**Bazalii V.V., Babenko D.V. Yields of winter wheat varieties with different environmental focus under irrigation under the conditions of the southern steppe**

The article presents the results of studies on yield formation in winter wheat cultivars of different genetic origin under irrigation. It proves that for getting stable high yields of grain in the south of Ukraine it is necessary to use steppe ecotype varieties.

**Keywords:** winter wheat, ekotype, productivity, environmental sustainability.

**Bazalii V.V., Boichuk І.V., Babenko D.V., Bazalii G.G. The character of formation and manifestation of winter hardiness in hybrids and varieties of winter wheat under the conditions of Southern Ukraine**

The article presents the results of studies on the character of formation and inheritance of winter hardiness in winter wheat hybrids and its manifestation in the typical varieties of winter wheat and alternative types.

It proves that for obtaining a stable grain yield under late sowing dates (October, November) in the south of Ukraine, we should use alternative type varieties of wheat (spring-winter) of the steppe ecotype.

**Key words**: winter wheat, alternative type varieties, inheritance, yield, winter hardiness.

**Averchev O. V., Osinnii O. A. Rice production based on drip irrigation under the conditions of southern ukraine**

Rice is one of the most valuable food crops on earth. Its grain is the main food product almost for half of all people. Currently rice is grown in 112 countries. It is grown on all continents.

The importance of the problem of rice production lies in the fact that the technological process requires considerable amounts of irrigation water. On the average they reach 25–30 thousand m³/ha on rice irrigation systems (RIS) of Ukraine. The considerable water supply is connected with a significant amount of non-productive technological discharge which may exceed 50% of the water supply on rice irrigation systems. The wastewater in all the regions of rice production (Kherson and Odessa regions, the Autonomous Republic of Crimea) is discharged in the water area of the Black Sea and the Sea of Azov, which worsens the ecological situation.

In this connection, in 2014–2015, the field experiments were carried out on dark chestnut soils with average agrochemical capabilities with drip irrigation on the farmlands of Tsiurupynsk district in Kherson region. The study investigated: Factor A – tillage; Factor B – tillage; Factor C – irrigation regime.

The experiment was repeated four times, the variants were placed by the method of split plots.

The research showed that growing rice using drip irrigation under the conditions of Southern Ukraine is not only possible but also economically efficient. Rice yields based on drip irrigation were 4–8 t/ha depending on the variants. The consumption of irrigation water for the rice growing period under drip irrigation was 3–5 times less than under traditional technology of growing rice in paddy fields.

**Key words:** rice, drip irrigation, tillage, fertilizers, irrigation regime, yield, Southern Ukraine.

**Balabak O.A., Liubych V.V.** **Giant filbert productivity depending on the variety**

The article presents the results of studying giant filbert productivity depending on the variety. It determines that the highest average crop capacity of filbert nuts throughout three years of investigations has been formed by Lozivskyi Вulavovydnyi variety, nearly 517.1 kg/ha. The yielding capacity of other varieties ranged from 110.1 to 478.8 kg/ha. The content of mineral elements in the kernel varies depending on filbert variety. The highest content of mineral elements in the nut is in Lozivskyi Вulavovydnyi (2.36 %) and Ukraine-50 (2.72 %) varieties.

Among the promising plants of natural and cultivated flora, nut plants such as *Corylus* L. – filbert (*Corylus domestica* Kosenko et Opalko) take a special place because of their positive impact on human health, food value, horticulture introduction, use in various industrial fields, breeding and gene pool extension during the creation of new varieties, forms and hybrids. Efficient use of this pool based on modern science and technology progress and conventional breeding methods is one of the important ways of cultivated flora enrichment.

Soil and climatic conditions of Ukraine satisfy thermal and day light requirements of filbert. The rest of conditions depend on agrotechnical practices.

Just during the last decades, the interest of geneticists and plant breeders to this valuable plant has revived under the influence of demand expansion for hazelnuts. Ukrainian breeders created a large majority of filbert varieties widespread in Ukraine. The greatest improvement in this sphere are connected with the name of F.A.Pavlenko.

The collection of the genus Corylus consists of 14 species, 15 forms and 137 varieties and hybrids concentrated in the mother plantations and industrial gardens at an area of nearly 11.5 ha.

This diversity gives us a possibility to estimate biological characteristics and horticulture and valuable features that show consumer advantages and determine the peculiarities of technological processes of nut growing and processing, moisture provision, forming the level of industrial expenses and competitive ability of the industry, conducting breeding work for the most promising filbert forms and varieties.

**Key words:** productivity, weather conditions, kernel, varieties, mineral elements.

**Vasiuta V. V. Features of total water consumption by table beet under drip irrigation in the Southern Steppe of Ukraine**

Under drip irrigation, due to the local character of watering, moistening contours differ from those formed by other methods of watering. Therefore, the use of calculation methods for soil water regime regulation under drip irrigation requires determining additional parameters that take into account the biological characteristics of crops and irrigation localization degree. Despite the ease of using calculation methods, little attention has been recently paid to them, although they, as publications demonstrate, allow fulfilling not only the function of soil water regime regulation, but its modeling, which simplifies the task of selecting an optimal watering mode. Considering a different character of the evapotranspiration intensity under spring and summer seeding, it should be noted that the value of the average daily evaporation in the optimum zone is within a relatively stable temperature range. The difference between the sum of active temperatures for it is relatively stable and under both sowing dates ranges between 951 and 1016 0C. Investigations of the relationship between average moisture consumption and the sum of temperatures obtained approximating dependence of the average daily evaporation with an accuracy of approximation of 92% (R2 = 0.9174) for the spring and 98% (R2 = 0.9783) for the summer sowing dates.

Comparing moisture consumption under drip irrigation determined by calculation and thermostat-gravimetric methods showed that in research years the average actual total water consumption determined by the thermostatic-weighing method was 11.1 – 22.0% less than according to the calculation methods of D.A. Shtoykо and Penman-Monteith. Evaluation of the differences in the total water consumption by the t-criterion confirms that at the 5% reliability level by the calculation methods total water consumption is significantly higher. This indicates that the use of calculation methods for drip irrigation to determine total water consumption requires the determination of clarifying coefficients, as Penman-Monteith method determines the value of the reference evaporation, and D.A. Shtoikо method determines evaporation from the whole contour of moistening. According to Penman-Monteith method, when determining water consumption, the crop factor and the area of moistening are taken into account. The application of D.A. Shtoikо method for drip irrigation requires the determination of a coefficient considering the difference in total water consumption for local and entire contours of moistening. The study of total water consumption by red beet using the D.A. Shtoiko method under drip irrigation found that the average value of the correction factor for spring sowing amounts to 0.77, while that of summer seeding is 0.74. According to the method of Penman-Monteith it is 0.80 and 0.89 respectively; the method of D.A. Shtoikо is equivalent to Penman-Monteith method at 5% reliability in Southern Ukraine.

**Keywords:** total water consumption, evapotranspiration, red beet, drip irrigation.

**Verdysh M.V, Bulaienko L.M., Kuzmenko V.D., Vashchenko Yu.I. Specific features of water distribution in the main Kakhovka canal**

The purpose of the article is analysis of water distribution in the area of the Kakhovka main canal, determination of the effect of weather and other factors on its performance. The article presents the results of the analysis of water distribution in the area of Kakhovka main canal in the period of 2010-2014. The studies found that in the period under study coefficients of water availability and uniformity of water distribution in the majority of water management departments remained fragile and prone to fluctuations. The article determined a correlation between indicators of water distribution and amount of precipitation in the region. Analysis of the correlation showed an inverse relation between the implementation of the plan of water supply and the annual rainfall in the area of the Kakhovka main canal. The implementation of the plan of irrigation is affected by the state of farm irrigation networks and water users' ability to pay for the services of water supply for irrigation. The conclusions show that in water plants where actual indicators of water supply do not exceed the planned values, there is a uniform distribution of water among water users. Low water supply in some district water management departments indicate inefficient water use planning in them.

**Keywords:** irrigation, main canal, indicators, water management organizations, water use, water distribution, correlation coefficient.

**Vozhehova R.A., Biliaieva I.M. Problems and promising directions of irrigation development in Ukraine and the world in the face of climate change** The article reflects the results of studies on the scientific rationale for the development of irrigation and increasing the productivity of irrigated land on a local and global level. It proves the necessity of expansion of irrigated lands and rational use of existing ones, with a view to the rational use of irrigation water, energy, technical means of agricultural production, human resources, increasing productivity, economic efficiency and environmental safety of irrigated agriculture.

The task was to research the scientific substantiation of expanding irrigation areas and optimization technologies of growing crops on local and global levels under the conditions of climate change.

The study used analytical approaches that form the basis of knowledge bases in irrigated agriculture aimed at the optimization of decision-making in growing crops, improving strategic planning and operational management of growing technology based on natural and economic factors.

The progress of current and future irrigated agriculture is impossible without the creation of energy-saving and environmental technologies of agricultural cultures, based on the rational use of natural resources (climate and soil) and artificial energy in the form of chemicals, irrigation machines. The approaches to the use of irrigated land have changed. The structure of sown areas has changed: the share of soybean, vegetable and grain crops has increased, whereas the sown area under forage crops has decreased by 70-90%. All this is mainly due to reduced acreage of perennial herbs. In addition, the group of technical crops, mainly sunflower, has increased by 2-5 times. Under these conditions, agricultural science should offer to the production sphere a complex of design and research and organizational work on the development and implementation of zonal farming systems at the local level. Besides, under climate change, manifestations of the economic crisis, lack of resource support for the agrosphere, modern systems of irrigated agriculture should be seen as the most effective tool of practical application of the achievements of agricultural science in the agricultural sphere.

**Key words**: irrigation, climate, cultivation techniques, weather conditions, moisture content, irrigation efficiency.

**Gerasko T.V. Еlements of productivity of organic peach in the southern steppes of Ukraine**

The aim of our study was to determine the possibility of growing peach without using any synthetic chemical plant protection under the conditions of the southern steppe of Ukraine and the impact of organic technology on the productivity of the culture.

Field experiment started in February 2010 on the lands of the Melitopol district of Zaporozhye region. Plant material for research was Redhaven variety grafted on apricot. The experiment was repeated four times, 10 trees in each repetition. Variations: 1 - control (lacking any spraying); 2 - biological protection, spraying with apple cider vinegar (200 ml per 10 liters of working solution); 3 - Chemical protection products: Bordeaux mixture, Horus, Delan, Aktellik (in accordance with the manufacturer's instructions); 4 - biological protection, bacterial, viral and fungal preparations of industrial production (Gaupsin, fitosporin, Lepidocide, Pentafag-C Trihodermin); 5 - biological protection, biological agents (same as in variant 4) + vegetable preparations (same as in embodiment 6); 6 – vegetable preparations (garlic tincture, tincture of horseradish, onion-skin broth, red hot pepper broth). The remaining technological methods were the same in all variations: the soil was kept under natural sod (10-15 cm), tree trunks were mulched with hay (thickness of the layer of mulch was 15-20 cm), beginning from April, each tree received 80-100 l of water at an interval of 10 days.

Lack of treatment did not reduce the height of trees, compared with the traditional technology of cultivation. In 2013, peach trees in the variant without any sprays were significantly higher than in the variant with traditional chemical protection, being inferior by this indicator only to the variant with herbal protection.

The largest volume of a crown had trees treated with herbal preparations and apple vinegar, probably due to the stimulating effect of plant hormones contained in apple cider vinegar and herbal preparations.

The largest number of annual shoots was in the variant with herbal treatment.

The leaf area in 2013 was not statistically different in options, in 2014 it was the biggest in the variant under the treatment with apple cider vinegar.

The highest score of flowering had variants with apple cider vinegar and chemicals.

The highest yield for 2013 was obtained in the variant with herbal preparations protection (19 kg / tree); at the same time biological preparations fell short of expectations (the harvest of 9 kg / tree). In 2014, in the variant using apple cider vinegar the yield was 6.8 kg / tree, while variants produced about 1 kg / tree.

**Keywords:** organic horticulture, peach, height of trees, tree crown volume, number of annual shoots, leaf area, score of flowering, yield.

**Dementieva O.I.** **Dependence of water consumption by corn hybrids of different groups of ripeness on the quality of irrigation water**

The article considers the expediency of cultivation of corn hybrids of different maturity classes when using irrigation water of class I and II - National Standard of Ukraine 2730-94. It determines the rational consumption of irrigation water by corn, shows a payback of 1 m3 of irrigation water in the crop of grain on dark-chestnut soils of the Ingulets and Krasnoznamianka irrigation systems. The article provides data on the grain yield of corn for the past four-year period; it also investigates the dependence of yield on meliorants, amount and quality of irrigation water.

The comparison of irrigation water of the Ingulets and Krasnoznamianska irrigation systems for chemical indicators has found that the quality was significantly different. The main problem of the Ingulets irrigation system was the low quality of irrigation water manifested in increased mineralization and unfavorable composition of salts. The irrigation water of the Krasnoznamianka irrigation system was less aggressive, which made it possible to obtain heavy crops at lower costs.

The interaction of irrigation water, fertilizers and meliorants on the Ingulets irrigated massif provided high yields of corn. An increase in productivity due to soil wetting on two experimental grounds was on average close over four years. A significant difference was observed only in hybrids depending on their groups of ripeness.

The rate of irrigation efficiency (RIE) has indicated a more rational use of the Dnieper water (Krasnoznamianska irrigation system) for irrigation. Each ton of grown corn saved an average from 48 to 101m³ of water.

The irrigation rate for growing corn hybrids using Dnieper water is lower, and the payback of 1 m³ of water by the corn harvest, on the contrary, is higher than under the conditions of the Ingulets irrigation system.

**Key words**: irrigation water, irrigation system, water quality, corn grain harvest, irrigation rate, total water consumption, water consumption coefficient.

**Lymar V.A., Naumov A.О. Optimization of nutrition of tomatoes grown from seeds under drip irrigation in Southern Ukrainian Steppe**

The article presents the results of field research on a comparative study of the effect of different options of optimizing the nutrition of tomatoes grown from seeds under drip irrigation and their impact on productivity, biochemical and economic indicators of tomatoes on sandy soils.

Increasing the productivity of any crop, and tomatoes are no exception, by developing activities that contribute to a fuller use of biological opportunities of crop formation is an ongoing problem.

The main objective of our research was to develop measures aimed at increasing crop productivity of tomato with high economic efficiency.

Field experiments, laboratory research and processing of results were performed in the laboratory of microirrigation at the South State Agricultural Experimental Station IVPiM of NAAS of Ukraine in 2011-2014. Research was conducted by the conventional method. Field experiments were laid by randomization of split plots. The experiments were repeated four times. Research plot area - 20 m2.

The scheme of the experiment envisaged the study of the effectiveness of various norms of fertilizers (Factor A), fertilization methods (factor B) on different layouts of plants (Factor C).

The maximum yield of tomatoes after the interaction of the studied factors in the experiment was obtained in the following variant: estimated fertilizer rate for a crop of 100 t/ha in combination with fertigation with the layout of plants of (152 + 28) × 31.7 cm - 95.0 t/ha.

After the analysis of variance it should be noted that the greatest influence on tomato yield in the experiment had a factor of fertilizer rates; a slightly lower share has a method of fertilization; the lowest effect had the layout of plants (3.6%); as for the interaction of factors, the highest rate (4.2%) was observed in the interaction of dose of fertilizer and method of fertilization. Analyzing the economic efficiency of the studied variants, it should be noted that the maximum profit (29,038 USD. / ha) was obtained under fertigation and integrated application of the estimated fertilizer rates for a crop of 100 tons / ha and two -line scheme of plant stand (152 + 28) × 31.7 cm). In addition, the same version has the highest level of profitability - 105%.

Overall analysis of bioenergy assessment of techniques and elements of technology of cultivation of tomatoes showed that the maximum bioenergy coefficient was recorded in the variant with mineral nutrition for the crop of 100 ton / ha in combination with fertigation and layout of plants (152+ 28) × 31,7 cm - 2.07.

**Key words**: tomato, fertilization, irrigation, economic efficiency.

**Likhovid P.V. Efficiency of using mineral fertilizers by sweet corn depending on cultivation technology under irrigated conditions**

Mineral fertilizers are one of the main factors of plant production intensification in case of plants cultivation under the irrigated conditions of the southern region of Ukraine. Significant increase in their prices is a factor of essential decrease of their use by majority of Ukrainian agricultural producers. First of all, landowners apply adequate quantity of mineral fertilizers under highly profitable crops, which are in stable demand in the market. Sweet corn belongs to such crops. At the same time, producers are interested in obtaining maximal efficiency of applied fertilizers, which needs a scientific basis of forming the rational nutrition background from this point of view. The lack of sufficient quantity of scientific research on the questions of effectiveness of mineral fertilizers use by sweet corn under the irrigated conditions of the Dry Steppe Zone of Ukraine determines an urgency of studies in this field. The study of peculiarities of the fertilizers assimilation by the crops in case of different technological methods of its cultivation was carried out in 2014-2015 on the basis of SK “Radianska Zemlia” of Bilozerka district of Kherson region by the standard methodology of the field experiment. As a result of two-year-long research it has been established that maximal efficiency of mineral fertilizers use by sweet corn is provided by basic tillage at a depth of 20-22 cm, nutrition background of N60P60, thickening of plants at a rate of 65 thousands/ha. Such a cultivation technology of the crop provides the highest payback of 1 kg of the mineral fertilizers active ingredient with product cobs yield (at a level of 124.17-161.83 kg) and the actual increase in yield (4.54-5.78 t/ha). Basic tillage at a 28-30 cm depth, doubled nutrition background of N120P120, thinning of plant density to 35-50 and thickening to 80 thousand/ha lead to a significant decrease in the mineral fertilizers use efficiency by sweet corn crops under the irrigated conditions of the Dry Steppe Zone of Ukraine.

**Keywords:** basic tillage depth, plant thickening, mineral fertilizers application efficiency, irrigation, sweet corn, nutrition background.

**Makarchuk M.O.** **Productive properties of seeds of heterotic maize hybrid Grand 6 depending on the genotype of the maternal component and agro-ecological conditions of the growing area**

Maize is one of the most important cereal crops in Ukraine. Increasing its productivity and improving product quality is provided by the creation and introduction of new high-yielding heterosis maize hybrids and the use of high quality hybrid seeds.

Now M- and С-types of sterility are mostly used in the seed production of heterosis maize hybrids. It is believed that maternal lines with male sterility in the hybridization areas use more nutrients in the grain formation, due to lack of pollen development needs, which increases the yield of hybrid seeds. V.E. Kozubenko got the confirmation of this in 1966 while growing hybrid Bukovynskyi 3 receiving 5% more yield throughout five years of the research than the yield of this hybrid analogue obtained in normal cytoplasm.

One of the methods of simplifying the control of the seed hybridity and reducing the cost of its production is the use of marker genes of maize grains colouring that are closely linked to male sterility genes.

In order to clarify the influence of genetic markers in different genetic systems of the controlled reproduction (GSCR) on the agronomic economically valued characteristics of heterosis maize hybrids on black soils of Uman National University of Horticulture (UNUH), located in the Right-bank Forest-steppe of Ukraine, and dark chestnut clay loam soils of Brylivska Research Station (BRS), which is located in the Southern Steppe, experiments of studying a number of coisogenic analogues of the hybrid maize Grand 6 (П7С×П26СВ*а1а1*) were put to, the seed production of which is held on the C-type of sterility. In the variants of the experiment the seeds of a controlled hybrid were sown, and coisogenic analogues with maternal lines П7зС, П7зС*а1а1* and П7зС*Vg1Vg1*, that were pollinated with the identical pollen of the parent component П26СВ*а1а1* of the controlled variant.

While studying the display of the seed yielding qualities in the variants of the experiment there was established a dependence of soil and climatic conditions of the zone location areas, and the weather conditions more than of the genotype. According to the yield with 14% of grain humidity, all the grown coisogenic hybrids on BRS significantly prevailed the markers of the relevant variants under the conditions of UNUH to 0.54–1.78 t/ha more than at LSD0,95 according to the factor A (area) — 0.10 t/ha.

Under the conditions of the Right-bank Forest-steppe (UNUH) the highest yield among coisogenic analogues provided a hybrid gained by the use of fertile line with the genetic marker *а1* (П7зС*а1а1*), which exceeded the control by 1.78 t/ha, while under the conditions of Southern Steppe (BRS), the highest yield increase of 0.56 t/ha provided a hybrid (П7зС×П26СВ*а1а1*) on the fertile basis. It should also be noted that in the Right-Bank Forest-Steppe and Southern Steppe coisogenic hybrids that provide the greatest yield increase had a slightly lower or almost equal to the control variant grain moisture at harvest time.

The results of the research give reasons to state that introducing maternal components into the genotype of the heterosis maize hybrids of thegenetic marker *а1*, which controls seed colouring, can be safely used in both areas of carrying out the experiment for simplifying the control of hybridity, as the presence of this gene in the genotype of the coisogenic analogues does not result in reducing the yield potential of the seed.

**Key words:** cytoplasmic male sterility, C-type cytoplasmic male sterility, fertility, genetic marker, co-isogenic analogue.

**Maksimov M.V. The impact of soil tillage, mineral fertilizers and plant density on grain yield of lentil under different moistening conditions in the southern Steppe of Ukraine**

The primary objectives of the research on technologies of lentil cultivation are to find out the ways for efficient use of the available natural (non-controlled) and artificial (controlled) factors to increase the yielding capacity for those varieties which have been created in recent years and the potential of which has been studied insufficiently. To solve these problems is possible in case of doing special research. Studies on the improvement of technology elements of lentil cultivation were conducted by carrying out a four-factor field experiment in the agricultural cooperative "Radianska zemlia" Belozersky district, Kherson oblast. During the field experiments the following factors and their options were studied: factor A – basic soil tillage: moldboard one to a depth of 20-22 cm; moldboard tillage to a depth of 28-30 cm; Factor B – nutrition background: without fertilizers; N45P45; N90P90; Factor C – plant density (million/ha): 2,0; 2,5; 3,0; Factor D – moisture conditions: without irrigation, under irrigation.

As a result of mathematical processing of the experimental data it was determined that the most expedient is the cultivation of lentil under non-irrigated conditions, moldboard soil tillage to a depth of 20-22 cm, mineral fertilization at a rate of N45P45 and plant density of 2.0 million/ha; it formed grain yield of 1.30 t/ha. Under irrigation, the following agricultural practices are also expedient at a plant density of 2.5 million/ha, the yield amounting to 2.44 t/ha.

**Key words:** lentil, grain, soil tillage, mineral fertilizers, plant density, moistening conditions, yield, share.

**Rudik O.L. Peculiarities of yield formation of oil-bearing flax depending on sowing dates and seeding rates in dry steppe zone of Ukraine**

Long term research studies the influence of seeding rates of oil-bearing flax within 4-12 mln pcs / ha in different periods. It is determined that the best conditions for obtaining the young growth and further development of plants are formed when sowing them in the mature ground within a ten-day period. From sowing to early budding we observe a significant improvement of water and temperature regimes, but precipitation is irregular. Germination decreased from 80.9% to 74.5% when shifting the sowing dates, and survival of plants decreased from 95.2% to 94.5%. The indices of productivity elements and their formation under the influence of factors studied are determined. Shifting the sowing dates reduces an average number of bolls per plant the most significantly, while thickening affects the number of bolls and the amount of seeds in them. The seeding rate of 6 mln pcs. / ha in the mature ground provides the highest seed productivity of 1.34 t / ha. Postponing the sowing dates ten and twenty days later is accompanied by a yield decrease by 0.04 t / ha and 0.2 t / ha and deterioration of the economic efficiency of cultivation. The necessity of increasing the seeding rate when sowing the crop later than optimal dates is substantiated. Optimization of growth conditions of oil-bearing flax by means of determining the seeding rate and sowing dates increases production profitability.

**Key words:** oil-bearing flax, seeding rates, sowing dates, elements of productivity, yielding capacity.

**Tsyliuryk A.I., Shapka V.P. Effect of tillage and fertilizers on the growth and development of plants of spring barley in the northern steppes of Ukraine**

Due to changes in the priorities of the development of modern steppe farming associated with the rising costs of energy and material resources, climate change in the steppe zone, frequent cultivation of spring barley after sunflower (atypical predecessor) as a result of the expansion of its acreage up to over 5 million hectares in recent years, and application of plowing when growing cereal crops, we see an increasing erosion, excessive anthropogenic pressure, deterioration of water regime and humus status of chernozems. The negative factors listed above cause the necessity of the improvement of the system of basic tillage under spring barley in the direction of its minimalization, taking into account soil and climatic conditions, the amount of stubble residues of the predecessor, fertilizers, phytosanitary condition of crops.

The article presents research material that proves that the use of moderate doses of mineral fertilizers (N30-60P30K30) significantly improves all biometric indicators of spring barley plants by 1.1-1.3 times. The use of plowing and chiseling in the technological cycle of work when growing barley makes it possible to get maximum values of biometric measurements of plant structure and elements affecting the ear in contrast to disking when they are significantly reduced by 53-140% due to slightly worse conditions of nutrition regime, agrophysical indicators and aeration of the soil.

Using plowing and chiseling gives a practically equivalent yield of barley 2.69-3.35 and 2.35-3.32 t/ha, respectively. Disking the soil reduces the yield of grain crops by 0.14-0.48 t/ha (5.9-17.8%) due to nitrogen immobilization of microorganisms during the decomposition of plant debris and increase weeds, especially increasing the number of Ambrosia artemisiifolia (Ambrosia artemisiifolia L .) to 45.9-48.7% of the weeds group.

Economic calculations show that the use of shallow tillage disking (10-12 cm) in cultivation technology of spring barley, despite lower grain yield, ensured, compared with plowing and chiseling, fuel saving by 12.0-13.2 l/ha, reduction in human resources by 0.62-0.91 man-hours/hectare and costs by 191-260 UAH/ hectare.

**Key words:** spring barley, tillage, crop residues, grain yield, economic efficiency.

**Chorna K.I. Analysis of modern conditions of irrigation application in Ukraine.**

The article highlights the results of a system analysis of irrigation application and an integrated action plan to overcome existing problems. The current state of irrigated land is taken into account including the prospects of recovery and further expansion of irrigated areas; this is necessary to optimize the structure of land use in southern Ukraine.

In the world, there is significant experience in elaborating integrated plans for land consolidation, in substantiation of the organizational, technical and technological methods to create Water and Land Users’ Associations and also mechanisms to attract investments in irrigation systems.

For irrigation rehabilitation and development we should take particular measures for the implementation of land consolidation projects at all levels (national, regional and local). To improve land reclamation of irrigated lands, it is required to comply with strict recommendations. For the consolidation of water and land resources it is recommended to organize pilot projects and create Water and Land Users' Associations within their irrigation system area. Also it is necessary to determine the vision and attitude of stakeholders towards the development of agricultural areas. This will support establishing a national dialogue on all important issues. The result of system analysis is the detailed evaluation and classification of water and land use organization, environmental state of agricultural areas and, of course, the technical condition of irrigated systems.

Finally, it is necessary to develop scenarios of water and land use and select the most economic and environmentally sustainable variant, taking into consideration climate, irrigation methods, crop rotation, etc.

**Key words:** system analysis, consolidation, land use optimization, Water and Land Users’ Association, land classification and evaluation, elaboration of water and land use scenarios.

**Shatkovskyi A.P. Drip irrigation regimes, water consumption and productivity of corn in the Steppe zone of Ukraine.**

In the last few years, the areas of drip irrigation of corn in Ukraine have increased and range now from 2 to 6 thousand ha. Despite the growing interest of agricultural producers, the question of drop irrigation regimes, characteristics of water consumption and formation of productivity of corn under the conditions of the Steppe of Ukraine are insufficiently studied.

Therefore, the goal of the research was to determine the effect of pre-irrigation soil humidity on the formation of drip irrigation regimes, processes of water consumption and corn grain yield in the Steppe of Ukraine. Field research was conducted on lands of Kamiansko-Dnieprovska Research Station IWPLR NAAS in 2013-2015 for a single-factor scheme (without irrigation, 70, 80, 85 and 90 % of minimum moisture-holding capacity).

The research experimentally determined basic parameters of drip irrigation regimes (the timing and amount of irrigation, irrigation norms) depending on the pre-irrigation soil humidity, and also its effect on corn grain yield and yield structure parameters.

The findings show that drip irrigation increases corn yield by 1.9-3.25 times compared to bogharic conditions. The study determines that keeping pre-irrigation soil humidity at 85 % of the minimum moisture-holding capacity provides grain yield of 17.15 t/ha under minimum consumption of irrigation water for the formation of a yield unit (412.6 m3/t).

**Key words:** drip irrigation, irrigation regime, water consumption, productivity, corn.

**Yanovskyi Y.P., Chepernatyi E.V., Ваndura L.P., Maslikova K.P. Biological peculiarities of harmful influence of Melolontha melolontha L. in industrial plantations of strawberries in the Steppe Forest zone of Ukraine**

The paper presents the results of research on the biological peculiarities and harmfulness of Melolontha melolontha L., which is a permanent species of industrial plantations of strawberries, and colonizes about 18 % of the area of the rotation. The greatest harm is caused by larvae that damage plant roots and cause their death (25 %), significantly decreasing the output.

**Keywords:** biology, harmfulness, Melolontha melolontha L., pest, phytophagan, strawberry plantations.

**Onyschenko O.M., Kharytonov M.M. Evaluation of economic and ecological feasibility of the application of anaerobic and photoaerobic biotechnologies in poultry farming**

Due to resource depletion and climate change, researchers and industry representatives in the poultry sector become more aware of and interested in utilization alternatives, such as anaerobic conversion.

At the same time, high productivity of algae per hectare and per year and its ability to recycle CO2 from fumes makes their application more promising.

Another option for taking advantage of the energy content is to carry out anaerobic digestion of poultry waste and raw algae in order to produce methane and recycle nutrients (N, P and K) by combining biogas production with culturing the microalgae *Chlorella vulgaris*.

A feasibility study of a hypothetical system was carried out in this article, and results are compared to algal biodiesels and regular biogas production schemes.

Economic analysis was made for the existing renewable energy resources market of Ukraine, taking into account actual investment climate with a focus on a simplified process where methane was the only recovered product optimal from the environmental and economic points of view.

These results suggest that production of methane from the mixture of microalgae and wastes improves significantly the overall efficiency of the anaerobic process in case of its integration into a large poultry farm. At the same time, the integration of anaerobic and photoaerobic chains leads to almost complete waste utilization.

This new bioenergy generating process strongly competes with other biofuel production technologies for poultry farms with a capacity of more than 70 000 chickens.

The introduction of such a system has numerous environmental benefits and leads to an increase of ecological safety and sustainability of natural environment around poultry farms, improves the quality of environment and human life.

**Key words**: waste, poultry farming, biogas, microalgae, renewable energy resources.

***Palii A.P. Innovations in ensuring the control of the purity of milk handling systems of milking machines***

The efficiency of dairy cattle can be significantly increased by increasing the milk yield of cows and by the organization of quality milk production. Along with an increase in milk production we must provide its higher quality. The quality of milk and increasing its purity, including the reduction of bacterial contamination, will affect human welfare and health. Furthermore, in a market economy, a factor of quality is one of the major factors in the marketing of milk. Above all, this is due to higher purchase prices for milk of the premium quality.

Contamination of milking equipment is mainly due to fat and protein. Fat not only sticks firmly the the surface, but also promotes the adhesion of protein and mineral particles of milk. It also depends on the materials of which the equipment is made, and the quality of the surface finish. More impurity is observed on the equipment made of aluminum and plastic, less on glass and stainless steel. Material with a smooth surface have the least adhesion with particles of dirt, while porous and rough material absorb it. Grease is easily adsorbed by rubber machinery parts, and if oil is not removed, it easily penetrates the pores deep into details and they lose elasticity and crack.

Because of careless and occasional washing of milking machines and equipment impurities continuously accumulate and hold on tightly so that it is impossible to wash them away without special means.

Analysis of scientific papers showed that after a short period, various types of impurities accumulate on the surface of the milking equipment and become a medium for microbial growth.

The purpose of research is to develop a simplified method for determining the purity of washing of milking machines, which will reduce the time to quickly and efficiently assess the sanitary condition of the inner surface of the milking system with different levels of automation through the use of effective tools, and to identify factors of violations of service of milking equipment.

The concept of “sanitization” of milking equipment comprises a complex of manipulations aimed at the elimination of pathogenic microorganisms and reduction in the numbers of non-pathogenic ones to a level when they do not exercise a significant influence on milk quality under equipment reuse that is why the development a method for determining the purity of washing milk lines with the use of reliable methods for assessing health and sanitary condition can become a significant reserve for an increase of milk quality and reduction in losses of agricultural products.

To determine the purity of washing the milk line, we developed a technological approach and designed a device that consists of a pipe section that has an opening, couplings, fasteners of the measuring device, a measuring device which has a body, scale and pointer.

When the temperature of a detergent in the final section of the milk line drops from + 70 – 90 °C to 40 °C, the quality of washing the line is assessed as 1 point – good.

When the temperature of a detergent in the final section of the milk line drops from + 70 – 90 °C to lower than 40 °C, the quality of washing the line is assessed as 2 points– unsatisfactory.

The present technological approach creates conditions to obtain high milk quality by preventing its high mechanical and bacterial contamination.

For assessing the quality of the technological operation of milking machine cleaning, there has been developed a technological approach to evaluating the washing quality of the milk line on a 2-point grading scale; its use in a production environment will create conditions for getting high-quality milk by preventing its high bacterial contamination.

**Keywords:** milking machine, milk line, device, cleaning quality, 2-point grading scale.

**Pelykh V.G., Ushakova S.V. Dynamics of live weight and growth intensity indicators in pigs in four-way crossing**

The article presents the results of research into grows energy of pigs of different genotypes. The research aim was to evaluate grows dynamic and its intensity in pigs of different genotypes. The most significant mark for estimating the growth energy in pigs is their live weight in different periods of ontogenesis. Crossbreeding is considered to be the best method to achieve the slaughter condition of pigs more rapidly.

The experiments were carried out under the conditions of Open Company Freedom Farm Bacon in the Kherson region. For our studies were selected purebred Large White pigs (♀LW×♂LW) – the control group, and ♀(LW×L)×♂(D×P) and ♀(LW×L)×♂(P×D) combinations.

Four-way cross young pigs had higher indicators of live weight, daily gain than Large White purebred pigs. According to the dynamics of live weight in the periods before and after weaning, the group of animals ♀(WB×L)×♂(D×P) was the best. The highest daily gain from birth to the weaning period was typical of piglets of ♀ (WB×L)×♂(D×P) combination, which was +21.30 g (P <0.001) more than in pigs of the control group and +15,82 g more than in animals of ♀(WL×L)×♂(P×D) group. The highest daily gain at the end of the fattening period had animals of the ♀(LW×L)×♂(D×P) and ♀(LW×L)×♂(P×D) groups (906.27.…910.80 g).

The study calculates the indices of growth intensity of young pigs, which reflect the advantage of the ♀(LW×L)×♂(P×D) group. The highest growth uniformity was observed in animals of the ♀(LW×L)×♂(D×P) combination. The maximum values of growth intensity were observed in the animals with the highest energy growth.

The higher the weight of animals at 4 months of age is, the higher indices of growth intensity the animals have. This allows making a predictive assumption about further growth of young pigs. Also the highest values of correlation in animals of ♀(WB×L)×♂(D×P) group are determined.

**Key words:** breeding, growth dynamics, daily gain, formation intensity, Duroc, Pietrain, Landrace.

**Pidpala T.V., Bondar S. A. Peculiarities of manifestation of breeding traits in dairy cattle of different breeds**

The research has established that according to their breeding features the animals of Ukrainian red-spotted dairy breed have particular advantages. The difference in body weight at birth compared with the cows of Ukrainian red dairy breed and Ukrainian black-spotted dairy breed was 3.5 kg (P> 0.99) and 3.1 kg (P> 0.99), respectively.Fresh cows of Ukrainian red-spotted dairy breed had higher fat content of milk by 0.05% (P <0.95) and 0.08% (P> 0.95) in comparison with the animals of the same age of Ukrainian red-spotted dairy breed and Ukrainian black-spotted dairy breed. Cows of black-spotted dairy breed had higher milk yield during the first lactation by 555 kg (P <0.95) and 1069 kg (P <0.95) compared with the animals of the same age of Ukrainian black-spotted dairy breed and Ukrainian red-spotted dairy breed. It is explained by the longer lactation period. The difference in duration of lactation was 33.6 days and 51 days (P>0.95), respectively.

The presence of biological variability causes selection on the basis of features that characterize the growth, the beginning of the economic use and milk productivity. Most of the recorded breeding features of dairy cattle belong to the medium and high variability, except for fat content in milk (Cv = 3.7-4.6%).

Positive correlative dependence of medium rate (r = 0.645 with P> 0.999) between age of the first insemination and age of the first calving by animals of Ukrainian red-spotted dairy breed is determined. Another peculiarity established by the analysis of dependence between features "age of first calving" and "productivity" is a positive direction of ties between the animals of Ukrainian red-spotted dairy breed and Ukrainian black-spotted dairy breed. Our research has confirmed a negative correlation between signs of "milk yield" and "fat content in milk". This pattern is typical of fresh cows of all the researched breeds: Ukrainian red dairy - r = -0.949 (P> 0.999); Ukrainian red-spotted dairy -r = -0.565 (P> 0.999) and Ukrainian black-spotted dairy cattle - r = -0.595 (P> 0.999).

**Pishchan I.S. Unconditioned and conditioned inhibition of milk ejection reflex in Swiss cows as an adaptive reaction to Parallel milking machines**

In industrial milk production the unconditioned reflex stimulation of the receptor apparatus of the udder of cows before milking using Parallel milking machine is rather short and does not exceed 30.9 seconds. In this case, all the unconditioned irritation is executed discretely and greatly stretched in time. Therefore, before milking, the conditional reflex stimulation of the lactation center in cows takes 88% of time, and the unconditioned reflex stimulation of the receptor apparatus of the udder takes only 12 %.

Low activity of milk ejection in experimental Swiss cows at the beginning of milking and during milking pointed to development of the conditioned and unconditioned reflex inhibition of milk ejection. Not by coincidence, under summation reflex inhibition of milk ejection, the intensity indicators of the first group of cows were significantly lower than indicators in cows of the control group with the active milk let-down. The average intensity of milk ejection in the cows of the first group was 2.1 kg/min, while in the control group it was by 19.2 % (P <0.01) higher – 2.6 kg/min. Although the maximum indicator of intensity of milk ejection in cows of the first group was significant and was 3.8 but by 7.9 % inferior to the indicator of control group cows, in which the index was 4.1 kg/min.

One of the main indicators of summation inhibition of milk ejection reflex in Swiss cows was total time of machine milking. Thus, with single-milking yield of 11.4 kg in group 1, the process of milking lasted about 5.4 minutes, that was longer than in control by 12.9 % (P <0.01). In some of the cows of first group the milking lasted up to 7 minutes 44 seconds. Under the inhibition of milk ejection reflex the index of milk yield was very low. Thus, in cows of the first group after the first minute of milking the amount of milk obtained was only 5.4 % of total milk yield; in cows of the second (control) group it was higher by 70.6 % (P <0.001) and was 18.4 %. The low milk ejection was observed after two minutes of machine milking, too. In animals of control group the udder was emptied of accumulated milk up to 71.4 %, in cows of the first group this value was lower by 38.9 % (P <0.01).

**Keywords:** milking, cow, milk ejection reflex, milk let-down intensity, reflex inhibition, milk yield.

**Povod** **M.G. Fattening of pigs kept in pig houses of different design and the influence of genotype and seasons on their performance**

 The study examines the performance of fattening pigs throughout the year in pig houses of different design and the influence of genotype and seasons on their productivity. The analysis of different housing conditions for the four seasons in the year suggests that a higher growth rate was observed in pigs in improved pig houses. It was higher in winter and in summer. In basic barns, peak growth rate was in the winter with a gradual decrease in other seasons. Thus in all seasons average daily gains of pigs finished in basic barns were lower compared to the improved conditions. In hoop barns, animal growth rates were inferior to counterparts housed in improved conditions. At the same time, an increase in average daily gains was observed in hoop barns in transitional periods of the year, and they declined in summer and winter, which was caused by a more significant impact of environmental factors.

The speed of growth and precocity of animals kept in houses of a new improved type are higher than in their counterparts housed in traditional barns and hoop structures.

The maximum impact of seasonal factors on animals is observed in hoop structures, whereas it is somewhat less in traditional barns and the lowest in improved pig houses.

Genotype traits fully manifested themselves in houses of a new improved type. Under the conditions when the impact of genotypic and seasonal factors is reduced, the influence of other unaccounted factors on the growth rate of animals and time of reaching a live weight of 100 kg increases.

**Keywords:** pigs, fattening, growth, gain, precocity, season, genotype, housing conditions.

**Burgaz M., Matviienko T. Bioproductivity evaluation and prospects for fish breeding in small reservoirs in the Odessa region**

In Ukraine, there are many small ponds, but their development is not interesting for large fisheries structures. Many of them are quite suitable for fish farming. Based on small reservoirs fish farm industry can be created. Therefore, it is necessary to generalize and analyze the data to study the features of marketable fish cultivation in small ponds of the Odessa region by the example of Starotsarychanskyi and Hlybochanskyi ponds.

Today, almost all small ponds in the Odessa region have retained their high biological productivity, and there are good prospects of conducting commercial fishing in them. It is possible to achieve satisfactory results only through the implementation of the complex of targeted actions for improving fish productivity, adapted to the individual circumstances of each reservoir.

The existing structure of fish fauna does not provide an optimal exploitation of fishery ponds and an effective transformation of food resources into a forage base. In these circumstances, it is considered appropriate to form purposefully an artificial ichthyocenosis by introducing freshwater aquaculture valuable organisms, such as white and motley silver carps or their hybrid forms, into its composition.

Thus, the study shows the possiability of effective aquatic exploitation of the ponds using the pasture technology that provides the appropriate amount of preparatory reclamation activities aimed at suppressing low-grade ichthyofauna, stocking ponds at a recommended composition of exotic species and estimated planting density.

Based on the analysis of specialized literature and the empirical researches the biological analysis of fish was conducted; food base was investigated; basic hydro-chemical parameters of small water reservoirs in the Odessa region by the example of Starotsarychanskiy and Hlybokochanskiy ponds were determined; the current state of water was estimated and the possibility of their further fishery use was specified.

**Keywords:** Starotsarychanskyi pond, Glybokochanskyi pond, food base, aquacultural use, hydrochemical parameters, ecological changes, biomass, biological productivity.

**Volichenko Y.N., Kutishchev P.S., Geina K.N. Specific features of nutrition of carp fingerlings under controlled conditions in relation to stocking the Dnieper-Bug estuary system**

The article features the peculiarities of feeding carp fingerlings under controlled conditions and depending on the state of food resources. The goal of reseach is to improve the technology of rearing high-quality stocking material with bigger individual weights compared to the existing regulations. The study establishes a reliable mathematical relationship between the stocking amounts of silver carp fingerlings and commercial fishing volumes in the fourth year of their introduction; this allows recommending stocking the water bodies of the lower reaches of the Dnieper with fingerlings.

The research findings show that physical and chemical parameters of water in the ponds under study are within the fish breeding standards for growing fingerlings of carp fishes using pasture technology.

The dynamics of biomass components of the food base indicate that fish reared have appropriate adaptive characteristics that will be employed during fattening under the conditions of the lower reaches of the Dnieper.

The spectrum of carp fingerlings nutrition corresponds to the composition of food organisms. The intensity of feeding during the growing season has a natural tendency to reduce before the fall. Indices of fatness indicate satisfactory food supply and readiness of fingerlings to the process of hibernation under the conditions of natural water bodies.

**Keywords:** nutrition, ponds, food base, carp fingerlings, estuary system.

**Loshkova U.М., Shevchenko V.U. Methodical aspects of phytoplankton estimation in the ponds in the process of carps material growing for the fish stocking in Lower Dnieper natural waters.**

In this article the methodological aspects of phytoplankton evaluation in ponds for fish cultivation are shown in the process of growing material of carp fish. The results represent development of quantitative and qualitative composition of phytoplankton in fishing ponds. The species composition of phytoplankton was close in all experimental ponds was represented by 4 systematic groups: *Chlorophyta, Bacillariophyta, Cyanophyta* and *Euglenophyta*. The biomass of phytoplankton (investigated by sedimentary method) varied in the range of 0.9 to 58.1 mg/dm3, while the average for the season indicator was 16.0 - 44.4 mg/dm3.

The dependence between the intensity of phytoplankton and water clarity is stated. As result the graph of the equation and dependence is: y = -74.81 + 42.76 x, where x – is clearance of water in meters, and y - is phytoplankton biomass in mg/dm3. The express method of determining the biomass of phytoplankton was improved in the ponds south of Ukraine.

**Keywords:** phytoplankton, biomass, water clarity, sedimentary method, express method.

**Poltavchenko T.V. Mycotic diseases of pond fish on fish farms in the Rivne region**

Mycoses are dangerous because they affect fish of all ages (even spawn) of various species and lead to a large number of deaths - up to 70%.

Mycotic diseases are caused by microscopic fungi belonging to several classes. Pond parasites are mostly freshwater halophilic, opportunistic species in the water and other substrates.

Effective treatment of fungal infections has not yet been developed, so it is essential to carry out preventive veterinary-sanitary measures and create optimal conditions in ponds where fish are bred and grown.

This article presents the epizootic situation analysis on such fish mycoses diseases of trout in fish industry in the Rivne region in 2008-2015. Monitoring and control of these infections were performed according to the planned laboratory experiments with given samples and fish industry epizootic investigations.

In 2008-2015, Rivne state veterinary control department investigated the epizootological state of fish farms in the Rivne region concerning such mycotic diseases in fish as saprolehniosis and branhiomyces.

In 2008 – 2015, there were investigated *Rivnerybhosp* PJSC, *Rivnenska* and *Alexandria* fish-meliorative stations*,* agricultural production cooperative *Victoria*, enterprises of different forms of ownership.

Monitoring studies conducted by the Rivne regional state veterinary laboratory in Rivne allow us to prevent timely the spread and development of such dangerous mycoses as branchiomyces and saprolegniosis. According to the 2008-2015 reports, the situation in the Rivne region as for branchiomyces is satisfactory but alarming as for saprolegniosis (in 2009-2011, some sporadic cases on pond farms were recorded).

**Keywords:** mycoses, branhiomyces, saprolegniosis, pond fish, pond farming, ichtyopatological research, microscopic investigation, monitoring, treatment, prevention.

**Sanzharevskа O.I. Romanovich I.S. Senenko N.B. Analysis of technogenic pollution of soils on the territory of the gas condensate enterprise**

In recent years, there have been annual increases in hydrocarbon production for sustainable development and energy independence of Ukraine. Therefore, there is a problem of the impact of oil and gas condensate enterprises on ecosystems of the environment. It is necessary to solve this problem as, because of basic technological processes of oil and gas production, large areas of agricultural lands withdrawn from use are contaminated. Oil and gas extraction territories are environmentally unstable due to various accidents and emissions at all stages of production. The problem of preservation of soil, agricultural land and improvement of soil fertility has become extremely relevant. To resolve the problem, it is necessary to carry out regular ecological monitoring of lands affected by industrial activities. This situation requires the implementation of operational and strategic agrochemical land evaluation and determination of the negative impact of oil products within the industrial areas.

Given the danger of the oil-gas sector and toxity of gas condensate pollution, the authors set the following tasks: to determine soil condition in the area of the gas production complex, namely to investigate basic agrochemical parameters of soil samples taken in the area of gas-condensate wells; to determine oil content of the studied soil samples and to perform a comparative analysis of the soil samples collected at the wellhead with a control sample.

The results of experimental studies of basic agrochemical parameters of the soil and the content of petroleum products in the samples are presented. The samples were taken at different distances and directions from the gas condensate well and pipelines leading to the installation of the complex preparation of gas condensate (ICPG). The main negative effects of the impact of oil and gas condensate on the lands were determined. The need to protect fertile lands exposed to the impact of industrial enterprises is substantiated.

**Keywords**: soil, gas condensate, ICPG, well, agrochemical analysis, hydrocarbons, sludge pits.