

## Summary

### **Burykina S. I., Parlikokoshko M. S. Organomineral fertilizers with a complex of amino and humic acids on chickpea crops**

**Purpose.** To study the reaction of chickpea plants to Organo-mineral fertilizers with a complex of amino acids and based on Humic and fulvic acids during their foliar use in the rainfall conditions of the Black Sea steppe of Ukraine.

**Methods.** Field, Laboratory, statistical.

**Results.** The results of studies of the effect of amino, Humic and fulvic acids as components of liquid Organo-mineral fertilizers on the productivity of chickpea plants in the Odessa region during 2019–2020 are presented. Soil southern chernozem with a high content of available  $P_2O_5$  and  $K_2O$ . Chickpea variety Memory, predecessor – winter wheat. The experiment is two – factor, where Factor A is the main background of nutrition: without mineral fertilizers and with the introduction of mineral nitrogen with a general norm of  $N_{60}$  ( $N_{30}+N_{30}$ ), Factor B is liquid Organo – mineral fertilizers (OMF). Preparations of the Ukrainian company "Libra-Agro" were used for foliar top dressing during the growing season of chickpea plants in the phases of branching, budding and grain filling.

**Conclusions.** The highest increase in productivity (35.9%) was obtained when using organomineral fertilizers based on fulvic acids with a complex of macro and microelements (Fulvo TE) at a dose of 0.5 l/ha; an increase of 28% was obtained from treatment with anti-stress (SG Protector) doses 1,0- 2,0- 1,0 l/ha, which contains Humic, Fulvic acids, nitrogen, potassium and silicon oxide.

In the arid conditions of the Southern steppe of Ukraine, OMF based only on amino acids (Amino, 0.5 l/ha) did not show a stimulating effect on the yield of chickpeas; aminochelate (Amino Mikro, 0.5 l/ha) provided an average yield increase of 17.3%.

On the influence on the formation of protein content and mass of 1000 chickpea grains, multidirectional results were obtained, which makes it impossible to distinguish the leader among the studied OMF based on two-year data; this requires longer-term observations.

There was a tendency to improve quality indicators on OMF application options, but the increase in the protein content in chickpea grain and the mass of 1000 seeds did not exceed the minimum level of reliability (they were below 5.0%).

**Key words:** chickpeas, southern chernozem, aminochelates, humic acids, fulvic acids

### **Vozhehova R.A., Marchenko T.Yu., Zabara P.P., Piliarska O.O., Sakhatsky G.I. Peculiarities of photosynthetic activity of lines – parental components of maize hybrids depending on elements of technology under irrigation conditions**

**The purpose of research.** Is to substantiate and improve the elements of cultivation technology in the conditions of irrigation of the south of Ukraine lines-parent components of maize hybrids of different FAO groups. **Research methodology.** The research was conducted during 2018–2020 on the research field of the Institute of Irrigated Agriculture of NAAS,

which is located in the area of Ingulets irrigated massif. A three-factor experiment was performed by the method of split randomized blocks. The research was carried out four times, sowing area of 50.0 m<sup>2</sup>, accounting – 30.0 m<sup>2</sup>. **Results.** Treatment with biologicals provided an increase in the area of the assimilation apparatus. Treatment with the biological product Bio-gel provided an increase in the leaf surface by 1.7 thousand m<sup>2</sup>/ha or 5.3%, treatment with the drug Helafit combi by 2.4 thousand m<sup>2</sup>/ha or 7.5%. The increase in the area of the assimilation apparatus from the thickening of crops from 70 to 80 and 90 thousand plants/ha was 2.5–6.3 thousand m<sup>2</sup>/ha, or 8.6–18.2%, depending on the variant of the experiment. The genotype of the line affected the leaf surface area. The largest area of plant leaves was 37.3 thousand m<sup>2</sup>/ha in the middle-late line DK 445, and the smallest was in the variant DK 281 and was equal to 28.5 thousand m<sup>2</sup>/ha. The maximum photosynthetic potential of maize line crops of all FAO groups was observed when crops were thickened to 90 thousand plants/ha – from 1994.7 thousand m<sup>2</sup>\*days (line DK 281) to 3431.2 thousand m<sup>2</sup>\*days (line DK 445). Biopreparation treatment increased the photosynthetic potential by 5.1% from Bio-gel treatment and by 7.2% from Helafit combi treatment. The minimum value of NPP on average by factor B was observed in the early-maturing line DK 281 (FAO 190) at a density of 70 thousand plants/ha – 5.48 g/m<sup>2</sup> per day, the maximum in the late-maturing line DK 445 also at a density of 70 thousand plants/ha. The late-maturing line DK 411 showed the maximum value of NPP at a density of 70 thousand g/ha – 6.30 g/m<sup>2</sup> per day, the middle-early line DK 274 showed the maximum value of NPP at a density of 80 thousand plants/ha – 6.25 g/m<sup>2</sup> per day, the early-maturing line DK 281 showed the maximum value of NPP at a density of 90 thousand plants/ha – 5.81 g/m<sup>2</sup> per day.

**Findings.** The maximum leaf surface area was observed in the lines of DK 445 at densities of 90 thousand g/ha and cultivation of Helafit combi – 41.2 thousand m<sup>2</sup>/ha.

The maximum photosynthetic potential of maize crops was observed in the mid-late line DK 445 at a plant density of 90 thousand plants/ha and treatment with the drug Helafit combi – 3502.0 thousand m<sup>2</sup> \* days. The maximum value of NPP – 6.43 g/m<sup>2</sup> per day, was obtained in the middle-late line DK 445 at a plant density of 70 thousand plants/ha and treatment with the biological product Helafit combi. The maximum seed yield of the early-ripening line DK 281 (FAO 190) was recorded at a density of 90 thousand plants/ha and treatment with the drug Helafit combi – 3.65 t/ha. The middle-early line DK 247 (FAO 290) showed the maximum yield at a density of 80 thousand plants/ha and treatment with the drug Helafit combi – 4.65 t/ha. Mid-late lines DK 445 and DK 411 showed the maximum seed yield at densities of 70 thousand plants/ha and treatment with Helafit combi – 6.30 t/ha and 4.65 t/ha, respectively.

**Key words:** FAO group, biological products, plant density, photosynthetic potential, net photosynthesis productivity, yield.

Granovska L.M., Maliarchuk N.P., Pysarenko P.V., Maliarchuk A.S., Tomnitsky A.V. Productivity of grain row crop rotations at the different systems of basic tillage in the area of action of Ingulets irrigatory system

The purpose of researches is determination of character of changes of agrophysics properties, accumulation and expense of moisture and nutritives of soil depending on methods and depth of tillage, mode of irrigation and systems of fertilizer. **Methods of researches:** hypothesis, experiment, supervision, analysis, generalization and special methods of researches : the field, laboratory, calculation, visual, instrumentation-gravimetric, biochemical, statistical – (dispersible) and (cross-correlation), comparatively-calculation. **Results.** Determination of agrophysics properties of soil in three 4-fields crop rotations with a different satiation and alternation of agricultural cultures during a rotary press enabled to set that both at the beginning and before completion of vegetation period a closeness of addition of soil was the least in a crop rotation with a 75% satiation grain-growing and 25% by technical crops ( crop rotation № 3). More intensive compression takes place at the system of onedeeep shallow tillage and arrives at the index of a 1,33-1,35 g/cm<sup>3</sup> with higher in crop rotations № 1 and № 2. On the average for years researches the greatest permeability to water in the period of shoots of spring and proceeding in the vegetation of winter crops at the 3-sentinel display of determination is marked in a variant with the use of different depth of soil basic tillage with the turn of layer and 4,2 was evened, 4,4 and 4,33. At the estimation of the productivity of crop rotation mm/min, in accordance with crop rotations № 1, № 2 and № 3. At the estimation of the productivity of crop rotations on the output of forage units calculating on a 1 hectare of area of crop rotation advantage of crop rotation № 3 with specific gravity grain-growing 75 and technical 25% on a background different depth basic tillage with the turn of layer with the index of 11,59 т/ha of feed units, that higher, than in crop rotations № 1 (beet sugar – 2016–2017, sunflower – 2018–2020 pp., sorghum 2016–2018, spring barley – 2019, soy, rape winter) on 4,98 т/ha of feed units, or 43,0% and more than in a crop rotation № 2 (wheat winter, grain-growing corn, soybean, soybean ) on 2,37 т/ha of feed units, or on 20,4%. The same conformity to law was observed and at plowless tillages – different depth chisel and single depth shallow. At the same time, the level of the productivity was substantially below (on 28,2-34,2% as compared to control). **Conclusion.** On the irrigated lands in the area of action of Ingulets irrigatory system with dark-chestnut middle-loame alkalized soils is expedient to introduce grain row crop rotations with a 75% satiation grain-growing and 25% by technical crops on a background different depth basic tillage with the turn of layer. Under act of set and alternation cultures and depth of basic tillage the optimal are formed for a height and development of plants and forming of harvest agrophysics indexes, that provides favourable water, air and nourishing modes. In such crop rotations, on a background the organo-mineral system of fertilizer with the use of all side products of cultures of crop rotation, and different depth tillage with the turn of layer is form the greatest productivity of 11,4 т/ha of feed units, cost of gross products 44,4 thousand грн., an income is a 27,461 thousand грн and level of profitability of 162,6% грн.

**Key words:** soil tillage, bulk density, porosity, productivity of cultures, net profit.

Dmytrenko P.V. Qualitative characteristics of basic seed potatoes depending on the number of vectors of viral infections and elements of technology

**Objective.** To determine the crop productivity, yield of tubers of seed fraction and infection of basic potato seeds with viral infection depending on the period of potato desiccation, application of mineral oil Sunspray, the number and species of winged aphids in the Polissia region of Ukraine. **Methods.** Field – evaluation of qualitative characteristics and productivity of seed potatoes accounting and monitoring of plant growth and development, development of the population of winged vectors of viral infections of potatoes, the manifestation of diseases in open field conditions, visual – determination of phenological phases of plant development, determination of viral, fungal, bacterial diseases by manifestation of symptoms, determination of types of vectors of potato viral infection, analytical – to detect the content of viral infection by the method of solid-phase enzyme-linked immunosorbent assay (double sandwich variant, DAS-ELISA), measuring and weighting – determination of biometric indicators of plant development, yield, number of vectors of viral infections, statistical data processing – to analyze the reliability of the obtained research results. **Results.** “Critical periods” of growth in the number of vectors in the Polissia region in 2018–2020 occurred in the period from the first decade of June to the third decade of July. The most numerous types of vectors were *Aphis fabae*, *Aulacorthum solani*, *Aphis nasturtii*, *Aphis frangulae*, *Macrosiphum euphorbiae*, which accounted for 79.37 – 97.1% of the total number of PVY and PLRV vector carriers. The total index of aphid harmfulness in 2018 was 118.28 points, 2019-50.38, 2020–28.67 points.

On average, during the years of studies in 2018–2020, the highest seed yield was obtained by potato desiccation 10 days after potato flowering – 82.4–85.3%, but the level of total and seed yield was low. The yield of potato seed material increased with the removal of potatoes in 20 days – with a total yield depending on the variety of 20.6-30.0 т/ha, the yield of seed tubers in the range of 20.6-22.9 т/ha for the seed content in the crop structure – 71.0–76.3% was obtained. On average, during the years of studies in 2018–2020, a high yield of seed tubers per hectare of sown area was obtained by removing potatoes in the first period (10 days after flowering), which was, depending on the variety, 344–467 thousand units/ha, through desiccation in 20 days after flowering, the yield of seed tubers decreased to 311-59 thousand units/ha. The decrease in seed productivity of 1 ha of sowing was observed when potatoes were removed on the 40<sup>th</sup> after flowering – the yield of tubers of seed fraction, depending on the variety was 268-358 thousand units/ha, when leaving without desiccation – 179-212 thousand units/ha. The potato plants, where the removal of potatoes during 2018, 2019 was carried out in 10 days after flowering, which was for potato varieties Myroslava – 4.0% (the control variant 9.0%), Predslava – 3.0% (the control variant 10.0%), Alians – 4.0% (the control variant 9.0%)) were the least PVM infected.

**Conclusions.** According to the results of observations on the development of the population of winged aphids in potato plantations in the area of the southern part of Polissia of Ukraine (Kyiv region) it has been established that “critical periods” of growth of the number of virus vectors occurred in the period from the first decade of June to the third decade of July.

The most numerous types of vectors were *Aphis fabae*, *Aulacorthum solani*, *Aphis nasturtii*, *Aphis frangulae*, *Macrosiphum euphorbiae*, which accounted for 79.37 – 97.1% of the total number of PVY and PLRV vector carriers.

The least PVM infected were potato plants, where the removal of potatoes during 2018, 2019 was carried out within 10 days after flowering, which was for potato varieties Myroslav – 4.0% (the control variant 9.0%), Predslava – 3.0% (the control variant 10.0%), Alians – 4.0% (the control variant 9.0%). The level of PVM infection when removing potatoes on the 10th day after flowering with the application of mineral oil Sunspray at a rate of 6.0 l/ha decreased for potato varieties Myroslava – by 2.0%, Predslava – by 1.5%, Alians – by 1.0%.

No PVY-infected plants were detected in the early desiccation variants and with the application of Sunspray mineral oil.

Removal of potatoes 20 days after flowering provided a yield of seed tubers in the range of 20.6-22.9 t/ha (71.0-76.3% of the total yield).

**Key words:** potato; harvest; seed fraction; M and Y- viruses, aphid species; mineral oil; potato removal; yield of seed tubers per unit area.

**Zaiets S.O., Muzyka V.Ye., Nyzheholenko V.M., Rudik O.L. Evaluation of adaptability and stability of soft winter wheat varieties under different conditions of moisture supply in the South of Ukraine**

The study presents the results of the ecological variety testing of soft winter wheat varieties and evaluation of their adaptability and stability under irrigated and non-irrigated conditions. The research object involved 28 varieties of different plant breeding institutions grown under conditions of the Southern Steppe of Ukraine. We determined a high degree of impact of the environmental factors – irrigation and the year conditions. The average productivity of the varieties ranged from 0.79 to 4.24 t/ha when the crops were grown without irrigation, and it ranged from 4.81 to 6.13 t/ha under irrigation. Against a background of natural moisture supply, the highest productivity of 2.96-3.06 t/ha was characteristic of the varieties Kokhana, Viktoriia odeska, Poshana, Khersonska unbearded and Popeliushka. Under irrigated conditions this group is represented by the varieties Khersonska unbearded, Poshana, Viktoriia odeska, Povaha and Ovidii – 6.08-6.29 t/ha. We found that the highest levels of general adaptability 0.39...0.26 are characteristic of the varieties Khersonska unbearded, Poshana, Viktoriia odeska and Ovidii. Simultaneously we determined high general adaptability and high variance of interaction with the environment for the varieties Khersonska unbearded, Khersonska 99, Znakhidka odeska and Ovidii. The varieties Khersonska unbearded and Ovidii, under conditions of the research environment, showed high instability by the value of the parameter  $\sigma_{2SA}$  (specific adaptability) – 4.25 and 3.76, respectively in comparison with the average of 3.48 with a high level of profitability. Among the analyzed varieties, higher stability was manifested by the less productive varieties, whereas the varieties of the intensive type Nakhodka 4, Kuiuynyk and Viktoriia odeska were the most balanced ones by the combination of productivity and stability. Less destabilizing effects were found in the varieties Driada 0.76; Odeska 267 and Dar Luhanshchyny 0.83 and Yednist 0.84, manifesting less intense reac-

tion on the changes in moisture supply. The varieties Khersonska unbearded, Khersonska 99 and Ovidii combined high values of productivity and stability under different growing conditions. We identified a high compensating effect of irrigation that is important for stabilization of grain production in the zone of the Southern Steppe.

**Key words:** soft winter wheat, varieties, productivity, conditions of moisture supply, adaptability, stability, plasticity.

**Zelenyanskaya N.M., Borun V.V. Water consumption of a grape nursery in the South of Ukraine**

The article presents the results of research to determine the total water consumption of a grape nursery in the south of Ukraine with different level of pre-irrigation soil moisture (LPSM). The relationship between the water consumption of grape nursery and the drip irrigation regimes, schemes of planting grafts in the nursery has been proved. **The purpose** of the research is to establish the dependence of the total water consumption of grafted grape seedlings, the coefficient of their water consumption on the drip irrigation regimes of the grape nursery and schemes of planting grafts in the nursery. **Methods.** During the execution of the work, field, laboratory and computational-comparative methods were used, as well as the methods and methodological recommendations generally accepted in viticulture and grape nursery. **Results.** According to the scheme of researches grape grafts were planted in a nursery by a tape with one and two rows, in each tape mounted one or two drip tapes. Pre-irrigation soil moisture at the grape nursery was maintained at different levels – 100–90% of the lowest moisture capacity (LMC), 100–80% LMC, 100–90–80% LMC and 100–80–70% LMC. It is shown that the formation of total water consumption of grape seedlings was influenced by productive precipitation, irrigation water and soil moisture. In the variants with a more intensive irrigation regime (LPSM 100–90, 100–80, 100–90–80% LMC and control 1) the share of irrigation water prevailed. Thus, under the conditions of the adopted agricultural machinery in these variants, it was within 50.0%, in control 1 – 77.3%. The share of moisture, which came in the form of precipitation, decreased to 38.3–45.7%, in control 1 – to 20.2%. Based on the determination of the water consumption coefficient of grafted grape seedlings, it is shown that the most efficient use of moisture by plants in the variants LPSM 100–90–80% LMC and 100–90% LMC, when planting grape grafts in the nursery tape in two rows. **Conclusions.** The formation of total water consumption of grape seedlings was influenced by productive precipitation, irrigation water and soil moisture. In the variants with a more intensive irrigation regime of the grape nursery, the share of irrigation water prevailed, which was within 50.0%, and the share of moisture, which came in the form of precipitation, decreased to 38.3–45.7%. Moisture was most effectively used by grafts and grape seedlings in variants where the grafts were planted in the nursery with a tape in two rows with LPSM 100–90% LMC and 100–90–80% LMC. They provided the lowest water consumption during the growing season for the formation of thousands of grown grafted grape seedlings – 16.9–18.7 m<sup>3</sup>/thousand. pcs.

**Key words:** grafted grape seedlings, drip irrigation, pre-irrigation soil moisture levels, water consumption coefficient.

**Iutynska H.O., Holoborodko S.P., Dymov O.M.**  
**Formation of humus in southern chernozem for the use of green manure in irrigation conditions**

**Purpose.** To highlight the results of research on determining the role of green manure as one of the most effective factors in the formation of humus in southern chernozem under irrigation conditions. **Methods.** Field and laboratory experiments. Spring rapeseed, oilseed radish and two-year-old white sweet clover were used as green fertilizers. The content of organic carbon was determined by Nikitin, the group composition of humus – by Kononova and Belchikova, the amount of carbohydrates in the soil and their distribution by the main groups of organic matter were studied by the Yukhnin method. Determination of the molecular mass characteristics of humic acids was carried out by the express method, by centrifuging their samples in the density gradient of sodium chloride solutions. Determination of the amino acid composition of humic acids was carried out after their hydrolysis with a 6% hydrochloric acid solution at 110 °C for 24 hours. The qualitative and quantitative composition of amino acids was determined on an automatic AAA–339 amino acid analyzer. **Results.** When plowing on Southern chernozem during irrigation of the green mass of spring rapeseed, oilseed radish and two-year-old white sweet clover, the total content of organic carbon, compared with the options with plowing their root residues, was higher by 2–12%. The highest humus content was found when plowing the green mass of white two-year-old sweet clover and oilseed radish – 3.10%, as well as root residues of spring rapeseed – 2.93%. The use of green manure activates the enrichment of humic acids with peripheral components, as evidenced by an increase in their molecular weight. In the studied humic acids, carbohydrates accounted for 3.57%–4.49%. Plowing of the green mass contributed to a greater enrichment of humic acids with amino acid components, compared to plowing of root residues. **Conclusions.** The use of green fertilizers on irrigated southern chernozem contributes to an increase in its total humus content and an increase in the proportion of humic acids with a developed peripheral part, enriched with amino acids and carbohydrates. These processes are most active when plowing the green mass and root remains of the two-year-old white sweet clover, which makes it possible to recommend it as a promising green manure crop on irrigated soils of the Southern Steppe of Ukraine.

**Key words:** green manure, southern chernozem, irrigation, white sweet clover, oilseed radish, spring rapeseed, humus.

**Klipakova Yu.O., Bilousova Z.V., Keneva V.A.**  
**Functioning of the assimilation apparatus of winter wheat plants depending on the terms and methods of fertilizer application**

**The aim** of the article was to assess the condition and work of the pigment complex of Shestopalivka variety winter wheat plants depending on the terms and method of fertilization in the Southern Steppe of Ukraine. **Methods.** Shestopalivka winter wheat variety was selected for field research during 2018–2020. The scheme of the experiment had the following variants: Factor A – the term of the first fertilization with nitrogen fertilizers ( $N_{40}$ ): 1. Early – first ten-day period of February; 2. Late – first ten-day period of March. Factor B – foliar fertilization: 1. control; 2. potassium monophosphate (1 kg/ha). First fertilization with nitrogen fertilizers was carried out using ammonium nitrate

in frost-melting soil using RUM machine, potassium monophosphate, in combination with the background application of urea (5 kg/ha), was used at the beginning of winter wheat plants. Pigment concentration was determined in acetone extracts spectrophotometrically at a wavelength of 662 nm, 644 nm and 470 nm. Chlorophyll productivity was calculated as the ratio of the increase in dry matter of the plant to the average chlorophyll content in the leaves. **Results.** It is determined that the amount of pigments and their productivity in winter wheat plants of the studied variety is influenced by the term of introduction of the first spring fertilization with ammonium nitrate with foliar application of potassium monophosphate. The combination of terms and methods of fertilizer application has a positive effect on the state of the pigment complex, where the maximum content of photosynthetic pigments (both chlorophylls and carotenoids) was recorded in winter wheat plants with flag leaf emergence (BBCH 37). Fertilizing plants with potassium monophosphate had a positive effect during the growing season, which resulted in an increase in the amount of chlorophylls and their productivity during both periods of nitrogen fertilization. **Conclusions.** A positive effect on the pigment complex and productivity of chlorophylls during the growing season of plants (BBCH 31–75) was observed at different terms and methods of fertilizer application. The highest pigment content and their high productivity during the whole growing season was observed with the use of early spring fertilization with ammonium nitrate at a dose of  $N_{40}$  in combination with potassium monophosphate (1 kg/ha), which had a significant effect on the formation of overall plant productivity.

**Key words:** nitrogen fertilization, potassium monophosphate, pigment complex, chlorophyll productivity.

**Kovalov M.M., Vasytkovska K.V., Reznichenko V.P.**  
**Influence of EM preparations and injection micro-irrigation systems on growing eggplants outdoor**

The prospect of Ukraine to enter international markets encourages vegetable growers to introduce more modern technologies for growing high-quality competitive open-field vegetable products. The key to obtaining stable and high productivity, which at the same time has high quality is the application of various types of micro-irrigation. These systems provide distribution of natural moisture both over time and territorially. This distribution throughout Ukraine is quite uneven. In the natural and climatic conditions of Kropyvnytskyi, the deficit of natural water balance is in the range of 180–240 mm. It must be reduced by using various drip irrigation systems.

**Purpose.** The objective of the article is to compare the effect of different types of microbiological preparations on the productivity of early-maturing varieties of egg-plant applying injectable drip irrigation. **Results.** Taking into account current situation, the use of microbiological preparations is of vital importance for the efficient and environmentally safe use of irrigated land. The current level of production of microbiological preparations allows determining the directions of improving the quality of vegetable products due to the optimization and redistribution of nutrients and more rational application of the potential of agroecosystems.

Irrational use of natural resources of agroecosystems through the use of intensive cultivation technologies leads to disruption of homeostasis of ecosystems

in general. Application of microbial preparations in modern technologies for growing vegetable products can increase the quantitative and qualitative indicators of agricultural products.

The study of the relationships in the productive system of the microorganism–plant–soil can improve the technology of microbial preparations, which will ultimately lead to stable yields and, most importantly, quality and competitive vegetable products. The introduction of injectable irrigation systems into the eggplant growing technology with simultaneous application of EM preparations has had a positive effect on the formation of vegetative mass both in the main phases of crop development and throughout the growing season. **Conclusions.** Calculations of the cost-effectiveness of the experimental data showed that the highest productivity of early-maturing eggplant varieties Iceberg, Annette and Gagat, provided a variant of separate root application of microbiological drugs EM Agro + EM 5M and EM Agro + EM 3 using injectable drip irrigation systems.

**Key words:** injectable drip irrigation, EM preparations, eggplant productivity, economic efficiency.

**Korotka I.O., Klipakova Yu.O., Priss O.P. Growth, development and yield formation of different perennial wall rocket (*Diplotaxis tenuifolia* L.) cultivars in greenhouses**

**Aim of the article** – to determine the parameters of growth, development and fresh yield of different perennial wall rocket cultivars in greenhouses.

**Research methods.** For phenological observations – visual; to determine biometric indices and yield – measuring and weighing; for objective evaluation of experimental data – statistical; for generalization of data, formation of objective conclusions – analysis and synthesis.

It was found that cultivars of perennial wall rocket 'Prudencia' and 'Temisto' passed all phenological phases of development faster than cultivars 'Gracia', 'Leticia' and 'Tricia': the formation of the leaves rosette took place on the 15th day, and the phase of technical maturity of greens – on the 36th-37th day.

Over the years of research, perennial wall rocket cultivars 'Prudencia' and 'Tricia' formed the tallest plants – 21.8 cm and 22.0 cm, respectively. A larger number of leaves in the phase of technical maturity was formed by 'Prudencia' and 'Temisto' cultivars – 15.2–15.8 pieces/plant. The number of leaves in the rosettes of 'Gracia', 'Leticia' and 'Tricia' cultivars was lower and ranged from 13.2 to 14.1 pieces/plant.

The most developed root system was formed by the plants of 'Prudencia' cultivar in which the length of the main root was 17.8 cm and the mass of the root system was 13.4 g. The least developed root system was formed by the plants of 'Gracia' and 'Leticia' cultivars, for which the length of the main root ranged from 13.5 to 14.7, and the mass of the root system was 9.1–9.6 g.

According to the productivity indices, 'Prudencia' and 'Temisto' cultivars were distinguished, the weight of one plant for which was 30.8 g and 29.3 g, respectively, and fresh yield at the first cutting – 1.24 kg/m<sup>2</sup> and 1.21 kg/m<sup>2</sup>, respectively. The lowest fresh yield was observed for 'Gracia' cultivar – 1.01 kg/m<sup>2</sup> at a weight of one plant of 21.4 g.

**Key words:** perennial wall rocket, cultivar, phenological phases, biometric indices, yield.

**Morozov O.V., Morozov V.V., Kozlenko Y.V., Bidnyna I.O., Leliavska L.V. Water-salt anthropogenic load on long-irrigated soils of the Ingulets massif**

The soils of the dry steppe zone of Ukraine in the process of their long-term irrigation (over 40-50 years) are under the influence of intensive anthropogenic water-salt load. The main levers of the formation of water-salt regime are irrigation and drainage are the main levers of the water – salt regime formation. Studies conducted in the Ingulets irrigation system, which is typical for the dry steppe zone of Ukraine in most natural and water conditions and is a permanent model for tracking and solving all possible soil and geological processes and problems associated with long-term intensive use of irrigation water class II mineralization, high content of chlorides, sodium and other factors that contribute to the development of negative processes of secondary salinization, salinization and soil degradation. For 55 years, when irrigated with water of class II with mineralization of 1.5-1.8 g/dm<sup>3</sup> on the background of closed horizontal drainage in the soil layer 0-75 cm there is a slight increase in total salinity by 1.2 times, and from the layer of 75-100 cm and to the critical depths of groundwater (1.80 m) there is a dangerous phenomenon of accumulation of salts, both general and toxic, salt maxima are formed and soils from unsalted (up to 0.20%) pass into the gradation of slightly saline (over 0.20%). Toxic salinization of southern chernozems for 50-55 years of irrigation increased in the layer of 0-75 cm on average from 0.05% to 0.06-0.07%, ie the soils remained unsalted. And in the horizons of 75-100, 100-125, 125-150, 150-175 cm the content of toxic salts increased to 0.16; 0.24; 0.29; 0.30%. This indicates the need for constant monitoring of this salt balance element and, in general, the development of measures for flushing irrigation against the background of continuous operation of horizontal drainage in the design mode with estimated drainage runoff 0.045 liter/second per 1 ha) without downtime and shutdowns of drainage pumping stations. The obtained data of long-term forecasts of salt accumulation in the soil layer of the aeration zone 0-75 cm indicate a constant increase in total salt reserves, but within 0.2%, and toxic salts up to 0.1%. However, starting with a layer of 75-100 cm and, in particular, 100-175 cm, it is possible to expect exceeding the limit of 0.2% for total salinity, and for toxic salinity 0.1%. The results of the study can be used as a basis for the formation of an expert system of ecological and agro-ameliorative monitoring, especially its block, which is aimed at controlling the problems of ecological and agro-ameliorative regime of irrigated lands of the dry steppe zone of Ukraine.

**Key words:** irrigation, soils, water-salt load, problems of ecological-reclamation regime of soils, horizontal drainage.

**Peretiak S.H., Rudik O.L. The current state and applied aspects of the development prospects of soybean production in Ukraine**

The study analyzes the current state and the tendencies in the development of the global and regional soybean production. We performed analysis of the statistical data concerning the crop production in the course of the average term showing an increase in the demand for soybean seeds and products of processing, positive dynamics of the national soybean production and a high potential of Ukraine in this segment of the

world production market. The purpose of the study is to evaluate the current state of soybean production and outline the promising directions in improving the technology of soybean production under specific conditions of the South of Ukraine. The research was conducted on the basis of the analysis and generalization of the official statistical information and the results of the national and foreign scientific studies. When conducting the research, we used dialectic, abstract-logical and analytical methods. In the course of the average term we performed evaluation of the regional crop production and indicated the available potential of growing the crop under irrigation under conditions of its renewal. The study determines the methods of impact of leading elements of the technology on realization of the crop biological potential under irrigated conditions. It indicates that an increase in the production is possible by implementing intensive competitive technologies. They must be based on using adaptive varieties, adapted to dry conditions and nutrition optimization by means of mineral fertilizers and applying modern poly-functional preparations, resource-saving schemes of soil tillage and adaptive schemes of plant protection. The study highlights that the basic element of any technology of soybean production is application of bio-preparations based on active strains of rhizobium bacteria. It emphasizes insufficient use of the potential of after-harvest soybean production on irrigated lands and the necessity of applying energy- and resource-saving environmentally friendly technologies under such conditions. We made a conclusion about the necessity to improve the technology of soybean production in after-harvest crops and practical importance of such scientific research.

**Key words:** soybean, productivity, production volumes, growing technology, irrigation, after-harvest crops.

#### **Rybalchenko A.M. Plasticity and stability of economic characteristics of soybean collection samples**

The main directions in soybean breeding are to increase yield and its stability with changes in environmental conditions, the creation of genotypes with the optimal duration of the growing season, increasing adaptability. This article presents the results of three years of research to assess the plasticity and stability of economic characteristics of soybean collection samples.

The regression coefficient ( $b_i$ ) for the length of the growing season varied considerably, from – 3.31 in the variety Merlin to 3.23 in the variety Eldorado. High plasticity on this basis was detected in 28 samples. Low values of stability variance and regression coefficient over the length of the growing season were combined in the ultra-early group – samples Bilyavka ( $b_i = 0.43$ ,  $S_i^2 = 0.33$ ), Lada ( $b_i = 0.43$ ,  $S_i^2 = 0.33$ ); in precocious – Denny ( $b_i = 0.26$ ,  $S_i^2 = 0.33$ ), VNIIOZ-76 ( $b_i = 0.43$ ,  $S_i^2 = 0.33$ ).

The samples differed in the parameters of plasticity and stability by seed weight of the plant. Among the ultra-early samples, Legenda ( $b_i = 0.93$ ,  $S_i^2 = 0.74$ ), OAC Vision ( $b_i = 0.35$ ,  $S_i^2 = 0.21$ ), Tanais ( $b_i = 0.88$ ,  $S_i^2 = 0.73$ ) were stable. ), LF-8 ( $b_i = 0.69$ ,  $S_i^2 = 0.16$ ). Among the precocious collection samples of soybeans, stable with low value stability variants over the years of study were – Constellation ( $b_i = 0.64$ ,  $S_i^2 = 0.31$ ), Nattawa ( $b_i = 0.03$ ,  $S_i^2 = 0.84$ ), Kharkiv 80 ( $b_i = 0.67$ ,  $S_i^2 = 0.37$ ), VNIIOZ 76 ( $b_i = 0.97$ ,  $S_i^2 = 0.76$ ), Khutoryanochka ( $b_i = 0.83$ ,  $S_i^2 = 0.91$ ), AS Bravor ( $b_i = 0.18$ ,  $S_i^2 = 0.16$ ), Lika

( $b_i = 0.3$ ,  $S_i^2 = 0.57$ ), Sribna Ruta ( $b_i = 0.17$ ,  $S_i^2 = 0.56$ ), Vasylykivska ( $b_i = 0.83$ ,  $S_i^2 = 0.43$ ). Among the medium-ripe stable samples – Sacura ( $b_i = 0.67$ ,  $S_i^2 = 0.39$ ).

Selected genotypes soybean that combined low values of stability variance and regression coefficient over the years of study, on the grounds of «duration of the growing season» and «seed weight per plant» are recommended for inclusion in breeding programs.

**Key words:** selection, soybean, collection sample, plasticity, stability, adaptability.

#### **Tishchenko A.V., Tishchenko O.D., Lyuta Y.O., Piliarska O.O., Kuts G.M. The density of alfalfa grass by years of life and slopes with different moisture supply**

**The goal** of the work. To evaluate the genotypes of alfalfa fodder direction of use under different conditions of moisture by shoot formation and to identify genotypes that would consistently reproduce a high level of economically valuable traits for the creation of new varieties. **Methods.** The research was conducted at the Institute of Irrigated Agriculture of NAAS during 2017–2020 pp. in the field on two humidifying backgrounds. **Results.** Studies have shown that both under irrigation and natural moisture conditions, the bushiness of plants differs by slopes, years of life by grass, depending on the biological properties of alfalfa genotypes. In the year of sowing alfalfa plants under irrigation had the lowest bushiness compared to subsequent years, in genotypes it increases from the first slope to the second with fluctuations from 387 pcs./m<sup>2</sup> to 667 pcs. (1 slope) and – 520–834 pieces m<sup>2</sup> (2 slope). In the third slope the attenuation of the process of shoot formation was noted and only in some numbers (Primorka / Sin (s), A.-N. d. № 38, M.agr/C.) It passed intensively (+ 14.7 + 32.1%) to the second slope). In the conditions of natural moisture supply there is an increase in the density of grass in the second slope compared to the first. Changes in this indicator on the slopes occurred differently depending on the biological characteristics of the genotype: in some, the process of shoot formation in the second slope was more intense than in the first, in others, on the contrary, it faded and the density of grass decreased. The weight of one stem in the first slope ranged from 0.13 to 0.27 g, in the second – 0.18–0.27 g and a decrease in the third to, 11–0.20 g. In the second year of life, the intensity of shoot formation increases markedly in the second slope, and then gradually fades. The most intensive process of formation of new stems in the second slope in relation to the first takes place in the populations: Son (s)/Primorka (+ 13.2%), Primorka/Sin(s) (+ 14.1%), Winter-hardy/M. K. (+ 17.4%), A.-N.d. № 15 (+ 18.6%), M.agr/C. (+ 19.5%), M.g./CP-11 (+ 22.5%), A.-N.d. № 38 (+ 30.5%). Starting from the third slope, the intensity of shoot formation in each subsequent slope was less than in the previous one. Under conditions of natural moisture in the second slope, genotypes are also characterized by a greater ability to form stems per unit area compared to the first slope, depending on the genotype + 2.7 + 43.7%, and in the third slope there is attenuation of this process, the number of shoots decreases by 26 , 2-68.1%. The mass of one stem fluctuated along the slopes, with its increase in the second slope: 0.20–0.36 (1 slope); 0.22–0.40 (2 slope); 0.22–0.32 (3 slope); 0.20–0.32 (4 slope). Under conditions of natural moisture, the first slope is characterized by the largest mass with fluctuations from 0.16 to 0.29 g. In the second slope there

is a gradual decrease in stem mass and it is from 0.14 to 0.26 g and reaches a minimum in the third slope (0,08–0,20 d). In the process of research the connection of green mass yield with the number of shoots per unit area was established. It varies depending on the year of life of grass and growing conditions with fluctuations: in the first year  $r = 0.51-0.68$  under irrigation,  $r = 0.44-0.79$  natural moisture, the second year  $r = 0.43-0.65$  and  $r = 0.55-0.85$ , respectively. **Conclusions.** The analysis of the results of the conducted researches allowed to establish that the populations of alfalfa differ from each other in the intensity of shoot formation by years of life of grass and slopes depending on the conditions of moisture. In the year of sowing,

alfalfa plants under irrigation had the lowest bushiness compared to subsequent years and it increases from the first cut to the second and decreases in the grass of the last cut. Under conditions of natural moisture, the number of shoots decreases in the second slope. In the second year of life with grass, the intensity of shoot formation increases markedly in the second slope, and then gradually fades. The relationship between the number of stems per unit area and the yield of green mass with fluctuations: in the first year  $r = 0.51-0.68$  under irrigation,  $r = 0.44-0.79$  natural moisture, the second year  $r = 0.43-0.65$  and  $r = 0.55-0.85$ , respectively. **Key words:** shoot formation, populations, irrigation, natural moisture, quantity, connection.