% and National - 4.2%. This is because the spring growing season in 2015 was extremely unfavorable for the growth and development of plants hops. The average air temperature exceeded the average long-term rates on 1,2-4,4 ° C, precipitation for the period amounted to only 50% of normal, during this period form the hop plant and provides potential for future harvest.

On average in 2015 was at record high temperatures in the growing season, which was 16,1 ^{o}C, while the average multi – 12,5 ^{o}C. The lack of rainfall and high temperature negatively influenced the formation and accumulation of alpha acids in hops cones. Higher alpha-acids observed in 2014 in the National varieties – 6.5 % and Zagrava – 7.9 %.

Based on the analytical data (Table.) held two-factor anova experiment changes in the content of alpha acids, depending on the features botanical variety (Factor A) weather conditions and vegetation (Factor B). Was established significant difference between the varieties of hops on the content of alpha acids 5% significance level.

NIP_{05} = 0,62 (Fф (146,80) > Fт (2,69)).

The content of alpha acids in hops cones, %

Varieties of hops	2014 year	2015 year	Average	to ± control
Slavyanka (k.)	4.1	3.4	3.8	_
National	6.5	4.2	5.4	+1.6

Zagrava	7.9	4.4	6.2	+ 2.4
NIP_{05}	0.44	0.32	0.51	–

Since the criteria Fischer actual Fa, Fb and FAB much larger than the theoretical criteria at both levels of probability, it features botanical varieties of hops and weather conditions during the growing season affect the accumulation of alpha acids in hops varieties. Since alpha acids varies considerably from year to year, it shows curvilinear relationship. To analyze the dependence of alpha acid content of varietal characteristics and weather conditions of vegetation, determined correlation ratio (ηyx) and correlation error ratio Sηyx. Correlation ratio ηyx (1) to factor A (ηyx (1) = 0,84 ± 0,03), for factor B (ηyx (1) = 0,29 ± 0,05). Thus, the accumulation of alpha acids in hops aromatic varieties such features affect more variety (as the correlation ratio is 0.84, which indicates a strong relationship between these factors). Correlation ratio of 0.29 indicates a weak link between weather factor influence on the accumulation of alpha acids.

For quantitative content of alpha acid hop varieties we studied are divided into groups, with an average content of alpha acids up to 5% - a sort of Slavyanka; with a high content of alpha acids 6-11% - a variety Zagrava and National. Discovered medium and strong ties between the characteristics of the variety and content of alpha acids (ηyx = 0,61 ± 0,02 ... 0,84 ± 0,03) in the context of the studied varieties of hops.

Conclusions

1. Formation of hop cones as domestic aromatic varieties such as raw materials for beer production, is based on the characteristics of the variety and weather conditions of vegetation. Depending on the particular variety and agro-climatic conditions in the cones of hop alpha acids accumulate from 3.4% (in Slavyanka grade control) to 7.9% (Zagrava).

2. Content of alpha acids in hops aromatic varieties such features affect more variety (as the correlation ratio is 0.84, which indicates a strong relationship between these factors). Correlation ratio of 0.29 indicates a weak link between weather factor influence on the accumulation of alpha acids.

3. Revealed medium and strong ties between the characteristics of the variety and content of alpha acids (ηyx = 0,61 ± 0,02 ... 0,84 ± 0,03) in the context of botanical varieties.

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BIOCHEMICAL PARAMETERS OF MAIZE GRAIN DEPENDING ON THE TECHNOLOGY POST HARVEST HANDLING

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Abstract. In this article was studied the amount of protein and starch in the corn seed of different hybrids and in the result of different types of post-harvest improvements. According to results, found out that there are more protein in corn seeds of Holosiivskiy and Techny hybrids, however the amount of starch is higher in Solonyanskiy and Louis hybrids. Higher rate of protein is provided by the technology: collecting corn cobs + ventilation + processing + aerodynamic separation. The starch enrichment is due to: collecting corn cobs + ventilation + processing + sieve-air separation.

Key words: grain, corn, hybrids, protein, starch, post-harvest improvements.

The quality of the harvest depends on the essence of climate, soil and technical factors. Modern growing and post-harvest improvements technologies require deep knowledge on the impact of every technological methods on the quality and safety of the harvest.

Corn processing technology includes pre-treatment of the major contaminants in mine drying, drum dryers and bunker, cleaning of grain impurities and foreign material separator. Modes of drying and cleaning set depending on the purpose and quality of the finished product [1, 3-5].

Grain corn in its composition contains 9-12 % protein, 65-70 % carbohydrate, 4-8 % oil, 2 % minerals. The key is a protein maize prolamin, globulin and hlyutelin. At the same time corn proteins are unevenly distributed, so about 70 % globulin grains are concentrated in the germ and endosperm in the shell and dominated zeyin and hlyutelin.

It is known that starch is a key biochemical component of corn. Its content ranges from 65-75 % and more than a third of grains. The magnitude of losses depends much starch duration of storage of grain and using it for certain purposes [2, 5].

Materials and Methods. The research is based on the aboratory of department technology of storage, processing and standardization of plant products after prof. B.V. Lesik of NULES of Ukraine and Scientific production subsection “Ukrelitcentr” village of Motovylivska Slobidka, Fastiv district, Kiev region. In the research are used 4 corn hybrids: 2 of Ukrainian selection (Holosiivskiy 260 CB and Solonyanskiy 298 CB) and 2 of French (Louis and Techny). Types of corn post-harvest improvements were studied with the sees humidity of 20-27% and 28-30%: 1. harvesting of grain + sieve-air separetion + grain drying (control); 2. harvesting of grain + aerodynamic separation + grain drying; 3. harvesting of grain + sieve-air separation + ventilation; 4. harvesting of grain + aerodynamic separation + ventilation; 5. collecting corn cobs + drying + processing + sieve-air separation; 6. collecting corn cobs + drying + aerodynamic separation; 7. collecting corn cobs + ventilation + processing + sieve-air separation; 8. collecting corn cobs + ventilation + processing + aerodynamic separation.

Results. Various characteristics affected the biochemical composition of corn – especially protein. Corn hybrid Holosiivskiy dominated over others samples: to 0.7-1.0 % – Tecno hybrid; 1.6-2.0 % – hybrid Luigi and to 3.2-3.6 % – hybrid Solonyansky.

According to the received data, the highest results this hybrid obtains by collecting cobs + ventilation + processing + aerodynamic separation with the initial humidity 20-27 %.

Protein content is higher at harvesting in corn cobs rather than in the grain with any kind of post-improvements. Although the difference is not crucial (taking in consideration of experimental inaccuracy ±0.5 %), however, it indicates the transfer of nutrients from cob to the grain during the post-improvement period. The difference in protein content in the different technologies varies between 0.2-0.7 %.

The lowest rate has the control sample, which uses aerosieve separation, which effectively removes small grains. In turn, small grains are rich in proteins in contrast to large grains.

Also the higher rate of protein was discovered in corn grains with the humidity of 20-27 % in comparison with 27-35 %. This difference is small within the experimental inaccuracy.

Dispersive analysis showed a significant effect on the rate of all factors: the hybrid, humidity, post-harvesting improvement.

The greatest influence on protein content have hybrids for humidity 20-27 % – $F_{calc} = 1889.62 > F_{crit} = 3.07$ and slightly smaller than for humidity 28-35% – $F_{calc} = 453.37 > F_{crit} = 3.07$.

The post-harvesting improvement affected greatly the content of proteins in hybrids: Holosiivskiy – $F_{calc} = 36.15 > F_{crit} = 3.79$; Solonyanskiy – $F_{calc} = 50.07 > F_{crit} = 3.79$; Luigi – $F_{calc} = 93.83 > F_{crit} = 3.79$ and Techny – $F_{calc} = 62.28 > F_{crit} = 3.79$; with the humidity 20-27 % – $F_{calc} = 16.76 > F_{crit} = 2.49$.

Also, a significant impact on Investigated indicators for the different technologies was humidity in hybrids: Holosiivskyi – $F_{calc} = 30.49 > F_{crit} = 5.59$; Solonyansky – $F_{calc} = 22.61 > F_{crit} = 5.59$; Luigi – $F_{calc} = 14.41 > F_{crit} = 5.59$ and Tecno – $F_{calc} = 19,21 > F_{crit} = 5.59$.

One of the main objectives of our research was to determine the impact of post-harvest improvement technologies on starch content in corn hybrids of different and varying humidity. The research results are presented in Table 2.

As you can see, after post-harvest improvements the highest starch content was in corn hybrid Solonyansky – 74.4-74.9% and slightly lower in hybrid Luigi – 72.3-73.6 %. Also, the starch rate was slightly higher by 0.1-0.2 % with the humidity 20-27 %.

Table 1

The protein rate in corn different hybrids and post-harvest improvement technologies

	Variants	Hybrids							
		Holosiivskiy 260 CB		Solonyanskiy 298 CB		Luigi		Techny	
		Hymidity, %							
		20-27	28-35	20-27	28-35	20-27	28-35	20-27	28-35
	harvesting of grain + sieve-air separation + grain drying (control)	10.92	10.76	7.64	7.58	9.06	9.01	10.07	10.03
	harvesting of grain + aerodynamic separation + grain drying	11.09	10.95	7.71	7.67	9.08	9.04	10.12	10.08
	harvesting of grain + sieve-air separation + ventilation	10.94	10.87	7.64	7.60	9.17	9.12	10.04	10.02
	harvesting of grain + aerodynamic separation + ventilation	11.18	11.03	7.76	7.72	9.23	9.19	10.15	10.10
	collecting corn cobs + drying + processing + sieve-air separation	10.96	10.87	7.80	7.78	9.34	9.30	10.27	10.19
	collecting corn cobs + drying + aerodynamic separation	11.20	11.16	7.82	7.76	9.58	9.53	10.36	10.28
	collecting corn cobs + ventilation + processing+ sieve-air separation	11.44	11.21	7.87	7.85	9.42	9.36	10.49	10.36
	collecting corn cobs + ventilation + processing + aerodynamic separation	11.57	11.33	7.94	7.83	9.76	9.58	10.64	10.48

As for the gathering technology, collecting in corn cobs has more advantages, as the protein content was higher by an average of 0.3-0.7 % compared with collection in grains. In general, the highest starch rate was provided by the technology – harvesting from cobs + ventilation + processing + sieve-air separation with grain moisture 20-27 %. Due to the passage of post-harvest ripening grain starts, careful drying and cleaning quality with the release of most major grains rich in starch.

It is reached by passing post-harvesting period in cobs with careful drying and cleaning quality allowing separating the largest grains rich in starch.

Mathematical processing of starch content in corn under different types of post-harvest improvement technologies identified a statistically significant effect on the rate of all factors, in exception of humidity and hybrid technology Solonyanskyi. The greatest influence on the starch content had post-harvesting improvements of hybrids: Holosiivskyi – F_{calc} =1753.25 > F_{crit} = 3.79; Luigi – F_{calc} = 979.11 > F_{crit} = 3.79 and Techny – F_{calc} = 6837.64 > F_{crit} = 3.79. Significant impact on the studied parameters in different technologies for hybrids has the humidity 20-27% – F_{calc} = 341.00 > F_{crit} = 3.07 and humidity at 28-35% – F_{calc}=542.06 > F_{crit} = 3.07. Also, a significant effect on the starch content was humidity in hybrids: Holosiivskyi – F_{calc} = 191.65 > F_{crit} = 5.59; Luigi – F_{calc} = 148.12 > F_{crit} = 5.59 and Techny – F_{calc} = 130.84 > F_{crit} = 5.59.

Conclusions

1. High performance protein after passing the post harvest handling characterized corn hybrids Holosiivskyi and Tecno – above 10-11%, grain latter can provide high quality groats, flour and animal feed.

2. High levels of starch were corn hybrids Solonyansky and Luigi, which will provide a high yield of starch, malt and alcohol.

3. The highest biochemical parameters of corn, obtained during harvesting in cobs, the latter extends the accumulation and synthesis of complex compounds from simple.

4. The best technology for high-protein corn are: harvesting in cobs + ventilation + processing + aerodynamic separation;

5. Higher rates of starch technology provides: harvesting in cobs + ventilation + processing + sieve-air separation.

Table 2

The starch rate in corn different hybrids and post-harvest improvement technologies

	Variants	Hybrids							
		Holosiivskiy 260 CB		Solonyanskiy 298 CB		Luigi		Techny	
		Hymidity, %							
		20-27	28-35	20-27	28-35	20-27	28-35	20-27	28-35
	harvesting of grain + sieve-air separation + grain drying (control)	70.58	70.53	74.58	74.51	73.46	73.39	71.37	71.30
	harvesting of grain + aerodynamic separation + grain drying	70.06	69.97	74.93	74.18	72.46	72.33	69.86	69.81
	harvesting of grain + sieve-air separation + ventilation	70.67	70.61	74.71	74.66	73.53	73.41	71.40	71.36
	harvesting of grain + aerodynamic separation + ventilation	70.24	70.18	74.59	74.43	72.84	72.73	69.93	69.86
	collecting corn cobs + drying + processing + sieve-air separation	70.79	70.72	74.87	74.81	73.60	73.48	71.51	71.42
	collecting corn cobs + drying + aerodynamic separation	70.38	70.32	74.76	74.68	73.24	73.08	71.08	71.02
	collecting corn cobs + ventilation + processing+ sieve-air separation	70.83	70.78	74.93	74.85	73.66	73.54	71.57	71.49
	collecting corn cobs + ventilation + processing + aerodynamic separation	70.56	70.49	74.61	74.52	73.30	73.21	71.17	71.09

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QUALITY OF MAIZE GRAIN OF HYBRIDS DIFFERENT GROUPS OF RIPENING GROWN IN A NORTHERN FOREST STEPPE

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Abstract. Qualitative indicators corn grain a hybrid of different maturity was investigated. The best indicators of nature, the mass of 1000 grains in corn hybrids of FAO 330–390, allowing their use for the production of flour and cereals was establishing. Higher rates germination has corn hybrids of FAO from 200 to 320 that may be used for the production of malt and alcohol.

Keywords: corn, grain, hybrids, group of maturity, quality indicators.

Corn is one of the most popular in Ukraine and abroad grain crops, fodder and vegetables.

According to FAO, today in the world of corn produced more than 500 different primary and by-products. Every year the interest in not only corn as grain, fodder valuable, but the culture that nowadays can be widely used as raw materials for industry and for the manufacture of food products. Today the world production of this crop for about 30 % of gross harvest is used for technical and food purposes. For grain the basic crops of corn are located in our country in the Steppe and Forest Steppe [1, 3, 4].

Between the duration of the growing season and harvest there is a close correlation. In this connection for growing of corn necessary to choose those hybrids that will fully utilize the growing season of the region and give maximal yield. Hybrids of corn are distinguished by group of ripeness. For comparison this indicator are used number of FAO. The entire assortment of world of corn distributed by FAO – numbers from 100 to 900 [4, 5].

The quality of grain corn factors of cultivation and post harvest handling and storage influencing. In order to get high quality corn grain should hold a series of operations post-harvest processing. Thus, maximum attention should be paid to drying of corn cobs.

Place and store grain on the basis of its type, condition and quality category (humidity and pollution). Corn of various types parts stored in different ways because of structural features of grain and unequal hygroscopic of glassy and powdery. Corn stored separately by quality grade, as one that is grown without pesticides and designed for the production of baby food [2, 4-6].

Materials and methods. Study was carried during 2013-2014 from 32 samples of grain corn hybrids of different maturity groups in the laboratory of department technology of storage, processing and standardization of plant products after prof. B.V. Lesik of NULES of Ukraine. Samples of corn were grown separated subdivision of NULES of Ukraine “Agronomic Research Station” (zone Northern Forest Steppes of Ukraine) to the typical black soil low humus by particle size coarsely dusty medium loam.

Before laying on storage of grain hybrids corn was dried to humidity of 15 %. In the experiments used a solar-air drying.

Samples of corn were analyzed in terms of quality (humidity, output of the cobs of grain, nature, 1000 grain mass, germination energy, germination, content protein and starch) of the program of research and compared the data to the existing standard for grain corn.

Results. Research quality assessment corn begin to determine the organoleptic characteristics, odor, color, appearance. Corn hybrids meet the requirements of all current standards – was in a healthy condition, little odor, characteristic sound grain (without musty, mold, malt and other odors), corresponding luster, color, characteristic sound grain type.

After defining organoleptic characteristics all prototypes were tested for the presence of live pests in various stages of development. Grains of all the options were not infected – during the test did not find any dead or live pests.

As can be seen from the table the highest performance out of cob corn characterized by hybrids: P9578 (87.8 %), P9025 (86.5 %), PR39T13 (85.6 %), PR38NO86 (85.4 %). The lowest output of grain to the cob had hybrids: PR39H32 (81.3 %), PR39R20 (81.8 %), PR39T45 (81.9 %).

Table

The quality of grain corn hybrids of different maturity groups grown under conditions separated subdivision of NULES of Ukraine "Agronomic Research Station"

	Name hybrid	Ripeness the catalog (FAO, units)	Indexes				
			Yield grain to the cob, %	Nature, g/l	1000 grain mass, g	Germination energy, %	Germination
	2	3	4	5	6	7	8
	PR39A50	200	83	775	367.83	74	92
	PR39A61	200	83.2	716	328.25	74	99
	PR39H12	200	83.4	763	346.12	55	83
	PR39H32	200	81.3	712	314.26	75	100
	PR39K13	220	79.4	720	307.59	93	97
	P8000	230	84.8	722	311.64	88	91
	PR39H83	230	84.5	716	271.98	86	98
	PR39V45	230	82.7	752	359.57	86	93
	PR39R86	250	82.6	770	372.21	82	90
0	PR39T13	250	85.6	741	345.74	56	67
1	PR39T45	250	81.9	721	368.18	56	71
2	PR39D81	260	82.4	731	308.85	94	100
	P8529	270	84.9	732	323.82	74	94

3							
4	PR39R20	280	81.8	786	390.41	37	65
5	PR39B76	280	84.7	738	336.46	85	89
6	P8659	290	83.9	720	282.98	85	99
7	PR39F58	290	85.5	726	331.06	76	85
8	Klarika	310	83.2	747	328.55	81	89
9	P9000	310	82.0	781	318.19	82	90
0	P9025	330	86.5	793	393.27	55	64
1	PR38N86	320	85.4	759	381.97	80	95
2	P9400	330	82.7	778	384.70	48	55
3	PR38D89	330	83.9	745	414.26	43	55
4	PR38A79	330	82.3	780	425.42	37	51
5	P9578	350	87.8	779	407.59	19	22
6	PR37N01	390	84.0	696	490.29	11	16
7	PR37Y12	390	83.3	716	446.36	9	23
8	PR38H67	390	83.0	740	397.06	22	37
9	PR38A22	390	82.4	718	508.77	13	18
0	PR38A24	390	82.6	770	487.61	4	12
1	PR37F73	440	83.5	782	487.87	3	10
2	PR35F38	490	84.7	761	447.91	4	6

The lowest yield of grain to the cob with hybrids: PR39H32 (81.3 %), PR39R20 (81.8 %), PR39T45 (81.9 %).

Nature – one of the earliest indicators of the quality of grain, which is widely spread in the world and is used to this day. Nature necessarily determine for the grain of flour crops. Researchers found a direct significant correlation (correlation

coefficient 0.762) between nature and output of flour. Nature depends on many factors: moisture, grain shape, debris, damage by pests and more.

Research has found that the bulk density dependent on corn hybrids. The highest levels of nature characterized corn hybrids: P9025 (793 g/l) PR39R20 (786 g/l) PR37F73 (782 g/l) PR38A79 (780 g/l), P9000 (781 g/l). The lowest figures recorded in hybrids: PR37N01 (696 g/l) PR37Y12, PR39A61, PR39H83 (716 g/l).

For corn seed and technological purposes (malt, alcohol) is important to its viability. The indicators of vitality vigor and is especially similarity (ability to germinate as this figure is called a standard for corn for use in malt).

100 % germination for the duration of laying the storage characterized corn hybrids: PR39H32, PR39D81. High performance similarity: 99 % – PR39A61, P8659; 98 % – PR39H83. Low rates have similarities hybrids: PR35F38 (3 %), PR37F73 (10 %), PR38A24 (12 %).

Analysis of the 1000 grain mass showed that the highest weight of 1000 seeds were hybrids of corn: PR38A22 (508.77 g) PR37N01 (490.29 g) PR37F73 (487.87 g) PR38A24 (487.61 g). The lowest 1000 grain weight recorded in hybrids: PR39H83 (271.98 g), P8659 (272.98 g).

Conclusions.

1. The best indicators of nature, mass 1000 grains were characterized hybrids of maize FAO 330–390, allowing their use for the production of flour and cereals.

2. High indexes germination had hybrids maize of FAO 200 to 320, which can be used for the production of malt and alcohol.

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THE QUALITY AND SUITABILITY FOR STORAGE CARROTS HYBRIDS CULTIVATION IN THE CONDITIONS OF UKRAINE'S FOREST-STEPPE

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Abstract. The results of the study of economic-biological, 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

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

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 [1].

Storage time determined by 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 [1,4]. 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).

In Ukraine, the 2015 assortment carrots have 122 names, of which – 63 sorts and 59 – hybrids F_1 [2]. In recent years in our country were botanical varieties of carrots with bright yellow, purple and even white colored roots. Dutch researchers studied the beneficial properties of purple carrots and found that the root purple body provides additional protection against cancer and heart disease because, in addition to the high content of carotene, also contains a significant amount of anthocyanin. The quality of new varieties and hybrids of carrots, their suitability for long-term storage poorly studied.

Material and methods research. The study was conducted during 2014–2015 years in National University of Life and Environmental Sciences of Ukraine. For experiments selected eight hybrids new and recommended for cultivation in the conditions of Ukraine's Forest-steppe. Standards were determined of hybrid Vita Longa, used Ukrainian, registered in 1997 [2].

By the scheme of research, in addition to traditional varieties of carrots with orange colored root, include new hybrids Bejo white color (White Sabine F_1), bright yellow (Yellowstone F_1), purple bark and orange core (Purple Haze F_1) (Figure 1). The scheme of the experiment is shown in Table. 1.

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^{0}C in the fall and spring and winter is 0…+2 ^{0}C and relative humidity of 85-95% in unregulated conditions (without artificial cooling).

A B

Fig. 1. General view of the of roots hybrids Yellowstone F_1 (A) and Purple Haze F_1 (B)

Results of research. Results comprehensive assessment of fresh carrot shown in Table. 1.

The largest mass marketable root crop was in hybrids White Sabine F_1 (135.3g) and Yellowstone F_1 (124.3 g), which was 30.2 and 18.8 g, respectively compared with control. The smallest roots formed plant a hybrids of Viking and Mars – 82.5 and 85.4 g.

Root diameter varies from 3.0 to 6.8 cm and the largest was the largest hybrid of roots White Sabine F_1 – 5.4 cm, 0.6 cm compared with controls. The longest roots formed hybrid Evolution F_1 – 22.6 cm, 5.7 cm compared with controls (significant difference). Most were aligned along the length of roots hybrids Napoli F_1 and Yellowstone F_1 (S.F. = 1.4).

The content of dry matter of roots hybrid Purple Haze F_1 (13.5 %) essentially dominated control and other experimental variations in both years of research. Its

advantage over two years, compared with controls was 1.67 %. Most sugars found in root hybrids Purple Haze F_1 and Evolution – 6.83 and 6.08 %.

Table 1

Biometric, biochemical parameters and tasting estimate assortment of carrots, average of the years 2014-2015

Name of the variety	Weight marketable of root	Diameter of root, cm	The length of root, cm	Contents in roots			Tasting estimate, score*
				dry matter, %	sugars, %	β-carotene, mg/100 g	
Vita Longa F_1 (control)	105.5	4.8	16.9	11.83	4.63	8.6	9.0
Viking F_1	82.5	4.9	19.4	12.69	5.24	9.5	8.6
Evolution F_1	99.0	4.5	22.6	12.86	5.78	10.8	9.0
Mars F_1	85.4	4.3	19.7	10.02	4.32	10.4	8.8
Napoli F_1	92.4	3.7	18.5	10.52	4.61	8.5	9.0
Purple Haze F_1	78.6	3.8	19.5	13.50	6.23	6.8	8.8
White Sabine F_1	135.3	5.4	21.5	11.24	4.88	2.3	8.0
Yellowstone F_1	124.3	4.5	19.5	12.40	5.20	6.0	8.6
HIP_{05}	8.2	0.8	3.3	0.9			

*9-point scale.

Most β-carotene accumulated roots hybrids Evolution F_1 and Mars F_1 – more than 10 mg / 100 g. For organoleptic characteristics were best roots hybridsVita Longa F_1, Napoli F_1 and Evolution F_1, who received while tasting the highest score – 9 points.

Established that root length has a direct significant impact on the dry matter content ($r = +0.78 \pm 0.12$) The highest marketability established in root hybrids Yellowstone F_1 (94.6 %) and White Sabine F_1 (93%), which formed the biggest root.

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 hybrids Viking F_1, Purple Haze F_1 and White Sabine F_1 (their keeping quality was 100 %) the worst thing – hybrid Napoli F_1 (76.4 %).

After 5 months of storage masse began to sprout roots hybrid Mars F_1 (58 %). 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 19–40%, and the keeping quality the maximum was roots hybrids Purple Haze F1 and White Sabine F1 – 84.2 та 83.4 %.

After 7 months of storage keeping quality all research roots ranged between 40.5 to 81.5 %. The greatest number of absolute shortages (root amazed or more than half, or completely) found in samples roots hybrid Napoli F_1 (22.5 %). The most total loss after 7 months of storage as found also in samples roots hybrids Napoli F_1 and Mars F_1 – 59.0 and 59.5 %.

Table 2

Keeping quality of different hybrids carrot's for seven months of storage (harvest 2014 year), %

Name of the variety	Quantity marketable products		Including		Natural mass loss*	The absolute shortages	The total loss
	%	± to control	sprouted	± to control			
Vita Longa F_1 (control)	77,0	-	62,4	-	22,5	0,5	23,0
Viking F_1	78,0	+1,0	40,5	-21,9	21,0	1,1	22,0
Evolution F_1	58,4	-18,6	31,5	-30,9	29,2	13,0	41,6
Mars F_1	40,5	-36,5	17,2	-45,2	43,0	16,5	59,5
Napoli F_1	41,0	-36,0	21,0	-41,4	36,5	22,5	59,0
Purple Haze F_1	80,0	+3,0	20,0	-6,4	13,4	6,6	20,0
White Sabine F_1	81,5	+4,5	27,2	-15,5	17,0	1,5	18,5
Yellowstone F_1	49,0	-28,0	33,4	-29,0	46,0	5,0	51,0
LED_{05}	7,7		6,1		5,3		

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

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 hybrids Purple Haze F_1 and White Sabine F_1 – 80.0 and 81.5% quantity marketable products after seven months of storage. High preservation was in root hybrids Vita Longa F_1 and Viking F_1 – 77 and 78 %. However, much of it had sprouted.

Known that better keeping quality, suitability for processing characterized varieties of roots are piled high content of basic biochemical parameters, including – dry matter and starch. The results of biochemical analysis roots studied hybrids after seven months of storage are presented in Table. 3.

Table 3

The content of the basic chemical elements and tasting estimate roots of different hybrids after storage, harvest 2014 year

Name of the variety	The content of dry substances, %	Quantity of sugar, %	The acidity, %	Nitrates, mg/kg*	Tasting estimate, score**
Vita Longa F_1 (control)	11.2	4.00	0.21	169	6.2
Viking F_1	11.2	4.44	0.20	199	6.6
Evolution F_1	11.7	4.24	0.20	157	6.5
Mars F_1	9.6	2.47	0.16	199	6.2
Napoli F_1	9.8	3.73	0.21	183	5.6

Purple Haze F_1	12.8	4.98	0.16	204	6.9
White Sabine F_1	10.4	4.19	0.16	155	7.0
Yellowstone F_1	11.8	4.46	0.20	150	6.1
LED_{05}	0.6				

*the maximum permissible concentration – 250 mg/kg; **9-point scale.

The greatest amount of dry matter after 7 months of storage detected in roots hybrid Purple Haze F_1 – 12.8 % (by 1.6% compared with the control). The high content of dry matter was roots hybrids Yellowstone F_1 (11.8%), Evolution F_1 (11.7%), also Vikihg F_1 and Vita Longa F_1 (control) – 11.2 %. As noted earlier (see Table. 2), the roots of these hybrids is better preserved.

Sugars after storage in the roots of the studied hybrids found within the limits from 2.47% to 4.98%. Most sugars contain roots, which accumulate more dry matter, – Purple Haze F_1 (4.98%), Yellowstone F_1 (4.46%) and Viking F_1 (4.44%)

Root studied hybrids contents of the titrated acids did not significantly differ. Their accumulated from 0.16 to 0.21 %. This is significantly lower than their initial content at the beginning of storage (0.32–0.70 %).

The tendency to accumulate nitrates genetically determined is depended on the varietal characteristics. The roots of the studied hybrids of carrot their content was in the range of 150 to 204 mg / kg and does not exceed the maximum permissible limits (250 204 mg / kg)

Most points after tasting the results of long-term storage roots received hybrids White Sabine F_1 and Yellowstone F_1 – 7,0 and 6.9 points respectively for the 9-point scale.

Conclusions. Thus, for complex of biometric parameters among the studied carrots varieties were distinguished hybrids White Sabine F_1, which form the largest tubers and have high marketability (93 %). The content of basic biochemical parameters to storage dominated roots hybrid Purple Haze F_1, which accumulated the greatest amount of dry matter (13.5 %) and sugars (6.83 %). The highest estimate tasting received hybrids Vita Longa F_1, Napoli F_1 and Evolution F_1.

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 hybrids Purple Haze F_1 and White Sabine F_1 – 80.0 and 81.5 % healthy roots after seven months of storage.

The high content of dry matter and sugars after seven months of storage was roots hybrids Yellowstone F_1 and Evolution F_1. Most points after tasting the results of long-term storage roots received hybrids White Sabine F_1 and Yellowstone F_1.

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THE GROWTH AND THE DEVELOPMENT OF DOLICHOS PLANTS IN THE RIGHT-BANK FOREST-STEPPE OF UKRAINE

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Abstract*. The density of Dolichos plants affected the duration of interphase periods. Unequal growing conditions, consisting of different density, influenced the duration of the plants' vegetative period. With the increasing of plants' density the period duration from the mass germination until the technical maturity was decreasing. This pattern was typical for all phases of growth and development of the Dolichos plants. The most early-ripening plants were the plants with the dense crops (71 thousands pcs / ha) and with the shortest duration of the vegetative period of 115 days.*

Keywords*: Dolichos, density of plant shoots, flowering, ripening of beans, vegetative period.*

At the current vegetable growing development there are many unresolved problems, among which are such as the lack of the varieties' diversity of vegetable crops, low yield and quality of vegetable production. Also the important question is providing the population with food rich in protein, which is lacking in the daily diet of every person. Among them is very valuable are the legumes – an important and cheap source of protein, which is a lack in a diet of modern humans [1,2,5].

Among the large legume family is a very interesting species - dolichos (Dolichos L). Among the 60 species, far to the north, was spread only one species - hyacinth beans (Dolichos lablab L). In southern countries it is valued for its medicinal properties and edible seeds, in Europe - for decorative effect. Decorative beautiful reddish leaves and flowers remind the orchids with the smell of hyacinth. The beans of the beautiful beet-red color have the parchment layer, so for the food can only be used unripe and ripe black seeds, which is considered as an important treatment raw material for the dissolving the kidney stones [4,5].

The widespread introduction of this almost unknown crop into the vegetable growing and gardening is constrained by lack of cultivation technology. Among the main technological measures that are directed to increase the yields, an important role belongs to the selection of scientific and reasonable norms of seedling and plant density of dolichos, with help of what the optimal areas of plants' nutrition are created [4].

There are no scientific and theoretical argumentations concerning the choice of optimal density of the dolichos plants. All this says about the need to study and to establish the most efficient areas of nutrition for the dolichos plants in the right-bank Forest-Steppe of Ukraine.

The aim of the research was to identify the adaptive properties of dolichos by studying the influence of plant density on the yield of beans-blades for the receiving the unripe seeds in the conditions of the Kyiv region.

Materials and methods of research. The studies were made during the 2013-2015 on the collector plot of vegetable growing department "Fruit and Vegetable Garden" of National University of life and environmental sciences of Ukraine in triplicate times in accordance with the method of one-factor experiments [3]. The subject of research was the variety dolichos (Dolichos lablab L). There were studied the following schemes of sowing: 70 × 20 (71 thousands pcs./ha), 70 × 30 (48 thousands pcs. / ha), 70 × 40 (36 thousands pcs./ha), 70 × 50 (29 thousands pcs./ha). As the control was taken the seeding scheme 70 × 40 cm. The growing technology is commonly accepted under the production conditions for the legumes [4].

The seeds were sown at the same time (in 2013 - 10.5, 2014 - 07.05, 2015 - 02.05). Seeding depth was 2-3 cm. The size of the estimated area was 5 m2. At each estimated section the 10 experimental plants were marked that were under the observation. The distance between the rows in the experiment for all the choices was the same. The area of the nutrition was regulated by the number of plants in row.

The results of the research. The results of the experiments showed that the planting schemes played role for the term of varieties ripening (Table 1). The quickest full appearance had the plants with the dense crops (71 thousands pcs./ ha) - 7 days after sowing. This is due to the high amount of active temperatures during this period that led to the faster completion of all phenological phases of plant growth and development. Low temperatures in late May affected the later date of plants appearing: and rare and mass germination. However, earlier this phase was coming with the largest density (71 thousands pcs./ha) - 17.05.

Dolichos was characterized as late-ripening variety regardless of sowing schemes. This is related to a stretched period of flowering and fruiting of the variety. However, during the crops density (71 thousands pcs./ ha) the vegetative period of variety was decreased for 5 days in average for three years compared to the sparse crops (26 thousands pcs./ha). However, lingering September in 2013 extended the vegetative period for 13 days.

Table 1

Duration of phenological phases in dolichosa plants under the different terms of sowing (2013-2015).

Experimental options	Plants density, thous. pcs./ha	Duration of period, days			
		«sowing – full shoots»	«full shoots –beginning of flowering»	«full shoots-beginning of technical ripening of beans»	«full shoots-beginning of biological ripening of beans»
70 × 20	71	12	39	56	115
70 × 30	48	12	40	58	118
70 × 40 (control)	35	14	41	58	118
70 × 50	29	14	41	59	120

It was determined that the duration of the period from the germination till the beginning of flowering during the different schemes of sowing was between 39 to 41 days. Early-ripening was characterized the variety with the biggest density of sowing (71 thousands pcs./ha), which had a duration of the period 39 days that is 2 days less than control. Unripe beans-blades in a phase of technical maturity have beautiful burgundy color. Dolichos differs by long term of flowering with beautiful purple flowers from June until autumn frosts. All this suggests the possibility of their use in gardening (Fig. 1).

Fig. 1 – The mass flowering of dolichos plants

The beans were ripening on the plant not at the same time that led to repeated harvesting of beans-blades. The longest period of beans formation was under control (35 thousands pcs./ ha) and the lowest density of plants (29 thousands pcs. /ha). Besides that the longer period from germination to the beginning of biological maturity of beans received the plants of dolichos with the smallest plants density (29 thousands pcs./ha) and was 120 days.

Conclusions. The growth and development of dolichos plants depend on soil and climatic conditions and the plants density in crops. The most early-ripening was the variety with the biggest sowing density (71 thousands pcs. /ha), with the shortest duration of the vegetative period of 115 days.

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CONTENTS

J11609-001 Paliy A.P. INFLUENCE CONTAMINATION
OF THE MILKING EQUIPMENT ON THE QUALITY MILK……..…3

J11609-002 Shabaldas O. G. Agafonov O. M. Bekmurzaeva R.
YIELD OF SOYA DEPENDING ON TREATMENT OF SEEDS
WITH BACTERIAL PREPARATIONS……...7

J11609-003 Shabaldas O. G. Agafonov O. M. Mikheeva Y.
THEUSINGOFTHEBACTERIALFERTILIZERSANDGROWTHING
STIMULANTSON SOWING OF SOYA……...10

J11609-004 ShabaldasO.G. GudievO. Y. StepinP INFLUENCE
OF CHEMICAL AND BIOLOGICAL PRODUCTS OF PLANT PROTECTION
ON THE DEVELOPMENT THE DISEASE IN SOYBEANS……...13

J11609-005 Shabaldas O. G. Tsesar V. Sheykina V. PRODUCTIVE
OF VARIETIES OF WINTER WHEAT IN CONDITIONS OF ARID ZONE…....16

J11609-006 Bondareva L.M., Ruban D.A. BACKGROUND
OF APPLE SAWFLY HARMFULNESS IN A NORTHERN FOREST
STEPPE OF UKRAINE……..19

J11609-007 Bondareva L.M., Ruban D.A. CALCULATION
OF THE THRESHOLD APPLE SAWFLIES QUANTITY DEPENDING ON
PRODUCTIVITY AND THE SCHEME OF APPLE TREES PLANTING……..23

J11609-008 Bober A.V. INFLUENCE VARIETAL CHARACTERISTICS
AND GROWING SEASON TERMS ON ALPHA-ACIDS IN HOP CONES……...26

J11609-009 Podpryatov G., Yashchuk N., Nasikovskiy V.
BIOCHEMICAL PARAMETERS OF MAIZE GRAIN DEPENDING
ON THE TECHNOLOGY POST HARVEST HANDLING……..30

J11609-010 Yashchuk N., Shambara J. QUALITY OF MAIZE
GRAIN OF HYBRIDS DIFFERENT GROUPS OF RIPENING GROWN
IN A NORTHERN FOREST STEPPE……...36

J11609-011 O. Zavads'ka, O. Kravchenko, THE QUALITY AND
SUITABILITY FOR STORAGE CARROTS HYBRIDS CULTIVATION
IN THE CONDITIONS OF UKRAINE'S FOREST-STEPPE……...40

J11609-012 Bobos I.M. THE GROWTH AND
THE DEVELOPMENT OF DOLICHOS PLANTS
IN THE RIGHT-BANK FOREST-STEPPE OF UKRAINE……..46