

Summary

Aliiev Dzhavidan. Extremely cold winter on the Absheron peninsula

Purpose. This article is devoted to the synoptic conditions of the extremely cold winter of 2011-2012. The article describes the mode of air temperature and atmospheric precipitation in the in the last decades. The research reveals the significant tendency of climate warming, especially during the cold period of year. It aims at revealing comfortable and uncomfortable housing conditions.

Methods. On the basis of the complex account of meteorological elements the estimation of some bioclimatic characteristics in the Tatarstan Republic is given. The reasons for such continuous and heavy precipitation in Baku, accompanied by records of low temperature, are considered. It should be noted that an anomaly lasting more than 10 days is a dangerous meteorological phenomenon. Considering that one of them lasted from January 22 to February 12, it becomes obvious how unique this process was.

Results. The reason for this anomaly was the giant Siberian anticyclone and the contrasting atmospheric fronts provoked by it, which passed through the Absheron peninsula. As a result, precipitation occurred every day intermittently and mainly in the form of snow.

Synoptic maps are compared with given meteorological phenomena and parameters, meteograms are constructed and a vertical section of the atmosphere is made on the Aquaz-Baku line. It is shown that over the mentioned period in all seasons the temperature was exceeded in comparison with the norm. This indicates a trend of climate change towards warming. An increase in the average annual precipitation was also observed.

Conclusions. The main amount of precipitation occurred during the autumn-winter period, and the summer months became more arid. In winter a strong mesoscale cyclonic eddy is generated in the Batumi anticyclone area. It originates presumably from intense local cyclonic wind vorticity arising in this zone in winter.

Key words: extremely cold winter, atmospheric fronts, cyclone, anticyclone, precipitation.

Bilyavskaya L.G., Rybalchenko A.M. The structure of quantitative signs' correlations in soya collection samples of the Left-Bank Forest-Steppe of Ukraine

Purpose. The aim of the article is to establish correlations between quantitative signs in soya collection samples of the Left-Bank Forest-Steppe of Ukraine. Studying correlation dependencies is the theoretical basis of plant selection.

Methods. The following methods to generalize the research results and scientific substantiation of the aim were used: general-scientific methods (to determine the direction of studies, experiment planning and establishing); special methods (field – to observe phenological stages of plant development and condition); laboratory – to determine plant structural indices and productivity); mathematical-statistical method (to process experimental data, define the parameters

of correlation relations and establish the reliability of obtained results).

Results. According to the results of three-year research, the strongest relation was established between the following signs: "yield" – "seed weight per plant" ($r = 0.98$), "yield" – "thousand-kernel weight" ($r = 0.94$), "yield" – "number of beans on a plant" ($r = 0.91$), "yield" – "the number of productive nodes" ($r = 0.90$), "yield" – "the number of seeds per plant" ($r = 0.77$).

The yield had average positive correlation relation with the duration of growing period ($r = 0.61$), stem thickness in the lower part ($r = 0.47$), number of branches on a plant ($r = 0.39$) and negative average relation with the number of seeds in a bean ($r = -0.49$). It was determined that the strongest correlation of yield (g/m^2) in soya collection samples was with such signs as seed weight per plant, thousand-kernel weight, the number of beans on a plant, and the number of productive nodes. It has been established that the level of yield (g/m^2) in soya collection samples will increase in case of increasing seed weight per plant, thousand-kernel weight, the number of beans on a plant, and the number of productive nodes.

Conclusions. Correlation analysis enables to reveal the available correlation and its measure between signs and determine blocks of signs, which are changed together in ontogenesis. The established correlation relations between quantitative signs in soya collection samples ensure rational approach to parental forms for the creation of highly productive cultivars having a complex of valuable economic characteristics.

Key words: selection, variety, genotype, elements of productivity, yield.

Burykina S.I., Taranyuk G.B., Kapustina G.A., Firsova V.I. Dynamics of heavy metal content in the soil-plant system during sunflower growing without irrigation in the Southern Steppe

Purpose. Investigate the distribution and accumulation of heavy metals of different hazard classes in the soil and cultivated plants, the crops of which are located in the area of the sewage outlet of the settlement.

Method. Integrated use of field, laboratory, mathematical and statistical, computational and comparative methods.

Results. The results of field research and observations conducted on the lands of SE "Yuzhny" of Odessa DSDS, which is located in the Bilyaiv district within the suburban area of Odessa and related to the implementation of the contract № 5 / 03/19 for the implementation of scientific developments (IPA "Fertility, protection and rational use of soils").

Experimental data of the influence of local weak degree of polyelement pollution on the content, distribution and coefficients of biological accumulation of heavy metals in plants and structural elements of sunflower according to the main phases of its development are presented.

Conclusions. The share of toxic elements (Cd and Pb) in the total soil pollution averaged 32.1% and 37.7%.

The phenomenon of synergism for the ammonium-acetate mobile form of Cd – Pb ($r = 0.98$), Cu – Zn ($r = 0.80$) and antagonism of the average degree of bonding for the Zn – Cd pair ($r = -0.64$) was confirmed in the southern chernozem.

Biological absorption coefficients, determined by the reserves of soluble form of heavy metals in the soil and the level of their content in sunflower plants, differed in the phases of plant vegetation and chemical elements. Their highest values were zinc and copper and ranged from 13.9 to 64.0 (Zn) and from 15.2 to 46.4 (Cu).

The concentration of heavy metals in the aboveground part of sunflower in the early phase of development, as well as in the leaves in the phase of budding and technical maturity are closely related to the content of their mobile form (ammonium acetate) in the soil: correlation coefficients are 0.85; 0.75 and 0.94, respectively.

The transition of VM to individual parts of sunflower depends on the phase of plant development, the content of metals in the soil and their ratio: mathematical reliability in the budding phase at the level of 65.6% (leaf-stem), 88.4% (stem basket); at technical maturity – 49.0% and 96.0%, respectively, and for the stem-seed system – 74.0%.

Key words: sunflower, polyelement pollution, heavy metals, biological accumulation coefficient.

Vozhegov S.G., Kokovikhin S.V., Kovalenko A.M., Galchenko N.M., Nikishov O.O. Seed productivity and economic efficiency of technology of cultivation of grades of winter wheat in the conditions of the south of Ukraine

Goal. To establish seed productivity and adaptability of winter wheat varieties depending on different plant protection schemes and application of microfertilizers in the conditions of the south of Ukraine. **Methods.** Field, laboratory, statistical. **Research results.** It is proved that the Konka variety formed an average seed yield of 3.59 t/ha, and the Kherson 99 variety this figure was 3.32 t/ha, or 8.2% less. The use of chemical and biological protection had different effects on the seed productivity of the studied crop. The use of the drug Gaupsin allowed to obtain an increase of this indicator by 6.7%, and the combined use of biological products Trichodermin and Gaupsin formed a maximum seed yield of 3.65 t / ha. The use of microfertilizers provided an increase in seed productivity of the studied crop from 3.08 t / ha in the control variant to 3.35-3.82 t / ha – in areas with the introduction of drugs Riverm, Nanovit Micro and Avatar. Among the studied microfertilizers, Avatar had the advantage, which allowed to obtain 7.3-14.2% more seeds than when using the drugs Riverm, Nanovit Micro. **Conclusions.** Analysis of variance proved that on average over three years of research, the influence of varietal composition, application of micronutrients and plant protection products on the formation of seed yield was manifested to varying degrees. Calculations have shown that 58.2% of it depended on microfertilizers. Also to a large extent, at the level of 16.3%, plant productivity was affected by plant protection. The varietal composition had a smaller influence on the formation of the grain yield of the studied crop – at the level of 9.8%. Modeling of seed productivity allowed to establish the maximum potential of seed yield in the variety Konka, at the level of 4.1-4.8 t / ha, with an increase in precipitation for the period "March – June" to 110-120 mm and the opti-

mal temperature with the sum of positive temperatures 4250-4350°C.

Key words: winter wheat, varieties, plant protection, microfertilizers, productivity indicators, adaptability, share of influence, modelling.

Vozhehova R.A., Balashova H.S., Boiarkina L.V. Methods for obtaining the maximum field germination of potatoes in summer planting with freshly harvested cut seed material

The aim of the study was to compare the effect of treatment of planting tubers with chemical preparations after drying on them of a 4-component solution of stimulants on germination, plant development and planting productivity in summer planting with freshly harvested tubers under irrigated conditions in the south of Ukraine.

Materials and research methods. Field research was carried out in accordance with the requirements of research methods and methodological recommendations for conducting research with potatoes on irrigated lands of the Institute of Irrigated Agriculture of the NAAS in the area of operation of the Ingulets irrigation system. The mathematical processing of experimental data was carried out according to generally accepted methods.

Freshly harvested tubers, cut into pieces weighing 40 g, variety Kosen 95, were first treated with a 4-component solution of stimulants to interrupt the dormant period of tubers, and then with chemical preparations. Agricultural technology in the experience, in addition to the factors under study, is generally accepted for irrigated lands in the South of Ukraine. The repetition is fourfold.

Research results. Among the indicators of planting productivity, the indicator of the mass of the average marketable tuber had the greatest influence on the formation of productivity. The maximum value of this indicator was obtained on variants with the treatment of planting tubers particles before planting with Prestige and sprinkling of the cut point on the tuber with plaster, which exceeded the control by 43 g or 31.7% and 52.1 g or 38.4% respectively.

On the variant with the lowest yield, the minimum starch content in tubers was determined (9.3%), respectively, with an increase in yield, the starch content increases (10.3%). The most economically profitable option can be considered by the use of sprinkling the place of cut on the tuber with gypsum, which ensured the receipt of 59.64 thousand UAH/ha of conditional net profit, a decrease in the cost of production compared to control by 16.2% and an increase in profitability by 35.6%.

Conclusion. By using the technique of cutting planting material for summer planting, the planting of particles should be carried out immediately after cutting and treatment with a solution of stimulants to interrupt the dormant period and Prestige, the yield of tubers increases by 2.11 t/ha, or 25.0%, the conditional net profit is by 16.84 thousand UAH/ha. To obtain the maximum economic effect, cut seed material before planting should be treated with gypsum to dry the cut site and reduce the likelihood of infection of the material with pathogens, the yield of tubers increases by 2.48 t/ha, or 29.3%, the conditional net income – by 20.93 thousand UAH/ha.

Key words: potatoes, freshly harvested tubers, cut seed material, summer planting, 4-component solution of stimulants, chemicals, productivity.

Hranovska L.M., Piliarska O.O. Legislative regulation on restoration and development of irrigation in Ukraine.

Purpose. The purpose of this article is to improve the legislative regulation of the transformation of the water economy complex in order to provide restoration and development of irrigation in Ukraine.

Methods. The methodology of scientific research is based on the modern scientific methods: historical, monographic, systematic approach and analysis.

Results. Irrigation is one of the main ways of effective sustainable agriculture in the South of Ukraine, especially in the conditions of regional climate change. An important condition for the implementation of the Irrigation and Drainage Strategy in Ukraine until 2030 is the improvement of the legal framework, among the main laws, regulating the water economy sector, are the Laws of Ukraine "On Land Reclamation", "On Transport Pipelines", the project of the Law "On Water Users Associations", "On Public-Private Partnership", "On Concession", the project of the Law of Ukraine "On Water Users Associations", Regulations on the pilot project "Association of Water Users – Innovative Irrigation", as well as "Methodology for Calculating Water Supply Services for Irrigation and Other Communal Needs". These laws and projects do not have clear enough mechanisms for reforming the water economy sector and do not consider the experience of other countries that have started reforming the water economy sector and creating water user associations since 2000. Today, only the introduction of a comprehensive water management system, namely: public-private form will allow preservation of the water and meliorative complex throughout the whole water supply and distribution chain: starting from the main canal to the last user in the chain. The Law of Ukraine "On Water Users Associations" should take into account all the drawbacks of other countries in this process and ensure conflict-free implementation of legislation on the formation of pilot water users associations in Kherson oblast as the territory with the most pronounced conditions of risky agriculture and the greatest areas of functioning irrigation systems. The pilot associations will be test ones to work out the mechanisms of their formation and functioning, as well as the entire legislative and regulatory framework that accompanies this process, and methods for resolving possible conflicts of interest.

Conclusions. Transformation of the water economy sector is necessary and urgent, optimization of the organizational structure of water resources management is relevant, but only scientifically substantiated management decisions, sound government policy and clear legislation can prevent or completely reduce the likelihood of any risks in this process.

Key words: irrigation, water management transformation, public-private partnership, legislation, water users associations, monitoring of irrigated lands.

Drobotko A.V., Vozhehova R.A., Kokovikhin S.V., Bilyaeva I.M. Efficiency of soybean crops using solar energy and soil moisture on irrigated and non-irrigated lands

Purpose. The aim is to establish the efficiency of the use of solar energy and soil moisture by soybean crops for cultivation on non-irrigated and irrigated lands of the Southern Steppe of Ukraine. **Methods.** The source materials for modelling and forecasting were experi-

mental data from field experiments with soybeans conducted in Mykolayiv and Kherson Regions. Agricultural techniques for growing corn in the experiments were generally recognized for the Southern Steppe zone of Ukraine. Research in this area has been conducted using special techniques for the use of information technology in agriculture. Results. It was found that the smallest number of tubers per 1 plant was formed in the control version in the dry year of 2013 – 44-45 pieces, and the maximum value was obtained in 2015 – 62-66 pieces. On average, over the years of research, the largest mass of tubers on one soybean plant was observed using the inoculum Optimize: in the variety of Currency – 1.41 g, and in the variety of Apollon – 1.37 g, and without the introduction of the studied 1.18-1.20 g. The maximum efficiency is provided by the drug Optimize – the yield increase was 0.2 t/ha on the Apollo variety, and reached the highest level on the Valuta variety – 0.3 t/ha. Obtaining by inoculation a yield increase of 7.0-16.5% indicates a significant efficiency of this technological measure. **Conclusions.** Cultivation of the variety Currency and the use of the drug Optimize allowed to obtain the maximum productivity of photosynthesis with the efficiency of headlights at the level of 2.94%. The minimum values of this indicator (efficiency of HEADLIGHTS = 2.19%) were formed on Apollon cultivars without seed inoculation. It is proved that the Apollon variety is characterized by a rapid positive reaction to the increase in total water consumption. Particularly noticeable difference between varieties is observed at the maximum simulated values of total water consumption (4500 m³/ha), which predicts the level of grain yield in areas with the variety Diona 2.53 t/ha, in the variety Apollon – 3.47 t/ha, or in 1.4 times larger. The maximum values of evapotranspiration are observed in the period from 50 to 80 days of vegetation (from the flowering phase to fruit formation), and in dry years this figure rises to 67-73 m³/ha per day, and in wet and medium humidity – decreases to 49-52 m³/ha per day.

Key words: soybean, non-irrigated conditions, irrigation, inoculant, photosynthetically active radiation, water consumption, productivity, quality, mathematical statistics.

Yeshchenko V.O., Kalievskiy M.V., Karnaukh A.B., Koval H.V., Naklioka Yu.I. Losses of the yield of oil flax seeds from contamination of crops during the main tillage of different intensity

Purpose. The influence of the main cultivation of chernozem soil on the potential and actual weediness of oil flax crops and the yield of seeds was studied in the stationary experiment of the Department of General Agriculture of the Uman National University of Horticulture during 2014–2016. The scheme of the 2-factor experiment includes two options for the main fall tillage (plowing and flat-cut loosening – factor A) and three options for working depths (15–17, 20–22 and 25–27 cm – factor B). Potential weediness was determined before sowing the culture, and actual – after germination, at the middle and end of the growing season of the culture.

Methods. The presence of weed seeds in the soil layer of 0–10 cm was positively affected by both methods of intensification of the main cultivation, when against the background of moldboard plowing of weeds, on average, for three years it was 41% less, and from replacing small (15–17 cm) plowing and flat-cutting loosening with deep (25–27 cm) treatments,

seed weediness of the soil decreased by 11.2 and 10.7%, respectively.

Results. Similarly, under the influence of the intensity of the main tillage, the actual weediness of oil flax seedlings changed, as evidenced by the presence of a straight line and close in strength correlation dependence of the actual weediness of seedlings from potential weediness when the correlation coefficient varied from 0.84 to 0.95 over the years. Less contaminated oil flax crops against the background of intensive main cultivation were also in the middle and the end of the growing season of the crop, which had a positive effect on the productivity of crops.

At the same time, the seed yield against the background of plowing, on average, taking into account all the depths of processing and for three years, was 13.2% higher in comparison with flat-cut loosening, and against the background of deep plowing and flat-cut loosening, the yield of flax was 19.2 and 18, respectively, 1% higher than small treatments.

Conclusions. The correlation coefficient between the yield of flax and the weediness of its crops was higher, taking into account weediness in the middle of the growing season, therefore this term is recommended for determining the regression coefficient indicating the yield value (0.0057 t/ha) by which the total yield changes when the number of weeds changes by unit.

Key words: plowing, flat-cutting cultivation, processing depth, oil flax, weediness, productivity.

Zaiets S.O., Onufran L.I., Rudik O.L., Netis I.N., Muzyka V.Ye. Productivity and grain quality of soft winter wheat with applying micro-fertilizers at different back-grounds of nitrogen nutrition under irrigated conditions in the south of Ukraine

The purpose is to establish specificity of the yield formation and grain quality of soft winter wheat depending on the background of nitrogen nutrition and foliar feeding with micro-fertilizers under irrigation in the Southern Steppe of Ukraine.

Methods. The research was conducted using a laboratory and field method in the irrigated crop rotation of the Institute of Irrigated Agriculture. The experiment was aimed at examining the micro-fertilizers of a prolonged effect "Nanovit micro" and "Nanomiks" containing a chelating agent and a complex of growth-regulating substances.

Results. The research determined that an increase in the rate of the fertilizers from N_{60} to N_{90} caused an increase in the grain productivity by 0.61–0.65 t/ha and a further increase to N_{120} – by 1.01–1.43 t/ha. Feeding with the preparations "Nanovit micro" and "Nanomiks" ensured an increase in the productivity by 0.28–0.70 and 0.27–0.61 t/ha respectively.

The highest productivity in the experiment was registered against the background of fertilizing with N_{60} before sowing + N_{60} early in spring with foliar feeding of the crops with the preparations "Nanovit micro" and "Nanomiks" at the stage of tillering. Against the background of nitrogen nutrition N_{90} the grain productivity of soft winter wheat was lower by 8.6–9.9%. Foliar feeding with the preparations "Nanovit micro" and "Nanomiks" at the stage of tillering did not affect the grain unit and increased protein and wet gluten content in the grain against the background of nitrogen nutrition N_{60} + N_{60} .

Conclusions. Under irrigated conditions, against the background of nitrogen nutrition N_{120} and foliar feeding with the micro-fertilizers "Nanovit micro" (2 l/ha),

the grain productivity of the winter wheat variety "Mariia" is 8.28 t/ha and with the application of the micro-fertilizer "Nanomiks" – 8.19 t/ha. A decrease in the background of nitrogen nutrition to N_{90} leads to a decrease in the grain productivity to 7.46 and 7.49 t/ha respectively. This technological complex allows obtaining food grain with the protein content of 11.0–11.3% and the wet gluten content of 25.2–26.4%.

Key words: grain, foliar feeding, micro-fertilizers, grain quality, grain-unit, protein, wet gluten.

Zayets S.A., Fundirat K.S., Onufran L.I., Yuzyuk S.M. Formation of the photosynthetic apparatus of plants of winter triticales varieties in the conditions of irrigation of the Southern Steppe of Ukraine

Purpose. To determine the peculiarities of the formation of the photosynthetic apparatus of plants of winter triticales varieties depending on the use of micro-fertilizers for growing on seeds in the conditions of irrigation of the Southern Steppe of Ukraine.

Methods. Researches were conducted in 2014–2016 on the irrigated earths on the methods of the field and laboratory researches of the Institute of Irrigated Agriculture NAAS (2014 year) and generally accepted technology of growing of winter triticales in South Steppe of Ukraine. The leaf surface area, photosynthetic potential and net productivity of photosynthesis were determined by the method of cutting according to A.A. Nichiporovich (1967 year).

Results. Seed productivity of winter triticales varieties Bogodarske, Rarity and Bouquet in the treatment of crops with microfertilizers significantly depended on the size of the leaf surface of plants. A close dependence of the leaf surface area with the yield of conditioned seeds $r = 0.66 \dots 0.99$, with a mass of 1000 seeds $r = 0.50 \dots 0.89$, germination energy $r = 0.86 \dots 0.94$ and field germination $r = 0.73 \dots 0.94$.

In the conditions of irrigation of the Southern Steppe of Ukraine it is established that the leaf surface area at the level of 58.4–73.4 thousand m^2/ha is optimal for providing the maximum seed productivity with winter triticales varieties. When Nanovit micro fertilizers were applied to crops, the leaf surface area increased by 10.2–17.9 thousand m^2/ha , the photosynthetic potential – by 0.19–0.31 million $m^2/day/ha$ and the net productivity of photosynthesis – by 0.51–0.9 g/m^2 per day.

Conclusions. Yield, weight of 1000 seeds, germination energy and field germination of seeds depend on the size of the leaf surface area of winter triticales varieties in the treatment of crops with microfertilizers ($r = 0.50 \dots 0.99$). The greatest effect on the formation of the optimal photosynthetic apparatus of winter triticales plants of Bogodarskoe, Rarity and Bouquet plants was exerted by the microfertilizer Nanovit micro (2 l/ha).

Key words: winter triticales, varieties, microfertilizers, leaf surface area, photosynthetic potential, net photosynthesis productivity.

Ilichenko A.S., Varenik B.F. Influence of tribenuron-methyl on yield and morpho-biological indications of sunflower (*Helianthus annuus* L.)

Purpose. The aim of the work was to investigate the effect of tribenuron-methyl on seed yield, oil content in seeds, and a number of morpho-biological characteristics of sunflower hybrids.

Methods. The research was carried out in 2019 in the conditions of the State Enterprise "Experimental Base" Dachnaya Plant Breeding & Genetics Institute –

National Center of Seed and Cultivar Investigation of the Belyaevsky district of the Odessa region. We used 18 sunflower hybrids resistant to tribenuron-methyl. For rate the resistance of sunflower hybrids to tribenuron-methyl, plants were sprayed in the phase of three true leaves. The experiment was laid in two versions: treated and untreated plants with herbicide. The seed oil content was determined by the rapid method using a Newport instrument from Oxford Instruments, Buckinghamshire, England. The results obtained were statistically processed according to the method of B.O. Dosepkhov by t-criterion, separately for each hybrid.

Results. The research hybrids to one degree or another (85%-100%) were resistant to the Granstar Pro 75 herbicide. The difference between the options was not significant. After treatment of the studied material with tribenuron-methyl, we observed some changes in the development of sunflower plants. The duration of the "seedling – flowering" period remains unchanged in such hybrids as Bastard, KSF 902 and Aldazor.

In other hybrids, there is a tendency to shorten the "seedling – flowering" period from 1 to 5 days. At the same time, the effect of the herbicide on the height of sunflower plants was multidirectional. Almost all of them showed an insignificant decline in plant height. All hybrids, with the exception of HC 2652, PR64LE99, Saxon and Aldazor, showed a decline trend in yield. The effect of tribenuron-methyl on the oil content in the seeds of the studied hybrids is highlighted. In all hybrids, this trait changed insignificantly, within 2%.

Conclusions. After spraying with the herbicide Granstar Pro 75 with the active ingredient tribenuron-methyl, some changes in morpho-biological characteristics were observed in sunflower plants. Most of the changes were observed in the seed yield and plant height, the duration of the "seedling – flowering" period, the diameter of the basket and the oil level in the sunflower seeds remained practically unchanged.

The best domestic breeding hybrids have the same degree of resistance to tribenuron-methyl when compared with the best foreign samples. Tribenuron-methyl does not negatively affect sunflower hybrids. There was only a specific reaction of the hybrids for some traits.

Key words: ALS-inhibitor herbicides, herbicide resistance, sulfonylurea, granstar, weeds.

Kovalov M.M., Vasytkovska K.B. Quality assessment of ground water for micro-irrigation systems in the conditions of protected soil

Purpose. The article deals with the work of fast filters at the well water treatment plant of Kropyvnytskyi section of the groundwater freshwater basin. The article presents the analysis of qualitative indicators and their suitability for the application in injection micro-irrigation systems in protected soil conditions.

The possibility of using groundwater of Kropyvnytskyi district for injection micro-irrigation systems without prior water treatment was investigated. The groundwater quality indicators were assessed statistically by agronomic and ecological criteria, as well as by the degree of water impact on technological elements of injection micro-irrigation systems.

Methods. Critical values of chemical and microbiological parameters of purified water on the efficiency of its use in injection micro-irrigation systems for growing vegetables in greenhouses have been determined. The suitability of surface sources of Kirovohrad region for use in micro-irrigation systems in open and protected soil conditions is analyzed. Their role in maintaining ecologi-

cal stability of the region as a whole has been assessed.

Results. The assessment of the quality of the basin of treated groundwater freshwater of Kropyvnytskyi section for micro irrigation systems was conducted in order to prevent possible negative technogenic influence on the quality of the obtained vegetable products, sanitary and hygienic state of surface and groundwater.

Conducted studies of the effectiveness of well water treatment at Kropyvnytskyi section of groundwater freshwater basin have shown that its chemical composition, overall ecological quality and phytotoxicity, sanitary-toxicological and water-migratory ability of chemical elements are completely in accordance with the operating standards and can be used in the system of open and protected soil conditions. Main directions of further scientific research are grounded.

Conclusions. They should correspond to the global tendencies of introduction of ecologically safe micro-irrigation technologies, as well as obtaining high quality vegetable products in the conditions of open and protected soil.

Key words: injection micro-irrigation systems, water treatment, groundwater quality.

Kovalenko A.M., Kovalenko A.A., Piliarskyi V.G., Kiriya Y.P. Peculiarities of plants growth and development in seed crops of winter wheat in the autumn depending on weather conditions and place in the rotation

Studies conducted during 2014–2017 years on the experimental field of the Institute of irrigated agriculture of the NAAS showed that the weather conditions of the presowing and sowing period and the location of winter wheat in the crop rotation determine the moisture of the sowing layer of the soil at the time of sowing. In the autumn of 2014 and 2016, the weather conditions were favourable for the formation of productive moisture reserves in the sowing layer of the soil, sufficient to obtain timely germination after all predecessors. In 2015, as a result of the dry period of the second half of summer and dry autumn, sufficient moisture supply for germination was formed only as a result of the rains of the third decade of October.

The duration of the period of "sowing-germination" in terms of optimal soil moisture in 2014 and 2016 for the bare fallow was 11 days for which the sum of positive temperatures was 142.1 and 163.1 °C, respectively. After other predecessors, the duration of the period "sowing-shoots" was 1 day more than the black pair. In 2015, as a result of the dry autumn, the soil was dry during sowing and seed germination began after precipitation in the second and third decades of November and therefore seedlings appeared on the 47th day after sowing for all predecessors. During the period of "sowing-germination" there was an accumulation of 414,0 °C positive temperatures.

Shoots in Ovidii variety in 2014 and 2016 for all predecessors appeared 1–2 days earlier than varieties Khersonska 99, as a result of this accumulation of positive temperatures was 5.6–20.3 °C less. In 2015, the shoots of both varieties appeared at the same time.

Field germination of winter wheat seeds also depended on soil moisture conditions and varietal characteristics. In variety Khersonska 99 field germination in 2014 and 2016 was 83.7–86.5 %, depending on the predecessor. At the same time, in 2016, it was lower by 1.8–3.0 % compared to the percent indicated for 2014 as a result of higher temperatures. In 2015, as a result

of the long stay of seeds in the soil, field germination decreased to 77.2–82.9 % and in the Ovidii variety it was 2–8 % higher.

The longest (35–36 days) tillering period was in 2014 for the early start of tillering, and extremely short – only 2 days in 2015. Variety and predecessors had little effect on the duration of this period. The greatest influence on the process of tillering and accumulation of biomass of plants of winter wheat in the autumn have weather conditions, the consequence of which is the moisture of the sowing layer of the soil.

Plants of winter wheat varieties Khersonska 99 before the end of the autumn vegetation formed the largest biomass in 2016 for the black pair – 680 g/m², which is 2 times more than in 2014 and 2.6 roses more than in 2015. Its accumulation depended more on the temperature regime during this period than on its duration.

Key words: stairs, interphase period, tillering, bare fallow, green manure, oil flax.

Kovaleva I.A. Varietal aspects of development of business plans for growing table grapes

Aim. Analysis of aspects of business plans for growing table grapes development in terms of assortment choice, its impact on prices, strengths and weaknesses of the domestic assortment varieties using.

Methods. Comparative analysis using general statistical data on the state and development of table viticulture in Ukraine for the period 2001–2019, as well as data on the impact of varietal composition on the formation and dynamics of prices obtained in NSC “Tairov Research Institute of Viticulture and Wine-Making” in 2015–2019, SWOT-analysis.

Results. The state and assortment of table grapes of Ukraine were analyzed. The increasing of the total area of new table varieties breded at NSC “Tairov Research Institute of Viticulture and Wine-Making” is about 35%, which confirms the high competitiveness of Ukrainian varieties was demonstrated. Among them the largest areas Arcadia and Odessa souvenir (second and third place by area, 381 and 110 hectares, respectively) possesses.

Analysis of the prices dynamics for table varieties breded at Tairov Institute demonstrated that the maximum retail prices are formed for early greenhouse grapes and late after storage – up to 120 UAH per 1 kg, wholesale prices for these categories of grapes are respectively 70 UAH per 1 kg. The price of seedless varieties is stable during the season – nearly 60 UAH per 1 kg (retail) and 40 (wholesale).

The SWOT analysis showed that the strengths of business plans for the development of table viticulture in Ukraine are based on the advantages of the Ukrainian assortment, which is suitable for creating a conveyor due to the presence of varieties of different time of ripening, resistance to biotic and abiotic factors, the presence of many early varieties high taste properties. The negative aspects of projects for the development of table viticulture in Ukraine are the lack of perfect mechanisms and qualified personnel to promote products on the market.

Conclusion. It has been shown that the share of areas planted with new table grapevine varieties has increased to 35% over the last 20 years. It is revealed that the varieties of modern table grapevine varieties breeding significantly affect the formation of retail and wholesale price due to external and taste attractiveness, early ripening and opportunity to stor-

age. SWOT-analysis of the table grapes assortment of Ukraine as a component of business plans showed that its strengths are based on the advantages of the domestic assortment.

Key words: table grapes, assortment, early-ripening varieties, seedless varieties, selling price, SWOT-analysis.

Kosenko N.P. Seed productivity of carrot (*Daucus carota* L. grown by stacking on the conditions of drip irrigation in the south of Ukraine

Purpose. Improvement of basic elements of the technology of cultivating carrot mother roots and seed plants at drip irrigation in the conditions of the southern Ukraine is the aim of our research.

Methods. The researches were based on complex use of field, calculated-comparative mathematical-statistical, methods and system analysis.

Results. Considerable influence of size of mother root crops of carrot and planting schemes set on a height, development and seed productivity at drip irrigation on the south of Ukraine. The results of the research showed that the highest yields of mother roots of the Yaskrava variety (60,0 t/ha) were obtained when sowing in the first ten-days of June, applying the calculated dose of fertilizers and plant density of 1,0 million units/ha.

It is established that the planting scheme has the greatest influence on the formation of the productivity of seed. When planting mother roots-stecklings with a chart of 70x15 cm, the yield of seeds was obtained by 16,9–21,6% more than from large and medium-sized root crops with a chart of 70x25 cm. From data of cross-correlation-regressive analysis dependence is certain and the mathematical model of the productivity of seed is built depending on the diameter of roots and chart of planting.

The quality of seed substantially did not change from the chart of planting and size of roots. With a planting of 70x30 cm, the germination energy and seed germination were 1,0–2,0% more than with 70x15 cm. The use of stecklings gives an opportunity to get seed with the same high quality of seed, as well as from standard mother roots.

Conclusions. Root-stecklings of the fraction (diameter 15–20 mm), with a planting chart of 70x15 cm, are able to form the level of seed yield higher than in the mother plants of standard sizes. A seed grown from steckling meet the requirements of the state standard of Ukraine, presented to the certified seeds of the first reproduction.

Key words: carrot, mother root, steckling, seed, productivity, drip irrigation.

Markovska O.E., Malyarchuk M.P., Isakova H.M., Tomnytskyi A.V. Crop rotation productivity under different systems of basic tillage in the Southern Steppe of Ukraine under irrigation

Grain production is the most important branch of crop production, so its increase is a key task for the development of agriculture in Ukraine. Barley is one of the most valuable and high-yielding crops, which ranks fourth in the world in terms of sown area and gross grain harvest.

Purpose – determination of indicators of the agro-physical state and water regime of the soil under various systems of basic tillage; determination of crop yields and crop rotation productivity depending on the systems of basic tillage and fertilization.

Methods. The study was carried out on dark chestnut soils in crop rotation on the irrigated experimental field of the Institute of Irrigated Agriculture of the NAAS. The experiment used generally accepted research methods and cultivation technologies.

Results of the study. It was found that an increase in the dose of nitrogen fertilizers for winter barley up to $N_{90}P_{60}$ kg/ha, for corn for grain up to $N_{180}P_{60}$ and for soybean $N_{60}P_{60}$ kg/ha with inoculation of seeds with rhizogum contributed to an increase in crop productivity by 15.1% of grain units. Replacement of the moldboard and moldboard-free systems of different depths and differentiated by methods and depth of soil cultivation by systematic shallow disc loosening led to a decrease in productivity to 5.18 c.u. in the fertilizer system № 1 and up to 6.01 c.u. in fertilizer system № 2.

Conclusion. On the dark chestnut soils of the Southern Steppe of Ukraine in the area of action of the Ingulets irrigation system in row crop rotations under irrigation with 50% soybean saturation the most favorable agrophysical properties, water and nutrient regimes of the soil for growth, development and crop formation are created at different depths. 1 systems of basic cultivation with the use of by-products for fertilization and application of mineral fertilizers at a dose of $N_{97.5}P_{60}$ kg/ha per hectare of crop rotation area, which provides favorable conditions for crop formation of crop rotation.

Key words: method, depth, fertilizer dose, bulk density, water permeability.

Marchenko T.Yu., Lavrynenko Y.O., Zabara P.P., Ivaniv M.O. Manifestation and variability of the trait “number of cobs per 100 plants” in maize hybrids under irrigation

Purpose. To establish the manifestation and variability of the “number of cobs per 100 plants” in maize hybrids of different FAO groups and to determine the relationship with other traits in hybrids under irrigation. To establish the manifestation of the number of cobs per hundred plants and influence on grain yield in modern domestic maize hybrids under different methods of irrigation and moisture supply in the Arid Steppe of Ukraine.

Methods. Field, laboratory, statistical, computational and comparative.

Results. On average over five years, the number of cobs per hundred plants of maize hybrids ranged from 101 to 105 in the previous varietal test, with the medium-ripe group of hybrids having the highest traits. A strong positive correlation of the number of cobs on the plant was observed with the signs “grain weight per plant”, “plant height”. Characteristically, differences between the general group and individual groups of maturity were almost not observed.

Slight feedback showed signs: length, number of grains in a row, number of rows of grains, weight of 1000 grains. There is a positive relationship between dicotyledonous and harvesting grain moisture, which is associated with a lag in the formation and filling of the second cob and an increase in its humidity by 1.5–3%. Determination of the number of cobs per hundred plants in maize hybrids of different maturity groups with different watering methods showed that with optimal plant density (80 thousand plants/ha) and moisture supply, the method of watering had almost no effect on the number of cobs per 100 plants.

The number of cobs per 100 plants ranged from 100.7 to 104.8. In the Dry Steppe without irrigation there is a strong dependence of grain yield and the

number of cobs per 100 plants ($r = 0.927$). Manifestation of the trait “number of cobs per 100 plants” is an important factor in the formation of potential productivity of maize hybrid plants ($r = 0.55–0.78$). Under conditions of optimal moisture supply and plant density, the number of cobs per hundred plants do not have a decisive influence on the grain yield of maize hybrids of different FAO groups.

Conclusions. Modern maize hybrids form mainly monocotyledonous plants with the realization of the potential grain yield according to a separate maturity group in the range of 108–148 t/ha. Dichotomy is more important for increasing the adaptability (plasticity) of hybrids in uncontrolled growing conditions (natural moisture, violation of the recommended plant density). Genetically determined dichotomy of hybrids is more pronounced in FAO hybrids 180–200. A positive relationship between number of cobs per hundred plants and grain harvest moisture has been established, which is undesirable in combine harvesting with direct threshing of grain.

Key words: yield, corn, hybrids, number of cobs per plant, irrigation, watering methods.

Nebaba K.S. The influence of mineral fertilizers and growth regulators on crop productivity of field pea varieties in the conditions of Western Forest-Steppe

Aim. The study is aimed on the influence of mineral fertilizers and growth regulators on crop productivity of field pea varieties in the conditions of Western forest-steppe.

Methods. Experimental part of the work was carried out during 2016–2018 by the Department of Agriculture, Soil Science and Plant Protection in the experimental field of the Training and Production Center “Podilya” at the State Agrarian and Engineering University in Podilya. The field experiment was laid down in the research ten-digit crop rotation. Soil of the experimental field was the typical black earth, characterized as deep, low-humus, and heavy gravel on forest-like loams.

According to the data obtained by the Department of Agriculture, Soil Science and Plant Protection, the soil had the following physical and agrochemical properties: in the 0–30 cm soil layer soil density was 2.55–2.62 g/m³; pH of aqueous and salt suspensions and hydrolytic acidity was measured by the Kappen method in the modification of the Central Research Institute of Agrochemical Service – CINAQ (GOST 26212–91). The content of humus (measured by the method of Tyurin in the modification of CINAQ (GOST 26213–84) in the upper horizon was 3.39%.

Results. Obtained data indicate that growth regulators in combination with mineral fertilizers contributed to an increase in the density of standing pea plants in the microstage BBCH 97 for all our studied varieties by an average of 0.3–4.5 pcs/m². After inoculation of mineral fertilizers in the dose of $N_{30}P_{30}K_{45}$ combined with spraying the plants with the growth regulator Vympel, the standing density of plants was the maximum for all varieties of peas studied – 101.8 pcs/m² for the Gotovsky variety, 106.7 pcs/m² for the Checkback pea variety and 100.7 pcs/m² for the Fargus pea variety respectively.

The maximum grain yield for the Chekbek pea variety (4.32 t/ha) was observed in the areas where mineral fertilizers were applied in doses $N_{30}P_{30}K_{45}$ in combination with the growth regulator Vympel. For Gotovsky and Fargus pea varieties, these figures were 3.79 t/ha

and 3,3 t/ha respectively. Growth regulators Emistym C and PlantPeg have demonstrated slightly lower effect on the crop productivity. Thus, for the Chekpek pea variety the yield amounted to 4.0–4.15 t/ha, for the Gotovsky pea variety – 3.60–3.71 t/ha, and for the Fargus pea variety – 3.13–3.22 t/ha.

Conclusions. Mineral fertilizers in combination with growth regulators had a positive effect on the crop productivity of field pea. The best yields were recorded after inoculation $N_{30}P_{30}K_{45}$ + Vympel growth regulator. Increasing the doses of mineral nitrogen to N_{45} caused a decrease in seed yield by an average of 0.36–0.67 t/ha, depending on the pea variety.

Key words: field pea, fertilizer, standing density of plants, yield, crop productivity, growth regulator, method of growing.

Nosenko S.M., Sinelnik L.M. Messengers – the modern tool of digital marketing

The aim of the research was the analysis of possibilities of the most common messengers, analysis of their advantages and shortcomings, prospects of the use of messenger marketing.

The materials and methods of research. Analysis and analytical processing of foreign and domestic sources for the use of messengers in Internet marketing.

The results of the research. The advantages of using digital marketing messengers paralogue the tools of digital marketing. Reviewed 11 of the most used messengers. It is established that leadership in dissemination in the world have WhatsApp and Facebook Messenger. In Ukraine most used Viber. The most secure messengers – Signal and Telegram. Basic tools messenger-marketing – distribution channels, advertising, the creation of chat bots.

Conclusions. Messengers are still a relatively new channel for promoting brands, but the use of instant messaging as a new platform for business communication in the world and in Ukraine is rapidly growing. Now the messengers are more effective than e-mail newsletters and social networks. Messengers have a number of advantages over other tools of digital marketing, because they have a large number of active users; provide real-time communication; satisfy users' needs for fresh, relevant, valuable information; enable you to more quickly meet customer and segment the customer base, to customize content, to study the interests of the audience through Analytics engines. According to the analysis of 11 messengers it is advisable to consider the Telegram messenger as the most versatile. Perspective ways of use of instant messengers in the marketing activities of scientific institutions: dissemination of relevant marketing information, create channels, create chat bots. It is advisable to use instant messaging in combination with other tools of digital marketing.

Key words: messenger, digital marketing, chat bot, instant messenger marketing.

Ochkala O.S., Lavrova G.D., Bushulyan O.V., Nagulyak O.I. Influence of low positive temperatures on germination intensity and sowing dates on yield elements in different genotypes of chickpea (*Cicer arietinum* L.)

Purpose. Tracking among the great genetic diversity genotypes of chickpeas with a high germination rate at low positive temperatures, analysis of these forms for the possibility of being a donor of this trait for their further use in creating high-yielding varieties with

high germination rate at low positive temperatures. To begin with, we set the task of analyzing the available material and finding sources of this trait to use them in the hybridization process.

Methods. Research methods include laboratory, field and analytical. The laboratory method included the development of a new method of studying this trait, namely: to study the system of germination of chickpeas at low positive temperatures, the Departments of Legume Breeding and Plant Resistance to Abiotic Factors developed a new method, which is divided into two phases: preparatory and experimental.

For the period 2018–2019, we conducted a structural analysis of plants on the following indicators: plant height, location of the lower bean, the number of beans per plant, the number of seeds per plant, the weight of seeds per plant. We used the variance method by Microsoft Excel for statistical processing of experimental results.

Results. In 2018, together with the Department of Plant Resistance to Abiotic Factors, we conducted a number of laboratory studies, during which we studied 22 genotypes of local and foreign origin on the intensity of germination at low positive temperatures (+4°C). According to laboratory tests 11 samples were found the most susceptible to low temperatures, among them KSI 12/18 – 13.7%, Jordan – 26%, Rosanna – 16.6%, Pamyat – 20.0%.

Slightly better at a temperature of +4C was the germination of such samples as Budzhak and KSI 21/18 – 36.7%, Yaryna – 50%, Skarb and Antey – 60%. The most resistant to low temperatures during germination are varieties Pegasus with a germination rate of 90%, Alexandrite – 96.7% and Krasnokutsky 123 – 100%. In 2019. We conducted the next experiment with the three best numbers selected from previous experiments and the numbers with the worst results. Based on these data, we can conclude that the numbers Krasnokutsky 123, Alexandrite and Pegasus, which had the germination rate of 96%, 100% and 53%, confirmed their results from previous experiments and are potential sources of this feature.

Also in 2019, we conducted a study with a collection of genotypes provided by the National Center for Plant Genetic Resources of Ukraine. According to the results of this experiment, the numbers udo500833, udo500808, udo500799, udo500798 had a high tendency to restore vegetation after the action of a stress factor and maintain the germination rate at the level of 67 to 93 percent. In the field in 2018, an experiment with chickpea genotypes was established to compare their yield and agronomical traits in different dates of sowing.

As we can see, there is a significant difference in the number of survived plants and their structural analysis. The resistance of plants to pathogens of fusarium wilt and root rot is very important at the beginning of the growing season. The varieties Antey, Triumph, KSI 16/2018 were the most able to yield and reach the stage of technological maturity.

They had the largest number of plants that survived under adverse conditions, plant survival ranged from 50% to 65%. In the second sowing period, soil moisture played a crucial role, which is very clear from the number of plants that survived and yielded. Krasnokutsky 123 is the only genotype that had a number of surviving plants of more than 50%, namely 60%.

Conclusions. As can be seen from the results of research, chickpeas is quite a “plastic” culture. Among the studied cultivars and genotypes there is a clear

difference in the yield structure and different reaction to a given stress factor. Based on these studies, it is already possible to form a hybridization scheme to create stable forms of chickpeas for germination at low positive temperatures. However, a more detailed research requires a number of additional experiments, as well as to study the nature of inheritance of this trait.

Key words: chickpeas, breeding, influence of low positive temperatures, cold resistance.

Osgchipok O.S. Optimization of vineyard school protection systems against patients of diseases taking into account natural and agrotechnical factors

Purpose. to determine the effectiveness of the use of chemical and biological means of protection of grape school, depending on the field hardness of different grape varieties to *Plasmopara viticola* in the South of Ukraine. **Methods.** The research was carried out in the conditions of the Right-bank Lower Dnieper zone of viticulture of Ukraine – on the basis of the Agrofirm "Belozersky" (Kherson region, Belozersky district, Dneprovskoe village) during 2011-2013. Field experiments were laid according to generally accepted experimental techniques. **Results.** It has been established that the use of fungicides (chemical protection) and biological product Mikosan B (biosecurity) has a high level of efficiency with some advantage of the former. Based on the studies carried out, it is possible to recommend the use of the biological product Mikosan B to protect the vineyard from *Plasmopara viticola* instead of fungicides on slightly and moderately affected (by leaves) grape varieties. **Conclusions.** On the leaves of cultivated grape seedlings of Isabella, Vostorg *Plasmopara viticola* without protective measures developed to a lesser extent than on the leaves of Bianca and Arcadia varieties, however, the most widespread damage was when cultivars Pervenets Magaracha, Rkatsiteli and Chardonnay were grown. So, the Isabella, Delight varieties in the studied viticulture zone are characterized as highly resistant, Bianca and Arcadia – as medium-resistant, and Firstborn Magaracha, Rkatsiteli and Chardonnay – as low-resistant to *Plasmopara viticola*. It has been established that the development of *Plasmopara viticola* on leaves with an indicator of more than 30% leads to a decrease in the quality of planting material, causes the output of non-standard products. The level of protective measures when using biological products to protect the grape school from *Plasmopara viticola* 50% or more – allows you to grow standard seedlings of grape varieties with high, medium and low field hardness.

Key words: grape varieties, grape school, *Plasmopara viticola* spread, biosecurity, protection efficiency.

Pysarenko P.V., Maliarchuk A.S., Mishukova L.S., Maliarchuk V.M. Productivity of sunflower at different methods and depth of basic tillage of soil in crop rotations on irrigation

The purpose of researches consisted in determination of influence of agrometeorological conditions of the year on the accumulation of autumn-winter precipitation and moisture consumption during the growing season, establishment of biologically reasonable terms of realization and watering norms, stakes of participation of constituents of aquatic balance of total water consumption on forming of the productivity of sunflower at different methods and depth of tillage in crop rotations on irrigation of South Steppe of Ukraine.

Methods: field, quantitative-weight, visual, laboratory, computational-comparative, mathematical-statistical.

Results. Most of moisture – 2139 m³/t on forming of one ton of harvest spent in the variant of disk tillage on a depth a 12-14 cm in the system of plowless single-depth shallow. In the variant of plowing and chisel tillage on a depth a 23–25 cm on a background a different depth moldboard and plowless systems of basic tillage the coefficient of water consumption did not change over the years of the experiment.

Analysis of yield data indicates that realization of plowing on a depth a 23–25 cm assisted forming of harvest at the level of 2,62 and 2,74 t/ha. Realization of the disk tillage on a 12–14 cm in the system shallow onedep tillage resulted in the decline of the productivity of seed of sunflower on 34,7 and 29,6% in accordance with the years of realization of researches as compared to control.

Conclusions. For maintenance of pre-watering threshold of calculation layer of soil a 0–50 cm at optimal level (70% soil moisture) in mid-dry years it is necessary to conduct three vegetation watering the norm of irrigation 1500 m³/ha, and in medium-moisture two – by the norm of irrigation 1000 m³/ha.

By the basic source of arrival part of water balance of sowing of sunflower, in favourable on the meteorological conditions of the years, is precipitation of the growing season, the share of which is 53–55%, while in dry years only 34–37%. Moisture was most rationally spent on creation of 1,0 t yield at plowing on a depth a 23–25 cm with an index on the years of researches according to 1514 and 1576 m³/t. Replacement of plowing deep chisel tillage and shallow disk tillage in the systems of the protracted application of different depth and shallow single-depth plowless tillage to the decline of the productivity on the average on 0,34 and 0,86 t/ha.

Key words: the productivity, sunflower, method of tillage soil, supplies of moisture, coefficient of water consumption.

Senik I.I. Feasibility study of sowing methods of perennial legume-cereal agrophytocenoses

The purpose of the research is to conduct a technical and economic evaluation of methods of sowing perennial legume-cereal agrophytocenoses to identify the most optimal option for use in the Western Forest-Steppe.

Methods – during the research field (laying and conducting experiments) and calculation (determination of economic, energy efficiency and competitiveness of sowing methods of perennial legume-cereal agrophytocenoses) methods were used.

Results. Studies have shown that in the Western Forest-Steppe conditions the most favorable conditions for growth, development and formation of productivity of sown clover-cereal and alfalfa-cereal agrophytocenoses are created when sowing their components separately-crosswise. Due to the optimization of the configuration of plant placement per unit area, the highest productivity of grass mixtures is provided while increasing the quality indicators and energy value of feed.

In a complex combination of all these aspects, the highest indicators of conditionally net profit, level of profitability, energy coefficient, energy efficiency coefficient and complex coefficient of competitiveness in sowing clover-cereal and alfalfa-cereal agrophytocenoses are achieved separately.

Findings. The technical and economic evaluation of the methods of sowing perennial legume-cereal agrophytocenoses indicates the feasibility of sowing the components of grass mixtures separately-crosswise. In the conditions of climate change and economic changes, this method of sowing provides the highest economic indicators (profitability level 54.0–60.4%), is characterized by an energy efficiency ratio of 4.46–5.01 and is the most competitive compared to other plant placement configuration. per unit area. The complex coefficient of competitiveness is 1,029–1,050.

Sowing of clover-cereal and alfalfa-cereal grass mixtures in the usual row method is significantly inferior to separate-cross sowing in terms of technical and economic indicators.

Key words: economic efficiency, energy efficiency, competitiveness, grass mixtures, sowing of seeds.

Sonets' T.D., Zakharchuk N.A., Furdyha N.N., Oliynyk T.N. Evaluation of potato varieties by their adaptability to the conditions of the Forest-steppe and Polissya of Ukraine

Purpose. To determine the main criteria of adaptability, to study the adaptive ability of potato varieties of different maturity groups and to select high-yielding varieties for use in seed production and production crops of Polissya and Forest-Steppe zones. Methods. The research was conducted during 2014–2016 in the Polissya zone at the Volyn and Zhytomyr branches of the Ukrainian Institute of Plant Variety Examination in the Forest-Steppe zone at the Cherkasy and Khmelnytsky branches of the Ukrainian Institute of Plant Variety Examination. Varieties included in the Register of Plant Varieties of Ukraine were used. The productive potential of the variety was analyzed in terms of yield for the overall species adaptive response, using the average varietal yield per year. For this purpose, we calculated the coefficient of adaptability of the variety in terms of its yield in the year of cultivation to the average varietal yield of the year. Results. The studied varieties were studied on the basis of: yield, adaptability coefficient, general and specific adaptability, stability. 12 varieties of potatoes of different ripeness groups in the Polissya and Forest-Steppe zones of Ukraine were analyzed. The annual coefficient of adaptability of the variety in terms of "yield" in the Polissya region was in the varieties: 'Esmi' (1.31), 'Bellarosa' and 'Constanc' (1.15), 'Picasso' (1.06), 'Predslava' (1.05), 'Riviera' and 'Granada' (1.03), 'Solokha' (0.65), 'Svitanok kyivskyi' (0.75), 'Lyudmila' (0.89), 'Catania' (0.96), 'Yavir' (0.98); in the Forest-Steppe zone – 'Esmi' (1.16), 'Riviera' and 'Predslava' (1.13), 'Picasso' (1.08), 'Bellarosa' (1.06), 'Granada' (1.04), 'Catania' (1.02), 'Solokha' (0.70), 'Lyudmila' (0.87), 'Yavir' (0.90), 'Constanc' (0.93). According to the complex of environmental factors, the year 2014 is favorable for potatoes in the Polissya and Forest-Steppe zone, 2015 is unfavorable in the Polissya zone, and 2016 is unfavorable in the Forest-Steppe zone. Conclusions. The main indicator of the adaptability of the variety is the coefficient of adaptability 1 and above, general and specific adaptability, stability, yield under different agrometeorological conditions in the years of cultivation. The use of the coefficient of adaptability makes it possible to determine the productive capacity of the variety in specific soil and climatic conditions. The general adaptive ability is inherent in the varieties 'Esmi', 'Bellarosa', 'Constanc', 'Predslava', 'Picasso', 'Riviera', 'Granada' in the Polissya zone and the

varieties 'Riviera', 'Esmi', 'Predslava', 'Bellarosa', 'Picasso', 'Granada', 'Catania' in the Forest-Steppe zone.

Such varieties as 'Esmi', 'Bellarosa', 'Constanc' in the Polissya area and 'Predslava', 'Picasso' in the Forest-Steppe zone are classified as varieties with specific adaptability. According to the results of the study, varieties with increased adaptability, stress resistance, stability were identified, the cultivation of which is an important factor in increasing the production of potatoes and seeds of high categories for varietal replacement and varietal renewal. Such varieties in the Polissya zone are 'Esmi', 'Bellarosa', 'Constanc', 'Predslava', 'Picasso', 'Riviera', 'Granada'. In the Forest-Steppe zone there are 'Riviera', 'Esmi', 'Constanc', 'Predslava', 'Bellarosa', 'Picasso', 'Granada', 'Catania', 'Svitanok kyivskyi'.

Key words: potatoes, varieties, yield, weather conditions, adaptability, coefficient of adaptability, stability.

Tishchenko A.V., Tishchenko A.D., Piliarska O.O., Didovich S.V., Galchenko N.M. The influence of bacterial preparations on seed productivity, root system and nitrogen fixation in growing alfalfa varieties under irrigation conditions

The purpose is to study the influence of bacterial preparations on seed productivity, nitrogen-fixing ability, accumulation of root mass in alfalfa during the second year of growth.

Methods. The research has been carried out in the 2-factor field experiment. A factor: alfalfa varieties: Uniro (*Medicago varia* Martyn) and Zoryana (*Medicago sativa* L.). B factor – bacterial preparations (seed treatment): 1 – control (without a treatment); 2 – Rizobofit; 3 – a complex of biological preparations (CBP); 4 – cyanobacteria consortium (CC); 5 – cyanobacteria preparations (CP).

Results. The seed yield during monoinoculation with nodule bacteria (Rizobofit) is higher by 16.0–20.0% compared to the control and amounts to 271.8 kg/ha for the Zoryana variety and 361.9 kg/ha for the Uniro variety. However, the effect of the monoculture (Rizobofit) on seed productivity was lower than the three-component associations (CBP) with a seed yield of 303.6 kg/ha (Zoryana variety) and 398.8 kg/ha (Uniro variety). Cyanobacteria consortium (CP) showed a high effect (337.3; 424.6 kg/ha), but the maximum result for the analyzed criterion was obtained due to the use of CP – 361, 1 and 456.4 kg/ha for Zoryana and Uniro varieties respectively. Along with an increase in seed yield, changes in the parameters of accumulation of air-dry root mass and nitrogen fixation occurred. The largest root mass was observed among Zoryana and Uniro varieties when using cyanobacteria preparations (CP) – 5.76 and 5.88 t/ha, respectively while the control showed 4.52 and 4.50 t/ha. An increase in the activity of nitrogen fixation processes was noted on the treatment with the same preparations of CC and CP. However, the highest nitrogen fixation was observed when using cyanobacteria preparations (CP), which amounted to 222.49 and 227.59 kg/ha among Uniro and Zoryana varieties respectively. In the context of low indicators, the control showed 161.98 kg/ha (Uniro) and 168.35 kg/ha (Zoryana). The correlation coefficients were established between the seed yield: the accumulation of root mass $r = 0.925$; 0.984 , nitrogen fixation $r = 0.992$; 0.975 for Uniro and Zoryana varieties respectively. Bacteria preparations had the greatest influence on seed yield, accumulation of root mass and

nitrogen fixation of alfalfa varieties. The share of influence was 49.4%, 94.6% and 96.1% respectively.

Conclusions. The highest amount of seed yield and accumulation of root mass was demonstrated by the Unitro variety when treating seeds with a cyanobacteria preparation – 456.4 kg/ha and 5.80 t/ha respectively. The process of nitrogen fixation was most intensive for the the Zoryana variety when the seeds were treated with a cyanobacteria preparation and amounted to 227.59 kg/ha. Bacteria preparations had the maximum influence on seed yield, accumulation of root mass and nitrogen fixation of alfalfa varieties. The share of influence was 49.4%, 94.6% and 96.1%, respectively. The correlation coefficient between the accumulation of root mass and nitrogen fixation in the Unitro variety was $r = 0.888$ and in the Zoryana variety $r = 0.931$.

Key words: alfalfa, variety, seeds, nitrogen-fixing ability, bacteria preparations, root system, productivity, irrigation.

Tkach M.S., Voronyuk Z.S., Lavrynenko Y.O.
Influence of sowing terms and doses of fertilizers on indicators of grain quality of rice varieties in southern Ukraine

Purpose. Determination of the optimal sowing dates for new registered rice varieties, taking into account the background of mineral nutrition, which will ensure the formation of high productivity of rice varieties with high indicators of grain quality.

Methods. Field, laboratory, statistical. The experiment studied the action and interaction of three factors: A – rice varieties: Marshal – mid-ripening (subspecies *indica*), Consul – mid-ripening, Lazurit – early-ripening (subspecies *japonica*) B – fertilization background ($N_{120}P_{30}$; $N_{180}P_{60}$) C – sowing time: date of stable warming in the soil layer at a depth of 0–5 cm up to 10–12 °C; the following dates – with an interval of 10 days (according to calendar dates – this is the third decade of April, I and II decade of May).

Results. It has been established that in the Lazurit rice variety at early and subsequent sowing periods (third decade of April and second decade of May), grain with high technological qualities can be obtained with a dose of $N_{120}P_{30}$ fertilizers. The formation of the best quality indicators of rice grain at a late sowing period was facilitated by the introduction of high doses of mineral fertilizers. The consul rice cultivar had the best technological qualities for the grain formed on crops of crops of I-II sowing dates with a dose of fertilizers $N_{180}P_{60}$, but the highest yield of a whole kernel was observed at the second sowing period with a moderate background of nutrition ($N_{120}P_{30}$). The formation of high technological qualities in the grain of the Marshal rice variety was facilitated by the introduction of an increased dose of mineral fertilizers: a greater yield of cereals was obtained on rice crops at a late sowing period (second decade of May), and a whole kernel at an early date (third decade of April). Polynomial models of dependences of yield and vitreousness, cereal yield, whole kernel yield in rice varieties showed a positive weak relationship. A strong relationship was observed between yield and whole kernel yield. A positive, albeit weak, relationship between the yield of rice varieties and the technological qualities of grain makes it possible to increase the yield of rice grain by selection and agrotechnical measures without limiting the technological qualities of grain. The genotype of the variety had a greater influence on the quality indicators.

Conclusions. For cultivation of rice varieties with high quality indicators, it is promising to grow them taking into account the biological properties of the variety and at early sowing terms with a dose of $N_{180}P_{60}$ fertilizers.

Key words: rice, grade, 1000 grain weight, whole kernel yield, fracturing, glassiness.

Kharchenko O.V., Petrenko S.V., Sobko M.G., Medvid S.I.
Efficiency of moisture resource use by maize crops in arid Forest-Steppe conditions

Methods. Field experiments to study the effect of fertilizer on the yield of maize hybrids were conducted in the experimental fields of the Institute of Agriculture of the Northeast NAAS during 2018–2019, rNSOL = 5.0, the content of easily hydrolyzed nitrogen (according to Cornfield) – 112.0, mobile compounds P_2O_5 and K_2O (according to Chirikov) – 118.0 and 100.0 mg/kg, respectively, 190 kg dr/ha ($N_{100}P_{45}K_{45}$) was applied for sowing corn.

The study was conducted with maize hybrids of domestic selection Zoryany (FAO190), Stork (FAO260) and Donor (FAO310) (originator V. Yuriev Institute of Plant Breeding NAAS). The experiments were carried out on four variants of the main tillage: I – shelf to a depth of 20–22 cm, II – shelfless to a depth of 14–16 cm (KLD), III – shelfless to a depth of 14–16 cm (AG), IV – without cultivation (zero). The repetition of the experiment is 3-fold. The area of the accounting area is 28 m². The yield was taken into account at a humidity of 14%.

Results. These data indicate that by the beginning of the growing season in 2018, fluctuations in the values of initial reserves of productive moisture in the meter soil, ie for the sowing period (GWP) depending on the treatment methods differed by 8.1 mm, and in 2019 by 14.7 mm (Table 2). Thus if in 2018. The largest stocks are noted on a variant of plowing that in 2019 – on a variant without processing.

Reserves of productive moisture during the ripening period (VGK) in 2018 ranged from 14.7 to 16.6 mm, and in 2019 they were more than twice as much and amounted to 32.2 – 40.6 mm (see Table 2). The value of the total water consumption (E) in all variants of the experiment was greater in 2018 than in 2019. The largest difference (15.0–16.2 mm) was noted in the first two variants of the main tillage (shelves to a depth of 20–22 cm and no-till), depth of 14–16 cm (KLD), and the smallest (1.7 mm) – on zero processing.

The data in Table 3 clearly indicate that the actual yield of corn against the background of $N_{100}P_{45}K_{45}$ in all variants of the experiment was 7.20–9.79 t/ha. It was observed that the higher the FAO value of the hybrid, the higher the yield. Thus, if the yield of the hybrid Zvezdny (FAO190) was 7.20–8.61 t/ha, then the hybrid Donor (FAO310) – 8.55–9.72 t/ha (Table 3).

Comparison of actual yields by years shows that in all variants the yield in 2018 was higher than the yield in 2019, in our opinion, as an option, can be associated with several large moisture resources in 2018. In addition, research can conclude that in very arid conditions natural moisture (Table 1) most often, although insignificantly, high yields were observed in the variant of shelf tillage.

Findings. It was found that in very arid conditions, the level of intensity of these maize hybrids in relation to the use of moisture against the background of $N_{100}P_{45}K_{45}$ was 2.46–3.33 and was directly proportional to the value of FAO hybrids.

Key words: maize hybrid, hydrothermal conditions, normative yield by moisture resource, level of hybrid intensity, total water consumption, total water consumption coefficient.

Chuhrii H.A., Vinyukov O.O. The influence of mineral nutrition elements on the productivity and quality of winter wheat grain in the zone of the Northern Steppe of Ukraine

The purpose of research. The aim of the study is to study the influence of mineral nutrition elements on the productivity and quality of winter wheat grains in the northern steppe zone of Ukraine

Research Methodology. The studies were carried out by the laboratory-field method in the field crop rotation in the experimental plots. The repetition in the experiments is 3-fold. Land area 25 m². The experimental design involved the use of food backgrounds: N₃₀P₃₀K₃₀, N₆₀P₆₀K₆₀, N₉₀P₉₀K₉₀. Used amofoska fertilizer, the content of the active substance N₁₅P₁₅K₁₅. Fertilizers were applied to the areas with a seeder before sowing.

Test options: control, option 1 (seed treatment with Gumisol-plus 01 Cereals, spraying plants in the tillering phase in spring Gumisol-plus 01 Cereals), option 2 (seed treatment with Gumikor, spraying plants in the tillering phase with Gumikor in spring), option 3 (seed treatment with Yarilo, spraying plants in the tillering phase in the spring with Yarilo).

Results. Against the mineral nutrition background, at the dose of N₉₀P₉₀K₉₀ fertilizers, all the proposed options provided an increase in yield. The highest level of productivity was when using the mineral background nutrition N₃₀P₃₀K₃₀. Although in general the level of plant development during the growing season and the formation of plants yield when using the proposed options suggests the correctness of the chosen research direction.

Findings. Studies have made it possible to establish certain patterns of the influence of mineral nutrition on the formation of winter wheat grains. The use of various options for growing winter wheat contributed to the good development of plants throughout the growing season, which allowed to form a yield that significantly exceeded the control option. The highest yield level of winter wheat of Peremoga variety (5.76 t/ha) was obtained using the composition of the drug Yarilo on a mineral nutrition background N₃₀P₃₀K₃₀.

Key words: winter wheat, variety, experiment variant, biometric indicators, bushiness, productivity.

Shafieva M.R., Kerimov A.N. Clostridium similar bacterias in nature biochemical indicators

Purpose. The microbiological activity of the Clostridium similar bacteria is very high. These bacteria fix the free atmospheric nitric, enriches the world ocean with organic matters, plays active part in overturn of organogenic and other elements. Land regulates its, increases and enriches the photosynthetic productivity on the earth, splits the organic garbages and other products, provides their redividing into periods. The study of the natural world, its biodiversity, the protection of its geo-fund and the effective research of scientific means of its use, its pattern of development are very important.

Methods. The nature of Azerbaijan, the study of its legality, the creation of biological information systems and the comprehensive monitoring of ecological processes of human health with the production of environmentally friendly products are one of the main and significant conditions. In this regard, the role of living organisms is indispensable and occupies an important place of bacteria in the world of microorganisms. Like all living organisms, bacteria have common biological characteristics.

Results. Therefore, bacteria increase, the number of organisms increases in population, etc. And ends with such physiological processes. So, in nature, there is a specific site of bacteria. Clostridia-type bacteria play an important role in the actual and potential productivity of nature; they are involved in the process of biosynthesis and metabolism.

Clostridia bacteria play an important role in the actual and potential productivity of nature, actively participating in biosynthetic processes in energy and metabolism. It should be noted that the relationship between individual development and bacterial populations of Clostridium has traditionally been analyzed ontogenetic and population. however, a complete study of these processes by methods of folk processes does not give positive results in many ways.

Conclusions. Analysis of the "stability of development" of ontogenesis, which is considered as a measure of environmental impact, is a more promising approach to environmental assessment and monitoring in natural conditions, as well as in various anthropogenic impacts.

Key words: bacteria genus Clostridium, identification of bacteria, systematics of bacteria, biochemical indicators, microbiological transformation.

Vozhegova R.A., Maliarchuk A.S., Kotelnikov D.I. Influence of different systems of basic cultivation and fertilizer on biological activity of soil and productivity of crop rotation on irrigated lands of the south of Ukraine

The aim of the research was to establish the influence of different systems of basic cultivation and fertilization on the indicators of biological activity of soil microorganisms and its further influence on the indicators of productivity of short-term irrigated crop rotation. **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 Askanian SARS IIA of NAAS of Ukraine. **Results.** Studies have shown that the results of studies suggest that the replacement of deep tillage with shallow in the system of long-term use in crop rotation at the beginning of crop rotation vegetation led to a decrease in soil biota on average by: ammonifying 14.0%, oligonitrophilic 14%, 14% 3% and cellulose-destructive by 16.0%. The lowest indicators were formed at zero cultivation: ammonifying 22.01 million pieces, oligonitrophilic 17.01 thousand pieces, nitrifying 7.21 million pieces, and cellulose-destroying 2.18 million pieces. in 1 g of absolutely dry soil and less control by 20.6-22.9%. **Conclusion.** The highest productivity of irrigated crop rotation in the experiment was achieved at different depth tillage, which increases the amount of production to 8.49 tons z.o./ha, or 3.3% relative to the control, and zero tillage reduces to 7.15 tons z.o./ha, or 14.8% compared to control.

Key words: stocking density, biological activity, irrigation, tillage, crop rotation productivity.

Kovalenko O. A., Steblichenko O. I. Yield and economic efficiency of growing summer savory (*Satureja hortensis* L.) in the conditions of the Southern Steppe of Ukraine

Goal. This article examines the economic efficiency of growing summer savory in the Southern Steppe of Ukraine. **Methods.** The analysis of the main economic indicators of summer savory production was carried out. The factors influencing the formation of economic efficiency of summer savory production in agricultural enterprises of the Southern Steppe of Ukraine are determined. **Results.** Production costs for growing summer savory ranged from 7288.8 to 24472.0 UAH/ha. The highest result was observed for sowing in the third decade of April (24035.8–24472.0 UAH/ha), where the maximum yield of dry mass was obtained – 1.92–2.34 t/ha. Net income from growing savory plants ranged from 12.81 to 44.14 thous. UAH/ha for natural moisture and in the range of 9.78–46.12 thous. UAH/ha for drip irrigation. The maximum result was obtained by drip irrigation, sowing in the third decade of April by a wide-row method with a row spacing of 45 cm, where the highest yield of dry mass was formed – 2.34 t/ha. The highest profitability of growing summer savory was provided by natural moisture during sowing in the third decade of April in a wide row method (45 cm) 544.1%. The profitability of the option in which the maximum net income was obtained was 191.3%. **Conclusion.** Thus, the maximum net income (46.12 thous. UAH/ha) can be obtained under drip irrigation, sowing in the third decade of April in a wide row with a row spacing of 45 cm. The level of profitability will be 191.3%.

Key words: profitability, profit, dry weight, net income, *Satureja hortensis* L.