

ANNOTATION

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Cherenkov A. V., Gasanova I. I., Solodushko M. M. Winter wheat – the development and selection of culture in historical perspective.

Keywords: winter wheat, origin, breeding establishment, grade, acreage, yield.

The article presents the data that the sowing area of wheat in the world each year varies between 220–230 million hectares and the total yield of grain exceeds 660 million tons per year. The largest amount of grain realize the following countries: USA, Australia, Canada and France.

As a food source, wheat is the oldest cultivated plants. It is grown on the globe since pre-historic times – for 15–10 thousand years B. C. It is established that the culture of wheat originates from the Middle East.

On the territory of modern Ukraine wheat in culture appeared in the IV–III millennium B. C. and was an important subject of trade between Ukraine and Ancient Greece and Ancient Rome. Long standing of wheat culture confirmed the findings of archaeologists. During excavations near the villages of Tripoli, Stayky and Scherbynivka in Kyiv region, archaeologists found ash-laden grain. By studying them, the scientists have found that the agriculture and the cultivation of wheat in Ukraine began since the neolithic period. Early agricultural tribes of Tripoli culture are known not only soft wheat, but durum wheat and six row barley. At the time of Kiev Rus, Lithuanian-Polish Principality and the Russian Empire wheat grown mainly for their own needs. Over the years, the amount of virgin lands decreased and the conditions for spring wheat cultivation significantly deteriorated. Then began to grow winter wheat, which is more productive and less dependant on environmental conditions.

In 1913 the sown area of winter wheat was 3,1 million hectares, and the spring wheat – 5,8 million hectares. The total gross grain yield of winter wheat was 3,6, spring wheat – 4,3 million tons. In 1940, the sown area of winter wheat has doubled and reached 6,3 million hectares. Today in Ukraine is grown mainly soft winter wheat. Its area is, depending on the year, 6–7 million hectares. Crops of wheat spring are up 350–400 thousand hectares. Over the past 100 years, the yield of winter wheat in the world has increased almost three times: from 9,10 to 30 cwt./ha. Currently, the share of Ukrainian wheat in world production is 3,6–3,7 %.

The success of breeders contributed to the expansion of winter wheat, who managed to create new varieties of this culture. At the end of the nineteenth century – beginning of XX in Ukraine actively open research institutes and experimental stations for the study of existing materials and create new high-yielding varieties of winter wheat. Because of the varieties of foreign origin that were less suitable for growing in our climate gradually displaced from Ukrainian fields.

The first plant breeding institutions on the territory of modern Ukraine were Selection and Genetics Institute, Yuriev Institute of Plant Growing and Myronivska Experiment Station, now V. M. Remeslo Myronivskyi Institute of Wheat. For these scientific institutions originated selection of modern varieties. Large areas in recent years occupied in Ukraine and varieties of Institute of Plant Physiology and Genetics, also is known varieties of the Institute of Agriculture, Institute of Irrigated Agriculture and the Institute of Agriculture of Steppe Zone.

It is known that the steppe zone is the largest producer of winter wheat in Ukraine. Every year, the sown area of winter wheat in the steppe zone reaches 45–55 % of the total area of this culture in Ukraine. Grain production reaches into the best years of 10–15 million tonnes per yield of 30–40 kg/ha. However, unfavourable weather conditions for years, the gross grain yield of wheat and its yielding capacity dramatically reduced.

With the increase in the average yield of wheat in Ukraine to leading European countries the gross grain yield can not be less than 35–40 million tonnes each year. This volume of grain fully provide domestic needs of the country and increase its exports. – P. 3–8.

Lebed E. M., Tsilyurik A. I. Resumption of fertility and productivity of chernozem steppe short of crop rotations dependent on mulching tillage system.

Keywords: *mulching soil tillage, chernozem productivity, crop rotation productivity, plant residues, mineral fertilizers.*

The expediency of the rational use of restoring the self-farming systems involving non-traditional sources of mineral nutrition of plants. Revealed the effectiveness of post-harvest residues precursors with moderate doses of mineral fertilizers, which provide extended process resumption and restoration of the natural fertility of chernozem soil in agrocenoses. Displaying change management tactics plant residues and their distribution on the field surface, which is regulated above all improving basic soil cultivation ways, which are the foundation of whether any technology of cultivation of crops in different cropping systems.

According to studies on the field left by crop residues of crops in short crop rotations return a significant amount of earlier alienated nutrients from the soil. Degree of return to components of plant nutrition with plant residues primarily dependent on crop by-products, nutrient status and biological characteristics of culture. The greatest amount of nutrients returned to the post-harvest residues of winter wheat straw (N – 57,4–79; P₂O₅ – 13,1–17,3; K₂O – 94,0–140,6 kg/ha), sunflower stalks (N – 50,1–70,5; P₂O₅ – 13,2–16,4; K₂O – 148,5–186,5 kg/ha) and maize (N – 53,3–65,1; P₂O₅ – 29,9–33,3; K₂O – 90,4–103,6 kg/ha), is due to high yield of by-products and significant content of nutrients in it. Significantly smaller amount (1.5–2.0 times) nutrients returns with spring barley by-products (N – 32,9–43,2; P₂O₅ – 7,8–10,4; K₂O – 43,5–63,7 kg/ha) via low yield of straw compared with winter wheat straw and sunflower stalks.

A significant portion of nutrients returns into the soil and root system of field crops. In particular, the roots of winter wheat after his leave of mineralization in soil N – 40,2–63,8; P₂O₅ – 6,2–8,9; K₂O – 13,9–19,2 kg/ha, which is slightly smaller compared to crop residues, especially potassium in 6–8,5 times, but there is a significant part a total scrip. Are the same regularities are inherent to nutrients in the root residues of sunflower, maize and spring barley, reducing their quantity in comparison with nutrients aboveground residues of nitrogen were in 1,4–3,1; phosphorus 2,4–4,2; potassium 6,2–6,8 times.

A total sum of its residues (root + post-harvest) leave a significant portion of the organic mass, which in humification and mineralization is partially converted into humus and mobile forms of nutrients (N–NO₃, P₂O₅, K₂O). Involved in the biological cycle total amount of nutrients in crops distributed by separate organs of plants in a ratio: the main products – 44 %, not the main products – 39–40 %, the root system – 16–17%, sunflower, respectively 32, 52 and 16 %.

The methods and systems basic soil cultivation have little impact on total return nutrients to the plant remains. In general, the a few general the highest level of productivity of field crops, and differentiated plowing tillage systems, returns the maximum amount of nutrients with relatively shallow (mulching) system for nitrogen in 1,15–1,21, phosphorus 1,03–1,05; potassium 1,13–1,15 times.

Relative indicators possible use macro after mineralization mass of roots and by-products of crops were relatively N – 48–53 %, P₂O₅ – 30–34 % K₂O – 72–90 % of the total biological circulation on crop formation, that is in the planning system fertilizers in crop rotation should be anticipated, primarily compensation consumed nitrogen and phosphorus.

The high efficiency of the use of shallow (mulching) tillage systems by 12–14 cm in three field grain-fallow-tilled crops field rotation, which does not lead to a reduction in productivity. Replacement of sunflower in spring barley crop rotation reduces the productivity of crop rotation as a whole at 2,9–5,9 %, and reduces the effectiveness of shallow (mulching) tillage systems compared with the plowing. Adding moderate doses of mineral fertilizers (N₃₀P₁₀K₁₀) together with plant residues in crop rotations precursor favors the growth of productivity on 6,6–12,2 and 4,5–7,4 %.

The use of different tillage systems (plowing, differentiated, small (mulching)) in five field rotation for their productivity indicators were equivalent, except for the options without making fertilizers, where small (mulching) and differentiated system is inferior to the plowing 5,5–7,5 %. Fertilizer use in moderate doses significantly increases productivity indicators of crop rotations on 5–13,6 %, especially in shallow system (mulching) tillage with more stringent initial conditions mineral nutrition of plants, where they grow and exceed 14,0 %.

Abandonment of crop residues predecessor as organic fertilizer is an essential source of replenishment of soil organic matter (humus) and partial return earlier alienated nutrients, especially when combined with moderate doses of mineral fertilizers ($N_{30}P_{10}K_{10}$, $N_{24}R_{18}K_{18}$, $N_{48}R_{18}K_{18}$ one hectare of crop rotation). – P. 8–14.

UDC 633.15:631.531.12

Kirpa N. Y. Methodology of definition and normalization seed quality (Zea Mais L.) in Ukraine.

Keywords: seeds, graded and sowing qualities, indexes and methods of definition.

Acting system of definition seed quality of agricultural crops in Ukraine foresees application of principal (obligatory) and additional indexes. Principal ones are determined with official standards and include indexes of graded and sowing qualities. Additional indexes serve for more wide estimation of quality on purpose to support their competitiveness and realization.

Recently it is necessary to specify acting official standards for seeds, their approach to international rates and organizations OECD, ISTA, UPOV, ISO, CEN. Besides, it's necessary to take into consideration native priorities, material and technical basis and experience of national standardization and certification of seed materials.

The aim of this work was to make retrospective analysis of native system of estimation seed quality, to definite the ways of its development. The work was carried out with corn seeds for period 1941–2014 years.

It's established that the basis of normalization and definition of seed quality were national all allied standards of State Standard, which were exchanged on native standard DSTU. The standards included obligatory indexes and methods of definition graded and sowing qualities, which were acting in definite periods of time. Periodically the standards were reconsidered, some indexes were changed, first of all, typicalness and germination capacity.

The main provision of State standards was seed distribution on categories, classes and also rating of indexes, which characterized graded and sowing qualities, depending on peculiarities of crop. To the main indexes applied: purity of variety (typicalness), physical purity (content the main seed), germination, moisture, infection rate with diseases and vermin.

According to germination indexes extracted three or two classes with minimum acceptable germination 85, 88 or 90 %. According to moisture index the maximum acceptable rate must not exceed 13 or 14 % depending on standard or period of it acting.

In some periods (State Standard 20582-85) was normalized also the level of macro-injury in germinal part of seed.

It was admitted content of seeds no more 20 % with macro-injuries in germ, this rate was active just for seeds of 1 class.

The most changes in rating were considered with elaboration and distribution standard DSTU 2240, and also introduction rules of international certification in Ukraine. Other categories of seed grain were input, excepted classes depending on germination, received methodology OECD for definition sort qualities.

It was established high efficiency of additional quality indexes depending on aim of ration and crop. It was recommended for corn to apply index of force growth under cold seed sprouting and also new method of definition their sowing availability.

On purpose raising the level and objectivity official certification it was offered to join laboratories of research institutions, first of all selection and seed farming centers with right to give out documents (certificates) on sowing seed qualities.

In connection with extension of international seed trade, elaboration of new standards, their harmonization with international rates has especial meaning. First of all, the standards on export-directed crops are liable to elaboration, such as corn, sunflowers, rape and soya.

To the separate group of standard belong so called Technical conditions, which acting within one enterprise. With help of these standards there is possibility to realize intraeconomic control, to apply additional indexes of seed quality. – *P. 15–21.*

UDC 631.416.9:631.583(251.1:477)

Chaban V. I., Podobed O. U. Microelement's balance in intensive crop rotations of a step-pe zone of Ukraine.

Keywords: *balance, microelements, chernozem, a crop rotation, system of fertilizers.*

At the long-lived application of organic and mineral fertilizers in a crop rotation the significant amount of macro – and microelements (ME) is involved in a biological circuit. It is impossible to control and operate an exchange of nutrients in system "fertilizer – soil – plant" without studying of receipt and losses of nutrition elements in agriculture. Thus it is important to study not only nitrogen balance, phosphorus and a potassium, but also microelements. It is connected with that the soil cover of separate regions of Ukraine and Russia has an acute shortage of ME, in parti-cular Zn, Mn. The knowledge of conditions of formation of balance enables to adjust purposefully a mode of accumulation microelements in a soil, to predict changes of their contents at various inten-sity of agriculture. Proceeding from it, the work purpose – to calculate balance of microelements in intensive crop rotations of a zone of the Steppe depending on systems of fertilizers.

Researches conducted in stationary experiences at Krasnogradsky and Erastovsky experimental stations. A soil cover – chernozem typical and chernozem ordinary, with the contents humus 4,8–5,0 and 4,0–4,2 %. As objects of researches served: a 5-pole grain a crop rotation (peas, a winter wheat, corn on a grain, corn on a grain, barley) and 8-pole grain-fallow a crop rotation (black pairs, a winter wheat, corn on a grain, barley, corn on a grain, peas, a winter wheat, sunflower). In experiences systems of fertilizers were studied: the control, mineral, organic, organic-mineral.

The sizes of removal out of microelements in intensive crop rotations depend, first of all, on biological features of cultures and size of a crop. This index reflects the common need of plants for ME and their significance according to which they are ranged in the line: Zn < Mn < Cu < Ni < Co < Pb < Cd.

Long application of organic and mineral fertilizers in intensive crop rotations of a steppe zone significantly affected on indicators of balance of microelements. Cultivation of agricultural crops on option without fertilizers where the crop is formed at the expense of the capacity of the soil, led to formation sharply the negative balance of all microelements. On a background of ente-ring of mineral fertilizers the substantial increase of efficiency of agricultural crops, in a corollary of that was observed, their carrying out increased. Thus the balance of elements remained the ne-gative. Deficiency of such important biogenic element as zinc, increased by 16–26 %. Along with it, reduction of deficiency of balance of manganese was observed, and at increase of loading of a crop rotation by fertilizers – copper and a cobalt. In this case the balance of nickel and cadmium was transformed to the positive.

The organic system of fertilizers promoted creation of conditions for formation of positive balance of microelements. Receipt of zinc, copper, manganese by 2,6–9,5 times exceeded their carrying out by crops. Positively it developed on the organic-mineral power supply system, except for a cobalt, nickel and the lead which balance was deficiency.

The settlement data are confirmed by a condition of microelement fund of the soil. The tendency of reduction in the contents of potentially accessible forms of manganese, a cobalt, and lead in the horizons of 0–25 and 25–40 cm, and zinc – in a subarable layer was observed, on the option of importation of mineral fertilizers, at the negative balance of ME. In too time, on the background of organic fertilizers, the tendency to accumulation of potentially available forms of

Zinc and manganese in the root a layer of ground was shown at positive balance of the majority of elements. Despite of excess of receipt in the soil of elements of the first group of danger (Pb, Zn, Cd) with organic and mineral fertilizers over their carrying out by a crop, their accumulation it is not revealed – the contents was much lower than maximum concentration limit. – P. 22–25.

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Gyrka A. D. Environmental crop variety testing of spring small cereals in northern Steppe of Ukraine.

Keywords: spring: (barley, oat, wheat, triticale), variety, climate, grain, crop yield.

The results of the analysis of available variety assortment and grain yields of different varieties of spring small cereals: barley, oat, wheat and triticale in the environmental crop variety testing, depending on the changing hydrothermal conditions are presented. Marked the varieties, which characterized by stable realization of genetic potential of grain yield in a wide range of variation of average air temperatures and conditions water provision. – P. 26–32.

UDC 633.15:631.52

Belikov E. I., Kuprichenkova T. G., Gumanenko O. S. Using Plant Stand Density to De-fine Ecological Ductility and Adaptive Capacity of Early Maturing Maize Hybrids.

Keywords: maize, hybrid, plant stand density, ductility, stability, adaptive capacity, grain yield.

The main task of modern selective science is merging high performance of the plants with it's sustainability to abiotic and biotic stress. Low adaptive capacity of maize hybrids leads not to only low grain yields but to high variability especially in bad weather conditions. Plant density is one of the important factors, which determines efficiency of usage of fertility, temperature and water regime of the soil, solar energy and other components of agrocenosis. Influence of plant stand density on structure of the yields may be a factor of good ecological environment for growing certain brands or hybrids, which are in a process of discovering. The purpose of our research was to define the optimum plant stand density of early maturing maize hybrids in Northern Steppe of Ukraine but also to research parameters of their adaptive capacity and ecological ductility.

Research was done at Synelnykivska Breeding and Experimental Station of National Academy of Sciences (NAS) of Ukraine during 2010–2012. Dniprovskiyi 181 SV, Gardemaryn 185 SV, Diana 198 MB and Elf 197 MB were chosen as a source material. Research areas were laid in about three times repetition of plant stand density 45, 55 and 65 t/ha. Area for the research was 9.8 sq.m. Sowing was done by seed drill and plant stand density was done by hand when the plants had 5 leaves. Harvesting was done by combine harvester “Hege-140”. Agricultural practices that were used during research meet accepted guidelines set out in the methodology of field experiment.

Weather conditions during 3 years of experiments were variable. 2010 was unfavorable for the growth and development of corn, but 2011 was favorable and 2012 was relatively favorable conditions for the growth and development of corn. As a result of research found that there are significant differences both between hybrids and between density. In 2010 grain yield of maize hybrids ranged from 3,49 to 5,07 t/ha. The biggest yield was when plant stand density was 45 t/ha but it was significant different when density was bigger. The results were different in 2011 when the weather conditions were perfect. Significantly higher grain yield nearly all corn hybrids formed by stand density of 65 thousand plants / ha, while with decreasing density was significantly reduced yields. Ambiguous results were in 2012. When the highest grain yield hybrids formed at the density of 55 thousand plants/ha, the lowest – in various thickness.

Average for 3 years for all early maturing maize hybrids proved to be the best density of 55 thousand plants/ha. Increased stand density to 65 thousand plants/ha failed to compensate for crop losses from reduced productivity of individual plants, especially in the dry year. At the same time, the stand density of 45 thousand plants/ha there was shortage of the crop due to the

reduction of the total number of plants. Diana 180 SV showed the biggest average grain yield during research at the density of 55 thousand plants/ha – 6,04 t/ha. Use of plant stand density as an ecological gradient, has revealed the potential yield of hybrids and genotypes data to study the reaction to changing growing conditions.

Analysis of all the data has shown that maize hybrids Zhayvir 198 MV and Elf 197 MB were hybrids of intensive type. These hybrids have a wide norm of reaction to growing conditions, and high ductility significantly reduces the stability of yield. Hybrids need a comfortable environment to grow and they well respond to the fertilization. Diana 180 SV was shown as mid-stable on the basis of grain yield. Regression coefficient b_i of this hybrid was close to 1, and the relative stability had average (20,53 %). Diana 180 SV observed nonlinear response to changing environmental conditions. In this research stable hybrids were Dniprovskiyi 181 SV ($b_i = 0,78$, $S_{di}=17,82$ %) and Garde-maryn 185 SV ($b_i = 0,86$, $S_{di}=20,36$ %) which were different by conservative yield in different ecological gradients. Better in this experiment due to assess the effects of GAA_i , and parameter value selection of genotypes was hybrid Diana 180 SV which successfully combined high genetic potential for yield stability of its implementation.

Analysis of the environment as background for selection showed that in this research were 2 types of backgrounds: analyzing and stabilizing. Analyzing background was observed under favorable weather conditions and stressful, but stabilizing – in the middle of productive environments. In favorable weather conditions when stand density was 55 t/ha best revealed the genetic potential of maize hybrids, but during tough weather conditions and standing density at 65 thousands plants/ha heat-and drought-tolerant genotypes were found. – P. 33–37.

UDC 632.51:632.9

Tsykov V. S., Tkalich Y. I. Harmfulness of Segetal and Ruderal Weeds.

Keywords: types of weeds, harmfulness, agricultural crops.

Weeds are wild plants that grow spontaneously in cultivated and uncultivated lands, reduce the yield of cultivated crops and impair the quality of products as well as the phytosanitary condition of crops and the environment.

Forming a strong root system that penetrates deeply into the ground and large above-ground biomass which shades the crops weeds dry and deplete the soil, deteriorate the phytosanitary condition of crops and the environment and, without proper control, cause noticeable damage to agricultural production.

Among the cultivated crops in the steppe zone vegetables and hoed crops (carrots, cabbage, cucumbers, onions, potatoes, corn, sorghum, soybeans, sugar and fodder beet) are most sensitive to weeds. They are infested by weeds 10 times as hard as winter wheat and three times as hard as the sunflower.

It has been established that the group of the most common dicotyledonous annuals found in the major field crops (winter wheat, corn, sunflower, peas, barley, etc.) comprises about 30 species of weedy plants. Poaceous plants include 5 species of annuals and 3 species of rhizomatous perennials.

Up to 2,5–3,0 thousand seedlings of annuals and from 30–70 thousand/ha to 250–850 thousand/ha sprouts (shoots) and more may appear on 1 m² of complete (black) fallow and early fallow land as well as in vegetable crops and forage crops during the growing season because of excessively high potential infestation of arable soil. Therefore, agro-industry is still undergoing tangible losses due to uncontrolled spread of weeds in cultivated and uncultivated land holdings of different forms of industrial activity.

Consequently, for the fields highly infested with weeds it is advisable to grow close-growing crops (rye, winter wheat, oats, buckwheat, barley) with a somewhat increased seed application rate but uniform distribution of seeds over the area. Pre-emergence and postemergence timely harrowing, tilling the soil between the rows and shallow hilling of plants in rows is important for protection of cultivated crops with delayed development against weeds in the early stages of ontogeny (sorghum, maize, sunflower, soybean).

As we know a whole set of factors such as humidity, temperature and texture of soil, its humus content, weed species sensitivity to the active ingredients of agents, etc. determine the phyto-toxic effect of herbicides on weeds. Accordingly, the action of soil herbicides (Dual Gold, Prymek-stra Gold, Treflan, Harnesses, etc.) should be used with a higher moisture content of the upper (seed) layer, i. e. when it is at the level of 18–20 % or more, and with the soil moisture deficit (14–16 % and less) it is necessary to use post-emergence agents (Granstar; Hrodil Maxi, 2,4-D, Dialen Super, Esteron 60).

Summarizing the above data, we can state that excessive spread of segetal and ruderal weeds in the field agrophytocenoses of the Steppe of Ukraine is caused by their high morphological and biological adaptation to soil and climatic conditions of the area, by failures in the farming practices of land users, by a weak resource base of most split to small shares households needed to effectively control the weedy flora. It has emerged as a result of plowing up of black soils or has been brought here from other regions or countries with increasing trade among them, that is, it has become a product of greater human activity. – *P. 38–41.*

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Cherchel V. Y., Aldoshin A. V., Lyashchenko A. I. Barley – the state of production, new varieties and opportunities.

Keywords: *barley, varieties, sown areas, total yield, productivity, profitability, prime cost.*

Barley in Ukraine always was the leading relayed culture. Barley grain is used as a valuable concentrated fodder for many kinds of cattle; of barley grain produced pearls (barley, fine-ground barley); barley is the main raw material for brewing industry.

Until 2006 the country was sown annually 4–5 million hectares of spring barley. Lately there is a tendency of reduction of sown areas under this crop. Since 2006, the area under barley decreased by 2647,1 thousand hectares and in 2013 was 2171,4 thousand hectares. Sown area decreased in all zones, in Steppe with 2670,7 to 1223,0, Forest-Steppe with 1823,3 to 774,8, Wood-lands with 323,5 to 173,6 thousand hectares.

The average yield of spring barley grain varies from 1,42 to 3,00 t/ha yield substantially depends on weather conditions in a particular year. In favorable years 2008, 2009, 2011 yield was at 2,23–3,00 t/ha, in unfavorable years 2007, 2010 – 1,42–1,83 t/ha

Therefore, the determining factor gross harvest of spring barley is sown area under this crop. Reduction of the area of sowing led to the decrease in gross harvest of barley grain with 10359,1 thousand tons in 2006 to 4680,6 thousand tons in 2013, despite the fact that the average yield in 2013, was higher than in 2006 and amounted to 2,16 t/ha against 2.15 t/ha Significantly decreased gross yields in Steppe (with 5602,4 to 2056,6 thousand tons) and Forest-Steppe (with 4058,5 to 2153,4 thousand tons).

Despite this, barley, along with corn remains the main relayed culture in Ukraine. In scientific institutions conducted significant work on selection and seed production of this culture, which is reflected in the number of registered varieties in 2014 – 90, of which 60 national breeding, and 30 foreign.

Through the use of a fundamentally new source material on the basis of the local steppe eco-types and introduced high-performance foreign samples using the methods interspecies hybridization and individual selection for Sinelnikovo selection-experimental station of State IASZ NAAS created varieties of spring barley Ilot and Sovira with high productivity potential and adapted to arid conditions. They successfully passed qualification examination and registered in Ukraine respectively in 2009 and 2010. Average data for the three years of the Nikopol SES prove high adaptation of new varieties and their significant advantage not only over national standard Donetsk 14, but common in the production of a variety Vakula by 0,50 t/ha (Ilot) and 0,38 t/ha (Sovira). In 2008, the Nikopol SES formed the highest grain yield, among 50 varieties were studied, the variety Ilot, which was the 5,45 t/ha yield. Increase compared to the variety of Donetsk 14 amounted to 1,05, and with a variety Vakula is 0,67

t/ha. Maximum yield 7,63 t/ha was obtained in 2007 in Rivne SAS the varieties of spring barley Sovira. Varieties Ilot and Sovira resistant to lodging, shattering and drought, especially, during the grain filling. Also they are characterized by maximum resistance to different types smut (9 points). For new varieties in the experimental stations of the Institute dep-loyed seed production.

When the compilation of normative calculations found that in modern conditions of mana-ging the cost of a ton of grain of barley spring, depending on its performance may be at a yield of 1,5 to 4,5 t/ha, respectively 2107 and 1278 UAH/t. At the same time the profitability of grain barley spring sufficient to ensure simple reproduction of production is achieved, subject to receipt of yield capacity is not below a 3,0–3,5 t/ha (under condition of implementation at the price of 1800 UAH/t), while the growth of the selling price to 2000 UAH/t, while the yield of 2,0–2,5 t/ha.

Therefore, with proper selection of varieties adapted to specific regions, the technology of cultivation, it is possible to harvest up to 5–7 t/ha, that would be economically profitable for produ-cers of barley grain. – *P. 42–47.*

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Nischenko M. P. Special Aspects of Formation of High-Yielding Sunflower Crops when Changing Row Spacing and Crop Density.

Keywords: sunflower, 35 and 70 cm row spacing, crop yield.

To grow high yields of sunflower we need to solve two problems: to create a proper morp-hological structure of agrophytosenosis that could use environmental factors most effectively and to obtain an optimum number of plants per unit of area which will provide maximum utilization of solar radiation and soil fertility in order to get economically valuable products.

The aim of our work was to investigate the factors of the effective use of the environment by creating an optimal structure of sunflower crops to ensure high yields by differentiation of row spacing and distance between plants in rows.

The work was carried out in Farming Company “Ptakhivnyche” of the Novomoskovsk dist-rikt, Dnipropetrovsk region in 2011–2013 using B.A. Dospekhov’s method. Soil: ordinary cher-nozem.

Today single-grain sowing with 70 cm row spacing is the main method of sunflower sowing. With the appearance of a new morphological type of hybrid in the hybrid production and with nar-rowing row spacing to 45 cm we managed to increase the sunflower yield due to approximation of the shape of feeding area to a square. Thus with the plant density of 35–70 thousand plants per 1 ha and the row spacing of 70 cm it has a shape of a rectangle 70 x 19–41 cm.

Narrowing row spacing to 35 cm reduces the number of plants per 1 running meter of a row by half, to 12–26 units. In this case the uniformity of placement of plants in the area is much better than in crops with 70 cm row spacing.

The methods of sowing did not influence the plant growth on a large scale. The length of the growing period in 2011 was equal to 109–112 days, in 2012 – 111–114 days and in 2014 – 120–124 days. Its duration shortened with increasing the crop density from 35 to 75 thousand of plants per 1 ha.

Our experiments show that with increasing the crop density from 35 to 75 thousand of plants per 1 ha the sunflower growth processes intensified irrespective of sowing methods.

As it was established by observations, the plants formed 32–50 % of their leaf surface before the phase of calathid formation and 78–100 % – before blooming. In dry years the area of leaves reaches its maximum in the blooming period while in wet years the leaf growth may continue till complete ripening of seeds.

Illumination in the crop, PAR absorption, net photosynthetic yield (NPY) and the crop yield capacity change in accordance with the change of plant height and the plant assimilation

system. There is an inverse relationship between the leaf area, illumination and NPY which is evidenced by our study.

Methods of sowing and crop density influence water use very little. Thus the consumptive water use factor was 4,1–4,5 % higher after narrowing the row spacing and it increased by 4,6–6,2 % in crops with higher density (75 thousand plants per 1 ha) compared with the density of 35 thousand plants per 1 ha. The moisture was used most effectively with 35 cm row spacing.

With increasing the crop density the calathid size and grain content as well as the grain size (Table 5) is reduced. In particular, over the years of the experiment in narrowed to 35 cm rows decrease in the crop yield with the density of 35–75 thousand of plants per 1 ha averaged 81,6 % while with the standard row spacing it reached 127 % which is an evidence of increased competition among the plants in crops with 70 cm row spacing.

Thus, in the Steppe zone the sunflower can be sown with 70 or 35 cm row spacing. The highest yield (3,55 t/ha) was obtained with sowing in spacing between rows narrowed to 35 cm and the density of 75 thousand of plants per 1 ha. With the 70 cm row spacing the optimal crop density is 52 thousand of plants per 1 ha and its decreasing or increasing will result in reducing the crop yield. – P. 47–52.

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Kyrpa N. Y, Bazileva Y. S. Comparative description of methods of estimation of corn seed quality.

Keywords: corn, seeds, injuries, classification, quality, methods.

In terms of increasing amounts of grain and increasing requirements for quality problem of preparation of national maize seed takes considerable relevance, since a significant portion of kind of seed of low quality due to the high percentage of injuries grains. If the volume of damaged seeds taken as 100 %, then the collection has been injured 22–27 %, grain post harvest completion – 65–70 %, sowing – 5,7 %. In reason for significant damage to the seed stage of post-harvest processing is too intensive on mode different machinery and mechanisms in terms corn plant as a result – reduced germination and vigour of seeds due to lesions of the disease, and this in turn leads to a de-terioration of seed material in terms of storage. Damaged seeds germinate worse, plants are behind in growth and development and, therefore, reduce their productivity. In this regard, a more thorough detection and removal remove damaged seeds is of practical importance to obtain high quality seed

The purpose of research is to develop methods to identify different types of injuries directly on the seed corn hybrids and spend their classification based on the features of damaged grains. Analyzing all direct and indirect methods of detecting injury to the seeds, was once offered the most suitable for corn, given its biological characteristics and physico-mechanical properties, method of watching seeds collared with aniline dyes

Research methodology included analysis and evaluation of known methods for detecting injury to the seed corn hybrids, as well as the development and experimental verification of the parameters of a new method that is appropriate biological characteristics and physico-mechanical properties of the seeds of this crop.

First, you need to select a working sample for analysis in accordance with applicable standard [2]. Then two samples of seeds of 100 grains each should be put in two glass-human vessel and pour the solution of one of the recommended colours. Seed mix thoroughly, maintaining appropriate exposure and then merge the solution to the flask and used for further analysis. During the experiments it was found that the results are not always accurate, to the same method needs a lot of time and circumstances. For example, not all injuries can be detected by colour, in addition to clearly distinguish between them. The accuracy of the method is also affected by the type, colour, moisture content.

Then put the seeds on filter paper for drying, and then carefully examine each seed in the first place – the embryo, and then – the endosperm, to sort by type of injury and determine the

nature of the damage. During the analysis we recommend that the following items: 1. Whole grain. 2. Knocked embryo. 3. Makroinjuries embryo (knocked out of the embryo). 4. Microscopic em-bryo (damaged fruit and seed coat). 5. Damaged fruit shell of the embryo. 6. Makroinjuries endo-sperm. 7. Microscopic embryo + endosperm makroinjuries. The most negative effect of trauma, be-longing to the 1st-3rd grade: seed to lose live similarity or reduces viability, including laboratory. By grade 4, according to our classification, are makrotravmy endosperms, leading to action diseases and reduce seed germination in the first place – the field. In article say about of enrolled in the 5 and 6 grade and microscopic germ seed as frustrated root cap, leading to a decrease in vigour, which negatively affects seed germination and field productivity plants. By the 7th class is microinjuries endosperm as internal cracks, they cannot directly affect the germination of seeds, but weakened its life processes in terms of storage.

There are methods for determining the number of damaged seeds are not of universal and need some classification according to each culture. Considering the biological and physicomecha-nical features corn, the method based on direct viewing of seeds under a magnifying glass to its classification and possible effects on the quality and yield of seed. The most dangerous are macro-induies of embryo and endosperm. The content of seeds of such injuries should not exceed 5–15 %, depending on the hybrid and features pre-preparation of inoculums. – P. 52–56.

UDK 633«321»:633.39 (251.1:1-17)

Dudka M. I. Comparative yielding capacity of one-specific and companion late spring ag-rophytocenosis with the amaranth participation at cultivation on green forage in northern Steppe.

Keywords: annual late spring cultures, companion agrophytocenosis, yielding capacity, green forage.

Experimental field researches were spent in 2009–2011 at Erastivska Experimental Station of State Institution of Institute of Agriculture of the Steppe Region of National Academy of Agra-rian Sciences of Ukraine for the purpose of definition of efficacy of companion agrophytocenosis of corn and sorghum cultures (sweet sorghum and sorghum-sudan-grass hybrid) with an amaranth.

By means of phenological researches it is determined, that differences in coming of the basic phenological phases at plants of each kind in one-specific and companion sowings were insignificant, or absolutely were absent. It indicates about favorable conditions for all species of plants at their companion cultivation. Tillering stage, stem extension stage, tasseling of the panicle at plants of sweet sorghum and of sorghum-sudan-grass hybrid have been noted accordingly on 19 37, 65 and 18, 35, 66-th day after seedling emergence accordingly.

Formation by corn plants of 3, 5, 7-th leaf and tasseling of the panicle are noted accordingly for 9, 21, 33 and 63-rd day, and phases of the amaranth plants development – stooling stage, ap-pearance of panicles and their blooming have come accordingly for 16, 34 and 52-nd day after seed-ling emergence. The beginning of aftermath shoots aftergrowing was defined, as a rule, by specific features of the cultures and at plants of sweet sorghum and sorghum-sudan-grass hybrid and ama-ranth have been noted on the average for three years for 9, 8 and 11-th day after harvesting of the first hay cutting accordingly.

Companion sowings of corn and sorghum cultures with the amaranth under conditions of placement of components on the area with drill rows, which alternate 2:1 at their simultaneous crowdedness of crop on 12,5 % (the general norm of seeding was 125 % from one-specific sowings) for the growing season on the average for years of researches, exceeded one-specific agro-phytocenosis as amaranth on yielding capacity of green mass (on 24,5–50,2 %) and to harvesting of absolutely dry material (on 29,5–64,8 %), and one-specific sowings of corn (accordingly on 6,9–28,9 and 3,1–31,3 %). The highest yielding capacity of green mass (42,38 t/hectare) and harvesting of absolutely dry matter (7,95 t/hectare) among companion agrophytocenosis in the basic hay cut-ting were formed by sowing of corn with the amaranth ,

which on these indexes exceeded sowings of sweet sorghum and sorghum-sudan-grass hybrid with the amaranth accordingly on 9,7–11,0 and 3,9–10,2 %.

Individual share of the green mass yield of the second hay cutting in one-specific and companion sowings thus reached only 22,5–27,5 % from the general yield. The highest level of yielding capacity of green mass in the sum for two hay cuttings (51,10 t/hectare) and dry matter harvesting (10,12 t/hectare) among companion agrophytocenosis on the average for years of researches sowings the sorghum and sorghum-sudan-grass hybrid with the amaranth differed at alternation of two drill rows of grassy culture, as more productive component, with one drill row the amaranth at crowdedness of each of species of plants on 12,5 % concerning their one-specific sowings.

Thus, by results of three-year experimental field researches, in northern Steppe in order to receive the highest yielding capacity of green mass and harvesting of absolutely dry matter in late spring companion agrophytocenosis with the amaranth under the conditions of once cut using of sowings it is more expedient to sow as component the corn, and at twocut using – the sweet sorghum and the sudan-grass hybrid. – *P. 57–60.*

UDC 633.111:631.81:65.018

Kramarev S. M., Gemela G. P., Shakaliy S. N. Influence of mineral fertilizers on the quality of the grain of winter bread wheat.

Keywords: winter wheat, fertilizers, nature grain, gluten, protein, falling number.

This paper presents the results of studies of the effect of mineral fertilizers on physical parameters and grain quality indicators of winter wheat (average for 2010–2013), in terms of left-bank forest-steppe of Ukraine. It is established that the application of fertilizers has an effect on increasing grain yield and increases the protein content in the grain. The correlation between the amount of gluten and protein content in grain.

One of the major problems of agriculture of Ukraine in modern socio-economic conditions is a significant increase and stabilizes grain production. In the grain balance Ukraine are among the leaders of major food crops – winter wheat. By increasing the production of high quality grain that culture can significantly improve the agricultural economy [2]. The work of many authors found that the increase in grain quality leading role of nitrogen fertilizers. Disadvantage leads to a decrease in protein and gluten in wheat. It is noted that the unilateral introduction of phosphate and potash fertilizers and their combination also reduces the quality of wheat. The combined use of potassium fertilizers with nitrogen has a positive effect on the quality [3].

Yields of crops growing technology determine the effectiveness and economic feasibility of production. The value of the yield is influenced by the specific soil and climatic conditions and growing technology elements. We know that getting high and stable yield performance is ensured by optimizing the growing conditions, primarily due to fertilization [1].

The study of the processes of harvest makes it possible to establish the degree of dependence of yield structure elements of environmental factors, including process. The modern world of technology growing crops is a number of measures to create optimal conditions for plant growth and development required for the formation of a high yield. It is noted that as used herein Agrotechnical each measure should be used for maximum optimization of growth and development of plants from the start.

It is known that to obtain the maximum, genetically based level of productivity, even in highly cultivated soils can only be directed regulation of power plants based on the laws of the formation yields. It is necessary dose of nutrients, their combination and ratio to choose, depending on soil and climatic conditions, a variety of biological properties [2].

Analysis of the results of our research shows that the yields of winter wheat have a significant impact as backdrop fertilization and methods of protection combined with weather conditions.

The study was conducted in terms of the left-bank forest-steppe of Ukraine on the basis of experimental field Poltava Institute of Agroindustrial Production named after M. I. Vavylova (2010–2013). According to the method of field experience B. A. Dosp'yehova [6]. General agricultural cultivation of winter wheat was accepted.

Soil land which conducted research related to the high content of humus chernozem typical. Mechanical composition of black soil – vzhkosuhlynkovyy, relatively homogeneous, coarse dust content of 37–43 %, 25–38 % mulkuvatyh particles. The total porosity of the soil to a depth of 120 cm – 59,8–55,9 %. This composition is quite favorable for the normal flow of soil processes and the development of plant roots.

The material for the study was a sort of soft winter wheat Vdala.

Technological parameters of grain quality were determined by the methods of the current standards in the laboratory as a grain of Poltava State Agrarian Academy. Mathematical treatment of the results was carried out using STATISTICA 6,0.

Repeated – Triple predecessor – peas, seed rate – 5,0 million of similar seeds per 1 ha seeding depth – 4–6 cm.

Variants of the experiment:

- No protection;
- Full protection (herbicides, insecticides, fungicides);
- Full protection + Extra Basfoliar 36.

Variants of fertilization: 1. Without fertilizers. 2. N₅₀P₅₀K₅₀. 3. N₁₁₅P₉₆K₅₁.

4. N₈₅P₉₆K₅₁ + N₃₀. 5. N₅₈P₄₅K₂₅. 6. N₁₀ on 1t of straw.

According to the data obtained the lowest yield was a variant without protection and without fertilizers 3,53 t/ha, the highest average yield – 5,69 t/ha in the form + Basfoliar 36 Ekstra complete protection. – P. 61–67.

UDC 633.854.78:632.954:631.5

Tkalich I. D., Tkalich Yu. I., Bochevar O. V. Herbicides in of sunflower sowings with different row width spacing.

Keywords: sunflower, herbicides, row width spacing.

This paper presents the results of field experiments on the effectiveness of herbicides betanal Expert, harnes and measures of sunflower tending. It is shown that spraying the plant in phase of 5–6 pairs of leaves by herbicide betanal expert don't lead to suppression of sunflower plants, but contributes to the destruction of dicotyledonous and some grass weeds. Seeding with narrowed row width provides better weed growth inhibition and increases the seed yield.

Terms and regulations of applying the herbicide betanal Expert studied in 2010–2012, and the effectiveness of its system of sunflower sowings tending at 35 and 70 cm row width – in 2012–2013 on the chernozem soils of the Institute of Agriculture of Steppe zone (Dnipropetrovs'k).

In the experiments, sunflower hybrid Yason seeded by seed drill SUPN-8 in the period 23,04–3,05 after winter wheat. For seeding with 35 cm row spacing did two drills passes. Accounting area was 28 m², with triple replications.

Sunflower management practices met zonal recommendations. Plowing was carried to a depth of 25–27 cm. In spring the fall-ploughed field was harrowed by crust buster. Herbicides applied by small-sized sprayer according to the experiments scheme. Plants density was formed by hand: 75 thous. plants/ha for seeding with 35 cm row spacing and 57 thous. plants/ha – with 70 cm.

During the sunflower growing season in 2010 fell 195 mm of precipitation, 2011 – 197; 2012 – 276; 2013 – 115 mm.

Observations showed that herbicide betanal Expert with consumption rate 0,5–1,5 l/ha at varying degrees inhibits development of dicotyledonous weeds and some grass weeds, destroying about 78–85 % of them, increasing the productivity of sunflower plants and its productivity. However, spraying the sowings in the phase of 3–4 pairs of leaves with

consumption rate 1,5 l/ha inhibits sunflower (causes icterus, stunting plant growth), but spraying in phase 5–6 pairs of leaves on young weeds do not observed it. By reducing the weed-infested sunflower sowings the yield in-creases compared with variants untended for 22,6–33,4 %. At herbicide application in the phase of 3–4 pairs of sunflower leafs the highest crop yield obtained at a rate of 1,0 l/ha, and in the phase of 5–6 pairs of leaves – 1,5 l/ha.

In a second experiment were studied the efficiency of betanal Expert with consumption rate 1,0 l/ha on sunflower crops with 35 and 70 cm row spacing as compared to well-known agro tech-nical practices: harrowing and inter-row cultivations and herbicide harnes, 2,5 l/ha.

In amount and dry weight of weeds untended sunflower sowings (control) were the most weed infested. Thus, at 70 cm row spacing the weed dry weight was 335 g/m², 35 cm – 251 g/m². Highly weed infested were both seeding methods at variant with only harrowing in the phase of 1–3 pairs of sunflower leaves (152 and 88 g/m²), and also treated with only by herbicide betanal Expert, 1,0 l/ha – 103 and 65 g/m². In all the tending variants in sowings with narrowed row spacing the abundance and mass of weeds was less than in wide-row (70 cm), which was the result of biological suppression of weeds by evenly placing plants in the area and due to the greater thickness at 35 cm row spacing. The only herbicide betanal Expert which applied on young weeds reduced weed infestation comparatively to control in sowings with 35 cm row spacing to four times, 70 cm – three times, and only harnes – respectively 15 and 8 times.

Thus, only due to a narrowing of row spacing were provided reduction of weed-infested sunflower crops comparatively to wide-row sowings (70 cm) by 25 %. The best options at narrowed rows were application only harnes, 2,5 l/ha or harnes, 2,5 l/ha + betanal Expert, 1,0 l/ha, and in so-wing with standard row spacing (70 cm) – harnes, 2,5 l/ha or harnes, 2,5 l/ha + one inter-row cul-tivation. In these variants obtained the highest crop yield – 4,07–4,14 and 3,33–3,38 t/ha. Betanal Expert can be used on sunflowers only after registration. Its effectiveness is lower than harnes. – *P. 67–69.*

UDC 633.16"324":631.84:338.43

Benda R. V. Economic efficiency of cultivation of winter barley depending on sowing and mineral nutrition.

Keywords: winter barley, sowing, mineral nutrition, nitrogen fertilization, economic ef-ficiency.

The grain growing, as priority industry of agriculture with the high level of competitiveness on internal and world markets, determines him modern development and food safety of every re-gion of the state. In this industry that is in a most degree related to the natural environment and lan-ded resources, the fixed material and technical assets are used agrarian to the sector of economy. The level of their use depends on organization of production, technology and many other factors, including climatic terms, that опосередковується in agricultural enterprises the annual indexes of the got result. Thus, a key issue for further development of the agro-food sector in Ukraine is incre-asing grain production, including by expanding the acreage of winter barley. In this respect, the ma-in objective is to increase productivity per hectare, stability and sustainability of grain production.

The conducted long-term market of grain analysis testifies that is the last years observed considerable narrowing of specialization of agricultural production. Focusing solely on market con-ditions led to the reduction in the area of clean and busy vapor perennial grasses and increase the share of sunflower crops and sternevoj headed cultures that are increasingly predecessors for winter crops.

In recent years, due to the reduction of mineral fertilizers and low culture farming, decreased soil fertility – humus content averages 3,2 %. Crisis situation of farms, lack of resources leads to fe-wer opportunities to fertilize the soil. In 2009, according to the State Statistics Committee of Uk-raine on 1 hectare of cultivated area in the country have made an average of only 48 kg ai fertilizers, while in 1990 – 109 kg a. i.

And this is why, according to research data that half the crop growth is obtained by

adequate and reasonable use of fertilizers.

Based on our experimental data was carried out economic evaluation of winter barley cultivation depending on sowing time and different mineral fertilizing conditions in the northern steppe of Ukraine on precursor – spring barley.

In economic calculations take into account all the costs of production per hectare crop of winter barley and expenses related to the acquisition, transportation and fertilization. Prices used 2010 marketing year.

In determining the value of products obtained per unit area was accounted main products (grain) and does not take into account the side – (straw). Crop estimated by purchasing exchange rates prevailing at the time of settlement – 1200 UAH/t of feed barley winter. Net income per hectare of crop derived from studies determined as the difference between the yield and costs associated with the cultivation of winter barley depending on factors that were studied.

It is well known that the sowing during the growing season is an important reserve for increasing grain yield and improving its quality, moreover, indicated Agrotechnological intake is not associated with additional costs and is considered the cheapest measures to increase productivity.

Comparing the cost of grain depending on sowing time can be noted that by sowing on September, 25 it was minimal compared to the other terms and net profit is much higher. This is explained by the higher yield of sowing.

The results of the economic analysis indicate that when grown in winter barley predecessor, the spring nitrogen fertilizing in different terms in different ways and doses are economically feasible. Using only one early spring feeding did not provide substantial allowances harvest dramatically increased its efficiency by introducing nitrogen follows in later phases of development. Thus, when growing winter barley advisable to make nitrogen fertilizer re-tail: N_{30} on a frozen-thawed ground and N_{60} locally in the end of a tillering stage. This provides a significant yield increase, which in turn, significantly outpacing the growth of additional costs and has a positive impact on all economic indicators.

Increasing doses of nitrogen and 90 kg/ha, a. i., in basal feeding in the late tillering stage compared to the N_{60} leads only to an increase in additional costs, the increase in yield was not significant, which is reflected in a decrease in net income per unit area and increasing production costs.

Analyzing the economic performance of growing winter barley after spring barley depending on Agrotechnical measures in terms of northern part of Steppe of Ukraine can be concluded that most benefits achieved by sowing of the winter barley on September, 25 with sowing rate of 5 million per hectare on the background of fertilization $N_{60}P_{60}K_{30}$ with subsequent top dressing N_{30} on a frozen-thawed ground and N_{60} locally in the end of a tillering stage, the highest grain yield (5,0 tons per hectare) has been received, that has provided on 1 hectare 2249 UAH net profit at level of profitability of 59,6 % and the cost price of grain 752 UAH/t. – P. 70–73.

UDC 631.582:631.8:633.15:633.34

Artemenko S. F., Rybka V. S., Kovtun O. V. Economic efficiency of growing of soybean and corn in short-rotation crop rotations.

Keywords: plowing, chisel tillage, fertilizer application system, costs of production, cost, profit, profitability, soy, corn, short rotation.

Protein and energy problem becomes essential in modern conditions for the world's population and also availability of protein balanced feed in sufficient quantities for agriculture in the livestock industry. To intensify the livestock industry important value has the presence of a sufficient amount of plant protein and high-energy feed in ration of animals. Increasing of productivity of field crops such as corn and soybeans can solve the problem of feed grains and protein for the industry

In the Erastivska research station of the Institute of Agriculture of the Steppe zone of NAAS of Ukraine in 2008–2011 researches have been conducted to ground not only agricultural

but also economic aspects of expediency of application of different ways of basic tillage, systems of fertilizing in short-rotation crop rotation using the soybean and corn in the concrete soil and climatic conditions of Northern Steppe.

The experiment was laid on the background of two ways basic tillage: mould board ploughing and chiseling. We have studied the saturation of crop rotations by soybean: in two-field crop rotation it was 50 %, in three-field crop rotation it was 33 %, in four-field crop rotation it was 25 % and 50 %, and by corn in two-field crop rotation it was 50 %, in three-field crop rotation it was 33 %, in four-field crop rotation it was 25 % and 50 % respectively. In the three- and four-field crop rotations in order to decrease herbicide load an interrupt rotation of corn and soybeans by one field of barley is envisaged. The systems of fertilization in crop rotation were studied by the scheme: control – no fertilizer, fertilizer use under planned yield according to the results of soil diagnostic and use of fertilizers in recommended doses.

Economic evaluation of the results of experiments carried out according to generally accepted methods. Basic economic indicators: cost price and profitability of grain production were determined to evaluate the effectiveness of corn and soybeans growing in short-rotation crop rotation.

Judging from the four-year data obtained in experiments with short-rotation crop rotations it was founded that increasing of the application rate of fertilizer according to the soil diagnostics under planned harvest ensured growth of soybean and corn productivity in short-rotation crop rotation. However, from an economic point of view it was not effective because of the high cost of applied chemical fertilizers.

The best economic indicators of grain production were obtained thanks to saturation of short-rotation two-field crop rotation (soybean – corn) and four-field crop rotation (soybean – corn – corn – barley) by corn up to 50% when growing cultures without using of chemical fertilizers.

The highest indicators of profitability of grain production (123,4 and 121,6 %) it was got due to the saturation of short-rotation two-field (soybean – corn) and four-field crop rotations by corn up to 50 % by growing of cultures without chemical fertilizers application. Indicators of profitability declined to 57,6–71,4 % in variants where fertilizers were used in accordance soil diagnostic and in recommended doses, which was due to high cost of fertilizers first of all (it makes 20–30 % in the cost structure) and their insufficient payback. Profitability in the three-field and four-field crop rotation with high saturation by soybean was formed at the level of 43,1–58,3 %.

A result of research we can make the following conclusions. Among the studied short-rotation crop rotation in the Northern Steppe of Ukraine the most productive and most profitable crop rotation is one with 50 percent saturation by corn, which is most productive crop in the region. Transition to the recommended fertilising systems is expedient under conditions of insufficient humidity of Northern Steppe of Ukraine which involves the application of moderate doses of fertilizers, providing increase in productivity of soybean and maize in short-rotation crop rotations and sufficient high indicators of economic efficiency; replacing mould board ploughing by deep chiseling at a high agrozone in four-course rotation with its 50 percent saturation by corn saves 9,1–11 liters of fuel per 1 hectare. – P. 73–78.

UDC 633.11:631.582:631:559

Desyatnik L. M., Lerinetz F. A., Fedorenko I. E., Lib I. M. The influence of winter wheat predecessors on the productivity in the crop rotations in Steppe.

Keywords: winter wheat, predecessors, crop rotation, crop harvest.

Height of production of grain in Steppe it is related to the increase of indexes of gross collections of winter wheat, as a basic food culture, that largely depends on the correct placing her in the fields of crop rotations. A winter wheat is very demanding to the predecessors, in particular, in connection with their influence on adjusting of the water mode, agrophysical and biological properties of soil. This problem is especially actual in steppe districts.

An aim of researches is a study of efficiency of action of predecessors on the productivity of winter wheat in the stationary experiments. Experiments took place in the zone of Step-pe on the Krasnograd, Erastovka, Rozovka and Izmail experimental stations.

The soil is black earth usual a little-humus, heavy loam with maintenance in an arable layer: humus 4,0–4,5 %; mineral nitrogen – 0,23–0,26, phosphorus – 0,11–0,16, potassium – al-most 2 %; pH of water extraction 6,8–7,0. A climate is mildly continental, hydrothermal coef-ficient less one. Average annual amount of fallouts for vegetation is 250–270 mm, relative humidity of air – 40–50 % with oscillation from 20–30 % to 60–70 % depending of a weather. Duration of period with the temperature of air higher 10° on the average is 170 days. The freezing of plants in winter period in some years stipulated the subculturing of winter wheat with a barley: on Krasnograd experimental station in 1995 and 2000; on Erastovka experimental station in 2000 and 2003; Rozovka experimental station in 2003; on Izmail experimental station in 2000, 2005 and 2006 years.

Winter wheat placing in black fallow field provided the receipt of the highest harvest of grain (3,49–4,95 ton of ha in a variant without fertilizers) in all districts of Steppe. Especially his positive hydrological role becomes noticeable in more droughty part of steppe zone. Winter wheat placing after concerned fallow by comparison to black fallow stipulated the shortage of harvest of winter wheat in an interval 0,4–0,95 ton of ha; after peas on grain and long-term herbares – 0,45–1,07 ton of ha, after the corn on a silo – 1,45–2,00 ton of ha. The level of the productivity of winter wheat after concerned fallow and peas on grain was practically identical. He did not almost yield to the indexes of the productivity, got after the alfalfa of the second year of the use and esparcet on one hay-crop. The harvest of winter wheat after a corn on a silo, diminished by comparison to the variants of placing after peas on a 0,41–1,03 ton of ha or 17,0–27,0 %; after long-term herbares on a 0,90–1,23 ton of ha or 20,5–30,6 %.

In the climatic terms of Krasnograd and Erastovka experimental stations in connection with the best material well-being by moisture sowing difference in the productivity of winter wheat after all unfallow predecessors was less, than in a south region. Especially this conformity to law was observed at sowing of winter wheat after a corn on a silo.

The educed conformity to law in relation to influence of predecessors to the harvest of win-ter wheat was saved not looking on the different terms of moistening in the years of carrying out experiments.

Thus, correct placing of winter wheat in a crop rotation promote to the most effective use of climatic and biological factors, directed to the increase the amount of grain from unit of area in the conditions of Steppe. The greatest harvest of winter wheat provides the black fallow as predecessor in Steppe. Especially it shows up in South droughty part of steppe area. Therefore it is necessary to place greater part of sowing on black fallow here. The second place on efficiency is occupied by fallow, which is sown by one-year bob-cereal mixtures on a green feed. Thus the more positive va-lue is observed in the conditions of north and center of Steppe. Pea on grain is the good predecessor of winter wheat practically in all region. More high harvest is formed in districts with the best providing moisture after him. Therefore it is needed a bit to extend sowing of pea as predecessor of winter wheat in north and central Steppe. Winter wheat placing after long-term herbares allows to get a harvest at the level of the best unfallow predecessors. A corn on a silo is the unreliable predecessor of winter wheat in South part of Steppe. – P. 78–81.

UDC 631.95:631.58:581.6:620.9:631.371

Tymofeev M. M., Orekhovskiy V. D., Belitskaya O. A., Solovyanova E. V. Biogenic system of agriculture in terms of renewable energy development.

Keywords: biogenic system of agriculture, eco-technological groups, renewable energy in agrosphere, solid biofuel.

In the agrosphere of Donetsk region manifested large-scale (67 % of the area) water and wind erosion. The aim is to establish the concept (model scenario) complete elimination of soil degradation as the main means of production in agriculture. At the level of the agrosphere it is

projected the formation of biogenic system of agriculture which require the use of new resources, macro-structural changes, organizational and technological innovations.

Lands of intensive usage refers to the I eco-technological group (48–50 % of the agrosphere). The growing of crops on them is more profitable at 3–5 times than on degraded and low-productive lands. On the lands of first eco-technological group there are high humus resources both on the gross figures and on the relative ones (4–6 %), as well as biophylic elements, the slopes have 0–3°, on these lands function highly productive crop rotations, soil surface is covered with mulch-plast during all the year and it is renewed annually through incidental crop production. At the conditions of mulch-plast it is used locally-vertical type of tillage, applying of bio-fertilizers, seeds are sown in the hydrophobic shell in organic-soil briquettes during of the non-growing period of the year.

II eco-technological group (14,2 % of the agrosphere) includes lands that were under tillage, hayfields and pastures and have a high energetic potential of humus, slopes up to 3°. It is the land of hayfields and pastures with legumes and cereals phytocenosis. III eco-technological group includes dendrofeed lands to collect leaves to feed the goats and making leaf flour and silage. Under dendrofeed lands are situated lands with slopes of 1–3° and humus content 4–2 %, their area is 15–18 % of the agrosphere. IV eco-technological group includes dendrofeed lands of pasture destination with slopes 3–5° on the area of 13,6 %. V eco-technological group includes lands where shrubs have grown for use as a solid biofuel and other technical revisions of wood. These include wetlands, rocky slopes, with more than 5°, only 5,2 % of the agrosphere.

Not less than 34 % of the agrosphere area will be occupied by dendromassives. The development of renewable energy in agrosphere is mutually connected with dendromassives, with complete elimination of erosion processes on production lands, with the continuity the technologies of improving the fertility of intensive used soils.

The researches were conducted at the field test site (400 m²) with mulch-plast and field station with the rotations at three levels of soil fertility in 1996–2013, respectively. Along with field and laboratory research methods were applied interdisciplinary structural system approaches in the developing the principles of constructing the corresponding biogeocenotic, technological and technical constructions. The aim of this work – the search of possible directions of development of renewable energy in agrosphere.

It is discusses the various technological directions of using the solar energy that falls on the earth's surface in 10000 times greater than it is produced by fossil energy.

It is predicted that for large plantations and continuous harvesting process of shrub biomass will be created the mobile power stations on solid biofuels, various technologies of recycling the biophylic elements, will become widespread wind power stations which resource is highest in the non-growing season, and various technical constructions for the direct use of solar energy.

Renewable energy in agrosphere of biogenic systems of agriculture will be formed in four directions: the large-scale production of shrubby biomass as solid biofuels for the production of heat and electricity; the construction of wind power stations; the application of devices to use heat of concentrated solar energy from the concave mirrors; the construction of solar stations and panels with photocells to convert solar energy into electrical energy. – *P. 81–87.*

UDC 633.15:57.017.6:631.5

Okselenko O. Sugar corn hybrids productivity of different ripeness groups depending on plants standing density.

Keywords: sugar corn, hybrid, ripeness group, plant height, leaf area, individual productivity, crop capacity.

It is established the effect of planting density on biometric parameters, tilling capacity, leaf area, individual plant productivity of different ripeness groups of sugar corn – Spocusa, Surprise, Glamour and Kabanets SV.

Keywords: sugar corn, hybrid, ripeness group, plant height, leaf area, individual productivity, crop capacity.

Experiments were carried out during 2008–2010 at Dnipropetrovs'k experimental station of the Institute of vegetable and melon growing NAAS of Ukraine.

The purpose of research is to establish the optimal parameters of preharvest planting density of sugar corn hybrids of different ripeness groups in northern Ukraine steppe subzone.

In average per years of research the plant height of the middle-early ripe Surprise hybrid was bigger at 8 cm compared with the early-ripe Spokusa hybrid, the other the middle-early ripe hybrid – Glamour, for this indicator is practically no different from early-ripe hybrid. The highest plants were mid-season hybrid Kabanets SV plants, they were 38 cm higher than early-ripe hybrid plants.

Sugar corn hybrids not equally react to thickening of crops. With increasing of standing density the plant height of the early-ripe Spokusa hybrid increased by 3–5 cm, middle-early Glamour hybrid – 4–6 cm, this factor of the Surprise hybrid was the biggest for standing density 40 th/ha. Depending on the density of crop the plants height is unchanged.

The greatest height of the lower corncobs binding was in 2008 and appreciably decreased in 2009 and 2010. The plants' thickening has almost no effect on this rate. On average over three years the height of the corncobs binding of Kabanets SV hybrid was at 22–26 cm higher compared to other hybrids.

In 2008, the weather conditions was the best for the formation of the assimilation surface, the leaf area was at 1,5–3,5 times higher compared with 2009. The best conditions for the formation of the leaf area were formed by the standing density of plants 30 th/ha, the increasing of plants density resulted in a decrease of the assimilation surface area.

On average over the three years at standing density 30 th/ha more productive plants were the mid-early Surprise hybrid and mid-season Kabanets SV hybrid. The crop thickening from 30 to 40 thousand/ha resulted in a decrease of the number of ears by 8–13 pieces. Within these limits, the Glamour hybrid reaction was more visible. With further crop thickening (to 50 th/ha) the number of ears reduced by 3–6 pieces.

As a result of our experiments it was revealed that the early-ripe Spokusa hybrid in 2008 and 2010 conditions the highest yield of cobs with milky stage grain formed by plants standing density of 60 th/ha, in 2009 – at 50 th/ha. The cobs yield of the mid-early Surprise hybrid in 2008 and 2009 was greater in the plants standing density of 40 and 50 thousand/ha respectively, in 2010 by these plants standing density the harvest was almost the same. The reaction to the plants standing density during the studied years of the middle-early Glamour hybrid and the mid-season Kabanets SV hybrid was something different.

On average over the three years the optimum preharvest plants standing density of the early-ripe Spokusa hybrid is 50 th/ha. When the density was 30 and 40 th/ha the yield cobs with grain milky stage decreased by 0,79 and 0,83 t/ha respectively, and significantly lower (by 0,13 t/ha) was by 60 th/ha. The mid-early Surprise hybrid formed the highest yield by 40 th/ha plants standing density, a decrease or an increase of the density resulted to lower yields at 0,33–0,88 t/ha.

The middle-early Glamour hybrid less react to the plants standing density. By 40 and 50 th/ha the average yield of cobs was similar and virtually unchanged at 60 th/ha. The mid-season Kabanets SV hybrid formed the highest yield of ears by the plants standing density of 40 th/ha, be the others densities the yield decreased at 0,16–0,34 t/ha.

The optimum preharvest plants standing density of the early-ripe Spokusa hybrid is 50 th/ha, which formed the yield of 6,98 t/ha. Surprise hybrid formed the highest yield (6,13 t/ha) by the plants standing density of 40 th/ha. For Glamour hybrid the optimum preharvest plants standing density is 40 and 50 th/ha (crop yield was 5,19 t/ha). The average yield of Kabanets SV hybrid by 40 th/ha plants standing density was the highest and was 6,53 t/ha. – *P.* 87–91.

Krasnenkov S. V., Berezovskyi S. V., Nosov S. S. Ground pests control of corn seeds involving soil and postemergent herbicides

Keywords: *corn, herbicides, ground pests, efficiency, yield.*

The results of the study of soil and postemergent herbicides as well as their combinations efficiency for corn seeds are shown. The advantages of use postemergent and combinations of postemergent and soil herbicides over agents of soil action on the basis of the amount of ground pests continuing vegetation after their application are established. The effect of the studied agents on reduction of air-dry weight of ground pests and increase of crop yield is determined.

Ground pests inhibit the growth and development of plants, impede soil cultivation, reduce the efficiency of fertilizers and prevent harvesting, decrease the quality of products and can contribute to the spread of invaders and diseases.

Corn is one of the most valuable and highly productive crops of universal use. However, due to the late development of rise at early stages of organogenesis (before closing leaves between rows) its crops are characterized by high energy intensity of illumination (0,45–0,50 calories per 1 cm² of soil surface) which is the reason for their poor competitiveness with ground pests. Under the conditions of poor ground pests control within the vegetation period they exhaust more than 60–80 kg/ha of nutrients and 800–1000 t/ha of water from the soil, reducing hybrid culture performance for 30–50 % or more. Ground pests is the greatest potential threat to the formation of corn crop. Due to this, establishment of herbicides effectiveness applied in corn cultivation becomes extremely important.

The tendency to expand the area of applying soil herbicides for corn seeds has greatly spread worldwide. However, in many cases, it is also advisable to apply additional postemergent agents at the initial stages of plant development of the given crop due to the high level of soil pollution and adverse hydrothermal conditions.

The research was conducted within 2012–2013 years at Erast Experimental Station of the State Establishment, the Institute of Agriculture of Steppe Zone of the National Academy of Agrarian Sciences of Ukraine. Soil of the area under investigation is common thin-humous loamy chernozem, contents of organic matter in plowing layer amounts to 4,0 %. Research methods used were field and laboratory field experiments. They have been carried out pursuant to the generally accepted methodologies.

The amount of precipitations within the period since May till August 2011 at the average many-years norm of 206,6 mm has reached 271,0 mm, 101,3 of which accrued to June (long-term norm of 62,7 mm) and 106,2 – to July (at the average many-years norm of 53,4 mm). Moisture regime during the 2012 vegetational season was not favourable for achieving a high yield level: within the period since May till August the amount of precipitations totaled 128,0 mm, while the long-time average annual amounts to 206,6 mm, the amount of precipitations in June reached 34,5 mm (long-time annual norm totals 62,7 mm), and in July – 29,6 mm, while the long-time average annual amounts to 53,4 mm. Average monthly air temperature in May–August 2012 exceeded long-term values by 2,8–4,4 °C. Atmosphere relative humidity (atmospheric moisture capacity) during June – August did not reach a long-time annual norm, being less by 1–14 %. During the next year vegetational season the moisture regime was favourable for this plant, which significantly influenced the crop yield data: the amount of precipitations in June totaled 38,1 mm, while in July it reached 47,3 mm. Since May till August the amount of precipitations totaled 175,8 mm. Average monthly air temperature in May–August 2013 exceeded long-term values by 0,8–4,1 °C. Atmosphere relative humidity (atmospheric moisture capacity) during June–August exceeded long-time annual norm by 2–5 %. The above data witness that the study years differed against each other in terms of hydrothermal conditions.

Winter wheat after autumn fallow was the corn's predecessor. Subsequent to its harvesting stubble disking and under-winter ploughing was carried out. The fertilizers were introduced in autumn within the course of basic soil cultivation in a dose of N₃₀P₃₀K₃₀. In spring the fall-plowed land dragging and pre-sowing cultivation to the depth of seeding-down was carried out.

The most effective control over the number of ground pests at corn seeds have demonstrated herbicides adengo 465 SC (norm 0,45 l/ha at the phase of 1–2 leaves), Master Power OD (norm 1,25 l/ha at the phase of 5–7 leaves) and the combination of Harnesses (norm 2,5 l/ha under harrowing) + Master Power OD agents (norm 1,25 l/ha at the phase of 5–7 leaves): the areas of crop seeds cultivated with the above-mentioned agents before harvest were grown with ground pests minimally, respectively 2,2; 1,0 and 0.6 units/m² at the second seed time (April 30 – May 5). Air-dry weight of ground pests before corn harvest was the lowest at the areas cultivated with the above-mentioned agents in the specified norms – 22,4; 16,1 and 7.4 units/m² at seed time during April 30 – May 5. Corn yield at the areas cultivated with herbicides adengo 465 SC, Master Power OD and combinations of Harnesses + Master Power OD agents was the highest compared to other agents and their combinations that have been studied – respectively 5,44 – 5,56 t/ha (seed time during April 20 – April 25) and 5,14–5,33 t / ha (seed time during April 30 – May 5). – P. 91–95.

UDK 633.11<324>:581.14:57.014

Gasanova I. I., Konoplyova E. L., Palchuk N. S. Correlative connection between the amount of nitrogen in the leaves of plants of winter wheat during a vegetation and content of albumen in grain.

Keywords: winter wheat, variety, nitrogen, protein, stage of development, correlation.

The researches were conducted during 2009–2011 in the Research Farm «Dnipro» of Institute of Agriculture of the Steppe Zone (Dnipropetrovsk region). Three varieties of winter wheat were sown from different Originators: Zemliachka odeska, Zolotokolosa, Apogey Luhanskyi, which had been entered in the State Register of Plant Varieties suitable for distribution in Ukraine since 2006.

By lay out of the field experiments we used a technique of B. O. Dospyekhov. As preceding crop was bare fallow. The wheat was sowed by sower seeder SN-16 with a width of row spacing 15 cm. The sown area of plots averaged 40 m², accounting area averaged 35 m². Replication of test was three – fold. The technology of winter wheat growing was common for the Steppe of Ukraine.

The chemical analyzes of plant and soil samples were carried out according to current of State Standards of Ukraine and in accordance with generally accepted methods. Total nitrogen in plant samples we determined with Kjeldahl's micromethod, protein content in grain – on the device of NEOTEC using infrared spectroscopy method (for calibration of measuring instrument we applied total nitrogen values obtained by chemical Kjeldahl's method – GOST/State Standard/10846-91).

The purpose of researches was to determine the relationship between amount of nitrogen in the leaves of plants and grain protein content in the different varieties of winter wheat. The upper leaves of winter wheat plants for chemical analysis were selected in following stages: spring tillering, stem extension stage of plants, ear formation and milk ripeness of grain.

We found that the actual amount of total nitrogen in the leaves of plants variety Zemliachka odeska on the resumption of the spring growing season (tillering stage) was 4,15 %, variety Zolotokolosa – 3,92, Apogey Luhanskyi – 4,11 %, that according to V. V. Tserling is not sufficient for the formation of high yields and grain quality.

It is considered that the optimal number of nitrogen for this vegetative period of winter wheat plants will be averaged 5,0–5,4 %. In the stage of stem extension plant the amount of nitrogen in the leaves of plants of variety Zolotokolosa was 3,48 %, and in varieties Zemliachka odeska and Apogey Luhanskyi remained practically almost the same and amounted to 3,80 and 3,73 %. These indices are for all varieties in the limit of optimal range (3,5–4,5 %).

In the stage of ear formation the amount of nitrogen in the leaves of plants of all varieties of winter wheat also varied within optimal parameters (3,0–4,0 %) and by variety Zolotokolosa was 3,15 %, Zemliachka odeska – 3,48. The highest quantitative indices were by variety Apogey Luhanskyi – 3,69 %.

In the stage of early milky ripeness of grain the amount of nitrogen in the leaves of winter wheat in each of the varieties decreased, but the tendency had not changed: it was the largest amount by plants of the variety Apogey Luhanskyi – 3,18 %; by varieties Zemliachka odeska and by variety Zolotokolosa this index was respectively 3,06 and 3,03 %.

The highest content of protein in the grain in the stage of complete ripeness was formed by plants winter wheat of variety Apogey Luhanskyi – 12,89 %. Less amount of protein contained in grain of varieties Zemliachka odeska (12,58 %) and Zolotokolosa (12,24 %).

Mathematical analysis of the obtained data and the definition of the correlation coefficient (r) between the amount of nitrogen in the leaves and protein content in the grain showed relatively high dependence on grain protein content of winter wheat of the total nitrogen in leaves in all stages of the plant development. The close positive relationship between the amount of nitrogen and protein content was observed. The largest correlation coefficient between these indices we marked in the stage of ear formation, it was in varieties: Zemliachka odeska – 0,75, Zolotokolosa – 0,87, Apogey Luhanskyi – 0,95.

According to mathematical analysis, the most weakly connection between the amount of nitrogen in the leaves and protein content in the grain of all varieties was observed in the stem extension stage of plants (for varieties: Zemliachka odeska – $r = 0,60$; Zolotokolosa – $r = 0,79$; Apogey Luhanskyi – $r = 0,71$). – *P.* 95–97.

UDC 632.51:93

Ivashchenko O. O. Influence of the induced power stresses on biological productivity of Amaranthus of retroflexus of L.

Keywords: plants of redroot amaranth ordinary, shading, stream of PAR energy, sensitivity, dis-stress, mass, area of leaf, seeds.

On the croplands of Ukraine one of representatives of botanical family of Amaranth (Amaranthaceae) there is redroot amaranth ordinary – *Amaranthus retroflexus* of L. It is a grassy plastic plant with high-efficiency photosynthesis as C4 (way of Khale-Slak). The plants of amaranth ordinary are enduring, droughts and heats steady, have the well-developed cored rootage and are a powerful competitor for all types of cultural plants, especially in the wide-row sowings, that is why in sowings of agricultural cultures they are especially undesirable [1, 2].

Complex researches of biological features of amaranth plants reaction in juvenile and the immature stages of organogenesis on the induced power stresses and their influence on the biological productivity of this weed are a question significant and actual [9, 10, 11, 12].

The aim of our work consisted in the study of reaction of plants of redroot amaranth ordinary on the induced light (power) stresses by adjusting of intensity of PAR energy stream in the micro-field experiments.

Studies were undertaken in the laboratory of herbology of Institute of biopower cultures and sugar beets in 2008–2013.

The chart of experience envisaged growing of plants of amaranth ordinary in a control variant under open-skies with the 100% falling stream of PAR energy during all period of vegetation, in other variants from the phase of seed-lobes (during 30 days) in pavilions with adjusting of intensity of PAR energy stream in direction of her decline on 20, 35, 50, 65, 80 %, and further under open-skies.

At the different level of illumination (intensities of PAR energy stream) in an initial period of vegetation (first 30 days from appearance of stems) the condition of vegetation of amaranth substantially differed from the terms of plants in a control variant. For the decline of intensity of stream of energy of PAR within the limits of 20 % their growth processes got notably weakened comparatively with plants in a control (without shading) in relation of height and mass growth. Plants that began the vegetation at the terms of reduction of PAR energy stream intensity on 50 % and more from the level of whole illumination tested substantial power dis-stress.

Weakening of PAR energy stream intensity on 80 % during the first 30 days since appearance of stairs and the next complete light providing of plants of amaranth to the end of vegetation resulted in weakening processes of forming of leaf surface for them. Such plants upon even receipt complete light stream formed on the average the area of leaves 1,7 dm²/plant, or her decline was 89,8 %.

As a result of power stress in an initial period of vegetation at the plants of amaranth capacity got weakened for growth processes in a height. Depending on the depth of the induced power stress the medium-altitude of plants substantially fluctuated depending on the variant of experience – a from 114 (plants are on the control areas without the initial shading) to 14 cm (neotenic plants of amaranthus, that at the beginning of period of vegetation during 30 days have tested an action reduced on 80 % of stream of PAR energy). Id est the decline of intensity processes of plants in a height presented 87,7 %.

The seminal productivity of amaranth in experiments average 0,06 thousand ps/plant, her decline was on 98,5 % comparatively with the control areas.

On the basis of adjusting of intensity of PAR energy stream and taking into account of reaction of young plants of amaranthus ordinary on the action of this factor it is possible in practical terms to attain forming of optimal optical density of agricultural cultures sowing and effectively to control the repeated stair of weeds with phytocenotic method. – P. 98–102.

UDK 631.174:631.527

Yalans'ky O. V., Ostapenko S. N., Isaeva N. M., Sereda V. I. Promising samples of Forage Sorghum.

Keywords: *Sorghum Sudanense (Sudangrass), Sorghum-Sudangrass hybrid, variety, sign.*

Promising varieties of Sudangrass and Sorghum-Sudangrass hybrids showed high flexibility and adaptability to extreme conditions of Prysuvashshya. For example, when in 2012 the moisture conditions were favorable and close to normal, the yield at the first slope of variety Myronivs'ka 10 was 16,7 t/ha; in moderately dry conditions in 2013 – 13,9 t/ha, and the difference of yielding level was only 2,8 t/ha. Even smaller differences in level of yield at those years were in a variety Bilyav-ka (1,4 t/ha), in a Genichanka 1 (1,6 t/ha), in a hybrid Prysuvas'ky 4 (0,9 t/ha), in a hybrid Geni-cheskiy 2 (2,0 t/ha). It should be noted that during the growing season of Sudanense sorghum (May – August) precipitation in 2013 fell to 94 mm less than in 2012 and yield of Sudangrass varieties and Sorghum-Sudangrass hybrids don't experienced significant fluctuations. This indicates a high level of plasticity and adaptability of this crop to adverse climatic conditions of Prysuvashshya. However, the results obtained in 2011 indicate the limits of hydrothermal indicators on which varieties of Sudangrass and Sorghum-Sudangrass hybrids lose their flexibility and significantly reduce the productivity of green mass. In 2011 rainfall during the growing period fell to 117 mm less than in 2012, their quantity was only 48,2 mm, which led to a significant decrease in the yield of the studied varieties and hybrids. Thus, the yield at the first slope of varieties Myronivs'ka 10, Bilyav-ka, Genichanka 1 and hybrid Prysuvas'ky 4 in 2011 was only 7,9; 9,1; 15,6 and 16,8 t/ha, accordingly. By analyzing of the dependence moisture conditions during the growing season sorghum and performance of yield at the first slope, we can say that the critical moisture levels at which yield begins a rapid decline in Sudangrass varieties and Sorghum-Sudangrass hybrids is below 71,2 mm (it is half of normal rainfall (143 mm)).

On average over the three years studied Sudanense Sorghum varieties and Sorghum-Sudangrass hybrids have shown good results in productivity of green mass. The highest yield formed variety Genichanka 1, the excess over the standard was 6,3 t/ha. The yields of Sorghum-Sudangrass hybrids was significantly higher performance largest was at the hybrid Genicheskiy 1, the excess over the standard was 10,5 t/ha. The yield of varieties and lines of Sudangrass at the second slope was 7,1–10,9 t/ha, while the yield of Sorghum-Sudangrass hybrids was 10,9–13,6 t/ha.

In our studies, the onset of the phase ejection panicles noted after 43–45 days after

germination varieties Myroniv's'ka 10, Bilyavka and Tavrichanka 21 (it is the early group), then – after 52 days in varieties Genichanka 1 and Genichanka 2, and only after 58–61 days in the studied hybrids.

The plants of hybrids are thus characterized as large size of underground parts (plant height reached 168 cm) and very thick stems (at below – 1,8 cm). Thus, compared with hybrids, the less productive Sudangrass varieties formed the stems with smaller diameter (approximately 1,0 cm) that is most suitable for feed and hay.

According to our calculations, the investigated samples of Sudanese Sorghum in their over-ground mass formed in common weight a significant fraction of leaves. In our study, the fraction of leaves of collected green mass ranged from 16 to 29 % depending on the sample.

Due to the extended of growing season, the Sorghum-Sudangrass hybrids formed on 2–4 leaves more than varieties of Sudangrass. For example, by our observations on the main stem of Sudangrass was formed 8 leaves, and on the main stems of hybrid plants were 10–12 leaves. In addition, hybrid plants formed with large – 265–333 cm² which is approximately greater more than twice unlike the leaves size of Sudangrass varieties (132–168 cm²).

As a result of this work was developed and tested a new high-yield varieties of Sudangrass and Sorghum-Sudangrass hybrids, which are in many ways far exceed existing standards. The best varieties of Sudangrass and Sorghum-Sudangrass hybrids will be copied for transference to the State variety trials. – P. 103–107.

UDK 633.358:631.5

Sydorenko Yu. Ya. Iliencko O. V. Bochevar O. V. Harvesting of pea varieties prone to long-ging with direct combining in the northern Steppe of Ukraine

Keywords: *pea, seeding rate, seeding mixture, yield of grain, economic efficiency.*

The article presents the results of two years researches on the effectiveness of joint cultivation of crops and varieties of pea leaf and mustache morphological types with different rates of seeding.

Field research was carried out in cereal-fallow-tilled crop rotation of laboratory cultivation technology of spring grain crops and legumes on Erastivka Experimental Station of the Institute of Agriculture steppe zone of Ukraine. Soil of experience plots – ordinary black earth, heavy loam with low humus. The humus content in arable soil layer is 4,0–4,5 %, pH of water extract 6,5–7,0. The hoards of gross nutrients forms are: nitrogen – 0,23–0,26 %, phosphorus – 0,11–0,16 %, potassium – 2,0–2,5 %. Level of ground mobile forms of phosphorus can be characterized as heightened, Potassium – high.

Experimental studies were conducted on winter wheat predecessor. Chemical fertilizers have made according to the scheme of the experiment during pre-sowing cultivation. As fertilizer use nitrophosphate (N₁₆P₁₆K₁₆ a. s.) in a dose N₃₀P₃₀K₃₀. Deployment variants of field experiment was systematic, three-time repetitiveness, the accounting area of plots was 25 m². The technology of growing peas in the experiment, with the exception of the measures studied, common for the area.

Two-year results of the study (2012–2013 years) showed that pea plants varieties of different morphological types – Kharkov amber and Kharkov benchmark shaped different values of structure yield depending on the type and value of each plant of sowing. For example plants of variety Kharkov amber (leaf morphological type) in fresh sowing of crop on 1,2 million of viable seeds/ha were more maximum height – 73,9 cm. Raising norm of seeding to 1,4 and 1,6 million of viable seeds/ha resulted in a decrease values of this index for 7,6 and 7,4 cm, accordingly. In mixed sowing of varieties leaf and mustache morphological types at a rate of 1,2 million viable seeds/ha and when the portion of leaf variety seeds in mixture was 25, 50 and 75 % the plant height compared to fresh sowing, decreased accordingly by 7,0; 7,4 and 6,6 %.

In fresh sowing of pea mustache morphological type variety Kharkov benchmark the preharvest height of plants was less than the varieties Kharkov amber and was by seeding rate: on 1,2 million viable seeds/ha – 60,3 cm; on 1,4 million – 59,1 cm; on 1,6 million – 58,1 cm, i. e.

decreased with thickened planting. Reducing the portion of plant varieties Kharkov benchmark lowers the height peas on 1,2–5,7 cm, depending on the rates of seeding.

It was established that the highest grain yield of pea in the experiment formed in variants of the rate of sowing 1,4 million viable seeds/ha. Maximum index plants productivity were obtained in fresh sowing varieties Kharkov benchmark (2,11 t/ha) and when the portion of varieties seed in sown mix was 50 and 75 % – 2,15 and 2,10 t/ha accordingly. Thus the plantings of best variants are fully suitable to direct harvesting. If in sowing of pea dominated plants varieties Kharkov amber (75 and 100 %), their direct harvesting was impossible.

As a result of the research it can be concluded that the best conditions for the growth of pea plants and harvesting grains yield were when seeding rate was 1,2–1,4 million viable seeds/ha. Using for sowing seeding mixture with the composition of seeds varieties with different morphological types (Kharkiv benchmark, Kharkiv amber) in a ratio of 50:50 and 75:50 accordingly contributed to higher productivity and increased economic efficiency of grain pea production in commodity planting. – *P. 107–111.*

UDC 633.11”324”:631.526.32

Solodushko M. Performance and features growing different varieties of winter wheat in a northern Barrens.

Keywords: winter wheat, variety, especially growing, productivity, adaptability, weather conditions.

In recent years Ukraine has experienced a significant increase in gross harvest of grain products. This was the result not only of favorable weather conditions, but also the result of a deliberate restructuring of acreage and reorientation of agricultural production in modern intensive technology of cultivation of major crops. Of course, the increase in grain production and due to high demand in global market because it is the basis of food for humans and animal feed concentrate, the main source of food and feed protein.

The results of studies on the features and performance of growing different varieties of winter wheat originating in the steppe zone of Ukraine. The relevance of the work caused by the ambiguity of evaluation and selection of available graded composition of winter wheat, which is used in the farms area Barrens. The results obtained make it possible to detect and reveal more fully untapped reserves in raising the level of gross harvest of grain products. Studies were conducted on Sinelnikovskoye selection and the experimental station of the Institute of Agriculture steppe zone of NAAS of Ukraine during 2009–2013, which helped to bring to work 87 varieties of both domestic and foreign breeding.

Weather conditions during the entire time the studies were quite different than the temperature regime and by rainfall during the growing season of winter wheat. It is possible to get reliable data on plant response to the action of different varieties of abiotic factors observed during their growing season. The most favorable weather conditions for growing winter wheat, which ensured obtaining high yields, were recorded in 2009, 2011, 2013 Adverse hydrothermal regime during most of the winter wheat growing season was observed in 2010 and especially in 2012, allowing us to fully check the varietal composition for resistance to dry conditions in autumn and early spring periods and low winter temperatures.

The most successful was 2013, when the yield of different varieties of winter wheat was 5,87–6,48 t/ha. The lowest yield (1,93–3,23 t/ha) was obtained in 2012 Among the varieties that were studied during the five years of research, the best were Smuhlianka and List 25, which relate to short stature and recommended for intensive technologies. Their average yield was respectively 5,03 and 5,0 t/ha of grain quality and superiority over other varieties ranged from 0,36 to 0,47 t/ha.

In some years, studies have provided high performance grain varieties such as the Epoha odes’ka, Kiriiia, Zolotokolosa, Blahodarka odes’ka, Bogdana, Rozkishna. Their yields in good years was 5,0–7,0 t/ha. Among them, the most adapted to adverse conditions of vegetation

seemed varieties Bogdana, Epoha odes'ka, Rozkishna that even in a 2012 grain harvest formed at the level of 3,20–3,49 t/ha.

The results of the study found that all sorts of foreign selection, which were studied in experiments yielded the yield varieties of domestic selection and were characterized by lower winter hardiness and drought resistance. For example, in 2009, when growing varieties of German Pehasos, Akratos, Astron found that their grain yield compared to the average for the landfill, which studied 34 varieties of winter wheat was lower, respectively, 1,24; 1,62; 2,03 t/ha.

Most prone to lodging by years of research were varieties such as Zlatohlava, Poveliiia, Zira. Depending on the degree and extent of plant lodging their level of productivity compared with the best grades decreased by 10–30 %.

As a result of studies found that the steppe zone of grain by far the most suitable varieties of winter wheat by a comprehensive assessment is Smuhlianka, Epoha odes'ka, Kiriaa, Zolotokolosa, Blahodarka odes'ka, Bogdana, List 25, Rozkishna. – *P. 112–118.*

UDC 620.93:631.164:631.17:633.1

Kompaniets V. O., Zhelyazkov O. I., Kulik A. O. The methods of energy assessment of efficiency of grain production technologies.

Keywords: total energy expenditures, energy efficiency indicators, winter wheat, predecessors, productivity, normative money-material outlays, energy consumption, energy efficiency coefficient.

For a comprehensive assessment of alternative technologies of grain production, especially in terms of inflation, the economic analysis should be complemented by energy one.

The purpose of the article is to give an overview of methods of energy assessment of technological processes in grain production which are the foundation for further determination of directions of saving of energy resources and rise of economic and energy efficiency of the branch.

The basis for determining of normative (planned) total energy expenditures is an operation card. By means of it the complete list of operations is defined and then on the basis of normative energy equivalents the total energy expenditures are calculated by the following main groups: machinery and equipment (fixed assets), aviation, seed, fertilizer, fuel and lubricants, electric power, pesticides, living labor etc.

Gross energy content in production obtained from 1 ha is calculated in the following manner. The indicator of yield with the standard level of moisture which was calculated on dry matter by means of proper coefficient is multiplied by index of gross energy content in 1 kg of dry matter of production.

Energy efficiency coefficient is defined as the ratio of the energy accumulated in crop to expenditures of human (non-renewable) energy for growing and harvesting. Also other efficiency coefficients are defined. They take into account energy reserves in soil, value of total photosynthetic radiation during growing season, expenditures of human energy for soil fertility regeneration and maintenance of its energy potential.

To carry out economic and energy assessment of efficiency of winter wheat grain production, we have taken as a basis the science-based technology that has been elaborated by scientists of Institute of Agriculture of the Steppe zone of the National Academy of Agrarian Sciences for conditions of Dnipropetrovsk region.

Analysis of the energy expenditures structure in case of winter wheat cultivation has shown that the most energy-intensive items are "Mineral fertilizers" (29–42 %), "Fixed Assets" (15–25 %), "Fuel and Lubricants" (15–23 %) and "Seeds" (15–25 %) ones. At the same time the expenditures of living labor don't exceed 6 % of the overall structure.

Parallel learning of the money-material outlays structure is showing that operating outlays take the largest share in case of winter wheat cultivation. In particular, amortization and outlays on repair of vehicles amount to 18–22 % whereas item "Fuel and Lubricants" takes 12–18 %. Mineral fertilizers also take the high proportion in overall structure (20–26 %).

Saturation of technologies by resources and energy varies depending on different factors. In particular the selection of predecessor directly affects on the volume of work performed by machine and tractor units. Thus placing of wheat after bare fallow needs of operations with its cultivation and harrowing. And it means the supplementary energy expenditures by items "Fixed assets", "Living labor" and "Fuel and Lubricants". At the same time the need for mineral fertilizers significantly increases when wheat is grown after full fallow, grain legume and especially after unfallow predecessors. In this case the seeding rate increases and thus it causes the supplementary need for means of seed treatment. Additionally it should be noted that the need for energy at the stage of harvesting, cleaning and drying of grain rises depending on increase of productivity per hectare.

The results of investigations indicate that increasing of normative expenditures of human energy in case of winter wheat cultivation is compensated by rising of crop productivity. Thus, with increasing of yield level a clear rise of correlation between the volumes of energy accumulated in the crop and energy expenditures is observed. When wheat is grown after bare fallow the energy efficiency coefficient rises from 3,75 to 4,99; after full fallow and grain legume – from 3,17 to 4,10; after unfallow predecessors – from 2,72 to 3,46.

The main directions of reducing of energy consumption of production are to improve the quality of used resources and to optimize their expenditures per unit of area. Equally with the intensive technologies the resource-saving technologies with elements of biologization take on great topicality. All the technologies have to correspond with the requirements of ecological safety. – P. 118–124.

UDK 633.16«321»:631.8](251.1–17:477)

Kulyk I. O. Optimization mineral nutrition of plants spring barley for cultivation after different predecessors in the Northern Steppe of Ukraine.

Keywords: spring barley, fertilizers, predecessors, micro-fertilizers, crop yield, grain quality, economic efficiency.

Much of area of spring barley focus in the steppe region, which is characterized by insufficient and erratic moisture and high temperature conditions during the growing season, which often leads to a significant reduction in grain yield and quality. Among the factors that determine the level of productivity of spring barley grain occupies an important place to ensure optimal plant mineral nutrients, and choosing the best predecessor. This requires continuous comprehensive study of joint actions and the impact of each factor separately on yield and grain quality and increase the stability of these parameters in a Northern Steppe of Ukraine.

The study was conducted at the Erastivka experimental station of Institute of Agriculture of the Steppe zone of Ukraine NAAS during 2011–2013.

The soil in the experimental plots – an ordinary black soil with low humus content, heavy clay. The humus content in arable soil layer (0–30 cm) 4,3–4,5 %, total N – 0,23–0,26 %, P₂O₅ – 0,11–0,16 %, K₂O – 1,8–2,0 %, pH of water extract – 6,5–7,0.

The climate of the region is continental with sufficient and reliable moisture. For long-term data Komisarivka meteorological average annual precipitation is 420 mm, including during the growing season of spring barley – 210 mm, the average temperature during the growing season is 15° C, hydrothermal coefficient of 0,7.

Meteorological conditions in the years of research (2011–2013) were characterized by significant variation of hydrothermal indicators that are different from the average long-term performance. This could set the response of spring barley to all manifestations of weather conditions that occur in the area of the Northern Steppe.

It is established that the cultivation of spring barley after winter wheat is increases leaf surface area of 1 spring barley plants to 6–9 cm² compared to other precursors. The highest value of surface assimilation and photosynthetic capacity of crop was obtained in the form N₄₀P₄₀K₄₀ + N₃₀ (feeding) + Reakom-SP-Grain (seed treatment and plant spraying). Formation of the highest rates of yield structure elements provided making N₄₀P₄₀K₄₀ + N₃₀ (feeding) +

Reakom-SP-Grain (seed treatment and plant spraying): number of grains per ear – 17–22 pcs., grain ear weight – 0,79–0,96 g, the weight of 1000 grains – 46–48 g.

The best conditions for obtaining the highest yield formed in variants, after predecessor winter wheat. Yields in these variants was 2,81–3,38 t/ha depending on of fertilization, whereas after corn for fodder yield was respectively 2,58–3,20 t/ha, and after sunflower – 2,32–3,03 t/ha.

The most efficient from an economic point of view, is to sowing crop after winter wheat. Under these conditions, in the form $N_{20}P_{20}K_{20} + N_{30}$ (feeding) + Reakom-SP-Grain (seed treatment and plant spraying) when grown spring barley received the highest economic indicators: net profit (987 UAH/t) and profitability (88.7%). Sowing after corn for fodder and sunflower requires making $N_{40}P_{40}K_{40} + N_{30}$ (feeding) + Reakom-SP-Grain (seed treatment and plant spraying) and ensures profitability – 61,7 and 23,6 %.

Thus, to obtain 3,08–3,33 t/ha of I class of quality grain spring barley in a northern steppes of Ukraine should be grown after winter wheat with technology, providing basic fertilization in a dose $N_{20}P_{20}K_{20} + N_{30}$ (feeding plants in the tillering phase) + Reakom-SP-Grain (seed treatment 3 l/t and plant spraying 3 l/ha). By growing after corn for fodder (for 3,03–3,30 t/ha of I class of quality grain) and after sunflower (for 2,91–3,15 t/ha of II class of quality grain), it is necessary to make $N_{40}P_{40}K_{40} + N_{30}$ (feeding plants in the tillering phase) + Reakom-SP-Grain (seed treatment 3 l/t and plant spraying 3 l/ha). – *P. 125–131.*

UDK 633.35:631.87

Gyrka A. D., Len' O. I., Aleinikova L. M. Productivity of lentil depending on the seed inoculation and mineral nutrition in conditions of Left-Bank Forest-Steppe.

Keywords: lentil, doze of fertilizers, inoculation, structural indexes, productivity.

In current market conditions, with limited economic opportunities have significantly reduced the amount of fertilizer use, which leads to need the find an alternative sources of plant nutrition. In order to solve this important scientific mission it is envisaged to determine the features of productivity formation of lentils, depending on the growing technology in Left-Bank Forest-Steppe of Ukraine.

The studies were conducted at the experimental field of Poltava SAES nd. after M. I. Vavilov during the 2012–2013. Soil of test plots – typical low-humic chernozem. The plow layer contains 122,8–138,4 mg/kg soil of easy hydrolysable nitrogen; 79,6–88,1 – of mobile phosphorus and 139,8–148,1 mg/kg exchangeable potassium.

The scheme of the experiment included variants of mineral fertilizers application with doses $N_{15}P_{45}K_{45}$, $N_{10}P_{40}K_{55}$, $N_5P_{20}K_{27}$ and a background without fertilization. Were provided options of seed inoculation by ryzohumin and feeding plants by micronutrient alfa Grow (2,0 l/ha) in the phase tillering, and their combined use. Accounting plot area 32 m² with four replications. Predecessor – winter wheat. Lentils variety – Luganchanka. Growing technology is generally accepted for Left-Bank Forest-Steppe of Ukraine, except in the cases envisaged by experimental design.

The obtained data showed that the use of chemical fertilizers has led to an increase in lentils plant height on 3,3–3,4 %, seeds inoculation – 5,1 %, fertilizing at top dressing plants – by 4,8 %, and applications on compatible base – 10,8–12,2 %.

Application of intensification technology positively influenced the number of pods and seeds per plant. Thus, fertilizer application increased the number of pods on plant from 17,1 % to 20,5 %, and the number of grains in them – from 14,5 % to 19,2 % depending on fertilization variant (on control – 17,1 and 19,3 pc.). The best of these indicators was the variant where fertilizers applied in the dose $N_{10}P_{40}K_{55}$.

Feeding the plants by micronutrient alfa Grow helped to increase the number of beans for 9,3 and grains – 10,0 %, and the use of seed inoculation by ryzohumin – 3,8 % and 14,7 %, respectively. Seed inoculation and plant nutrition by micronutrients helped to increase the number of pods per plant to 12,3 % and the number of grains – 10,4%. The maximal values of these parameters were in variant of mineral fertilizers application at doses $N_{15}P_{45}K_{45}$ and

N₁₀P₄₀K₅₅.

Studies results indicates that the use of fertilizers increased the weight of 1000 lentils grains at 6,8 %. Increasing the weight of 1000 grains noted in variants, with seeds inoculation (2,3 %) and micronutrient fertilizing plants (2,5 %), and for their joint use – 3,6 %.

With the increase in individual productivity of plants increased and grain yield. The highest (1,53 t/ha), it was at combination of seeds inoculation, mineral fertilization (N₁₀P₄₅K₄₅ and N₅P₂₀K₂₇) and foliar application of micronutrients.

The obtained data on changes of lentil crop yield due to fertilization indicates an increase in the yield of lentils for 29,5–31,6 % comparatively to productivity on control – 0,95 t/ha. Fertilization was effective in all variants of the experiment.

It should be noted that although the lentils considered, as slow responses to macro- and micronutrient application, yet our study showed the opposite. Increase in grain yield of lentil due to seed inoculation reached 22,1 %, to micronutrient fertilizing plants – 23,1 %, the combination of seed inoculation and foliar feeding of plants – 33,7 %. The combination of fertilization and seed inoculation increased productivity data for 53,7 %, fertilization and plant nutrition by micro-nutrients – by 47,4–52,6 %, and fertilization, seed inoculation and foliar feeding of plants – for 58,9–61,0 %. – *P. 131–135.*

UDC 631:633.256:631.8.095.337

Vinyukov O. O., Mamedova E. I., Popovich S. A., Solovyanova K. V. Influence of preparation sizam onto the productivity of spring barley depending on the nutrition background.

Keywords: *spring barley, seed treatment, microfertilizer, nutrition background, yield.*

This article presents the results of investigations of studying the effective using of microfer-tilizer sizam to increase grain productivity of spring barley in the conditions of the Northern Steppe.

Research conducted in 2012–2013 years at the experimental field of Donetsk State Agricultural Research Station NAAS.

The purpose of this paper is definition of the drug sizam on productivity of spring barley.

It was studied the effect of the microfertilizer sizam that was used for seed treatment (50 g/t) of barley and for crop spraying (50 g/he) in the phase of tillering and earing.

The research was consisted of five variants in the fourfold repetitions in two nutrition backgrounds: without fertilization and with the fertilization of N₃₀P₃₀K₃₀.

The improving of the nutrition conditions had contributed to better plant growth and development of spring barley, which has a positive impact on the improvement of the structure para-meters of the crop. As a result of the research, on the nutrition background without fertilizers, the total number of stems compared with control decreased by 62 pc/m² and the number of productive ones – increased by 38,5 pc/m².

Using of the preparation in the nutrition background without fertilizers contributed to the in-crease of productive tillering coefficient from 2,3 in the control variant to 2,4 in variant of sizam –seed treatment + crop spraying in the phase of tillering and earing. Intermediate position occupied variants of seed treatment with the sizam and crop spraying in the phase of tillering and earing. As for mineral nutrition background, the coefficients of both general and productive tillering have increased compared with control to 0,4 and 0,3, respectively. The highest rates of tillering were observed in the application of fertilizers in the earing phase (3,4 overall, 2,8 – productive).

The usage of fertilizers sizam, regardless of nutrition background helped to increase the elements of structure of yield of spring barley. On the agrofion without fertilizers it was observed an increase in crop structure parameters as compared with the control in the following versions: plant height – seed treatment with sizam (62,1 cm), ear length – seed treatment and double spraying in tillering and earing phase (7,0 cm), the number of grains in the ear – seed treatment and spraying in tillering and earing phase (16,0 pc.), weight of 1000 grains – spraying in earing phase (0,8 g).

On the mineral nutrition background the highest plants were obtained when spraying crops with the preparation sizam in the earing phase (+ 4,6 cm compared with the control). When spraying crops with microfertilizer sizam in the earing phase it was observed slight increase of parameters such as ear length, number of grains in the ear and weight of 1000 grains compared to other variants.

In average years of research on the nutrition background without fertilizers highest rate of harvest was formed by seed treatment with preparation sizam – 4,45 t/he, increase to control variant was 0,41 t/he (10,1 %). On the nutrition background $N_{30}P_{30}K_{30}$ the highest yield was obtained by seed treatment and spraying with preparation sizam during the phases of tillering and earing. Increase of yield was 0,53 t/he compared with controls.

Thus, the researches have shown that the use of fertilizers sizam contributed to increase yields of spring barley, regardless of the variant of its usage. It was also founded that the complex interaction of microfertilizer sizam and chemical fertilizers promotes the highest grain yield of spring barley. – *P. 135–138.*

UDC 633.15:631.27

Gangur V. V., Totzkyi V. M., Len' O. I. The yield of maize hybrids depending on sowing terms.

Keywords: maize, maturity group, hybrids, sowing terms, plant height, grain moisture, yield.

Field researches were conducted in Poltava State Agricultural Experimental Station named after M. I. Vavilov during 2011–2013. The aim of researches is to establish the optimum sowing terms for maize hybrids of different groups of the ripeness.

According to the research the sowing terms significantly influenced on the growth and development of plants, and also caused some differences for the duration of the main phases of the development of maize hybrids of different groups of the ripeness. So, in early ripe hybrid of maize Kvi-ten' 187 MB, middle early Orzhitsa 237 MB and middle ripe Bystritsa 400 MB, for planting on Kvitin' 25 the full shoots appeared on 12 day, on May 5 were on 10 day, on May 15 were on 8 day.

The longest period of shoots – flowering of panicles was in hybrids Kvitin' 187 MB, Orzhitsa 237 MB, Bistritsa 400 MB for the first term of sowing and was respectively 56, 57 and 63 days. In the third sowing maize hybrids currently interphase period was shortened to 53–58 days. The duration of the next interphase period of flowering panicles – a full ripeness also changed depending on sowing terms, but slightly and was within 64–66 days in hybrid Kvitin' 187 MB; 64–68 days for hybrid Orzhitsa 237 MB and 68–69 days for hybrid Bystritsa 400 MB. In general, the longest growing period was in hybrids Kvitin' 187 MB, Orzhitsa 237 MB, Bistritsa 400 MB for sowing in the first term – 121, 124 and 132 days. By planting hybrids in the second and third terms of the growing period was shortened to 1–6 days.

The plant height is an important indicator that makes it possible to research first of all the features of their vegetative mass accumulation, the formation of leaf surface, and then harvest. On average over the three years the maximum height of plants in the flowering phase hybrid Kvitin' 187 MW was for sowing in the third period and was 244 cm. In hybrid Orzhitsa 237 MB the maximum plant height was observed in the first planting date (April 25) – 239 cm, and hybrid Bystritsa 400 MB had per second sowing – 256 cm.

Important technological and economic indicators for the cultivation of maize grain is the moisture at the time of harvest. The lowest it was for the first sowing term and averaged was in early ripe hybrid Kvitin' 187 MB 10,8 %, in middle early Orzhitsa 237 MB – 11,8 %, in middle ripe Bystritsa 400 MB – 16,3 %. At harvesting hybrids of the third sowing term the grain moisture was significantly higher – 16,5–28,4 %.

In experiments it was significant also the impact of sowing terms on the extent of damage of hybrids by the corn butterfly. Thus, the damage of plants of hybrids Kvitin' 187 MB, Orzhitsa 237 MB, Bistritsa 400 MB by the corn butterfly for sowing in the third term was

accordingly 29 %, 32 %, 38 %. The maximum damage by a pest of plants of corn hybrids was observed in the first sowing term – 35 %, 57 %, 51 %.

The formation of a grain yield depended on as from morphobiological features of corn hybrids, and also from sowing term. On average over the three years of researches the highest yield of hybrid Kvitin' 187 MB formed for the third sowing – 7,43 t/ha. By sowing of a hybrid in I and II terms the yield was lower on 1,08 t/ha and 0,91 t/ha, respectively. For hybrid Orzhitsa 237 MB the best conditions for the formation of yield were for the first term of the second sowing – 7,19 t/ha. In comparison with the other terms of grain growth was 0,48–0,75 t/ha. In hybrid Bystritsa 400 MB the highest yield was obtained for the first sowing term (7,43 t/ha). To a significant decrease in the yield of hybrid resulted sowing in the third term on May 15. The shortage of grain yield compared to the first term of sowing was 0,97 t/ha.

Thus, according to the research, the best sowing terms in the left-bank forest-steppe of Ukraine for early ripe hybrid Kvitin' 187 MB is the second decade of May (soil temperature 14–16 °C), middle early hybrid Orzhitsa 237 MB – the first decade of May (10–12 °C), middle late hybrid Bystritsa 400 MB – the third decade of April (8–10 °C). – *P. 138–142.*

UDC 636.2.085

Kozyr V. S., Dimchya G. G., Maystrenko A. N. Organization of rational feeding of cattle.

Keywords: *diets, feed additive, milk productivity, reproductive potential.*

In the article it is proved that for increase milk productivity and reproductive ability of the cows must be in rations have to use green fodder different Botanical composition. They are a source of biologically active substances for the normal functioning of microflora scar ruminants, which promotes the formation necessary for optimum metabolism of low molecular weight volatile fatty acids (acetic, propionic, oil) and amino acids.

Translation of animals on the same type of feeding rations with a complete rejection of the green mass affects the livelihoods of microflora of scar with the outgoing negative consequences from here. As a result of not fully manifested genetic potential of livestock productivity and reduced output calves per 100 cows to 75 goals against 97–98 heads when using feeds green conveyor. When and concentrated style of feeding cattle in many agro Steppe zone of Ukraine is widely used by a large number of expensive meals and meal sunflower and soybeans, with insufficient level of rations level of carbohydrates which are easily overcooked and fiber, resulting in disrupted normal scar digestion.

Given that natural food can not fully meet the requirement of animals in nutrients and bio-logically active substances, in practice, the use of feed additives and premixes various domestic and foreign manufacturers, which only partially offset the deficit. In addition, promote them everywhere without regard to gender, age, physiological state of animals and chemical composition of the feed. Therefore, it is not a coincidence that they are ineffective. In this regard, we have developed a methodology recipes balancing feed additives that are different from domestic and foreign the fact that they are made specifically for animal farm. Their technological regulation provides for the main principle is included in the recipe only that and so much lacking in the diet.

In addition proposed and patented technological scheme of manufacture of fodder additives, which differs from the standard simplicity and cheapness, and also provides a high quality of fini-shed products. This technological scheme of preparation of feed additives and mixed fodders gives the possibility to receive homogeneity of the products at the level of 98–99 %, which contributes to the organization of rational feeding cows and improve the daily milk yield 22–25 kg of milk.

The authors propose to establish a domestic regulatory framework in the field of fodder additives on the basis of harmonization with the acts of the European Union, as well as the introduction of a relevant approval and registration of enterprises fodder production with permission to free movement in the country only registered feed additives. This will ensure the

scientific organization of feeding of livestock, improve feed efficiency and on this basis to improve the reproductive functions of cows to increase their productivity and improve the profitability of dairy cattle. – P. – 143–145.

UDC 636.2:727.2

Sokrat O., Chernyavsky S. The different components of organic raw materials for biogas plants.

Keywords: biohazohenerator, anaerobic digestion, biogas, electricity and heat energy.

The problem of energy shortage today is a major in the world. The growing population and its corresponding energy demand is limited disastrous decline in their natural stocks while value growth. Therefore, the relevance of the search for alternative energy sources is not in doubt.

One of these is a biogas that can be used as natural gas, store, pump, produce electricity from it, the heat used as fuel for internal combustion engines. Mainly used for obtaining biogas manure of livestock farms while scientists proved that efficient biogas is plant material.

The material in our study were manure of pigs, cattle and raw materials of plant origin. Studies conducted on laboratory biogas plants as well as studying the experience of using pig farm biogas systems Corporation "Agro-Oven" Mahdalynivskoho of Dnipropetrovsk region. At that used biochemical methods for analysis of raw materials, processing methods comparison of fermentation, methods of calculation of economic efficiency of biogas production.

Dynamics and yield Registered volumetric gas meter. Temperature range – mesophilic (34–35 ° C) maintained with an automatic temperature controller. Humidity substrate in the biore-actor was adjusted to 90% by adding water (calculation method).

The study was conducted in three series, each of them as raw materials of plant origin used corn silage, green fodder corn and Sudan grass. Established that the fermentation process 20 kg of biomass effectively held the first and third biohazohenerator digesters where loaded 3/4 share of plant material and 1/4 share of pig manure and cattle, respectively. And most of the biogas produced from Sudan grass in combination with manure of pigs and cattle, respectively, 5,55 and 5,48 m³.

In Dnepropetrovsk biogas plant works effectively in "Agro-Oven" Mahdalynivskoho area (system volume of 2000 m³ reactor power single-stage process of recycling – 80 tons of manure per day). The output of receive two products – biogas and substrate (solid and liquid). Out of gas – 3,300 m³/day, of which two cogeneration units producing daily 160 kW of electricity (1 m³ – 2 kW of electricity) and 240 kW of heat energy per hour. Annual electricity production 3,5 MW. With a solid fraction of separated manure processed by microorganisms obtained more than 1,000 tons of dry organic biofertilizers.

Thus, the use of plant material and manure in different proportions, can be an effective factor for increasing the yield of biogas and increase efficiency biohazoenerhetychnyh installations. The highest efficiency for biogas production is raw, which consisted of three parts of a plant material and particles, respectively, pig manure and cattle manure. Her performance was higher compared to the digesters, which consisted of raw materials to 1/2 of herbal products and the same number of pig manure and cattle, respectively, 30,2 and 40,5 %.

Analysis of the results of research and accumulated international and domestic experience proves that the expansion of industrial production and mass introduction of biogas systems in livestock complexes will help in the realization of tasks aimed at developing innovative technologies that improve the efficiency of livestock production. – P. 146–149.

UDC 636.2.083.314:631.17

Kozyr V. S., Denisyuk O. V., Chegorka P. T. Some peculiarities of formation of feeding behavior heifers ukrainian meat breed.

Keywords: cows, calves, functional activity, live weight.

The peculiarities of the behaviour of cows Ukrainian meat breed and their calves. Depen-

dence of growth heifers in early ontogenesis of behavior.

In our country enough breeding, production, fodder and human resources to provide the population with high-quality meat of own production, including beef, but through economic, technological and human factors lagging behind in the consumption of this product from the developed countries of the world.

Today in Ukraine the main way of increasing meat livestock productivity and quality beef is the intensification of livestock including with the use of individual behavior of animals as a technological component.

The researchers divided into the following components of the behavior of animals: population relationships in a pair of "cow-calf"; herd hierarchy; fodder, and brake motor behavior; sexual and adaptive behavior.

The aim of the study was to define the features of formation of feeding behavior in heifers depending on their ethological features and their cows-mothers. The object of the study was cattle Ukrainian meat breed 31 pair "cow-calf". Technology of maintenance – loose when the maintenance of the group on sub cattle-breeding farm ground.

Studied behavioral reactions of animals and weight indicators of development of heifers. Found that most of the time the cows spent on food actions. 54 % of this time was spent on eating food and 46 % "ruminant". Adult animals even when tethered technology content in the state of rest and "ruminant" most of the time was spent standing and not lying.

When loose cattle keeping in the paddock area is also the most time spent on the stern action – $345,8 \pm 1,87$ per min. including, eating food $233,2 \pm 6,51$ minutes, drinking water – $11,2 \pm 0,57$ minutes and gum – $101,1 \pm 8,96$ min. At a comfortable actions (activities) animals spent $192,1 \pm 11,6$ min. or 32 % of the total observation time. At leisure standing cows on $148,900$ min. or 87 % spend more time in comparison with the situation lying down. The period of "ruminant", in the standing position compared to the prone position also continued at 20,9 min. or 34 % longer. In the structure of conduct cows for the period of the world day for stern action is about 58 % of the total functional activity and including the eating food – 39 %.

Set a positive correlation between time spent on: feed actions \times accessions: 0,322 eating feed \times accessions: 0,194, chewing gum \times accessions: 0,426, chewing "ruminant" lying \times accessions: 0,526. It should be noted curvilinear relationship between spending time on the move and increments: -0,396.

Proved the influence of cows mothers on the formation of separate elements of conduct their descendants, which is consistent with results of other authors. So, the correlation coefficients of the pair «cow-calf» between times spent on individual behaviors were: "braking action" – +0,697; "ruminant" standing – +0,563.

Studies suggest the possibility of using indicators of functional activity of separate elements of the behavior of cows as a test for the selection of the heifers for technological purposes. – P. 150–153.

UDC 619:612:017.11/12:636.22/28

Kozir V. S., Antonenko P. P., Filippov Y. O. The influence of phytopreparations on animals immunity and productivity raising.

Keywords: influence phytopreparations, immunity, productivity, animal, blood, biochemical indices, calves, "Gastrotsid", technology, reactivity, organism, trustworthiness, economic effect.

Immunity enhancing and animals productivity raising under the natural phytopreparations influence was studied on red steppe breed calves of 2,5 months of age. – P. 153–155.

UDC 619:576:858:636.096.1

Bila N. V., Marshalkina T. V., Kolbasina T. V. Risk assessment of the epizootic situation in the pig farms of dnepropetrovsk region.

Keywords: *pigs, monitoring, epizootic situation, bacterial infection.*

Pig breeding is one of the priority branches of livestock development in Ukraine and plays a significant role in providing food. Under conditions of complicated the epizootic situation in the world for of pigs diseases, especially such as African swine (ASF) and classical plague of swine (CSF), Aujeszky's disease (AD) and reproductive and respiratory syndrome swine (RRSS), epi-zootological analysis and forecasting concerning these situations especially dangerous infectious diseases of pigs (EDIDP) is a crucial for the industry Pig breeding value, since these diseases are not just threaten the economy of some pigs farms, but at the WTO requirements may destroy the pig at the regional and even national levels, and ACTS can destroy even the entire the export potential of national agriculture.

On the one hand, monitoring of RRSS, ASF and AD is based on the use of modern laboratory diagnostics, which should include not only the most sensitive, specific and reproducible with the existing diagnostic methods, but also conducted under conditions of maximum possible of bio-logical safety for avoiding environmental contamination causative agents especially dangerous diseases. This makes it impossible to conducting laboratory diagnosis EDIDP outside special schools. However, on the other hand, in order to monitor the epizootic situation on EDIDP diagnostic and analytical work must be based on extensive network of of special observation points, based on systematic investigations epizootic pigs farms and forestries, including the use of screening diagnostic agents specially trained specialists would be in have supplied a reference center EDIDP primary monitoring materials – information, biological, pathological – for the formation forecast of RRSS of epizootological, ASF and AD risk in regions of emergence and / or dissemination.

Purpose of work – conducting monitoring and forecasting of of epizootological epizootic situation by reproductive and respiratory syndrome, African plague and Aujeszky's disease in pig production farms in Dnepropetrovsk region.

Research Methods – epizootological, clinical, pathological, bacteriological, serological.

Of the ten we tested four pigs farms of three districts of Dnepropetrovsk Oblast per of clinical and epizootic indicators under to the Methodological Recommendations of NSC "IECVM" had signs of risk and dissemination RRSS and / or AD.

In these pigs farms revealed reproductive disorders in sows (dead generations in 15–37 % of sows in the survey period), non-viability of piglets in the nest (care per piglets sucking period was in these 4 farms from 34 to 47 %), lesions of the respiratory tract groups in rearing and fattening, decreased for the last quarter before your test feed conversion in fattening group by 20–30 %. Of the 27 samples of blood serum, we selected four pigs farms in control points monitoring EDIDP, 13 were positive for RRSS, 9 – positive for antibodies against the virus AD and 20 – positive for anti-bodies to PVS, in addition, all 27 tested in the NSC "IECVM" blood serum samples were positive for sows antibody against CVIP. The foregoing research results demonstrate the importance of an integrated approach to solving the problems of monitoring EDID pig in Dnepropetrovsk region, because modern epizootic situation in one farm can circulate variety infectious diseases – not only EDIDP.

By bacteriological studies revealed the following infectious diseases of pigs: enteropathogenic and toxigenic variants of *E. coli* – 74,6 %, *Proteus spp.* – 3,5 %, *Staphylococcus spp.* – 2,0 %, *Pasteurella multocida* – 2,2 %, *Salmonella spp.* – 4,1 %, *Pseudomonas aeruginosa* – 2,0 %, *Streptococcus spp.* – 2,9 %.

The data obtained indicate the need to consider in laboratory studies of samples of pathological material on ONHS high probability of the presence in them of specific and extraneous microflora, which can mask the presence of the pathogen in a sample EDIDP and hinder its detection. – *P. 155–159.*