Summary

Vinyukov O.O., Chuhrii H.A. The influence of biological products on the determination of drought resistance of spring barley plants in the conditions of the eastern part of the Northern Steppe

The purpose of research. The aim of the study is the organic combination of high-quality pesticides in a complex crop protection technology and careful control.

Research methodology. The research was carried out according to the method of field work by B. A. Dospekhov, the method of state variety testing of agricultural crops, as well as methodological recommendations developed at the Donetsk State Agricultural Experimental Station of the National Academy of Sciences of Ukraine.

The scheme of experiments provided for the introduction of research preparations of the company LLC "SUMMIT-AGRO UKRAINE" for seed treatment and foliar feeding in the phase VVSN 23-27 of the development of spring barley. To protect plants during the growing season, the crops were sprayed with the following pesticides: end of tillering phase, tank mixture Prima Forte 0.7 l / ha + Amistar Extra 0.5 l / ha + Connect 0.5 l / ha; heading phase tank mix: Alto Super 0.5 l / ha + Engio 0.18 l / ha.

Results. The preparations that were studied were introduced at the beginning of the tillering phase, and the selection of plants for analysis was carried out on the 14th day after the treatments. According to the data obtained, it was proved about the positive effect of the studied intensive feeding systems on the formation of a larger number of productive stems. It was proved that in all variants an increase was obtained from 14.3 to 22.1%. The coefficient of productive tillering was the largest on options 2 and 5, option 1 (control) was the worst in this indicator.

A balanced approach to the introduction of biological products has an undeniable advantage in the productivity of grain production of spring barley in the steppe zone. All research options demonstrate an increase in yield from 1.0 t / ha to 2.0 t / ha.

Findings. Studies have shown that the use of drugs that have been studied contributes to the enhancement of adaptive processes in spring barley plants. The effectiveness of the impact of these drugs is proven by an increase in biometric indicators, indicators of the structure of the crop and, as a result, the yield of spring barley plants. However, the results for the year do not allow us to draw definitive conclusions, therefore it is recommended to continue the research in the next growing year.

Key words: spring barley, variety, preparation, technology, plant protection, yield structure, yield.

Vozhehova R.A., Balashova H.S., Boiarkina L.V. Influence of soil moisture and fertilizer level on water consumption and productivity of summer potatoes planted with freshly harvested tubers

The purpose of the article. Present the results of research on cultivation of seed potatoes during the summer planting with freshly harvested tubers using drip irrigation. **Materials and methods.** The research was conducted in the fields of the Institute of Irrigated Agriculture NAAS on dark-chestnut soil under irrigation conditions during 2011–2013. The first irrigation regime provided for maintaining soil moisture in the period from planting to budding at least 70% LMC; during budding – the end of flowering – 80% LMC. The second irrigation regime provided for maintaining soil moisture of at least 80% LMC throughout the growing season. Mineral fertilizers were applied locally to the ridge directly during potato planting in doses $N_{60}P_{60}K_{60}$, $N_{90}P_{90}K_{90}$ and $N_{120}P_{120}K_{120}$. Fertilizers with irrigation water were applied in the period from germination to budding in doses $N_{60}P_{60}K_{60}$, $N_{90}P_{90}K_{90}$ and $N_{120}P_{120}K_{120}$. Freshly Picked tubers (SE) from spring planting of the early-maturing Kobza variety were treated 4-component solution of stimulants to interrupt the dormant period and planted in the field in the first decade of July. **Research results.** Water consumption of potatoes of the summer planting period was formed by 51.1 and 52.6% due to irrigation, respectively, while maintaining soil moisture of 70–80 and 80% LMC. Precipitation was 32.6–29.5%, 16.2 and 17.9% of moisture were directed to replenish the final moisture reserves in the soil. The average yield while maintaining soil moisture 70–80% LMC was 16.37 t/ha, raising the pre-irrigation threshold to 80% LMC increased the yield by almost one ton (17.36 t/ha). **Conclusion.** Water consumption of potatoes of the summer planting was formed by 63.1 and 69.3% due to irrigation, respectively, while maintaining soil moisture 70–80 and 80% LMC, precipitation formed 35.8–34.6%, and excess moisture was directed to replenish the final soil moisture reserves. When maintaining soil moisture of 70–80% LMC, plants formed a yield of 12.76 t/ha under the control, and at 80% LMC 8.4% more – 13.91 t/ha.

Key words: potato water consumption, seed potatoes, drip irrigation, tuber yield formation, summer plantings, soil moisture reserves.

Vozhegova R.A., Kozlenko Ye.V., Morozov O.V., Bidnyna I.O. Ways to implement the Irrigation and Drainage Strategy in Ukraine until 2030 on the Ingulets irrigation system

Ingulets irrigation system, despite its 65 years of age, has a high potential, development prospects and is quite suitable for the restoration of projected irrigation areas (60 thousand hectares) by implementing the measures provided by the Irrigation and Drainage Strategy in Ukraine until 2030.

Modernization of the main pumping station – replacement of pumping and power equipment, as well as modernization of the main and distribution channels of Ingulets irrigation system are appropriate and necessary for further operation and restoration of the system, taking into account modern innovative technologies of system management and introduction of modern sprinklers.

When restoring irrigation areas on the Ingulets irrigated massif to the projected 60 thousand hectares, it is necessary to apply scientifically based crop rotations, irrigation regimes and technologies on irrigated lands, as well as recommendations developed by sci-

entists from NAAS, IVPiM NAAS, NSC "Institute of Soil Science and Soil Science N. Sokolovsky" NAAS and Kherson DAEU just for IZS.

When restoring irrigation areas at the IZS to the design level (60 thousand hectares and more, taking into account the functioning of Yavka and Spasska irrigation systems), it is proposed to apply a new "hybrid" version of irrigation water quality on the Ingulets irrigation system – "Flushing from above for the entire irrigation period in synergy with the option "Anti-river". The use of such a comprehensive option will ensure stable regulatory quality of irrigation water at the Institute of Irrigated Agriculture.

One of the current ways to implement the Irrigation and Drainage Strategy at the Ingulets Irrigation System is to create dynamic models of irrigation water quality management taking into account all conditions and factors of its formation during the year, as well as the formation of expert systems of ecological and agro-ameliorative monitoring and monitoring of irrigation and drainage efficiency.

Restoration of drainage systems in the irrigation area and supplementing them with the function of reuse of irrigation water (according to the Strategy) take place at the ISS, because most horizontal drainage systems do not work; the quality of drainage water allows to use it for irrigation.

Key words: irrigation, development strategy, irrigation systems, irrigated lands, drainage.

Vozhehov S.G., Rudyi O.E., Kokovikhin S.V., Drobitko A.V., Kazanok O.O., Kerimov A.N. Yield, economic and energy efficiency of growing sunflower hybrids depending on the regimes of irrigation and tillage in the South of Ukraine

The aim is to determine the levels of seed yield, economic and energy efficiency of growing sunflower hybrids on irrigated lands of the Southern Steppe of Ukraine. Methods. Field, economic, energy. Results. The method and depth of tillage, the share of which was 12.1%, also had a significant effect on plant productivity. The hybrid composition had the smallest effect on the yield of the studied crop - 5.8%. The effect and interaction of the studied factors was less than 5%, and the influence of unaccounted for factors was equal to 7.7%. The highest conditional net profit is UAH 7.6 thousand/ha, obtained under the biologically optimal irrigation regime, under the resource-saving irrigation regime it decreased to UAH 6.8 thousand/ha (by 11.8%), and in the non-irrigated version - to 2.2 thousand UAH/ha (3.8 times). The profitability of growing sunflower hybrid seeds was in the range of 52.9-53.9% under biologically optimal and resource-saving irrigation regimes, and in non-irrigation control - decreased to 31.6%. Conclusions. It is established that the maximum seed productivity at the level of 3.41 t/ha is provided by the hybrid Region for plowing to a depth of 28-30 cm and compliance with the biologically optimal irrigation regime. The minimum result was obtained on non-irrigated plots with the Souvenir hybrid without tillage, where the yield decreased to 0.91 t/ha or 3.7 times. According to the results of economic analysis, it is proved that the biologically optimal irrigation regime contributes to the increase of the value of gross output up to 21.9 thousand UAH/ha. The coefficient of energy efficiency in the cultivation of sunflower hybrid seeds primarily depended on the irrigation regime. It was formed the largest under the resource-saving irrigation regime - 2.32. Plowing to a depth of 28-30 cm also provided an increase in this figure by 7.2-8.1%. In terms of hybrid composition, the Region hybrid had an advantage in terms of energy efficiency coefficient - 2.12, while in other hybrids it decreased to 1.91-1.99. Energy intensity tended to increase in non-irrigated areas without tillage, where the hybrid Souvenir was sown.

Key words: sunflower, irrigation, tillage, yield, variability of performance traits, economic efficiency, energy assessment.

Hranovska L.M., Morozov O.V., Ivanov V.I. Irrigation water quality evaluation and its impact on the fertility indices of soils under drip irrigation

The purpose is evaluation of irrigation water quality and its impact on soil fertility under drip irrigation in the Dry Steppe of Ukraine. **Methods.** The methodological basis of scientific research consists of modern research methods: historical, systematic approach and analysis, economic and statistical methods. The Dnipro water is used for irrigation of the studied soils in Kherson region, which is supplied by Kakhovka, Krasnoznamyanka and North-Crimean main canals. Evaluation of irrigation water quality was carried out with accordance to DSTU 2730:2015 "Quality of natural water for irrigation. Agronomic criteria", DSTU 7591:2014 "Water quality for drip irrigation systems. Agronomic, environmental, and technical criteria" and DSTU 3866-99 "Soils. Classification of soils by the degree of secondary salinity". **Results.** Evaluation of the quality of irrigation water with accordance to the state standards testifies that the Dnipro irrigation water, which is supplied for irrigation of agricultural lands in Skadovsk, Hola Prystan, Kalanchak and Chaplynka districts, by the indices of possible secondary salinization, heavy metal content, content of Cl^- ions and Na^+ ions belong to the first class and is not toxic to plants. However, in terms of pH (7.9–8.8) and the content of the CO_3^{2-} ion (0.04–0.08), which is the most toxic among the ions, it belongs to the class II and is limited suitable for irrigation. This means that it will intensify the processes of alkalinization of soils, and in the future, it will increase the level of their salinization, so it can be used only under the conditions of constant control and mandatory application of agro-ameliorative measures. **Conclusions.** The Dnipro irrigation water of Kakhovka, Krasnoznamyanka and North-Crimean main canals belongs to the first class by most indices, but the pH index, which indicates possible processes of soil alkalization during irrigation with this water, refers the water to the second class, which means that the measures to reduce and prevent processes of soil alkalization are required.

Key words: irrigation water, water quality, criteria, state standards, salinization, alkalization, agro-meliorative measures.

Drozd O.M., Afanasiev Yu.O. Spatial variety of local occurrence of soil salinization under the drip irrigation

Purpose is to investigate spatial variety of local occurrence of soil salinization under the drip irrigation. **Methods**. The experimental work carried out field research using appropriate techniques. Physicochemical and chemical analyzes were carried out using standardized and certified methods, followed by statistical data processing. Theoretical studies provided for a systematic approach to the problem using methods of analysis and synthesis. **Results.** It was found that in soils with groundwater up to 2 m under drip irrigation

the contours close and soils periodically flooded. It was not noted variety in vertical and horizontal directions into zones of greater or lesser salt contents, soils are slightly saline and moderately solonetzic. The ecological and agromeliorative state is unsatisfactory. The potential for the productive ecosystem service is satisfy to unsatisfactory level. In soils with a groundwater level of 3–5 m, after a long period of use in a vegetable crop rotation (5 years), there is an accumulation of water-soluble salts in a layer of 0–30 cm with a tendency of maximum content at the border of the moisture contour, soils are slightly saline and moderately solonetzic. The potential for productive ecosystem service is satisfy to satisfactory level. **Conclusions.** Evaluation of Spatial variety of local occurrence of soil salinization under the drip irrigation in a vegetable crop rotation has a specificity due to the technological features of crop cultivation. Leveling of linear occurrences of halogenesis during the inter-irrigation period is possible only for 0–25 cm soil layer; in lower soils horizons degradation changes are stable. It complicates the registration of areas of real distribution of halogen soils.

Key words: Chernozems Calcic, local soil moisture, salinization, solonetzic, production services.

Zabolotna A.V., Zabolotnyi O.I., Datsenko A.A. Net photosynthetic productivity and yield of maize under the use of Stellar herbicide

The article is focused on the study of changes in the formation of net photosynthetic and grain productivity of maize plants, as well as the establishment of correlation relationships between these indicators under the use of Stellar herbicide, (aq.sol.)

Studies were conducted in the field and laboratory conditions at the Department of Biology, Uman National University of Horticulture during 2018–2020. Stellar herbicide, (aq.sol.) was applied in the phase of 3–5 leaves of crop development. Indicators of photosynthetic and grain productivity of maize plants were determined in accordance with generally accepted methods.

It was found that the formation of the index of net photosynthetic productivity in different variants of the experiment occurred differently and depended on the application rate of herbicide and the phase of crop development. In particular, in the phase of the crop development of 8–10 leaves with the application of 1,0; 1,1; 1,2 and 1,3 l/ha of herbicide the index of net photosynthesis productivity exceeded the control variant by 6, 11, 18 and 11% respectively. The same pattern was observed when repeatedly determining the productivity of photosynthesis in the phase of tasseling. In accordance with the growth of the net photosynthetic productivity index, the maize grain yield also increased. The highest, as in the case of photosynthetic productivity, it was at the application of 1,2 l/ha Stellar herbicide, (aq.sol.), which was 28% higher than the control variant.

From the analysis of the experimental material we can conclude that the use of Stellar herbicide (aq.sol.), has a positive effect on the formation of productivity indicators of maize. The largest increases in net photosynthesis productivity and grain productivity are traced in the case of herbicide use at the rate of 1,2 l/ha. Regression analysis of the obtained results showed close correlation (r^2 = 0,99) between the net photosynthetic productivity and grain productivity of maize.

Key words: agrotechnical measure, preparation, photosynthetic productivity, grain, efficiency, correlation relationship.

Zaiets S.O., Netis I.T., Onufran L.I., Fundirat K.S. Features of water consumption of modern varieties of winter wheat and winter barley at different sowing dates under irrigation

Purpose. To set the total water consumption of modern varieties of winter wheat and winter barley and define the charges of water on forming of 1 t grain depending on the terms of sowing in the conditions of irrigation of South Steppe of Ukraine. **Methods.** Researches were conducted at the Institute of Irrigated Agriculture of NAAS in 2015–2020 after the methods of the field and laboratory researches on the irrigated earths (IIA NAAS, 2014). **Results.** It was found that the total water consumption of winter wheat and winter barley significantly depended on agrometeorological conditions in the years of research. In wet weather conditions in 2016 and 2019, the total water consumption of winter wheat and winter barley was 2896 and 2900 and 2660 and 2900 m^3/ha and depended mainly on precipitation, the share of which was 66.8–71.8 and 78.9%, respectively. In arid conditions in 2017, 2018 and 2020, the total water consumption of winter wheat was 2756, 2936 and 2628 m^3/ha, and winter barley – 2439, 2810 and 2310 m^3/ha. In these years, the largest share in the total water consumption of winter cereals falls on the irrigation rate of 39.7–40.0%, and the smallest on soil moisture – 27.9–28.4%, precipitation is 31.9–32.1%. Water efficiency is determined by the size of the crop, and the shift of sowing dates from the optimal 30 days in winter wheat increases the water consumption by 9.77–13.1%, and by 20 days in winter barley – by 2.38–5.61%. **Conclusions.** Shifting the sowing dates from the recommended ones, having a negligible effect on the total water consumption, significantly affects the efficiency of water use by winter crops. The introduction of the variety for sowing both in the optimal and in the late period helps to increase the coefficient of water consumption. The difference in water consumption of winter wheat and winter barley is due to different levels of use of bulk moisture.

Key words: irrigation, winter wheat, winter barley, varieties, terms, water consumption.

Klymyshena R.I. Dependence of beta-glucan content in spring malting barley wort on the effect of foliar fertilization with microfertilizers

The purpose of research is to establish the dependence of the brewing quality of spring barley grain on the content of beta-glucan in the wort on the influence of foliar fertilization of plants during the growing season with microfertilizers «Wuxal» on different backgrounds of mineral fertilizers.

Methods. To summarize the results of the study and scientific substantiation of the purpose, the following methods were used: general scientific (to determine the direction of research, planning and bookmarking the experiment); special (laboratory – to determine biochemical parameters); mathematical and statistical (for processing experimental data).

Results. The effectiveness of the foliar fertilization effect of spring malting barley plants with «Wuxal» microfertilizers during the growing season on the biochemical quality of grain in terms of beta-glucan content in the wort was established.

Conclusions. The effectiveness of foliar fertilization of spring barley plants with microfertilizers «Wuxal» depends on the technological scheme of application, ie on the number of receptions of the conducted agricultural event during the growing season.

When growing barley on the background of mineral nutrition $N_{30}P_{45}K_{45}$, the best variants were double application of microfertilizers – «Wuxal P Max» 1.5 l/ha during tillering and «Wuxal Grain» 1.5 l/ha at the beginning of flowering (variant A5) and «Wuxal Grain» 1.5 l/ha during stem elongation and «Wuxal Grain» 1.5 l/ha at the beginning of flowering (variant A6), where the beta-glucan in the wort was 122.3 mg/l and 114.4 mg/l, respectively. Variant of three foliar fertilization of plants with microfertilizers – «Wuxal P Max» 1.5 l/ha during tillering, «Wuxal Grain» 1.5 l/ha during stem elongation and «Wuxal Grain» 1.5 l/ha at the beginning flowering (variant A7) provided the lowest value of beta-glucan 108.3 mg/l.

Against the background of mineral nutrition $N_{60}P_{90}K_{90}$ variants for double application of microfertilizers were the best – «Wuxal P Max» 2.0 l/ha during tillering and «Wuxal Grain» 2.0 l/ha at the beginning of flowering (variant A5) and «Wuxal Grain» 2.0 l/ha during stem elongation and «Wuxal Grain» 2.0 l/ha at the beginning of flowering (variant A6), where beta-glucan in the wort was 158.5 mg/l and 152.9 mg/l, respectively. Variant of three foliar fertilization of plants with microfertilizers – «Wuxal P Max» 2.0 l/ha during tillering, «Wuxal Grain» 2.0 l/ha during stem elongation and «Wuxal Grain» 2.0 l/ha at the beginning flowering (variant A7) provided the lowest value of beta-glucan 143.3 mg/l.

Key words: spring malting barley, beta-glucan, mineral fertilizers, microfertilizers.

Kovalenko O.A., Andriichenko L.V. The effectiveness of environmentally friendly methods of growing *Lavandula angustifolia* in South of Ukraine

The **aim** of the research was the effectiveness of use of environmentally friendly preparations Biokompleks BTU and Azogran on productivity of narrow-leaved lavender plants under various irrigation regimes. **Materials and methods of research.** Field experience was carried out during 2019–2020. On the lands of Mykolaiv State Agricultural Research Station of the Institute of Irrigated Farming NAAS. The object of research was the mid-season variety 'Stepova', which has a light lilac color of the corolla. The control over pre-irrigation soil moisture according to periods of plant development was carried out using tensiometers, irrigation was stopped 14 days before harvesting. The experimental scheme included two factors: factor A (treatment of plants with biological products): control (without treatment), treatment of plants with Biokompleks BTU, treatment of plants with Azogran. By factor B (irrigation regimes), two levels of crop moisture were studied: 80–70–70% MHC and 90–80–70% MHC. Treatment with bacterial preparations Biokompleks BTU and Azogran (2 l/ha) was carried out twice with an interval of 14 days. **Results.** The potential possibility of obtaining ecologically safe raw materials of narrow-leaved lavender in conditions of Southern Steppe of Ukraine for production of pharmaceutical and cosmetic substances has been established. In particular, with drip irrigation and treatment with bacterial preparations, optimal conditions are created for growth and development of plants. When plants were treated with biological preparations, a better development of aboveground mass of lavender plants was observed, number of stems increased by 7–10 pcs. per plant, plant height – 3.8–5.9 cm, bush diameter – 2.3–5.5 cm compared to untreated control. The most developed plants were recorded during cultivation of lavender under irrigation regime of 90-80-70% MHC with treatment of crops in budding phase Biokompleks BTU. In this variant, when plants were treated with the biological product BTU Biocomplex, there were 40 stems on one plant, the plant height was 41.1 cm, the diameter of the bush was 33 cm, the length of the inflorescence was 13.4 cm. This option provided a yield of absolutely dry biological raw materials of 22.2 c/ha and a collection of essential oil 35.19 kg/ha. **Conclusions.** Thus, the potential possibility of obtaining ecologically safe raw materials of lavender in the Southern Steppe of Ukraine for the production of pharmaceutical and cosmetic substances has been established. In particular, the drip method of irrigation and treatment with bacterial preparations creates optimal conditions for plant growth and development. The most developed plants were recorded during the cultivation of lavender under the irrigation regime of 90–80–70% HB with treatment of crops in the budding phase of the BTU Biocomplex.

Key words: lavender, moisture level, bacterial preparations, yield, essential oil content.

Kovalov M.M. Growing microgreens of romaine lettuce in NFT systems depending on the influence of the substrate type

The article presents experimental study and substantiations of the peculiarities of growing microgreens of romaine lettuce varieties Maximus and Carmesi in a film dome greenhouse on natural and artificial substrates in flowing hydroponic systems. **Purpose.** The study was conducted to increase productivity of romaine lettuce and improve elements of cultivation technology by identifying substrates for microgreens using natural and artificial substrates. **Results.** The expediency of the technology of growing the studied varieties of romaine lettuce on different types of substrates has been proved.

As a result of the analysis of experimental data of the processes of growth and development of microgreens of the studied varieties of romaine lettuce at different stages of organogenesis, Maximus and Carmersi varieties were distinguished by a set of biometric indicators. They were grown on linen mats, and the biggest average length of a leaf was 5,9±3 mm and 6,1±3 mm, which is 0,7 and 0,3 mm higher than the control. According to the germination rate of seeds of romaine lettuce varieties Maximus and Carmesi, for 2019–2020, the highest rate was recorded on linen mats – 97±1.7% and 98±2.4, respectively, which was 3.1% higher than the control for Maximus and Carmesi by 2,8%, respectively. The variant of the experiment using linen mats, the length of the cotyledon leaf of the microgreen lettuce can reach up to 2,3 cm, on average it ranges from 1,9 to 2,2 cm. The number of roots on average over the years of research for the variety Maximus reached 30,5–34,8 pcs. At the same time for the variety Carmesi slightly lower values of this indicator were recorded, which amounted to 27,9 pcs. on linen mats and were by 3.6 pcs. larger than in the control version. **Conclusions.** The use of agrospan as a substrate for growing microgreens is less appropriate because it has lower moisture content, and the biometric indicators of microgreens grown on it are inferior to the values of the control options (the number of roots 30,1 vs. 30,5 pieces in the control options).

Thus, it was found that the cultivation of romaine lettuce microgreens on agrospan has the lowest vegetative mass in comparison with coconut-agroperlite substrate and linen mats.

Key words: microgreens, flowing hydroponics, romaine lettuce, natural and artificial substrates, dome film greenhouse.

Kotelnikov D.I. Agrophysical properties of dark chestnut soil under different systems of basic cultivation and organo-mineral fertilizer in irrigated conditions of the South of Ukraine

The article presents the results of research on the density of sowing at the beginning and end of the growing season, total water consumption and moisture utilization depending on the systems of basic tillage and further impact on corn productivity in crop rotations in irrigated conditions in southern Ukraine. The **aim** of the research was to determine the influence of the main tillage on the physical-mechanical and water indicators of dark chestnut soil and its further influence on the productivity of corn. **Methods.** During the experiment, field, quantitative-weight, visual, laboratory, calculation-comparative, mathematical-statistical methods and generally accepted in Ukraine methods and methodical recommendations were used. The research was conducted during 2016-2019 in the research fields of the Askani DSDS IZZ NAAS of Ukraine. **Results.** Studies have shown that the use of chisel tillage at 28-30 cm in the system of different depth shelfless loosening led to the lowest density in the experiment of 1.18 g/cm^3, which was practically at the control level. Replacement of chisel loosening by disk tillage by 12-14 cm increased the density of folding to 1.25 g/cm^3, or 5.1%, and the maximum values of 1.31 g/cm^3 were obtained at zero tillage, which is higher by 10.1% compared to control. The lowest water consumption coefficient of 422 without and 440 m^3/t using green manure was obtained with chisel treatment by 28-30 cm, which is 5.0% more than in the control. The use of disk tillage by 12–14 cm in the shallow single-depth loosening system increased the coefficient to 435 without and 456 m^3/t using greening, and the maximum water consumption was obtained at zero treatment of 555 and 605 m^3/t using greening, which is more control 30.6 and 30.9%, respectively. **Conclusion.** The highest level of corn productivity was observed with shelf-free tillage of 10.93 t/ha, which is more than 0.52 t/ha, or 5.0%, and the use of zero tillage led to the lowest rates in the experiment of 8.71 t / ha, which is 19.5% less than the control. The use of $N_{120}P_{40}$ + green manure formed a productivity of 9.50 t/ha, and the maximum level of productivity was obtained for fertilizer systems $N_{180}P_{40}$ + green manure 10.68 t/ha, which is higher by 1.18 t/ha, or 12.4% compared with control. At the same time, the use of green manure increases the yield on average by factor B by 6.8%.

Key words: density of addition, total water consumption, water consumption coefficient productivity, corn, irrigation.

Krychkovsky V.Yu. Digistat influence on harvest structure and corn productivity

Goal. The goal of paper is to highlight the features of the influence of bioorganic fertilizer Effluent. The Effluent obtained on the basis of anaerobic fermentation of pig manure in a biogas plant on the productivity and yield structure of the hybrid corn Camponi KS. To substantiate effective norms of Effluent bioorganic fertilizer application in modern technologies of corn cultivation. **Methods.** Observation, comparison, analysis and synthesis, system analysis and forecast. Determination of yield structure and productivity was performed according to generally accepted methods. **Results.** The analysis of production efficiency of bioorganic fertilizer Effluent usage at cultivation of grain corn is carried out. It was found that the application of bioorganic fertilizer Effluent has a positive effect on the element of crop structure, improving their value at that time. The results of two-year applied scientific researches on the influence of the fertilizer system on the grain productivity of the Camponi KS maize hybrid are analyzed. **Conclusions.** Improving the nutritional conditions of corn plants by applying fertilizers increases the number of cobs on the plant by 0.21–0.25 pcs. The number of grains in a row grows to 5.6–7.1 pcs. compared to the control version. The application of organic and mineral fertilizers to some extent improved the value of the number of rows of grains, but this increase was not significant by 0.3–0.5 units, compared with the control (without fertilizers and water application). Fertilization of maize crops of hybrid Camponi KS with bioorganic fertilizer Effluent at the rate of 55 t / ha in combination with mineral provides the highest growth of weight of 1000 grains on 12,5–58,8 g on the average for years of researches. According to the results of the research, preliminary conclusions can be made that the fertilization of crops of the hybrid corn Camponi KS with bioorganic fertilizer Effluent at the rate of 55 t / ha and complete mineral fertilizer at the rate of $N_{90}P_{90}K_{90}$ showed improvement of plant nutrient supplement, which ultimately provided the highest yield. The use of organic and mineral fertilizers provides an increase in grain moisture by 1.6–5.4% of the hybrid corn Camponi KS, compared with the control.

Key words: hybrid, digistat, bioorganic fertilizer, corn, yield structure, yield, effluent.

Manuylenko O.V., Konovalov V.O., Gribinyuk K.S., Karpenko O.I., Konovalova V.M. Effectiveness of the No-till system compared to the traditional systems of short-rotation soil cultivation under conditions of Southern Steppe of Ukraine

The aim of the study was to investigate changes in soil fertility and phytosanitary condition of crops with different methods of tillage in short rotation in non-irrigated conditions, which will increase and stabilize soil fertility, increase crop yields while reducing production costs.

Research methods – field agronomic research on non-irrigated lands with laboratory analysis in a certified agrochemical laboratory, statistical processing of the results and economic evaluation of agronomic methods of growing crops.

Results. The article presents the results of research on the impact of basic tillage systems and elements of No-till technology on crop productivity. The dependence of soil fertility indicators, yield and quality of crop production of short-rotation crop rotation on the systems of basic tillage is revealed. The economic and energy efficiency of the No-till system in comparison with other systems of the main tillage in the conditions of the Southern Steppe of Ukraine is determined.

Conclusion. It was found that the best option for basic tillage in non-irrigated conditions when growing sorghum, Sarepta mustard and spring wheat is differentiated deep loosening, in which the increase in crop yields compared to disking by 6-8 cm and zero technology was: sorghum – 0.38 t / ha, mustard – 0.27 t / ha and spring wheat – 0.52 t / ha. The use of 12–14 cm heavy disc harrowing ensured the yield of peas at the level of 1.74 t / ha, which is 12.2% higher than this indi-

cator at zero tillage. The conducted researches allowed to reveal the positive influence of No-till technology on the soil environment (preservation of humus and productive moisture in the upper layer of the soil, reduction of the possibilities of wind and water erosion). The advantage of implementing the No-till system is also savings on fuel and lubricants and financial resources.

Key words: crop rotation, tillage, fertilizer systems, water-physical properties of soil, yield, quality.

Moldovan V.G., Moldovan Zh.A. Influence of presowing seed treatment and foliar top dressing on the formation of indicators of individual corn productivity in the Western Forest-Steppe of Ukraine

Purpose. To study the influence of pre-sowing seed treatment and foliar cultivation on the growth and development of plants, the formation of indicators of individual productivity and yield of corn hybrids of precocious groups.

Methods. The following methods were used in the research: field experiment – to study the action and interaction of organized factors; morpho-physiological – to determine the biometric parameters of plants, counting and weight – to establish the parameters of the structure of the crop and determine the yield, methods of mathematical statistics – to determine the probability of the results of field experiments.

Results. The results of field studies and observations conducted on the chernozems of podzolized medium loamy Western forest-steppe are presented. It is established that weather conditions in interaction with the studied factors have a significant impact on the growth and development of plants, the formation of indicators of individual productivity. In particular, pre–sowing seed treatment and foliar top dressing in phases 3–5 and 7–9 leaves contributed to an increase in the number of productive heads in the early – maturing hybrid of DN Meotida by 3,1–10,2%, the average early hybrid of DB Khotin – by 1,1–5,4% compared to the control. At the same time, improving the nutrition of maize plants also had a positive effect on their morphological characteristics: length, number of rows and grains in a row.

An important feature of the grain productivity of corn is the mass of the cob, the mass of grain in the cob and the % yield of grain from the cob. Pre–sowing seed treatment and foliar top dressing of corn at the early stages of growth provided an increase in grain weight from 1 cob of the early – maturing hybrid DN Meotida by 7,1–27,2 %, and the mid-early hybrid DB Khotin – by 5,5–32,0% compared to the control. The mass growth of 1000 grains, respectively, was 6,9–12,3% and 10,5–18,0 %.

Conclusions. The studied methods of pre-sowing seed treatment and foliar top dressing of corn plants with growth stimulants and complex microfertilizers in the early stages of development have a significant impact on the formation of indicators of individual productivity of corn plants: the number of cobs, rows and grains in the cob, the mass of the cob, the mass of 1000 grains and % of the grain yield from the cob.

Key words: weather conditions, hybrid, microfertilizers, growth stimulator, head, grain weight, grain yield.

Nedilska U.I. Productivity of miscanthus planting material depending on agrotechnical measures

Purpose. The paper presents the results of scientific research to substantiate the feasibility of using energy culture of giant miscanthus in order to obtain raw materials for biofuel production. This is a cereal crop, an erect heat-loving plant.

Methods. On the example of rhizome analysis, it was found experimentally that the timing of planting and the depth of wrapping of rhizomes affect the growth and development of planting material, which is associated with the temperature and soil moisture.

Results. Miscanthus giant is propagated vegetative by dividing the rhizomes (rhizomes). During the division of the uterine rhizomes of the giant miscanthus receive rhizomes. The main requirement for planting material is the number of potential buds that have the ability to germinate. The planting material is characterized by the example of rhizomes with the number of buds not less than 4–5 pieces, length within 5–15 cm, weight up to 30 g. In the course of the research the indicators of planting material were analyzed, which changed for different variants of the experiment. It is established that for planting it is expedient to use rhizomes of linear form in comparison with rhizomes of branched form. This result is due to the presence of kidneys and nutrients. The highest mass of rhizome 1648,4 g was observed during observations on the variant of the first planting term for the second decade of April at the depth of rhizome wrapping 9 cm. The number of buds on this variant was the highest and amounted to 185,2 pcs. According to observations, the first term of planting giant miscanthus is characterized by the highest value of large rhizomes with 4-8 buds, which was 34,9 pieces, and small rhizomes with 1–3 buds was 54,8 pieces. Qualitative indicators of planting material of giant miscanthus of later planting dates and other variants of rhizome wrapping depth were lower.

Findings. It has been experimentally established that for the conditions of the Western Forest-Steppe, the optimal elements of giant miscanthus cultivation technology for the Autumn Zoretsvit variety are planting in the second decade of April with a rhizome wrapping depth of 9 cm.

Key words: miscanthus, planting dates, wrapping depth, rhizomes, mass, buds.

Onopriienko D.M. Efficiency of fertilizer irrigation of corn using liquid and solid forms of mineral fertilizers

Purpose. Determination of the influence of different methods of application of solid and liquid mineral fertilizers on the efficiency of agrotechnology of corn grain production in irrigation conditions of the northern Steppe of Ukraine.

Methods. Field experiments were conducted in the fields in the peasant farm "AIST" of the Sinelnikovsk district of the Dnipropetrovsk region during 2016–2018. Common low-humus heavy loamy chernozems were studied with the following main characteristics: the volume weight of the soil layer is 0–70 cm is 1.96 g/cm^3, the lowest moisture capacity is 24.1%, the range of active moisture in the humusated part of the soil profile is 25.79–30.41%, the power of the humusated layer is 70–75 cm, and the organic matter content in the arable soil layer according to Tyurin is 2.6–3.0 %. Nitrate nitrogen (according to Kravkov) in 1 kg of dry soil contains 8.2–20.6, mobile compounds P_2O_5 and K_2O (according to Chirikov) - 134–145 and 175–188 mg/kg of soil. In the experiments, we studied a medium-ripe corn hybrid DKS 4351 (FAO 350) with a sowing density of 80 yew plants per hectare. We studied mineral finishing standards, which were calculated by balance sheet method for grain yield

of 12 t/ha ($N_{200}P_{90}K_{60}$). Experiments were carried out according to the following technological schemes of mineral fertilizer application: I – for cultivation before sowing (carbamide) scattering with the full norm N_{200} and for autumn ploughing (ammophos) with P_{90} for irrigation; II – for cultivation before sowing (CAS-32) with a N_{200} rate with a self-propelled sprayer and for autumn plowing (ammophos) with a P_{90} rate for irrigation; III – fractionally with irrigation water with a full rate of N_{200} (carbamide) during vegetation irrigation (fertigation); IV – fractionally with irrigation water at full rate N_{200} (KAS-32) during vegetation irrigation (fertigation). Experiments also provided for a control option without fertilizers. In all these technological schemes, liquid potash fertilizers were applied by the K_{60} standard with a self-propelled sprayer for presowing cultivation.

Results. Table 1 shows the data on determining the nitrate content in the 0–60-centimeter soil layer, depending on how nitrogen fertilizers are applied when programming the crop for 12 t/ha of corn grain. The data obtained indicate that the nitrogen content, which plays an important role in plant productivity in irrigation conditions, depends on the methods and lines of fertilizer application (Table 1). On all fertilized backgrounds, the number of productive corn cobs was almost the same, but the absolute mass of grains in them differed from 332.1 to 370.1 g (Table 2). It increased significantly when mineral fertilizers were applied together with irrigation water. The data shown in Table 3 clearly indicate that the actual yield of corn hybrid grain DKS 4351 when applying mineral fertilizers together with irrigation water was cherished than with traditional technology for their application. The maximum yield of corn grain, on average, in three years was obtained when carbamide was applied to N_{200} with irrigation water during vegetation irrigation – 12.9 t/ha, and when applying CAS-32 a norm of N_{200} with irrigation water during vegetation irrigation, grain yield was the least 0.2 t/ha (Table 3). When irrigated at the same time as the increase in yields, there is often a deterioration in quality, namely, a decrease in the amount of protein. Table 4 shows the results of determining protein, fat, starch and gluten, which showed that when calculating doses of mineral fertilizers were applied in different ways, the protein content of corn grain increased, but did not significantly affect the content of starch, fat and gluten in the grain.

Conclusions. High efficiency of fertilizer irrigation (ferrigation) on common chornozems in the production of corn hybrid grain DKS 4351 has been established, instead of traditional energy-intensive methods of applying mineral fertilizers. The maximum yield level of corn grain was obtained when carbamide was applied to N_{200} with irrigation water during vegetation irrigation (12.9 t/ha), and when KAS-32 was applied under the same rate with irrigation water, the grain yield was 12.7 t/ha.

Key words: corn hybrid, fertigation, irrigation, mineral fertilizers, grain quality, agrotechnology, fertilizer method.

Rozhko I.I., Kulyk M.I. Seed yield of switchgrass, depending on the elements of cultivation technology

The purpose of the research was to improve the elements of varietal technology of switchgrass growing to increase seed yield in the central Forest-Steppe of Ukraine.

Research methods. Field research was conducted in the conditions of 2018–2020 on chernozems of normal medium humus conditions of the central Forest-Steppe of Ukraine. The experiment was set up and conducted in a two-factor field experiment. The following factors were included in the scheme of the experiment: factor A: variant 1 – control (sowing with untreated seeds), variant 2 – application of the proposed method of pre-sowing seed preparation (treatment of seeds with the Humiam), and factor B: row spacing: 30 cm, 45 cm, 60 cm and 75 cm.

The experiment was set up and conducted in accordance with the research methods in agronomy and taking into account methodological recommendations. The research results were calculated using mathematical statistics taking into account LSD_{05} (Least Significant Difference) and 5% significance level.

Research results. Conducting research during 2018–2020 made it possible to establish a different response of switchgrass varieties in terms of seed yield to the elements of cultivation technology. In the control variants, the highest seed yield was recorded when growing switchgrass of the Zoriane variety at row spacing of 60 cm. At the same level, this figure was at row spacing of 30 cm; 45 and 75 cm.

The application of the proposed method of presowing seed preparation (treatment of seeds with the Humiam), compared with the control, with different row spacing allows to increase the seed yield of the Zoriane variety by 0.01–0.03 t/ha (up to 0.66–0.71 t/ha). The most optimal row spacing was the switchgrass cultivation with row spacing of 60 cm and pre-sowing seed treatment with the drug.

In the control variants, the row spacing did not have a significant effect on the seed yield of the Cave-in-Rock variety (0.35–0.38) with LSD_{05} 0.05. In the variants, using the proposed method of pre-sowing seed preparation (treatment of seeds with the Humiam), compared with the variant 1, with different row spacing allows to increase the seed yield of the Cave-in-Rock variety by 0.07 t/ha (up to 0.3–80.45 t/ha). The highest switchgrass seed yield of the Cave-in-Rock variety was recorded for growing plants at row spacing of 60 cm (0.45 t/ha), the lowest one – at row spacing of 30 cm (0.39 t/ha).

When using pre-sowing treatment of seeds with the Humiam for row spacing of 60 and 75 cm, there is an increase in seed yield of the Morozko variety, respectively, 0.30 and 0.33 t/ha.

The optimal row spacing to increase the yield of the Liniia 1307 variety was 60 cm on the variants for presowing treatment of switchgrass.

Among the studied varieties, the lowest level of seed yield was formed by the Morozko variety, and the highest one – the Zoriane and Liniia 1307 varieties; the Cave-in-Rock variety had an average value. In terms of seed yield, the annual dynamics of increase of this indicator was noted, which was characteristic of all varieties of switchgrass.

Conclusions. According to the results of the research, the tendency of increasing the seed yield of the assortment of switchgrass varieties with each year of the growing season (from the first to the third one) was determined. Among the studied varieties, the highest seed yield was formed by the Zoriane and Liniia 1307 varieties, and the lowest one – by the Morozko variety; the Cave-in-Rock variety had an average value.

It was found that for the Cave-in-rock, Zoriane and Liniia 1307 switchgrass varieties, the most optimal row spacing was one of 60 cm, and for the Morozko variety – 75 cm. It was established that the width of the row

spacing with the pre-sowing treatment of seeds with the Humiam, allowed to significantly increase the seed yield of the Zoriane variety to 0.71 t/ha, Cave-in-rock – up to 0.45 t/ha, Morozko – up to 0.33 t/ha, and Liniia 1307 – up to 0.69 t/ha. This was confirmed by the proportions of the influence of the studied factors on the switchgrass seed yield.

It was determined that the conditions of the year (25.3%), varietal characteristics (28.1%) and row spacing (25.7%) had the greatest influence on seed yield. To a lesser extent, this indicator was influenced by: presowing seed preparation measures (1.6%), year-to-row interaction (9.4%), year-variety interaction (8.4%) and other factors – 1.5%.

Key words: switchgrass, varieties, elements of cultivation technology, yield, seeds.

Sobko M.G., Butenko A.O., Danylchenko O.M. Agroecological adaptability and suitability of growing soybean varieties of different maturity groups

Purpose. Under the conditions of the North-Eastern Forest-Steppe of Ukraine, on typical low-humus chernozems, conduct agroecological tests of soybean varieties. Establish the adaptability and suitability of growing soybean varieties of different ripeness groups in a zone of unstable moisture.

Methods. Planning, field experiments, observations and counts were carried out according to Dospekhov. Methods of mathematical statistics were used to process the data obtained. Statistical processing of the yield data was carried out by the method of analysis of variance using the Statistica for Windows, Microsoft Excel software package. Accompanying observations, counts and analyzes were carried out according to the "Methodology of the State Variety Testing of Agricultural Crops".

Results. For most varieties with a long growing season, ripening of the beans was not typical with a sufficiently moist stem and the presence of leaves. All this did not allow to fully carry out the harvesting of soybeans (the moisture content of the grain increases significantly). On average, over the years of research among soybean varieties that have been tested all the years, the highest yield was provided by: Danny – 2.44 t/ha, Gali – 2.37 t/ha, Aventurine – 2.34 t/ha, Sharm – 2,26 t/ha, Aventurine – 2.19 t/ha, Anthracite – 2.16 t/ha, Sprytna – 2.10 t/ha and Diona – 2.09 t/ha.

In the conditions of 2018, the results of calculations of economic efficiency showed the advantage of growing soybean varieties: Zlatoslav, Sprytna, Perlyna, Nugget, Diona, Sultana, Sinara, Aventurin, Anthracite, Danny, Gali, Ranok, Sharm, Almaz and Siverka, which with a yield of 2.09-2.68 t / ha provided a high level of profitability – 79, 4–130.1 %.

Conclusions. The studies carried out with soybean varieties of different origin and ripeness group showed a significant difference in agroecological adaptability and suitability for effective cultivation in the conditions of the North–Eastern Forest–Steppe of Ukraine.

Key words: varieties, adaptability, productivity, ripeness group, biometric indicators.

Tyshchenko A.V., Tyshchenko O.D., Piliarska O.O., Kuts G.M., Galchenko N.M. Adaptive ability is an important feature in plant breeding

Purpose. The article evaluates the importance of adaptive selection, which provides adaptive capabilities of the variety under constant changes in weather conditions. The main adaptive properties of plants are plasticity, stability and homeostaticity, which characterize the potential of modified and genotypic variability of individual varietal characteristics, the main of which is yield. Methods. The use of various provocative backgrounds allows you to identify genotypes with certain traits and properties. This sowing in late summer, mowing in the early stages of development of alfalfa plants, sowing in rice checks with a close level of groundwater and high salt content, lack of moisture. Results. Sowing in late years showed the degree of response of alfalfa genotypes in terms of seed productivity to changes in environmental conditions. Seed productivity variability, studied over eleven years in all ecological gradient environments, provides a fairly objective assessment of adaptability. High plasticity was characterized by hybrid populations: CP-11, VN/02, NS/02, in which the regression coefficient (bi) ranged from 0.903 to 1.077. The hybrid population of CP-11 was less responsive to environmental degradation and responded well to its improvement, with high nitrogen-fixing activity. To determine the parameters of variability and adaptability of the new selection material of alfalfa according to the yield of green mass depending on moisture and weather conditions, the years of research were conducted under irrigation and in conditions of natural moisture. Selected populations: 1) stable (bi <1) M.agr./C, Ram. d and M.g./M.agr, which are characterized by a weak response to changes in growing conditions and provide stable yields when conditions deteriorate; 2) highly plastic (bi> 1) M.g./ P.p., M.g./CP-11, Unitro, Prymorka, AN.d-114 and Elegiya – populations with high genetic potential, but with low stability of yield. These populations have high potential yields, but require timely watering, disruption, or weather disturbances reduce yields, sometimes to complete loss; 3) stable-plastic (bi = 1) is a population of Em/T with an adequate rate of response to improved growing conditions, and restrained response to unstable weather conditions. Conclusions. Thus, to create adaptive (plastic) varieties of alfalfa with high potential productivity, various provocative backgrounds were used to show the valuable features and properties of alfalfa in fodder and seed use. According to the results of research and selection of elite genotypes on provocative backgrounds, varieties have been created that have adaptive potential under certain agroecological conditions.

Key words: adaptation, selection, plant varieties, plasticity, productivity.

Jahangirov M.M. Results of research of physicochemical parameters of tea extract to increase the biological value of finished products

Purpose – to study the physicochemical characteristics of tea extract to increase the biological value of finished products and use in the production of alcoholic, non-alcoholic and low-alcohol drinks, bakery and confectionery products. **Methods.** The object of the study was a fresh green tea leaf grown in the Lankaran-Astara zone of the Azerbaijan Republic, waste and molding material of tea production, dried green and black tea, liquid and dry extract based on them. In the samples, organoleptic indicators, mass fraction of moisture, total ash content, concentration of dry substances in an aqueous extract by mass of dried extract, the amount of extractive and tannins, caffeine and minerals were determined by standard laboratory methods, the content of water-soluble polyphenols was determined by calorimetry, improved by the author of this publication. **Results.** It is shown that during the primary processing of green tea leaves, various

wastes are formed and they can be used as an additional resource of biologically active substances. Experimental drinking has established that they can be used as an additional resource of biologically active substances. It was found that the optimal conditions for the transition of the maximum amount of extractives into the solvent during the extraction of black and green tea with water are a temperature of 363.15 K, the duration of the extraction is 180-200 min, and the ratio of raw materials to the extractant (hydromodule) is 1:20. **Conclusions.** The obtained tea extracts can be used in the production of alcoholic, non-alcoholic and low-alcohol drinks, bakery, confectionery, etc. in the amount of 5-15% of the raw material. This is based on organoleptic characteristics and an increase in the biological value of the finished product, in part, its cheap cost and availability for the majority of the population. The research carried out allows us to obtain a natural and functional tea extract from black and green tea.

Key words: tea leaf, waste, extraction, temperature, hydronic module.