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CONTENTS

J21409-001

Yuriy Kravchenko, Ganna Matviiv

PODZOLISED CHERNOZEMS OF THE WEST OF UKRAINE AND THEIR USE

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Abstract: This review paper introduces the Podzolised chernozems of Ukraine. Chernozems are reputed as the most productive and fertile soils of which Podzolised chernozem takes the position of the subtype in Ukrainian system of Soil Classification and covers minor highland of Forest-Steppe areas in the west and east of Ukraine. The manuscript describes the Podzolised chernozem formation factors: general climate, vegetation, topography, parent materials and areas of their distribution. It has been reported particularities of morphology, genesis and properties of Podzolised chernozem depending local conditions and management.

Key words: chernozem, black soil, classification, properties, organic matter, tillage, management

Introduction. Podzolized chernozems are encountered mainly in the western regions, central part of Kyiv oblast, eastern periphery of Volyno-Podilsky plateau, in Vinnytsya oblast and northern parts of Chernigiv and Poltava oblasts. In the Left Bank of Dnipro river they are occupying some areas on the right-banks of the rivers. They do not form an unbroken band but are invading the areas of typical and leached chernozems, as well as dark grey soils on watersheds and gentle slopes. According to Tyhonenko et al. (2009), Podzolized chernozems occupy 8.2% of Ukrainian territory, 5528 ths ha (13.8 % of the total farmland area) of them are used in agriculture. The diversity of podzolized soils increases at the expense of regradation (27.8 %), erodedness (36.5 %), wetness (10.5 %), drainage (5.8%) etc [1,2]. In spite of common appearance, Podzolized chernozems vary in their morphology [3], properties, lithology that call forth different land use and conservation practices [4,5]. The purpose of this manuscript is to identify the features of soil profile, parent materials, properties of West Podzolized chernozems laying down the development of local strategy their use.

Material and methods. This research was conducted by the Soil Science and Soil Conservation Department of the National University of Life and Environmental Sciences of Ukraine on a Podzolised chernozem in the Forest-Steppe zone of Ukraine, near the town of Zalistchyky, Ternopil region (lat. 48°40'54.46N, long. 25°41'10.27E). Soil profiles were dug out on the loess plateau, first terrace of Dniester river. The soil was classified as a Haplic Chernozem according to the FAO Soil Classification.

Humus determination was conducted by using a technique of Tyurin (1937). Mechanical (Particle-Size) analytical procedure was fulfilled using the Kachinsky pipette method with a soil dispersion by sodium pyrophosphate solution (4%). The soil cores were collected to determine soil bulk density. The Kappen – Gilkovitz procedure were used for Cation Exchange Capacity determination. pHKCl were determined potentiometrically in soil suspensions with soil to 1N KCl ration 1:5

Soil forming factors. Podzolised chernozems are formed in the temperate short with a relatively brief freezing period. In general, the climate in the west is semi-humid or humid. The amount of solar radiation is within 102–112 kcal cm^2 yr^{-1}. Mean January temperature is (-) 4-6ºC. Mean July temperature is (+) 18-21ºC. Average annual temperature from +7.2 till + 7.8ºC. The maximum depth of frost penetration is within 28-54 cm. Above zero temperature duration is 250-260 days and 210-215 days exceed 5ºC. The sums of the temperatures exceeding 10ºC are equal to 2500 and 2800ºC respectively. The average amount of precipitation is within 550-640 mm. The ratio between the average annual amount of precipitation and average annual evaporation from the open water surface (coefficient of humidity, Kh) within 0.9-1.3. The western regions of the Podzolised chernozems zone are more moist and humid, while the eastern ones are more arid and continental in climate. The vegetation types found on chernozems are oak-maple-lime-hornbeam forests with grasslands and meadows. Parent materials are characterized by “lithologic uniformity” represented by the loess and loess-like loams. The topography of Podzolised chernozems is dominantly plainland but nonuniform in both genetic and structural respects.

Local Features of Podzolised Chernozems Forming Factors. West Podzolised chernozems begin its distribution on interfluve area between the Stryp and the Syret rivers and go forward to the plateaus of Zalistchyky and Zboryv cities. The profiles of these soils bear the mark of modal Podzolised chernozem formed on medium loam loess. At a distance of 1.1-1.4 km from Dnister river, downward the slope appears the red argillites of upper Silurian period, which close to flooding plain intermix with ancient alluvium. Nearby the Dniester levee, parent material washes out of clays, enriches with modern alluvium and becomes lighter and yellowish.

Podzolised Chernozem Properties. Soil texture in chernozem varies from light loam to heavy loam and become heavier from the north to the south. Coarse silt and clay are dominant soil particles, but differ in their distribution. The percentage of particles 0.05-0.01 mm varies from 53.4% in upper horizon to 41.6% in the bottom. The distribution of <0.01 mm particles down soil profile is uniform with the minor tendency its accumulation in He horizon. The content of soil organic matter (SOM) in Podzolised chernozem gradually declining through soil profile: 3.3%, 3.2%, 3.2%, 3.1%, 2.9%, 1.9%, 1.5%, 1.2%, 0.5%. Abandoned for 40 years chernozem possess with higher humus content (4.7 – 4.5%) in 0-15 cm layer than ploughing one (3.3 – 3.2%). Humus type (a ratio of the carbon content in humic to fulvic acids, Cha/Cfa) changes respectively from 1.2 to 0.8 or is fulvate-humatic in the upper and humate-fulvatic in the lower horizon of soil profile. The bulk density in chernozems depend on humus content and soil texture. It was found in the favorable ranges for plant growth – 1.16–1.3 g cm^{-3}. Slightly illuvial horizons increase soil compaction considerably compared to ploughing horizon because of reduction SOM, increasing colloidal compounds Al^{3+} and Fe^{3+}, metamorphism activity, nutty-prismatic aggregates, etc. Ukrainian chernozems, as a rule, have a neutral reaction, with soil pH ranging from 6.6 to 7.5. By pH_{KCl} and hydrolytic acidity Podzolised chernozem is slightly acid in the upper horizon. The comparatively higher amount of physical sand (>0.01 mm) and lower amount of OM have resulted medium level of cation exchange capacity (CAC) in Podzolised chernozem. Ca^{2+} usually makes up 95% of all soil cations.

Summary. Podzolised chernozem is distributed in the Forest-Steppe area, and is mostly formed under temperate and freezing zones. Parent material is represented by the loess, but regional conditions may influence soil profile by clays, shists, limestone, alluvial deposits. Soil texture varies from light loam to middle loam. Coarse silt and clay are dominant soil particles but differ in distribution. Chernozem have an accumulative type of OM distribution in soil profile. The soil have a slightly acid reaction in the upper horizon and neutral or slightly alkaline in the bottom, medium level of cation exchange capacity. Podzolised chernozem have been primarily used in Ukraine for growing winter wheat, barley, corn, sugar beet, and sunflower. Soil properties have been changed by different management. The eminent changes are decline in soil organic matter and soil thickness, while the water and wind erosion as well as soil compaction are also becoming serious. Practices that favor conservation of the soil resource is urgently needed to guarantee food security.

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Bober A.V.

INFLUENCE FACTORS ON GROWTH DYNAMICS STARCH CONTENT IN CORN GRAIN DURING STORAGE

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This paper presents the results of research on the impact of farming systems and soil tillage on the dynamics of starch content in corn grain during storage.

Key words: maize, grain, starch, storage, systems of farming, systems soil tillage.

Human need for carbohydrates (55 % of diet) provides crop production, mainly in the form of starch and sugars. Carbohydrates – the main material carts flora (crude fiber) and reserve substances (mainly starch, sugar, etc.) to humans – the main energetic material. Their importance as a source of energy depends on the ability to oxidize in the body as aerobic and anaerobic means. Given the physical labor rights should be enhanced rate of carbohydrates [3].

It is known that starch is the main component biochemical corn. Its content varies between 65–75 % and is more than a third of the grain. When storing starch consumed in respiration to maintain vital functions seed. From the size of its losses significantly dependent duration of storage units and using it for certain purposes. Corn has a different intended use: food concentrates, baby food, starch and molasses, cereals, flour and feed needs. Regardless of the purpose corn must be in sound condition, no perspired and without heat damage during drying; have color and odor characteristic sound grain corresponding type [3].

When storing corn occurring complex biochemical processes that contribute to the livelihoods of corn, as well as microorganisms and pests. The results of these processes by enabling them to progress is to preserve and even improve the natural qualities of grain, and unfavorable – the loss of a part of the organic matter and the deterioration of the chemical composition of the grain. The nature and intensity of these processes depends on the conditions of storage of maize and its quality and condition are significantly different from those observed in embankments headed grain crops. The most important task – to eliminate conditions conducive to the development of negative processes [2].

The main objective of agricultural production is not only to obtain high and stable grain yield, but also to provide the best of its technological properties [1]. Improving the quality of grain – a complex problem. It depends on the set of interrelated organizational, biological and agronomic factors. No doubt during post-harvest ripening and extended storage is changing the biochemical composition of the grain. Therefore, the study and preservation of the proportion of substances that are part of the corn is important.

Materials and methods. The study was conducted at the laboratories of the Department storage, processing and standardization of plant products by name prof. B.V. Lesika of National University of Life and Environmental Sciences of Ukraine for 2009–2013 years. We investigated the corn grown for industrial (control), environmental, biological farming systems and in conventional+minimum+harrowing (control), minimum tillage, conventional+ minimum tillage, harrowing tillage on test plots stationary experiment the Department of Agriculture and herbology in NUBiP of Ukraine " Agronomic Experiment Station".

Studied farming systems differ resources. For industrial system (control) per hectare of arable land in rotation brought 12 tons of organic and 300 kg of active ingredient of fertilizers and crop protection industry conducted by pesticides. In the ecological model by means of priority organic fertilizer 24 t/ha , minerals contributed 150 kg/ha and crops protected by biological agents and industrial pesticides on the criterion of ecological and economic threshold number of pests. The biological model of agriculture was achieved only possible norm Manure 24 tons per hectare of arable land in crop rotation and crop protection performed only by biological means.

Conventional+minimum+harrowing tillage (control) combined rotation by holding six oranok two surface disc harrow cultivation under winter wheat after peas and corn silage and ploskoriznyy cultivation in barley after sugar beet. Option мinimum primary tillage was performed by rotation under all cultures мinimum loosening than winter wheat fields where the soil was treated with disc harrows. In an conventional+ minimum primary tillage by rotation was performed under two tillage sugar beet bunk plow five мinimum rozpushuvan and dyskuvan in soil under winter wheat fields. Variant нarrowing surface soil cultivation in crop rotation was carried out to a depth of 8–10 cm disc harrows under all cultures.

Samples of grain were stored for one year at an unregulated environment (in a warehouse) in linen bags. Before laying deposited samples of grain and every 1, 3, 6, 9 and 12 months for all variants was determined starch content in corn.

Results. Conducted research found that during the first month of storage for all samples was characterized by rapid increase in starch content (Table 1). Average contents of this indicator increased by 2.34–2.99 %, depending on the variant. Most intensive increase of this index was in corn grown for industrial and ecological farming systems at 2.70–2.99 %. It should be noted that after the first month of storage had the highest starch content in all samples of grain throughout the whole experiment. This can be explained by the fact that during the first month of storage in the processes of grain post-harvest ripening of simple carbohydrates synthesized complex forms, which include and starch.

Most starch month after deposit accumulated in grains obtained by biological farming systems at the harrowing surface tillage – 74.67 % (1.25 % compared with control), and the lowest in grain grown for industrial system with conventional+minimum+harrowing tillage – 73.42 %. In general, throughout the storage period, as in the beginning, the starch content was highest in corn grown for minimum tillage and harrowing surface tillage, the lowest – for conventional+minimum+harrowing tillage and conventional+minimum tillage. Significant differences in systems were noted.

In the future, all the samples showed a gradual decrease in starch. It should be noted that the grain rather sparingly spends starch. Thus, a decrease in its six months of storage was 0.31–0.45 %. After 12 months of storage in grain contained 72.44–

73.92 %. Compared to the original content held in the increase of this index 1.63–2.19 %.

Table 1

Dynamics of starch content in corn grain during storage grown under different farming systems and soil tillage% (average 2009-2013)

Variant		The duration of storage, months						NIR_{05}
Farming systems	Soil tillage systems	Before storage (control)	1	3	6	9	12	
Industry (control)	Conventional+minimum+ harrowing tillage	70.80	73.42	73.18	72.97	72.77	72.44	0.72
	Minimum tillage	70.95	73.77	73.60	73.38	73.19	72.91	0.74
	Conventional+ minimum tillage	70.84	73.58	73.31	73.15	72.79	72.47	0.77
	Harrowing surface tillage	70.91	73.84	73.71	73.51	73.30	72.98	0.76
Ecological	Conventional+minimum+ harrowing tillage	70.71	73.60	73.41	73.27	73.08	72.90	0.72
	Minimum tillage	71.49	74.19	74.03	73.83	73.60	73.32	0.71
	Conventional+ minimum tillage	71.28	74.28	74.10	73.86	73.60	73.31	0.79
	Harrowing surface tillage	71.41	74.17	73.97	73.76	73.54	73.30	0.73
Biological	Conventional+minimum+ harrowing tillage	70.91	73.48	73.31	73.10	72.82	72.64	0.68
	Minimum tillage	71.50	74.07	73.96	73.78	73.58	73.35	0.66
	Conventional+ minimum tillage	71.75	74.09	73.90	73.77	73.57	73.39	0.61
	Harrowing surface tillage	72.00	74.67	74.53	74.37	74.15	73.92	0.69
NIR_{05}		0.29	0.34	0.38	0.35	0.38	0.35	X

Variance analysis of dynamics of corn starch showed a statistically significant impact on this indicator as a growing factor ($Fr = 131.21 > F_{kryt} = 1.97$) and shelf life ($Fr = 1598.08 > F_{kryt} = 2.38$) a much greater influence shelf life. The greatest effect of tillage on biological farming systems ($Fr = 348.44 > = F_{kryt}$ 3.29), slightly lower than the environmental ($Fr = 102.23 > F_{kryt} = 3.29$) and even lower for industrial ($Fr = 34.59 > F_{kryt} = 3.29$). The biggest impact shelf life for ecological systems (Fr =

916.54 > F_{kryt} = 2.90), somewhat less than the biological (Fr = 789.30 > F_{kryt} = 2.90) and smallest in industrial farming systems (Fr = 518.45 > F_{kryt} = 2.90).

Conclusion: During the first month of storage for all samples was characterized by rapid increase in starch content (an average of 2.34 – 2.99 %) and the most intensive industrial and ecological farming systems at 2,70 – 2,99 %. Most starch month after deposit accumulated in grains obtained by biological farming systems at the surface of soil – 74.67 %. In general, throughout the storage period, as in the beginning, the starch content was highest in corn grown for minimum tillage and harrowing surface tillage, the lowest – for conventional+minimum+harrowing tillage and conventional+minimum tillage. Significant differences in systems were noted. In the future, all the samples showed a gradual decrease in starch, but whole grain corn starch spends quite sparingly.

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Bober A.V.

INFLUENCE FACTORS ON GROWING GERMINATING POWER GRAIN OF MAIZ DURING STORAGE

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This paper presents the results of research on the impact of farming systems and soil tillage on the dynamics of corn germinating power during storage.

Key words: maize, grain, germinating power, storage, systems of farming, systems soil tillage.

The current trend of agricultural development on the implementation of intensive technology of cultivation of crops aimed at obtaining high yields of quality products. Only, if sown and technological indicators will meet the requirements of the standard, we can talk about the high cost and realizable consumer product quality [1].

In the grain, as in any living organism, constantly occurring complex biochemical processes, the intensity of which depends on environmental conditions – humidity, temperature and aeration. In batches of grain, especially freshly, there are different physical and biochemical processes that can lead to improvement or deterioration in its quality during storage. Although corn is much better preserved its products, providing storage at low loss requires some theoretical knowledge of the complex biochemical processes that occur in the grain, and storage conditions [3].

One of the main indicators of quality that is normalized to a standard corn seed supplies, and for what is used in the manufacture of starch, molasses and malt is similar. What is in compliance with current standards for first-generation hybrid seed must be at least 92 %. As for grains technical purposes, this figure is normalized to the level of 55 % [2]. Weight similarity – one of the most widely used criteria for assessing damage to the grain. Energy and similarity are the major indicators of changes in grain quality that are sensitive to the conditions of its storage.

Maintaining high quality indicators corn is double interest as seed quality is an important factor that contributes to getting a good of stems and obtain products with high nutritional value. Conditions that contribute to the preservation of sowing seeds, causing also preserve their flavor and nutritional properties [4]. The aim of the research was to study the effect of different farming systems of soil tillage and longevity dynamics similarity corn.

Materials and methods. The study was conducted at the laboratories of the Department storage, processing and standardization of plant products by name prof. B.V. Lesika of National University of Life and Environmental Sciences of Ukraine for 2009–2013 years. We investigated the corn grown for industrial (control), environmental, biological farming systems and in conventional+minimum+harrowing (control), minimum tillage, conventional+ minimum tillage, harrowing tillage on test plots stationary experiment the Department of Agriculture and herbology in NUBiP of Ukraine " Agronomic Experiment Station".

Studied farming systems differ resources. For industrial system (control) per hectare of arable land in rotation brought 12 tons of organic and 300 kg of active ingredient of fertilizers and crop protection industry conducted by pesticides. In the ecological model by means of priority organic fertilizer 24 t/ha , minerals contributed 150 kg/ha and crops protected by biological agents and industrial pesticides on the criterion of ecological and economic threshold number of pests. The biological model of agriculture was achieved only possible norm Manure 24 tons per hectare of arable land in crop rotation and crop protection performed only by biological means.

Conventional+minimum+harrowing tillage (control) combined rotation by holding six oranok two surface disc harrow cultivation under winter wheat after peas and corn silage and ploskoriznyy cultivation in barley after sugar beet. Option мinimum primary tillage was performed by rotation under all cultures мinimum loosening than winter wheat fields where the soil was treated with disc harrows. In an conventional+ minimum primary tillage by rotation was performed under two tillage sugar beet bunk plow five мinimum rozpushuvan and dyskuvan in soil under winter wheat fields. Variant нarrowing surface soil cultivation in crop rotation was carried out to a depth of 8–10 cm disc harrows under all cultures.

Samples of grain were stored for one year at an unregulated environment (in a warehouse) in linen bags. Before laying deposited samples of grain and every 1, 3, 6, 9 and 12 months on all variants defined, germinating power grain.

Results. Research has established that the initial similarity indices consistent standard corn grown for industrial system for all tillage systems, except minimum tillage, and in environmental and biological systems only conventional+minimum+harrowing tillage and conventional+minimum tillage. After the first month of storage of all test items, the figure rose by 2–9 %, amounting to an average of 93–95 %. (Table 1).

For industrial system germinating power gradually increased up to the third month of storage, amounting to 94–98 % with the highest rates for conventional+minimum+harrowing and conventional+minimum – tillage. Later on industrial system during storage of grain germination varied significantly – in the range of 1–2 % (allowable error of experiment 5 %) compared to the previous months of storage. After twelve months of storage of corn grown under this system of agriculture similarity was 93–96 % and for all tillage meet the requirements of the standard. Corn grown for environmental and biological farming systems improves the performance of germinating power to the sixth month of life: and conventional+minimum+harrowing and conventional+minimum – tillage resemblance increased by 4–9 %, and мinimum tillage and нarrowing surface tillage to 9–13 % from baseline. Thus the germinating power of corn for all variants meet the requirements of the applicable standard (exceeding 92 %). For further storage germinating power decreased slightly within the error of experiment – 1–2 %. After 12 months of storage at grain germinating power and changed into downward, but was 92–97 % and allowed the use of grain for various purposes, in addition to surface tillage on biological systems – 90 %.

Table 1

Dynamics of germinating power corn grown during storage under different farming systems and soil tillage, %
(average of the years 2009–2013)

Farming systems	Soil tillage systems	Before storage (control)	1	3	6	9	12	NIR_{05}
		The duration of storage, months						
Industry (control)	Conventional+minimum+ harrowing tillage	96	98	98	98	98	96	1
	Minimum tillage	91	95	96	95	96	94	2
	Conventional+ minimum tillage	97	98	98	97	97	97	1
	Harrowing surface tillage	92	94	94	93	94	93	1
Ecological	Conventional+minimum+ harrowing tillage	92	95	97	98	98	97	1
	Minimum tillage	88	92	95	97	95	94	2
	Conventional+ minimum tillage	90	95	98	99	98	97	2
	Harrowing surface tillage	86	91	94	97	94	92	3
Biological	Conventional+minimum+ harrowing tillage	96	98	98	99	97	96	1
	Minimum tillage	82	91	93	95	94	92	3
	Conventional+ minimum tillage	94	97	97	98	98	96	1
	Harrowing surface tillage	85	93	94	96	93	90	3
NIR_{05}		7	4	3	3	3	4	X

Mathematical processing of data dynamics corn germinating power during storage showed a statistically significant impact on the rate of all factors studied. The biggest impact shelf life for ecological farming systems ($Fr = 47.52 > F_{kryt} = 2.90$), slightly lower than the industry ($Fr = 4.40 > F_{kryt} = 2.90$) and biological ($Fr = 7.09 > F_{kryt} = 2.90$). Overall, the impact of factors on germination growing corn was $Fr = 11.84$ at $F_{kryt} = 1.97$.

Conclusion: During the initial performance standards consistent germinating power corn grown for industrial system for all tillage systems, and for environmental and biological systems only conventional+minimum+harrowing and conventional+minimum – tillage. For industrial system of agriculture germinating power gradually increased to 3-month deposit and was 94–98 % with the highest rates for conventional+minimum+harrowing and conventional+minimum – tillage. Corn grown for environmental and biological farming systems improves the performance of similarity to the 6-th month of storage. Further germinating power varied within the error number, and after 12 months of storage was 92–96 %, allowing the use of corn for sowing and technological goals.

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Yashchuk N.

QUANTITY GLUTEN OF GRAIN WHEAT IS DEPENDING ON FACTORS OF GROWING AND DURATION OF STORAGE

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The influence of storage duration on quantity of gluten in grain of winter wheat varieties Poliska 90 grown under different precursors and farming systems. Is established the highest rates the quantity of gluten in wheat grown after perennial grasses and peas for industrial and ecological farming systems throughout the shelf life. Quantity of gluten and klassnost significantly raised in grown after corn grain in the first three months of storage.

Key words: grain of winter wheat, quantity of gluten, growing factors, duration of storage.

Introduction. Wheat grain occupies a special place among other even more valuable on biochemistry of cereals. Because of its proteins (mainly hliadiny and glutenin) with swelling in water to form a kind of complex protein – gluten, which has elasticity and extensibility. The high content of gluten in grains by high quality allows it to bake bread with elastic, porous crumb [3-4].

The quantity and quality of gluten formed under the influence factors of external environment and agricultural practices. Storage of grain, as the last stage in its production significantly affects the quality of the products. Indeed, in the grain constantly occurring physical, chemical and biological processes that may lead to improvement or deterioration in the quality grains [1-3].

The quantity of gluten in wheat grain normalized standard and defines klassnost grain. For 1st class the mass fraction of wet gluten must be not less than 28.0 %, for the 2 st – 23.0 %, for 3 st – 18.0, for other classes is not limited [5-6].

Materials and methods. The studies was conducted during the 2009–2013 with using winter wheat variety Poliska 90 grown after perennial grasses, peas and corn which used on silage by intensive, ecological and biological farming systems.

Grain stored in a normal granary and evaluated its quality 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.

Quality of grain according of research program defined before storage samples of grain (control) and after 1, 3, 6, 9 and 12 months of storage. The quantity gluten of grain determined respectively GOST 13586.1-68.

Results. According to average indexes for 2009-2013 winter wheat grain grown up under all farming systems in predecessor of perennial herbs contain the maximum amount of gluten (26.5-32.4 %), and corn – minimum (22.0-27.9 %) (fig. 1).

The lowest percentage was gluten grain grown after corn biological farming systems – 22.0 % of the storage units and a maximum of 25.4 % after six months of storage, which was caused by the passage of post-harvest ripening: the transition simpler compounds (amino acids) to the complex (protein). However, even after nine months of storage gluten content in this version fell by 0.5 %, and after twelve months by 1.2 % compared to the sixth month. By increasing the content of gluten already after the first month of storage of grown after peas for biological farming systems switched from 3 st to 2 st class quality and retained the position until the end of data storage.

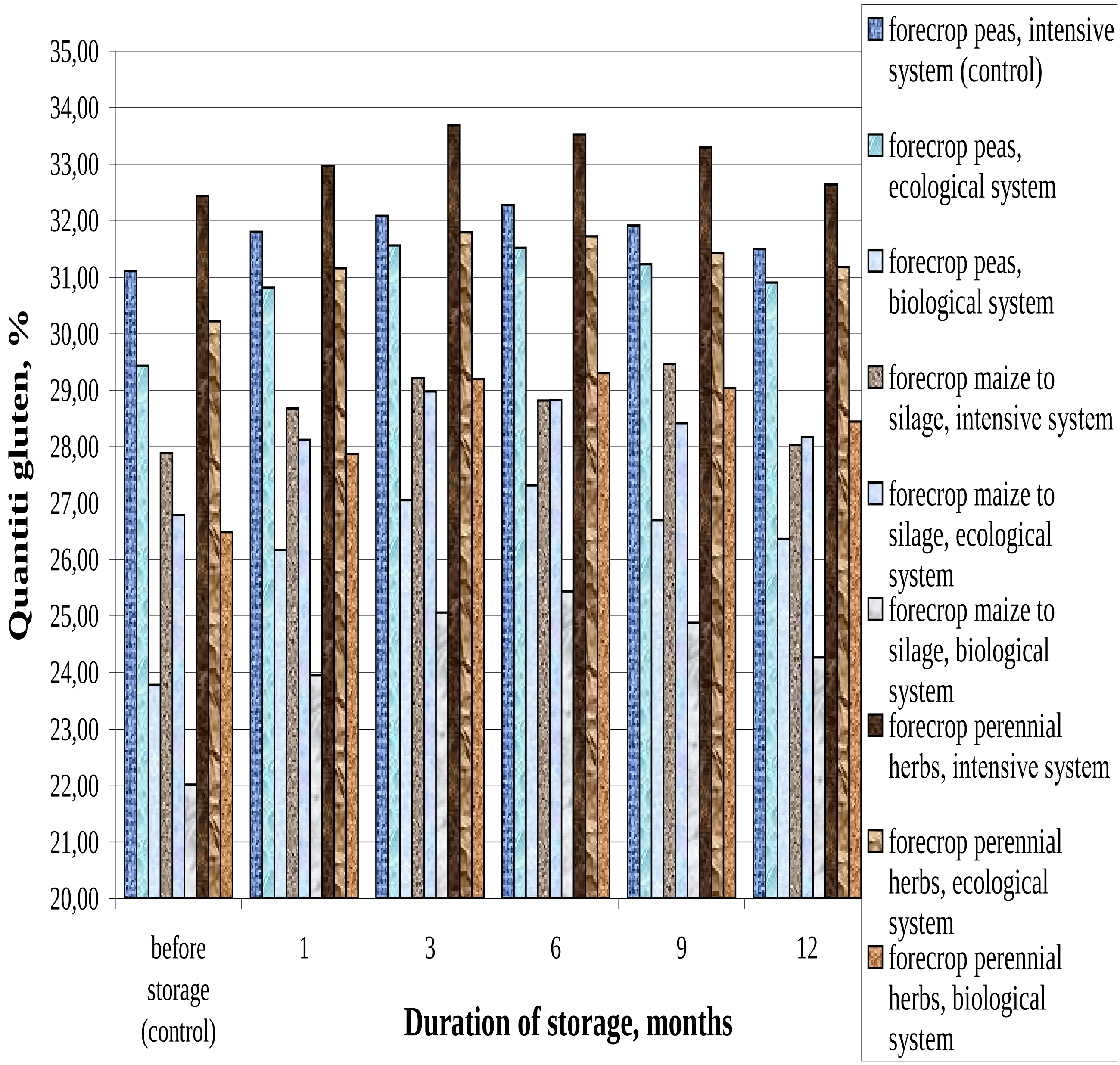

Fig. 1. Changing amount of gluten in the grain of winter wheat grown under different farming systems and predecessors during storage

Grain grown up after corn on silage by the industrial and environmental farming systems under the initial indicator of the number of gluten belonged to 2nd class quality. However, in the month indicator grew to 28.1-28.7 %, which contributed to the transition of grain to 1st class quality. After three months of storage the amount of gluten for these systems grew by another 0.5-1.1 %, reaching its maximum. During further storage index decreased (by 0.4-0.8 %), while remaining within the 1st class quality.

Total wheat grain locally grown after perennial herbs and peas by industrial and ecological systems belonged to 1st class quality throughout the storage period. At the same gradually increased gluten content for the first three months, an average of 0.5-1.0%, and for subsequent storage decreased by an average of 0.3-0.7%.

Grain grown under biological farming systems after perennial grasses and peas for the initial mass fraction of gluten index belonged to the 2nd class quality. However, the grain grown on perennial grasses by the system after three months of storage and improve their quality of gluten content of 29.2 % was considered to be 1st class quality, while remaining within the upper class during the entire storage period. Grain grown after peas for biological systems although increased gluten content during post-harvest ripening of 3.5 %, still remained within the 2nd class quality throughout the storage period.

Analysis of variance dynamics gluten content of winter wheat during storage established a statistically significant effect on the studied parameters of all factors. The highest impact predecessor studied parameters were observed under the ecological farming system ($F_{calc} = 957.61 > F_{crit} = 4.10$), somewhat less on the biological ($F_{calc} = 789.84 > F_{crit} = 4.10$) and by industry ($F_{calc} = 658.21 > F_{crit} = 4.10$). The greatest influence on the dynamics of the gluten content during storage were farming systems after pea and perennial grasses ($F_{calc} = 259.84\text{-}241.33 > F_{crit} = 4.10$) was slightly less impact on corn ($F_{calc} = 164.57 > F_{crit} = 4.10$). The highest impact on the dynamics of period of storage of gluten content of is marked by biological farming systems ($F_{calc} = 130.75 > F_{crit} = 3.33$) and after perennial herbs ($F_{calc} = 10.36 > F_{crit} = 2.90$).

Conclusions

1. Grain of wheat locally grown after perennial herbs and peas by industrial and environmental systems increased the gluten content in the first three months and further reduced by storing answering 1st class quality throughout the storage period.

2. Grain locally grown on perennial herbs by biological farming systems after three months of storage improve its quality to 1st class, and after peas remained within the 2nd.

3. At the beginning of storage of grain grown after corn, content of gluten increased and increased klassnost: the biological system grain switched from 3rd to 2nd grade for industrial and from 1st to 2nd environmental systems. Grain changing the klassnost until the end storage.

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SELECTION OF INDETERMINATE TYPE TOMATO HYBRIDS FOR GROWING IN WINTER GREENHOUSES

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Abstract. It is given the estimation of the economic and biological indicators of tomato hybrids in terms of winter hydroponic greenhouses. It is shown the dynamics of crop revenue for the month, set saleable quality of tomatoes. According to the studied parameters it was selected the most precocious and productive hybrid Hrodena F1.

Key words: hybrid, tomato, extended culture, the degree of tying, productivity, saleable quality, productivity.

Introduction. Nowadays, tomatoes are the most common crop in greenhouses. In Ukraine, it occupies about 400 hectares of greenhouse areas, where they are grown about 1 million tons of fruits. This is a low rate. Increasing of production is possible only on the successful combination of the use of new highly productive hybrids of the first generation with modern cultivation technologies.

In recent years, in order to improve productivity it became important in Ukraine to grow tomatoes in extended culture, whereby plant growing lasts for 10-11, and fruiting – 8 months.

To succeed in tomato growing in extended culture of greenhouses, heterotic hybrids are imposed special requirements. They should be early maturing, less demanding of light intensity and duration of daylight, have intense growth and fruiting, resistance to diseases (especially against brown spot and tobacco mosaic virus) and pests, with high fruit inception in terms of lowered light, high productivity (not less than 30 kg/m^2) and with good fruit quality. In addition to these features, tomato hybrids for extended culture must possess plasticity to light and high relative humidity, which significantly increases the resistance of plants to fungal diseases, affects the formation and impact of yield [1].

Recently, the domestic market receives a large number of foreign bred hybrids. Their growing in our environment does not always provide the desired result. Considering this, there is a need to study the economic and biological characteristics of foreign tomato hybrids and selection of the best ones for production. Therefore, our study had the following objectives: to identify the most short-season and productive indeterminate type tomato hybrids; to compare the dynamics of the formation of tomato hybrid fruits; to establish saleable quality and productivity of fruits.

Methodology. The study was conducted in 2008-2009 on the basis of scientific and research production Agricultural Complex "Pushcha Vodytsia" in extended culture in winter hydroponic greenhouses. They were used indeterminate type hybrids of foreign selection: Raisa F1 (control), Hrodena F1, Emotion F1 bred in Netherlands (firm Syngenta Seeds) and Anabel F1, Camry F1 – German selection (firm Rijk Zwaan).

The study was conducted according to the "Methodology of Research in Vegeculture and Melon-Growing" (2001), "Methods for experimental work in the fruit and vegetable growing" (V. F. Moiseichenko, 1988), and "Methods of field experiment" (B. A. Dospehov, 1985) [2, 3, 4].

Plots were placed by full rendomization according to the scheme (60 +100)×50sm. In studying they were applied basic research methods: experimental, computational, analysis and comparison.

Harvest accounting was conducted in spring and fall three times a week, in summer – every second day. After each harvesting it was counted and weighed the mass of marketable and non-marketable fruits. To the non-marketable parts of yield belonged fruits damaged by diseases and pests, deformed, underdeveloped, with mechanical injuries. Productivity was measured in kg/m^2 of the inventory greenhouse area [2].

Results. Comparison of the number of generative organs of studied plants showed that Camry F1 hybrid has been the most productive. During the vegetation season the greatest number of bunches formed on plants of Camry F1 hybrid, the lowest – in hybrid plants Emotion F1.

The number of flowers and fruits on plants of one hybrid was not proportional. This can be explained by the degree of fruit inception. Thus, in terms of the greatest number of flowers in Anabel F1 hybrid they were formed much less fruits due to the lowest level of inception – 76%. The highest number of fruits showed Hrodena F1 hybrid, the inception level of which was 85%.

The largest fruit proved Hrodena F1 hybrid, their average weight was 19% more than control. This index had a significant impact on plant productivity, which in the mentioned variant was by 31% higher than control and was 18.7 kg of fruits from one plant. A lower fruit weight when compared to the control was noted in Emotion F1 and Anabel F1 hybrids.

The main indicator of the feasibility of growing indeterminate tomato hybrids in extended culture is productivity. Getting an early yield is very important for providing the population with vegetable production in the off-season period and is economically important for production. Between the timing of getting production and prices on it there is a direct relationship - the earlier tomato fruits are supplied, the higher are the prices.

On average for two-year studies they were observed changes in the dynamics of tomato fruit getting. Thus, for the first month of fruiting from plants of all hybrids it were obtained higher yield than from plants of the control variant. Particularly high growth of yield had Hrodena F1 hybrid, which doubled the control rate. In addition to high weight of fruit this hybrid entered a phase of bearing by 6-8 days earlier than other hybrids.

The most intensive bearing was for the entire period of growing tomatoes in May and July. Since August it was observed a significant decrease of yield. Despite the decline in productivity and physiological aging of plants, in autumn months it was also observed the highest productivity of Hrodena F1 hybrid.

During the whole vegetation season the most productive was Hrodena F1 hybrid. The lowest yield had Emotion F1 hybrid, the productivity of which for a single month of cultivation did not exceed 6 kg/m^2.

Experimental data suggest that the significant increase in total productivity of tomato fruits in comparison to control variant was in Hrodena F1 and Camry F1 hybrids (Table 1). Indicators of these hybrids exceeded the control variant by 10.6 and 4.4 kg/m^2. Productivity of other hybrids was at the level of control and there was no significant difference between them.

Table 1

Productivity and saleable quality of tomato fruits of indeterminate type, in average for 2008-2009

Variant	Tomato fruit yield, kg/m^2			saleability, %
	total	including		
		saleable	non- saleable	
Raisa F_1 (control)	36.5	35.3	1.2	96.7
Anabel F_1	37.4	36.5	0.9	97.6
Camry F_1	40.9	39.8	1.1	97.3
Hrodena F_1	47.1	45.4	1.7	96.4
Emotion F_1	35.2	34.0	1.2	96.7
HIP_{05}	2.4	2.0	0.8	

Considering the research results, it is clear that the percentage of saleable tomato fruit production in all studied hybrids was quite high and exceeded 96%. Thus, the highest saleability of fruits was noted in Camry F1 and Anabel F1 hybrids – 97.6 and 97.3%, respectively. The same number of high-quality fruits was obtained from Emotion F1 and Raisa F1 hybrids – 96.7% from each.

Non-saleable part of harvest was fruits infected with apical rot, underdeveloped, cracked and deformed. In plants of all variants this figure was not high and ranged from 0.9 to 1.7 kg/m^2.

Despite the lowest percentage of saleability – 96.4 and the highest part of non-saleable yield - 1.7 kg/m^2, the number of products to implement the Hrodena F1 hybrid was significantly higher than indices of other hybrids and was 45.4 kg/m^2.

Conclusions. According to complex of economic and biological indicators, namely ripening, degree of fruit set, fruit weight, productivity and yield per plant, the most efficient hybrid was Hrodena F1. The hybrid productivity was significantly influenced by small fruit weight.

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EFFECT OF GROWING TIME ON PRODUKTIVITY OF WELSH ONION UNDER CONDITIONS OF THE FOREST-STEPPE ZONE OF UKRAINE

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Optimal lines of cleaning up and productivity of sorts of welsh onion at vegetative reproduction in the early spring and summer periods was set. The productivity of one-year plants of welsh onion in the variant of the spring landing below than in summer was educed

Key words: welsh onion, variety, yield, weight of plant, planting of time

The use of long-term types of onion, in particular welsh, can diversify and enrich the ration of feed the vitaminized and phytoncidal products, that is characterized an early ripeness, productivity and protracted period of consumption. In the young green leaves welsh-onion is rich in mineral salts, organic acids, vitamins and easily assimilable carbohydrates [1–3]. The planning the conveyer growing of welsh-onion, for the receipt of harvest from an early spring, when yet there are not vegetables from open soil, and by a late autumn, when the most of them is already collected it is expedient to use the different terms of sowing and landing, one-year and long-term cycles of growing of this culture [4 - 5]. Last years welsh-onion all more often grow as an one-year culture [6]. At vegetative reproduction welsh-onion duration of rearing plants is shorter, than at rearing on greenery of onion, and also higher in 1,5-2 times the productivity. Output of standard products when grown with ordinary cutting leaves is 92-97%, and with a single assembly - 98%. Increase in marketable yield depends on the productivity of the variety of [7].

The aim of our study was to compare the productivity of onion varieties batun Piero and Wales in the early spring and summer term revegetation in open ground.

Venue, facilities and research methodology. Investigations were carried out at the department of vegetables growing Uman national university of horticulture (2012-2014 years). Planted subsidiaries 2-3-well shoots perennial shrubs welsh-onion row spacing of 45 cm April 10, 2012 and 2013 (control) and 20 July 2012 and 2013. When summer watering timing landing conducted to further support the soil moist. The first harvest was shot in phase shareware - technical maturity at a height of 25 cm leaves, before the onset of budding, cutting off the leaves with the aboveground part of the false stem. The second time the crop was obtained by digging annuals this fall - early spring planting options and next spring - summer plantings.

Results and discussion. Given the state of development of the plants and the possibility of obtaining a green, the first harvest was performed in a variety of control options Piero in the second decade of May and 2-3 days later in the variety of Wales, that is, 33-35 and 35-38 days after planting early spring (table 1).

Limiting factor term harvesting plants pen welsh onion year period, along with the length of the leaves were autumn temperature decrease and slowing of metabolic processes that affect the onset period of rest and wintering perennials. Bookmark summer plantings subsidiaries shoots that had developed root system and leaves 3-5 allows the first harvest of green on feather varieties Piero after 38-50 days after planting, ie, 10-19 September.

Table 1

The date of the conditional phase of technical maturity plants bunching onion varieties depending on the timing of cultivation

Sort	Planting period	Years of research	
		2012	2013
Piero (control)	Early spring (control)	15.05	13.05
	Summer	18.09	19.09
Wales	Early spring (control)	18.05	15.05
	Summer	15.09	10.09

Plant varieties Piero year term revegetation had conditionally phase of technical maturity by 7-11 days earlier than plants of the investigated varieties of Wales. On average, two years growing season onion varieties welsh onion Piero in the embodiment of the spring landing was 34 days, varieties of Wales - 37 days, and in the summer term of planting - respectively 39 and 47 days. Implementation of early spring and summer planting dates welsh onion for annual growth cycle provides conveyor delivery harvest from the second decade of April to the second decade of May and the third decade of August until the third decade of September. The level of productivity significantly affected by the magnitude of aboveground mass formed in phase shareware - technical maturity in the first cut-off green and during digging annual bushes. Average summer planting varieties of Wales for the first gathering of the pen provided by 0,4 t/ha yield lower than sort Piero. For early spring planting time yield for the first gathering was on average 3.5-3.6 t/ha, which is 1,0-1,5 t/ha higher than that of perennial plantations (table 2).

Table 1

Yields *batun* varieties depending on the timing of cultivation, t/ha (2012-2014 years)

Sort (A)	Planting period (B)	The first cutting leaves	Yields dug plants	Overall crop yield	± from control
Piero (control)	Early spring (control)	3,5	13,8	17,3	-
	Summer	2,5	17,8	20,3	+3,0
Wales	Early spring (control)	3,6	14,2	17,8	+0,5
	Summer	2,1	20,5	22,6	+5,4
** Overall crop yield 2012 year disembarkation $LSD_{05\ AB}$ 2013 year disembarkation $LSD_{05\ AB}$				2,59 2,05	-

Number of harvest at the first sampling cutting in averages 9,3-12,3% of the total for summer plantings and 20,2-20,3 % - for early-spring period disembarkation.

During the study period the highest overall yield obtained at the summer growing sorts of Wales – 22,6 t/ha on average significantly - by 2,3 t/ha more than the same grade option Piero, whose total yield was 20,3 t/ha. Average yield varieties Piero early spring planting was 17,3 t/ha, whereas in summer plantings were 3,0 t/ha more yield. In early spring planting varieties of Wales total yield – 17,8 t/ha, while summer crops – 4,8 t/ha above. Thus, when the method of vegetative propagation welsh onion provides significantly higher overall yield year term revegetation, force of impact of this factor according to an analysis of variance is 65-66 %.

Conclusions. The growing season lasts until the conditional phase of technical maturity welsh onion large-defined time schedule for planting than varietal characteristics. Productivity was lower than annual plants welsh onion embodiment spring planting. Confirmed the effectiveness of the summer vegetative reproduction mode welsh onion sorts Wales case of double

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Bordyuzha N. P.

THE INFLUENCE OF FERTILIZATION IN OPTIMIZATION OF LEAVE DELOPMENT OF WINTER WHEAT IN FOREST-STEPPE OF UKRAINE

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The effect of different fertilizers combinations on dry matter accumulation by winter wheat on black soil was researched. The condition of optimal plant development was determined.

Winter wheat, fertilizers, dry matter in leave, yield

The leave formation and time of it activity depends from nutrients supply of winter wheat, etc. Plants that are grown in conditions of good fertilization accumulate more energy in 2-3 times [1]. Dry matter is accumulated less active by plants by reason of nutrients misbalance. The first year leave and second year leave have more important role in period of grain formation and grain ripening [2]. They stay green and active. The plant development and yield formation and grain quality formation depends from leave functioning and physiological and biochemical processes in its.

The goal of our investigation was determining of optimal fertilizers rates under winter wheat for increasing of grain yield.

The methods of our investigation. The field trials were located in long-time experiment of department of agrochemistry and quality of plant products in Right-Bank of Forest-steppe of Ukraine in 2007-2008. The experiment was arranged in tree replication. The area of seed plot (variant) was 30 m^2. In field trials the next fertilizers ware applied: ammonium nitrate (34 %) (ГОСТ 2 – 85); OSP (19,5 %) (ГОСТ 5956 – 78); potassium chloride (60 %) (ГОСТ 4568 – 95).

The soil of research plot was medow-chernozem calcareous. The content of humus was 4.09 %. The content of available phosphate was 27.0 mg per ha. The content of exchangeable potassium was 89.0 mg per ha.

Winter wheat was seeded in optimal time. The grain yield was harvested in stage of biological ripeness. Every variant was harvested individually. The results of field trials were considered with Macrosoft office Excel, Agrostat.

The results of investigation. The intensive plants growth show the using of water and using of nutrients by plants. And the dry matter is integrating index of the plants growth.

The program of our investigation included research of dry matter accumulation in first layer leave and second layer leave of winter wheat. We are set up irregularity of it process running during plant vegetation (table 1).

The intensity of dry matter accumulation in plants increased to preheading stage and was maximal in this stage. The dry matter content in plants was 16.0-26.7 g per 100 air-dry leave of the first layer leave and 14.1-21.2 g for second layer leave in comparative to 13.9-22.6 g and 13.2-18.9 g for plants in stem elongation.in the next period the dry matter accumulation by plants decreased through movement of the organic compounds to grain and leave drying up and leave defoliation. The first layer leave of winter wheat accumulated more dry matter than second layer leave because they is more active physiologically and they are not shaded.

The fertilizers application under winter wheat helps plants accumulate more dry matter in leave. The aftereffect of manure caused dry matter content in first layer leave on a parity basis 17.1-18.1 g and in second layer leave on a parity basis 15.4-16.2 g in comparative to 16.1-17.7 g and 14.2-15.3 in control. Optimization of phosphorus nutrition on the background of the manure aftereffect increased this index on 1.9-1.2 g and 0.6-0.4 g. phosphate fertilizers and potassium fertilizers combination on the background of manure aftereffect improved dry matter accumulation by plants.

Table 1.

The effect of fertilizers application on dry matter accumulation by leave of winter wheat of the Nationalna variety, g per 100 air-dry leave

Variant of the investigation	Year	Leave layer	The stage of plant growth					
			stem elongation	preheading	frowering	privot	lactic ripeness	lactic-wax ripeness
Without fertilizers (control)	2007	1 2	13,9 13,2	16,0 14,1	15,2 13,5	14,2 12,7	13,1 12,2	12,2 11,4
	2008	1 2	15,6 13,7	17,7 15,3	16,2 14,0	15,2 13,3	14,5 12,3	13,7 11,5
Manure aftereffect (saturation 12t per ha) – background	2007	1 2	14,7 14,4	17,1 15,4	16,2 14,5	15,1 13,2	13,9 12,2	13,0 11,6
	2008	1 2	16,6 15,1	18,1 16,2	16,8 14,9	15,6 14,2	14,9 12,7	13,9 11,8
Background + P_{80}	2007	1 2	16,8 13,9	19,0 15,2	16,8 14,6	15,8 13,8	14,4 12,3	13,5 11,4
	2008	1 2	17,0 14,1	19,3 16,6	18,0 15,7	17,3 14,3	16,1 13,0	15,3 12,1
Background + $P_{80}K_{80}$	2007	1 2	16,4 14,6	18,7 16,0	17,8 15,2	16,6 14,2	15,0 13,2	13,9 12,6
	2008	1 2	18,1 15,7	20,2 17,8	18,6 16,5	17,5 15,2	16,2 14,5	15,5 13,4
Background + $N_{30}P_{80}K_{80}$ + N_{30}	2007	1 2	17,6 14,8	19,9 16,7	19,1 16,2	18,0 15,2	17,3 14,2	16,3 13,4
	2008	1 2	20,9 18,7	23,5 20,6	22,0 19,5	20,6 17,3	19,2 15,9	18,4 14,7
Background + $N_{45}P_{120}K_{120}$ + N_{30}	2007	1 2	21,5 18,0	24,1 19,1	23,4 18,2	21,3 17,0	19,3 15,2	18,5 14,1
	2008	1 2	22,6 18,9	26,7 21,2	25,5 20,1	23,1 18,2	21,4 16,7	20,5 16,6

$N_{30}P_{80}K_{80}$ + N_{30}	2007	1 2	16,9 14,8	18,8 16,2	18,2 15,8	17,1 14,6	16,2 13,2	15,3 12,4
	2008	1 2	19,1 18,0	21,0 19,3	20,0 18,3	19,3 17,3	18,0 16,5	16,9 15,6
$LCD_{0,5,\%}$, г	*2007*	*1*	*0,53*	*0,67*	*1,12*	*0,85*	*1,32*	*0,83*
	2008	*2*	*0,46*	*0,75*	*0,95*	*0,73*	*1,01*	*0,93*
	2007	*1*	*0,28*	*0,82*	*0,73*	*1,01*	*0,87*	*1,07*
	2008	*2*	*0,35*	*1,11*	*0,96*	*0,81*	*0,56*	*0,86*

The nitrogen has important role in the organic matter accumulation by plants. Nitrogen in rate 60 kg per ha that was applied in two times intensified dry matter accumulation. This index increased on 3.2-4.2 g for the first layer leave and 0.7-1.6 g for second layer leave. He increasing of the nitrogen rate in 1.5 occasion improved dry matter accumulation. And dry matter content was increased on 4.2-3.2 g for first layer leave and 2.4-0.6 g for second layer leave in comparative to N_{60}. The leave accumulated more dry matter in 2008.

The fertilizers application influenced positively on dry matter accumulation by leave of winter wheat. The tendency of change in fertilization variants was same to dynamic of the dry matter change in plants. The intensity of dry matter accumulation running into plants was improved according to optimization of fertilization. The maximal level of this index in the first layer leave and second layer leave was in the variant with fertilizers application in rate $N_{45}P_{120}K_{120}$ + N_{30} on background of the manure aftereffect of the 12 t per ha. The grain yield was 7.40 t per ha in this variant.

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Zavgorodniy V.M.

TECHNOLOGICAL PROPERTIES OF WINTER WHEAT GRAINS GROWN UNDER DIFFERENT FARMING SYSTEMS DURING ITS STORAGE

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Annotation. The results of studies on the influance of farming systems on the technological properties of winter wheat during storage were presented.

Key words: wheat, farming systems, tillage, the quality of gluten, quantity of gluten, protein, vitreous.

Introduction. A winter wheat with which should receive superior quality indicators has sufficient number of new varieties. Characteristics of knowledge to change the technological properties during storage of wheat winter were important to determine the feasibility of storage. And to not to lose the quality of the grain, it is necessary to know which varieties can be stored over the long term with minimal loss of quality, and that should be processed immediately after passing the post-harvest period maturation [1].

Material and methods. The study of changes in wheat quality during storage was carried out on samples of grain varieties "Polis'ka 90" grown under different farming systems. In the experimental work combined two-factor field experiment to study the three farming systems and four primary tillage systems with laboratory experiments to study the dynamics of grain quality during storage. In conducting this experiment was used as the control system of industrial agriculture as the most widespread in farms.

The three farming systems used four gradations of primary tillage: differentiated minimum tillage, conventional+ minimum tillage and harrowing.

Results. Grain consistency is great value for the its processing. Vitreous affects the properties of the flour. This is a valuable indicator of technology that determines the possibility of obtaining a certain type of flour
Analysis of wheat grown after clover shows that the highest vitreous (67 - 77%) has a grain received by industrial farming systems, and lowest (41 - 55%) - the biological system. For vitreous wheat grown under ecological system occupies an intermediate position.

In grain consistence affected the way of cultivation. By conventional+minimum+harrowing and conventional+ minimum tillage obtained with higher grain Vitreous in all farming systems and therefore, the figure was 55 - 76% and 53 - 74%.

Vitreous generally stable and is a measure of the changes that were recorded are quantitatively small - an average of ± 2 - 5% for each term storage. If you store up to 9 months in wheat grown for industrial farming system was the strengthening of the consistency, expressed quantitatively improving your vitreous 6 - 12% compared to control (for storage).

A crop grown for environmental and biological farming systems also improved their consistency by an average of 5 - 10% from baseline, but only up to 6 months of storage. For further storage vitreous grains decreased and the storage period of 12 months or reached its initial level, or become something less than it, especially minimum tillage and surface of tillage.

Crop of winter wheat obtained by industrial, environmental, and biological systems for agriculture in differentiated and conventional+minimum tillage in terms vitreous as storage and during storage meet the requirements of class 1 quality (at least 50% vitreous grains). For biological systems at minimum tillage and surface tillage to lay deposited and after a year of storage vitreous was within the requirements of class 2, while the storage of 1 to 9 months, this indicator to satisfy the requirements of class 1.

Determining wheat quality parameters are the number and quality of wet gluten, providing in the process of making bread good properties as organoleptic and physico-chemical.

Studies show that corn grown for industrial and ecological farming systems had higher gluten content for differentiated and conventional+ minimum tillage of tillage. In the biological system of agriculture gluten content in wheat significantly lower compared to the previous two systems. Content of gluten in grains by biological farming systems before storage was based on the method of cultivation 24.0 - 24.8%, whereas in industrial and environmental systems respectively 28.4 - 32.2 and 27.0% - 28.9%.

Wheat during storage behaves differently depending on its origin. Gluten content in grain obtained for almost all the methods of processing and farming systems through 9 months of storage at an average of 0.5 - 1% increase, although not significantly.

Changes gluten content in wheat grown under biological farming systems was different. After 1, 3 and 6 months of storage, the grain harvested from all versions of the system substantially gluten content (an average of 2 - 3%) increased. Theoretically, it has become possible due to the conversion of albumin, globulins (soluble protein) soluble in alkaline.

Up to storage and during storage for gluten content of winter wheat grown for industrial farming systems in all investigated methods of soil and ecological system of differentiated, conventional+ minimum tillage cultivation methods satisfy the requirements of class 1 quality (gluten content was at least 28%). Up to store for grain gluten content of the rest of the studied variants meets the requirements of class 2 quality (gluten content was at least 23%). In the course of storage (up to 9 months) in grain grown under ecological farming systems during minimum tillage and surface cultivation and biological systems with differentiated conventional+ minimum tillage increased gluten content and satisfy the requirements of class 1 quality.

After storage grain during one year the gluten content in grain grown under different tillage methods in environmental and industrial farming systems differed not significantly, whereas the content of gluten in grains obtained by the biological system was lower than in the previous two.

Comparing the data of gluten content in grain grown under different tillage methods for industrial and ecological farming systems should be noted that after a year of storage, the figure was reduced, but not significantly. Gluten content in grains obtained by biological systems, with the exception of the variant surface tillage, significantly increased compared with the contents of it before laying on storage.

Theoretically, it can be expected that any increase in quantity albumin in grain will be accompanied by a relative increase in the content of gluten, while some deterioration of its physical properties by increasing hydration.

Before storage deposited, as shown in Table 1, gluten was weak. Since gluten is considered good when its is 40 – 75 index of device IGD, units. The indicator shows a decline of elasticity of gluten.

Table 1

Gluten quality of winter wheat varieties Polis'ka 90 in storage units, index of device IGD

Options		The duration of storage, months						
Farming systems	tillage	By keeping (control)	1	3	6	9	12	HIP_{05}
Industries (control)	Differentiated	102.4	97.4	94	92.4	99.9	104.9	5.5
	Minimum tillage	102.4	102.4	99.9	99.9	97.4	102.4	5
	Conventional+ minimum tillage	102.4	99.9	99.9	97,4	94.9	97.4	5
	Surface	102.4	102.4	99.9	102.4	94.9	102.4	5.5
Environmental	Differentiated	107.4	89,9	89.9	92.4	94,9	97.4	7
	Minimum tillage	109.9	102.4	99.9	97.4	97.4	99.9	7.5
	Conventional+ minimum tillage	107.4	92.4	89.9	84.5	89.9	89.9	5.5
	Surface	109.9	102.4	97,4	97.4	89,9	92.4	5
Biological	Differentiated	107.4	97.4	97.4	82.4	82.4	94.5	5.5
	Minimum tillage	112,4	97.4	94.9	89.9	94,4	97.4	7
	Conventional+ minimum tillage	107.4	94.9	92.4	92.4	87.4	89.9	5.5
	Surface	112.4	99.9	97.4	89.9	94.5	107.4	7
HIP_{05}		4.5	3	5.5	5	5	3.5	X

As shown in the Tab. 1 grain grown for industrial farming system before laying on storage was satisfactory weak, and in environmental and biological systems unsatisfactory weak gluten. Slightly better quality gluten corn was obtained for all farming systems and the application of differential conventional+ minimum tillage.

Grain storage for 12 months showed that the quality of gluten-free grains with some options are not improved and during long-term storage. In all variants of the experiment gluten grains for quality before store belonged to the 3 group and long-term storage is not improved.

Gluten grains obtained by conventional+minimum+harrowing and conventional+ minimum tillage farming systems at all tends to improve the quality, in particular to strengthen it. A gluten grain of these options is improving after a month of storage, except for variations intensive farming systems. However, the stability improved quality of gluten in differentiated and conventional+ minimum tillage lasts only grain that grows for environmental and biological farming systems. Grains of alternative differential method for the cultivation of industrial farming systems, providing elasticity of gluten to 100 units of index of device IGD this property was only 9 months of storage, after which the elasticity deteriorated.

Crop grown by surface tillage was less consistent quality gluten in certain periods of storage is somewhat improved, gaining strength, and worse - is weakening. After storage, the quality of gluten in grains, substantially improved compared to the original, with all tillage methods for environmental and biological farming systems. For industrial farming systems increase only conventional+minimum tillage in corn gluten quality than the original. Gluten grains of these options meet the quality of experience for group 2.

Protein - one of the most important components of wheat. As the data in Fig. 3.6 in grain grown under all farming systems and methods of soil protein content higher than 13% in the biological system of farming was more than 15% for industrial and ecological systems. This enabled us to include wheat in this indicator to 1st class and use the term "strong" wheat. For a variety of tillage highest protein content in grain was grown and differentiated in conventional+ minimum tillage cultivation of different farming systems.

Equally important is to keep the albumins of grain for a long time, because of the seasonal production is a necessity. The protein content hardly changed in the grain of wheat that was stored for 6 months. Quantitative fluctuations of the index at the specified shelf life averaged 0.2 - 0.3% and was not significant (within error detection). With further storage of grain protein content in it also significantly decreased by an average of 0.1% every 3 months.

After a year of storage of grain in the various options tillage intensive and ecological farming systems remained in the "strong", ie it protein content was higher than 14%. Crop grown under biological farming systems during storage lost 0.3 - 0.4% after one year of storage, depending on the method of tillage was more than 13% protein-differentiated and conventional+ minimum tillage cultivation and less than 13% protein (12.8 %) - for minimum tillage and harrowing way of cultivation. Analyzing the data we can conclude that the grain of this variety are very labile to the effects of factors like cultivation and longevity factor

Conclusions. As seen from the results of a study by a number of major characteristics of the highest quantitative and qualitative characteristics were is endowed with winter wheat grown for industrial and ecological farming systems with conventional+minimum+harrowing and conventional+minimum+harrowing.

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FEEDING NORMS FOR FATTENING HEREFORD STEERS USING LOCAL ADAPTOGENS IN CONDITIONS OF YAKUTIA

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Abstract. Based on this research there have been developed new recommendations for growing steers for slaughter, which will increase in the future the production of beef and allow to provide more quality beef for the population of Yakutia.

Keywords: adaptogens, hongurin, sapropel, ration, feeding.

In our republic alongside with increasing the milk yield, constant attention is given to increasing the production of beef. Currently it is about 60% of the gross production of all kinds of meat. The main ways to increase beef production in the republic are increasing the yield of calves, significant increase in live weight and fatness by growing up to 1.5 years old. The increase in beef production will be based on the intensification of growing of super replacement Heifers and better organization of summer feeding and final fattening [1].

It is necessary to take into account the economic and biological characteristics of animals and in accordance with it to create such conditions of keeping and feeding, which would contribute to the fullest expression of their genetic potential [6, 7].

The purpose of this research is to study the influence of hongurin + sapropel with mineral additives on productivity of young Hereford cattle at commercial ranch IAPC (integrated agricultural production centre) “Churapcha” of Churapcha region of the Republic of Sakha (Yakutia).

The research problem is to study the impact of inclusion in the ration of the zeolite + sapropel with mineral additives on the productivity of young cattle of imported Hereford breed, and to create feed ration for young animals for slaughter.

The research was conducted using the group of Hereford calves of Siberian cattle. The similarity of groups was achieved by selection of identical pairs. The deviation from the average parameters within groups did not exceed ± 10%. All the bull-calves, which were selected for the research, had an average fatness and were clinically healthy.

The control group had an economic ration; the first experimental group got 0,5 g./kg l.v of hongurin and 200 g. of sapropel with 0,04 g. KJ in addition to the economic ration; the second experimental group - 0,5 g./kg l.v of hongurin and 200 g. of sapropel with 10 g. $CuSO_4$ [4].

Here are the results of research: the tables 1, 2, 3, which are below outline the calculation of the ration and feed consumption. The calculations of ration and feed costs are based on reference manual [5]. The diagram of feeding from the birth to 18 months age in the summer period is presented in Table 1. (calves from birth to 8 months are at inleakage).

Table 1

From birth to 18 months (summer period)

Feed	Kg	Feed unit	Structure of the ration, %
Milk	1140 kg * 0,30	342,0	11,2
Hay	2493,1 kg * 0,42	1077,1	35,0
Feedstuff	810 kg * 1,02	826,2	27,0
Grass	2514 kg * 0,23	578,2	18,2
Haylage	810 kg * 0,29	234,9	7,7
Total:		3058,4	100

Experimental animals were constantly on pasture during the grazing period, the average daily feed intake and nutrition of calves at the age of 18 months are indicated in the Table 2.

Table 2

Average daily feed intake and nutrition of calves during the grazing period

Feed	Value
Grass of onion pastures	20
Haylage	2,0
Salt, g	37,0
The ration contains:	
Feed units	6,64
Energy exchange, MJ	63,0
Solids, kg	7,0
Digestible protein	540,0
Crude fiber, g	1950,0
Sugar, g	370,0
Ca, g	42,0
P, g	28,3
Carotene, mg.	531,0
Structure of the ration, % of nutrition:	
Grass of onion pastures	70
Haylage	30
Total:	100

Fodder provision is 93% [3] due to the requirements of the norms of cattle feeding.

In spring, the animals were in free stall barn, the ration is shown in Table 3.

In winter and autumn, the animals were in free stall barn, the ration is shown in Table 4.

Table 3.

From birth to 18 months (spring period)

Feed	Kg	Feed unit	Structure of the ration, %
Milk	3,0	1,0	22,3
Hay	5,0	2,12	46,8
Haylage	3,0	0,87	19,5
Feedstuff	0,5	0,51	11,4
Total:		4,48	100

2479 c.u. (caloricity units) are spent from birth to 18 months in the course of intensive rearing of Hereford breed for slaughter, 3111.3 EFU (energetic feed units). The live weight at birth is 25-29 kg, at the age of one year - 280 kg, and at the age of 16 months – 350-365 kg, which is comparatively closer to the standard of class I of Hereford cattle; slaughter yield is 58% up to 62%.

Table 4

Feed consumption by young animals (51 animal units) - from birth to 18 months

Feed	From birth to 18 months. kg	Structure of the ration, %	n.u.		EFU		T.e.	MJ
			1 kg,g	Total, kg	1 kg,g	Total, kg	1 kg,g	Total, kg
Whole milk	1140,0	13,8	0,30	342,0	0,27	307,8	2,28	2599,2
Meadow hay	1470,0	24,9	0,42	617,4	0,70	1029,0	6,68	9819,6
Haylage	810,0	9,5	0,29	234,9	0,31	251,1	3,44	2786,4
Meadow grass	1875,0	17,4	0,23	431,3	0,28	525,0	2,29	4293,8
Cryo feed	30,0	1,2	1,0	30,0	1,0	30,0	2,1	63,0
Feedstuff	807,0	33,2	1,02	823,1	1,2	968,4	10,5	8473,5
Total:		100,0		2479		3111,3		28035,5

3083,9 g of dry matter and 274229,7 g of digestible protein were spent over the entire period of experimental cattle breeding, the concentration of metabolizable energy on dry matter - 9,1 MJ /DM.

The study results showed that, supplement of hongurin + sapropel with mineral additives to the daily ration for young cattle helps to increase daily growth by 16.4% (P>0,940). Feeding animals at the age of 6-8 months within 180 days of spring-summer period with local adaptogens as feed additives resulted in an increase in the average daily weight gain - 3.6%, all physiological parameters were within normal limits. There is the growth retardation and development delay for the periods of growth of imported Hereford calves in conditions of Yakutia. This is because feed is own-produced, the quality of it is low, and there are huge temperature swings throughout the year.

Based on the above findings about productive qualities of calves from different seasons of birth [2, 8], it is best to practice breeding of calves of the spring season of birth. After weaning the adaptogens such as hongurin + sapropel with mineral additives should be included in the ration of young animals, which would provide an increase in live weight - 16.4%, reducing the cost of 1 hwt of live weight by 20.2%.

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PROBLEMS ON THE CREATION OF FOREST CROPS FAST-GROWING SPECIES IN THE GREEN BELT ASTANA

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Abstract. In this paper we describe of creation of foresr cultivation of six line from fast growing trees in the green belt of Astana city. In create forest cultivation from poplar its necessary an application of complex approach projection of artificial plantings that taking into account the possibility of obtain wood of fast growing trees in short time and their using as biofuels in the future; *recommended to mix a poplar with soil-improving shrubs (red and black elderberries, caragana)*

Key words: fast growing trees, poplar, green belt, forest cultivation, plantation.

One of the most pressing problems is creation a culture of fast-growing species for energy purposes in the conditions of Astana. Forest areas in the territory of Astana and in the immediate vicinity of the capital of the Republic of Kazakhstan, is performed only sanitary-protective functions.

Wood of fast-growing species are renewable sources of energy, the use of which relatively save exhaustible sources of energy and could have a significant impact on the reduction of the greenhouse effect on the planet.

Currently, to solve the problem of ensuring a stable development of urban and near-urban forests can only be due to the creation of artificial plants. The creation of a green belt of the city of Astana in order to protect the city from the wind, creating a favorable climate for the population in the capital is began in 1997 in accordance with the request of the President of the Republic of Kazakhstan.

With the increasing demand for wood is necessary to establish a plantation crop, which gives the opportunity to provide for the needs of the country of wood timber and furniture industries varietal wood material and energy use.

Location of the capital Astana of the Republic of Kazakhstan is on the treeless plain in the zone of the dry steppe, which is open to all the winds. In this region, the characteristic features of the climate are sharp fluctuations in seasonal and twenty-four-hours temperatures, long winters with low temperatures, short hot summers with high temperatures. The aridity of the region gives an explanation discrepancy abundance of warmth and light and low rainfall during the growing season [1].

Winterkill tissues in poorly prepared for winter plants are the result of unfavorable climatic features in forest plantations. Seedlings exposed to drought dry winds, if is not to spend watering during the hot period in time, which in turn affects the growth and status of forest crops.

Currently in the territory of the green zone of Astana planted 65 thousand hectares of planted forests. As noted in the scientific - practical conference "Technology creation of protective forests in a suburban area of Astana" is in the near-urban areas of Astana widespread complexes of soil with varying degrees of salinity and alkalinity, which limit the establishment of effective forest cover in a suburban area of Astana. The total area of green belt for the current period is 16,584 hectares, including about 10.5 thousand hectares of new plantations [2,3,4].

Protective plants are creates at the territory maximal approximate to the borders of the city of Astana. The climate and soil condition are limited a creation of effective forest plantation in a suburban area of Astana.

In the green belt of the tab scientific and industrial experiments on the development of sustainable, high-performance cultures of different forest tree species were carried out in several directions. Transplantation of 7-year-old plants of birch in the space of the near spaces between of link growing wings were transplanted more than 3.0 thousand trees (survival rate of 77.6%). This indicator is obtained by performing a series of events to ensure favorable conditions that require a lot of costs. Planting year-old seedlings with closed root system and two-three-year seedlings with bare-root has a number of advantages: the protection of the root system during transport, landing and storage; easy portability after planting period; long-term transplant plants. The best survival rate with closed root system had a Siberian spruce (87%), the lowest - balsam fir (16%). Two-year seedlings of English oak showed survival rate of 95%, Siberian spruce age 3-4 years - 69%. Survival rate of other breeds ranged at an average level. [5]

The obtained preliminary results led to the recommendation of one and two-year seedlings of Siberian spruce and two-year seedlings of English oak for landing with closed root system.

As the experience in the creation of forest plantations in the conditions of the second reception of the green zone of Astana, the proportion of hardwood is 98.2%, 1.8% conifers. Plantations grown on soils of 1group forest suitableness – high completeness, already have undergrowth and forest floor; there is a natural regeneration from seed of tree crops. Natural losses of trees and shrubs occurred on stains with not forest suitable soils.

Researches were having been conducted in the green belt of Astana (Astana ormany, Airport, the first phase, block 73). Forest plantations established six-row link of fast-growing species of poplar Kazakhstan, rooted cuttings and maple of ash like leaves. Number of six-row link in the block - 13, of which one is five-row link. Width of six-row link - 24 m, spaces between of link - 10m, row spacing - 4m. Displacement diagram M-P-P-P-P-M. The distance between the seats in the row, the main species - 1.5m, concomitant breed -1m. Quantity of planting material per 1 ha: poplar Kazakhstan - 1116 pcs., maple of ash like leaves - 549 pcs. Planting poplar Kazakhstan was carried out in 2001-2002. Currently, the average height of poplar Kazakhstan is 10,99 ± 0.16 m, the diameter at breast height 11,46 ± 0,16sm, crown diameter - 1,56 ± 0,05 m. The age of plantations currently is 13-14 years. Safety is 83,3%. Condition is good. There are individual dead wood. Needs care cuttings. Observation is continued.

Salt marshes and alkali soils are spots in the territory of green belt. Fine-grained soils to suitable forest also hinder cultivation of resistant plants.

The study of the existing experience of creating artificial forest plantation allows the following conclusions:

1) Application an integrated approach is necessary for to the projection of artificial plants, taking into account the possibility of fast-growing species of wood in a short time, and their use as biofuel in the future.

2) Develop a methodology to assess the state of the plantation forest plantations is need for allows an objective assessment of the quality of forest plantations of fast-growing tree species, intended for energy purposes, as well as to develop more advanced bias circuitry to planting had high productivity;

3) Needs proper selection of components of artificial plants, based on the knowledge of ecological and biological characteristics of woody plants, the particular features of interference between them, understanding the specifics of the interaction of plants with the environment in a particular type of site condition.

4) To study the effect of mineral fertilizers is necessary for ensure the rapid development of the trunks of forest plantations;

5) In the green belt of Astana the creation of forest plantations of fast-growing species in one type of crop is recommended to mix a poplar mainly with soil-improving shrubs (red and black elderberries, caragana) in one type of crop.

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