

## Summary

**Vozhehova R.A., Borovyk V.O., Rubtsov D.K., Marchenko T.Y. Seed productivity of midseason soybean variety "Sviatohor" depending on the seeding rate and nitrogen fertilizer rates under conditions of irrigation of southern Ukraine**

**Purpose.** The goal: to establish the survival of plants of the new medium-ripening variety of soya Svyatogor to harvesting, depending on the different thickening of plants against the background of nitrogen fertilizer in the conditions of irrigation of the south of Ukraine.

**Methods:** laboratory, field, statistical.

**Results.** The article presents the results of scientific work on the effect of doses of nitrogen fertilizer and the density of plants standing on the survival of soybean seeds of Svyatogor. It is proved that one of the main indicators of the crop structure - the density of plants, is the first in the formation of the level of productivity. During the vegetative period, the medium-ripening variety of soya Svyatogor showed slight loss of plants - at a level of 0.7-4.1%, depending on the density of their standing and the amount of nutrients. Over the years of research, with an increase in the seeding rate, the common for the medium-ripening soybean variety Svyatogor was a decrease in the density of standing of plants to harvest crops. On a plot without fertilizer applications at a seeding rate of 300 thousand ha, the number of plants that fell out was 2.0%, with an increase in the seeding rate to 600 thousand /ha, 2.2% were lost, up to 900 – 4.1%.

By the years of research, the above-described indicators fluctuated insignificantly. The maximum amount of plant loss was observed in the plots without fertilizer application at the seeding rate of 900 thousand pieces/ha of seeds and amounted to 36.3 thousand units. plants/ha. The main reasons for the fallout of soybean plants during the vegetation period were agrotechnical measures (inter-row cultivation of soil), pests, diseases. A special influence on the formation of the density of standing of plants for harvesting was a high rate of seeding. This is explained by the fact that during vegetation a part of plants die as a result of intraspecific competition, which is more pronounced with an increase in the number of plants per unit area. In these areas, the lighting of plants worsened, and the planting of the crops increased.

Sparse soybean crops led to excessive evaporation of soil moisture and the creation of favorable conditions for the development of weeds. On such crops uneven maturing of beans, their low attachment, breaking of branches under the influence of wind were observed, which leads to a decrease in yield and to large losses.

Thanks to the use of mineral fertilizers, the safety of soybean plants increased by 0.2 – 1.5% compared to the control. The best survival of plants during the growing season of soybeans to harvest was on the sites with fertilizer application with a dose of  $N_{60}$  and was 98.5%.

The density of standing of plants in different ways influenced the formation of a crop of soybean seeds.

Optimal for the medium-ripening hundredth soybean Svyatogor was the rate of sowing 600 thousand seeds / ha. Both a decrease in this indicator to 300, and an increase of up to 900 thousand led to a decrease in the yield of soybean seeds, and on different backgrounds of nitrogen nutrition. With a seeding rate of 300 thousand per hectare yields were less in options without fertilizers,  $N_{30}$ ,  $N_{60}$ , by 0.21; 0.59; 0.94 thousand pcs. / ha, respectively, compared with the optimal rate of 600 thousand pieces. seeds / ha. In the areas with thickened crops, yields were also reduced by 0.27; 0.39; 0.76 t / ha (options: without fertilizers,  $N_{30}$ ,  $N_{60}$ , respectively) in relation to the seeding rate of 600 thousand pieces./ha, however, by slightly lower indicators, except for the variant without fertilizers.

The application of nitrogen fertilizer significantly influenced the formation of the yield of seeds: according to its application, the excess over the variant without fertilizers averaged 0.55-1.67 t/ha. The maximum yield increase, 11.67 t/ha, obtained on the plot at the seeding rate of 600 thousand pieces./ha and application of nitrogen fertilizer in the amount of 60 kg/ha, minimum - 0.55 t/ha, 300 thousand seeds/ha and application of 30 kg/ha of nitrogen fertilizer. It should be noted that for the greater density of sowing (900 thousand pieces/ha) against the background of nitrogen nutrition, the yield was increased by 0.24-0.26 t/ha higher than at the sowing rate of 300,000 pcs./ha.

**Conclusions.** With an increase in the seeding rate from 300 to 900 thousand pieces. seed / ha common to the medium-ripening variety of soybeans Sviatogor was a decrease in the density of standing plants to harvest crops. The maximum number of dead plants was observed on plots without fertilizer application at the seeding rate of 900 thousand pieces. / ha and amounted to 36.3 thousand units. plants/ha.

Thanks to the use of mineral fertilizers, the safety of soybean plants increased by 0.2 – 1.5% compared to the control. The best survival of plants during the growing season of soybeans to harvest was on the sites with fertilizer application with a dose of  $N_{60}$  and was 98.5%.

The maximum yield increase, 11.67 t/ha, taking into account the surviving plants for the growing season, obtained on a plot with a seed rate of 600 thousand pcs./ha and the application of nitrogen fertilizer in the amount of 60 kg/ha, the minimum - 0.55 t/ha, with the norm of sowing 300 thousand seeds/ha and applying 30 kg/ha of nitrogen fertilizer.

In order to obtain the planned density of plant standing, their survival should be taken into account, depending on the thickening of the crop against the background of the application of nitrogen fertilizer. For the medium-ripening soybean variety, Svyatogor, the optimal seeding rate is 600 thousand seeds per hectare, with application of 60 kg/ha of nitrogen fertilizer.

**Key words:** leguminous culture, ammonium nitrate, watering, density of standing, plant conservation.

**Vozhehova R.A., Biliy V.M. Accumulation of aboveground mass and structure of seed yield of winter wheat varieties depending on the terms of sowing and fertilizing in the conditions of the Southern Steppe of Ukraine**

The aim is to determine the dynamics of formation of above-ground mass indicators and yield structure of winter wheat varieties depending on the terms of sowing and fertilization for growing on seed plots in the conditions of the Southern Steppe of Ukraine.

Methods. Field, laboratory, dispersion.

Results. It was determined that the highest level of raw mass accumulation on winter wheat seed crops was observed in Antonivka cultivar – 42.3 t / ha, and on Maria and Blago cultivars this indicator decreased by 3.9 and 4.5%, respectively. The late sowing period was the most favorable, in terms of the formation of high rates of raw weight. Application of fertilizers contributed to the growth of the studied indicator by 12.1-21.7% compared to the control variant. The average daily increase in dry matter reached the highest values in the period of “earring – grain filling”: Antonivka – 285 kg / ha, Blago – 269 kg / ha, Maria – 254 kg / ha. The interphase period from vegetation recovery to tubing and from grain filling to milk ripeness was characterized by a relatively low average daily increase in dry matter. Indicators of dry matter of winter wheat in the wax phase of the grain were weakly dependent on the varietal composition and sowing dates. Application of mineral and microfertilizers according to the maximum scheme of permission to obtain the highest yield of winter wheat dry matter from seed crops at the level of 19.1 t / ha, which is more than other fertilization schemes by 12.2-13.4%, and for the control option – at 21.7%.

Conclusions. It was found that the yield of seeds from winter wheat grain, depending on the varietal composition (factor A) almost did not differ and was: Antonovka – 71.6%, Blago – 71.5, Maria – 72.9%. The sowing date also had a negligible effect on this indicator, but there was a tendency to reduce seed yield in all varieties under conditions of early sowing in the second decade of September. The use of fertilizers led to an increase in seed yield by 1.5-5.9 percentage points. During the first sowing period, the number of productive stems under the condition of applying microfertilizers in the variety Antonivka was 497-574, Blago – 567-575, Maria – 596-631 pieces, and during the third sowing period it increased by 5.2-15.9, 2, 6-3.3 and 3.6-5.4%, respectively. Microfertilizers also affected the number of productive stems. Thus, this figure in varieties of winter wheat in fertilized versions was higher by 10-103, 17-53, 5-44 pcs., Compared with the option without fertilization by sowing dates. The largest number of grains in the ear is also observed when sowing at a later date.

**Key words:** winter wheat, seeds, variety, sowing period, fertilizers, raw mass, dry matter, seed yield, yield structure.

**Hranovska L.M., Lykhovyd P.V., Zhuzha P.V. Assessment of the hydrogeological and meliorative state of the irrigated lands of the Right Bank territory of Kherson region**

The article contains the results of investigations devoted to assessment of the hydrogeological and meliorative state of the irrigated lands and factors of its formation at the territory of the Right Bank of Kherson region. **Goal.** The goal of the scientific investigation is to study the possibilities of renovation and development of irrigation at the territory of the Right Bank part of Kherson region on the basis of investigation of the hydrogeological and meliorative state of the irrigated lands by the indexes of hydrogeological, ecological and toxicological characteristics. **Methods.** The methodology of the investigation based on the use of the modern scientific methods, viz.: analysis, synthesis, induction and deduction, mathematical statistics, systematic approach, and analysis. **Results.** It was established that aquifers of the zone of active water exchange of the Right Bank territory are represented by ground waters and interlayer ground waters. The mineralization of the ground waters increase from fresh and slightly saline (0.5–2.6 g/L) to highly saline (4 g/L), and unsuitable for irrigation and household water supply. It was proved that the effect of irrigation on the regime of ground waters level at the Inhulets massive of the Right Bank territory depends on a number of factors: the initial depth of the aquifer, distance from the source of irrigation, technical parameters of the source of irrigation (channels, irrigated plots with different ways of irrigation, irrigation machines, engineering status of water facilities), surface relief, conditions of water-use, filtration properties of the local water-holder, weather conditions. The analysis of the ground waters level regime directly at the irrigated plots shows that the first year of the irrigation systems exploitation is a period of saturation of the aeration zone with waters which infiltrate from the irrigation systems. A continuous, gradual increase of the level begins from the second year and lasts with the speed up to 1.0 m/year. From the depth of 4–5 m from the soil surface, the seasonal fluctuations of the ground waters level begin which are connected with the irrigation regime and evapotranspiration intensity. Their amplitude is higher with lower depth of the ground waters. Under the ground waters depth of 3 m, yearly fluctuations decrease, seasonal – increase, and their amplitude gets practically aligned. In the zones near the channels of the inter-farming distributive channels with the bandwidth of 2–3 m/sec which are usual for the Inhulets massive within Kherson region, ground waters formation was the most intensive. The main features of the ground waters regime were the same as at the irrigated fields, however, the speed of the level increase was fixed as 1.5–2.0 times higher. Northern part of the Right Bank territory of Kherson region that is characterized with small irrigation systems and areas of the «local» irrigation can be classified as the zone of the minimum influence of the irrigation meliorations. The source of irrigation here is the Kakhovka reservoir, the Dnipro river, the Inhulets river and ground waters of the main Neogene aquifer. It was established that the main sources of the salts to the soils and subsoil layer are natural and anthropogenic factors. According to the data of the last three soil-salt surveys at the Right Bank territory of Kherson region at the irrigation systems, the areas of salinization did not change. At the territory of the Inhulets irrigation massive of the Right Bank the area of salinization raised up to 358 ha. In the course of the researches, the assessment of the ecological and toxicological state of the irrigated lands and factors of its formation at the territory of the Right Bank of Kherson region.

ecological state of the irrigated lands by the soil pollution with heavy metals was performed. The main sources of pollution are lithosphere, anthropogenic and technogenic activities. The heavy metals release from the lithosphere by the deflation processes of rocks that mainly depends on the content of the rocks and climate. **Conclusions.** Proceeding from the above-mentioned evaluation of the hydrogeological and meliorative, and ecological and toxicological state of the irrigated and the adjoining agricultural lands the most attractive for renovation and development of irrigation is Northern part of the Right Bank territory. The territory harmoniously combines fertile soils, qualitative irrigation water of the first class from the Kakhovka reservoir, satisfactory hydrogeological and meliorative state of agricultural lands and settlements territories. Expansion of the irrigation areas at the existent irrigation systems we recommend to conduct gradually – 15–20% per year with further outlet to the project power after 5-8 years

**Key words:** Right Bank of Kherson region, hydrogeological and meliorative state of soils, irrigation, flooding, salinization, filtration feeding, ecological and toxicological state of soils, renovation and development of irrigation.

**Zaiets S.O., Kysil L.B. Growth and development of varieties of barley of winter in autumn depending on hydrothermal conditions, sowing dates and growth regulators**

**Purpose.** Determine the influence of agrometeorological conditions, sowing dates and Growth Regulators Gumifield Forte Brix, MIR and PROLIS on plant growth and development during the autumn vegetation during the cultivation of winter barley varieties in irrigated lands. **Methods.** The research was conducted at the Institute of Irrigation Agriculture of the NAAS on methods of field and laboratory research on irrigated lands (IIA NAAS, 2014). **Results.** It has been established that during the years of research the hydrothermal conditions and the duration of the autumn period of the winter barley vegetation were significantly different. For sowing on October 1, the duration of the autumn vegetation period in 2016 was 45 days, and in 2017 – 102 days. During the sowing of October 20, barley plants of the winter vegetated, respectively, 25 and 81 days. During the autumn vegetation, depending on the sowing dates, the sum of effective temperatures (above 5°C) ranged from 50.7 to 156.8°C in 2016 and from 159.0 to 314.4°C in 2017. The uneven sum of effective air temperatures in the years of research has differently influenced the growth processes of barley winter. The positive effect of seed treatment by growth regulators on the growth and development of plants in the autumn period of vegetation was revealed. **Conclusions.** Agro meteorological conditions of the autumn period and the timing of sowing significantly affect the growth processes of plants of varieties of barley of winter: for warm and long autumn vegetation, plants develop well for sowing, as of October 1 and October 1, and in cool conditions, on October 1. Under favorable meteorological conditions, ninth-grade plants are better developed, and for unfavorable – there are no advantages of one sort over the other. Application of Growth Regulators Gumifield Forte Brix, MIR and PROLIS for seed treatment promotes not only the increase of the aboveground mass, but also increases the bushiness.

**Key words:** agrometeorological conditions, winter barley, varieties, sowing dates, growth regulators.

**Kalenska S.M., Novytska N.V., Maksin V.I., Karpenko L.D., Kaplunenko V.H., Doktor N.M. Planting crops of grain and leguminous crops by pumping metal nanoparticles, fertilizing nanoparticles and immunomodulators**

The **purpose** of the study was to determine the effect of presowing treatment with microfertilizer of carboxylates of natural acids Avatar–1, immunomodulators of lodos concentrate and lodos concentrate + Se and colloidal solutions of metal nanoparticles ( $10^{-9}$ ) on germination energy and laboratory germination of soybean, bean and lentil seeds. **Methods.** The sowing qualities of soybean seeds were determined according to the methods of DSTU 4138–2002 in the laboratory of «Quality of seeds and planting stock» of the Department of Plant Cultivation of the National University of Bioresources and Nature Management of Ukraine. **Results.** The energy of germination of soybean seeds when processing lodos with concentrate exceeded the control variant of studies by 2%, beans by 9%, lentils by 6%; the laboratory germination of seeds was increased in the range of 1–5%. Seed collection before seeding with the immunostimulant lodos concentrate + Se increased the germination energy by 8–13% relative to control, laboratory germination – by 4–8%. The increase in the seed quality of seeds is facilitated by the use of molybdenum and manganese nanoparticles, while the laboratory germination of soybean seeds is increased by 5%, beans by 7%, lentils by 12%. **Conclusions.** The positive effect of presowing treatment of microfertilizer of carboxylates of natural acids Avatar–1, immunomodulators of lodos concentrate and lodos concentrate + Se and colloidal solutions of metal nanoparticles ( $10^{-9}$ ) on the sowing quality of seeds of leguminous cultures was established.

**Key words:** soybean, beans, lentils, seeds, germination energy, laboratory germination, Avatar–1, lodos, metal nanoparticles.

**Knyazev A.V., Reznichenko N.D., Lopata N.P. Effect of green manure fertilizers on the contamination of crops and crop yields in a crop rotation on irrigation using different methods and depth of tillage**

**Purpose.** To investigate the influence of green manure fertilizers on the contamination of crops and crop yields in a crop rotation on irrigation using different methods and depth of tillage. **Methods.** Field, laboratory, statistical, and comparative. **Results.** The article presents the results of experimental researches regarding influence of green manure fertilizers on the contamination of crops and crop yields in a fast crop rotation on the irrigation using different ways of primary tillage, direct sowing and sideration. It is established that the application of green manure provides reduction of weed under all methods of soil tillage. Under the same doses of mineral fertilizers there were 4-11 pcs/m<sup>2</sup> fewer weeds in corn crops, 1-4 pcs/m<sup>2</sup> – in soybeans, 13-31 pcs/m<sup>2</sup> – in winter barley crops, and 4-15 pcs/m<sup>2</sup> – in winter wheat crops using the green manure background than in same crops without green manures. The smallest number of weeds with less biomass were formed during sowing of crops under deep chisel tillage, while more weeds were

formed during sowing of crops in untreated soils, which led to the oppression of crops and, consequently, poor yields. The use of post-mortem green manures provided better conditions for the development of plants, and as a result, higher yields of crops were obtained. **Conclusions.** Application of green manure provides reduction of weed during seeding of all crops in a crop rotation up to 19-49%; improvement of agrophysical parameters of dark-chestnut soil: reduction of its density and the growth of the total porosity up to 0.4-6.3%; increase in yields of corn up to 5.9%, soybean – 10.2% winter wheat – 4.7%, barley winter – 12.9%.

**Key words:** tillage, No-till technology, crop rotation, green manure, weeds, crop yield.

**Kovalenko A.M., Novokhyzhnii M.V., Tymoshenko G.Z., Piliarskyi V.G., Kazanok O.O. Productivity and water consumption of sunflower depending on its place in crop rotation and soil tillage systems**

**Purpose.** To substantiate the optimal placement of sunflower in crop rotation and the parameters of an economically feasible system of basic soil cultivation. **Methods.** The research was carried out on non-irrigated dark chestnut soils of the Institute of Irrigated Agriculture in a stationary two-factorial experiment on generally recognized methods in agriculture. **Results.** Modern hybrids of sunflower react differently to the conditions of moisture. The most stable yields during the years of research were provided by hybrids Time, Watson and Cyril, who least used the moisture to form their own crop. The highest yield of all hybrids was formed in the wet 2015 – 2,00–4,12 t/ha, when the time of sowing in the meter layer of soil contained 142 mm of moisture, and the amount of precipitation for vegetation was 142,9 mm. In 2016, moisture reserves were 26,8% lower, which led to a reduction in yield almost twice. The transfer coefficient ranged from 688–965 to 1661–1975 m<sup>3</sup>/t depending on the hybrid and year. The moisture content of the time of sowing largely determines the yield of sunflower – the correlation coefficient between them is 0,81–0,88. **Conclusions.** The yield of sunflower was higher in crop rotations with black steam and for carrying plowing. The share of influence of the place of placing sunflower on its yield was 17–29%, and cultivation of soil – 51–75%.

**Key words:** water supply, hybrid, correlation, formation, yield.

**Maliarchuk N.P., Bulyhin D.A., Maliarchuk A.S., Isakova G.M., Mishukova L.S. The productivity of winter rape at different terms moistening and background of mineral feed**

**Purpose.** Study of influence of the modes of irrigation, mineral fertilizers and additional fertilizing "Kristalon" on a height and producing processes of winter rape in the conditions of south Steppe. **Methods.** The field, in-gravimetric, visual, laboratory, calculation-comparative and mathematically-statistical methods with the use of confessedly in Ukraine methods and methodical recommendations. **Results.** The total water consumption of rape depended on the terms of vlagooobespechennosti plants. A maximal total water consumption of culture was at 70% HB in p.c. a 0,5 m during a vegetation are a 3018 m<sup>3</sup>/of ha. On the variant of 60% HB in p.c. a 0,5 m it folded is

2883 m<sup>3</sup>/ha. On the irrigated variants a coefficient of water consumption was 1090 and 1186 m<sup>3</sup>/t. most of water, which was needed for forming of a 1 ton of rape the winter-annual is marked on a variant without irrigation (1386 m<sup>3</sup>/t). Most recouperment of watering water was at the observance of humidity in the calculation layer of soil a 0,5 m at the level of 60% HB and made 1,09 kg/of m<sup>3</sup>. The best results of the productivity were provided by application of fertilizers in the norm of N<sub>60</sub> jointly with preparation "Crystalon". The greatest harvests were got on a variant with maintenance of humidity of soil at the level of 70% HB in p.c. a 0,5 m, basic bringing of fertilizers in the norm of N<sub>60</sub> jointly with Crystalon and 2,67 made and 2,95 т/ha, accordingly. **Conclusions.** Highest level of the productivity of rape winter on the years of researches (2,90-3,20 т/ha) the dose of fertilizers of N<sub>60</sub> provides jointly with Crystalon at support before watering threshold of moistening at the level of 70% during a vegetation.

**Key words:** winter rape, mode of irrigation, productivity, background of mineral feed.

**Sakhnenko V.V., Sakhnenko D.V. System indicator of management mechanisms and monitoring of winter wheat pests in the Forest-Steppe of Ukraine**

**The purpose of the research.** Features of monitoring and control of harmful insect species on winter wheat crops under modern farming systems in the research region are highlighted. Specific features of biology and ecology of pests of stems and root system of wheat winter in the region of research are specified. **Results.** Refined individual mechanisms of formation of the entomocomplex in agrocenoses depending on the number of soil and phyllophagous phytophages. The cumulative pest feeding rates for the actual population of the species at different stages of ontogenesis of cereal crops were determined. The effectiveness of the application of remote, computer and laboratory methods for the study of phytophagous organisms has been estimated, which also multiplies under new crop protection systems. The developed models of the seasonal prediction of the number of winter pests of winter wheat from internal stem pests in the Forest-Steppe of Ukraine.

**Key words:** winter wheat, black wheat fly, Swedish fly, structure of the entomocomplex, forecast.

**Stefaniuk V.Y. Ecological and agronomical basics of stevia introduction (*Stevia rebaudiana* Bertoni) in the Forest-Steppe and Steppe of Ukraine**

**The purpose** of the research was to find out morphological and agronomic characteristics and economic value of stevia varieties, their ecological plasticity and adaptability to the new soil-climatic and agroecological conditions when introduced into the Forest-Steppe of Ukraine. **Methods.** Laboratory (*in vitro*), field, analytical, statistical. **Results.** Based on the analysis of the peculiarities of the growth, development, and productivity as affected by optimization of the varietal composition, methods of propagation, plant density, doses of fertilizers, water regime, and hydrothermal conditions vegetation during period, the theoretical substantiation is given and the feasibility of stevia introduction into production in the Forest-Steppe and Steppe of Ukraine is substantiated. The

productivity of stevia is subject to the interaction of biological, environmental, and agronomical factors. To increase organic matter yield is possible by increasing the growing season, leaf area and the net productivity of photosynthesis. The productivity of photosynthesis was significantly affected by growing new high-yielding tetraploid hybrids providing drip irrigation, fertigation, optimal rates of mineral fertilizers for the soil and foliar dressing. The following methods of stevia propagation were substantiated: tissue culture (*in vitro*), with cuttings and seeds. The method of stevia propagation with cuttings turned out to be one of the most effective. Carried out in April along with the application of optimal doses of mineral fertilizers and the nutrient ratio (NPK)<sub>60</sub> and (NPK)<sub>75</sub> it significantly accelerates plant establishment, growth, and development. It was experimentally proved that the highest productivity of plants (yield of green mass of 34.2 t/ha and dry mass of 3.4 t/ha) was reached when propagating stevia with seeds: seeding stimulated seeds at 4–5 plants per 1m in late May. **Conclusions.** Integral application of technological and organizational-economic factors, such as growing stevia in the most favourable regions of Ukraine, appropriate logistics and intensive growing technology (drip irrigation, foliar dressing) provide the cost of one plant produced *in vitro*, using cuttings and seeds 0.24, 0.15 and 0.12 UAH, respectively with a profitability level of 86,146 and 183 %, respectively.

**Key words:** stevia, morphology, biological features, methods of propagation, seed stimulation, plant density.

**Khomina V.Ya., Stroyanovsky V.S. Influence of a complex of technological measures on plant productivity and economic indicators for the cultivation of fennel in the conditions of the Western Forest-Steppe**

**Purpose.** Purpose is to determine terms of sowing, row spacing and seeding rate on the productivity of fennel plants and the feasibility of growing in the conditions of the western Forest-Steppe. **Methods.** Field studies were accompanied by observations, records, and analyzes that were performed in compliance with the requirements of scientific agronomy described by B.A. Dospekhov, V.F. Moiseychenko and V.O. Yeshchenko. Harvesting was carried out by the method of continuous fractional threshing. Statistical processing of the results of the research was carried out using the method of dispersion analysis. **Results.** The research has established the best time and method of sowing of fennel in the conditions of the western Forest-Steppe. The crop yield showed that the maximum indicator of 1.20 t / ha was received for sowing in the 1-st row (for RTR 6-8<sup>0</sup>C) with row spacing of 45 cm, seeding rate of 1 million / ha. The expediency of growing fennel in the conditions of the western Forest-Steppe is proved, which is proved by calculations of economic efficiency. The profitability level fluctuated within 50-182%. **Conclusions.** The results of studies have shown that plants form seeds in the first year of vegetation. A significant advantage was observed for the yield of the first seeding period (according to RTR 6-8<sup>0</sup>C) with row spacing of 45 cm, seeding rate of 1 million / ha.

**Key words:** fennel, sowing period, row spacing, seeding rate, yield, profitability level.

**Balashova G.S, Kotova E.I, Yuzyuk O.O., Kotov B.S. Influence of amber acid on intensivity of potato tuber formation of cultivars of different ripening groups in in vitro conditions**

**Purpose.** Determine the optimal mode of potato cultivation *in vitro*, depending on the concentration of succinic acid and the cultivars of different ripening groups to increase the yield of the improved seed material. **Methods:** comprehensive use of laboratory, mathematical-statistical, computational-comparative methods and system analysis. **Results.** The experimental data on the effect of the concentration of succinic acid in the nourishing environment on the growth, development, and productivity of potato *in vitro* cultivars of different ripening groups are presented. **Conclusions.** Based on the results of two years of research on the effect of succinic acid concentration on the potato tuber formation rate in *in vitro* conditions, the best performance indicators were obtained when growing the Yavir cultivar with an amber acid content of 1.0 mg/l, the mass of the average microtuber was 505.7 mg, microtuber mass per plant – 503.0 mg the yield of microtubers weighing more than 350 mg – 83.2% with the intensity of tuber formation 101.0%. The addition of succinic acid in the cultivation of Kobza cultivar of different concentrations significantly reduced the yield of microtubers

**Key words:** *in vitro* culture, growth regulator, seed material, microtuber, productivity.

**Vozhegova R.A., Balashova G.S., Boyarkina L.V. Seed potato yield at the early harvesting time in irrigated south Ukraine**

**Purpose.** Investigate the influence of the density of planting and the time of removal of the tops of irrigated seed potatoes during early harvesting for the formation of tuber harvest, its quality and economic efficiency. **Methods of research:** field, analytical, mathematical-statistical. **Research results.** The analysis of the three-year researches obtained data showed that on average for three years, the harvest at the removal of the peduncle on June 15 and the density of 40, 60 and 80 thousand pcs/ha was 43,1; 47,0; 42,0 % below the control variant crop without removing the hedge. After 5 and 10 days after the stalk first removal, the yield in terms of planting density was 28,5; 28,0; 23,0 % and 8,3–5,6; 3,0; 5,0 % lower than control. So, the later the heath was removed, the less was the harvest lack. **Conclusion.** An economically justified density is 40 thousand tubers per hectare. An increase in planting density to 60 and 80 thousand helps to obtain higher yields, but the increase practically does not exceed the extra spent potato amount at planting. Irrespective of the planting density of potato plants, by June 15 accumulates about 55% of the harvest of early harvesting, by June 20 – about 70%, to June 25 – more than 90%.

**Key words:** seed potato yield, early parfesting period, irrigation, planting density, removing the hedge period.

**Vozhegova R.A., Krivenko A.I. The effectiveness of the application of different fertilizer systems in the cultivation of winter wheat, depending on predecessors and weather conditions**

**Purpose.** To study the effectiveness of the use of mineral and organic fertilizers in the cultivation of winter wheat in the Southern Steppe of Ukraine, depending on the predecessors and weather conditions

of the growing season. **Methods:** field, laboratory, analytical. **Results.** According to the results of generalization of long-term field research data, it was established that, depending on the predecessors, the yields of wheat grain in winter for the predecessor black pair during the first 34 years averaged 12.7%, the next eleven – 32.9%. With the deterioration of the quality of the precursor, the absolute yields decrease with respect to the black pair, but the increments relative to the zero variant grow in the series sideral steam → pea → corn MAS → stubble predecessor - from 34.2 to 71.9%. **Conclusions.** At a high level of fertility of the black soil of the southern by the content of available forms of phosphorus and potassium, the doses of fertilizers  $N_{60}$  and  $N_{60}P_{30}K_{30}$  are most effective. The payback of 1 kg of nitrogen by grain growth at a dose of application of  $N_{60}$  is 14.3 kg/kg, at  $N_{120}$  – 14.0 kg/kg and  $N_{180}$  – 10.7 kg/kg; agronomic efficiency was practically the same when one nitrogen was applied in pure form and against the background of  $P_{30}K_{30}$ , and against the background of  $P_{60}K_{60}$  – a higher one by 71.4; 14.3 and 8.8%. Mineral and organo-mineral fertilizer systems with long-term use provide a high content of protein and gluten in the grain, which meets the requirements of Class 2. On average for 2007–2017 research mineral fertilizers contributed to an increase in the protein content by 1.11–3.25 absolute percent, and the gluten content by 3.0–10.5%.

**Key words:** winter wheat, fertilizer, predecessor, weather conditions, productivity, quality.

**Vozhehova R.A., Rudik O.L. Power analysis of technologies of growing of flax of oily on unwatering and irrigated lands South of Ukraine at different charts of the use of products**

**Purpose.** To define power efficiency of technologies of growing of the flax of oily on unwatering and irrigated lands South of Ukraine at the different charts of the use of the got products. **Methods.** Researchers conducted during 2009-2013 in the field and irrigated crop rotations of the Askaniyska SA RS of Institute of the Irrigated Agriculture of NAAS, which is located in the Kakhovka District of the Kherson Area. The bookmark of experiments, realization of supervisions and power analysis, was carried out in accordance with the confessedly and special methods of researches. **Results.** The conducted biopower estimation of technology testifies that growing of flax oily is power expedient, and expenses of energy are at the level of most spring field cultures of not intensive type. Most substantially the expenses of energy grow as a result of bringing of mineral fertilizers and irrigation. The terms of sowing unimportant influenced on the expenses of energy, however stably diminished Kee from the early to the last term sowing. The most increase of energy and coefficient of power efficiency are provided by the norm of sowing 6 million per ha. **Conclusions.** Thus, application of plastic, adapted to the terms of growing, high-yield varieties of flax provides the increase of power efficiency of their growing. The variants of technology of cleaning up of culture on seed differ on the expenses of energy no more than on 7.1%. Pre-harvest десикація sowing gives considerable advantages at cleaning up and is power reasonable. The least power-hungryness – 10.4 GJ/t, and the greatest to Kee – 1.97 were got during realization of direct combining after десикації That will do 2 l/ha. The purveyance of straw requires the increase of power

expenses in 1.39-1.46 time; however arrival of energy in 2.38-2.47 time exceeded expenses. The technological use of straw promotes to Kee on 0.16-0.83 units.

**Key words:** flax is oily, sort, irrigation, natural moistening, fertilizers, term of sowing, width of space between rows, energy efficiency.

**Kobilina N. O., Liuta Yu O, Kuts G. M. Characteristics of economically valuable characteristics of hybrides of F<sub>4</sub>–F<sub>7</sub> tomato of the Institute of irrigated farming**

**Purpose.** The aim of the research is to analyze the biochemical and economically valuable features of the new promising tomato lines adapted to the conditions of the south of Ukraine, suitable for mechanized harvesting. **Methods.** Field, laboratory, and statistical methods were used to conduct the studies. When creating tomato lines, hybridization and selection were used. **Results.** In 2011-2015 years. 431 samples were studied at the Institute of Irrigated Agriculture: 130 lines F<sub>4</sub>, 126 – F<sub>5</sub>, 93 – F<sub>6</sub>, 82 – F<sub>7</sub> for 30 plants of each sample. The best hybrid combinations have been singled out in terms of the productivity of one plant and combination, which have the largest number of fruits on the plant, single fruit, high biochemical indicators of fruit content. **Conclusions.** Promising tomato lines will be the basis for the selection of new high-yield varieties adapted to mechanized harvesting, adapted to the conditions of the south of Ukraine, which will contribute to an increase in the volume of tomato products, the strengthening of the material base of farms and the renewal of the positions of the domestic commodity producer.

**Key words:** tomato, selection, variety, standard, yield, marketability, weight of fruit, quality of products.

**Kovalenko A.M., Kiriya Yu.P. Photosynthetic activity of seed crops of winter wheat depending on growing conditions**

**Purpose.** Study of the peculiarities of growth and development of new varieties of winter wheat plants, during its seeds cultivation in different crop rotations under increasing climate dryness. **Methods.** The research was carried out in 2015-2017 on non-irrigated lands of the experimental field of the Institute of Irrigated Agriculture of the National Academy of Sciences in a stationary two-factorial experiment on the study of crop rotation in the generally acknowledged agriculture methodologies and guidelines with two winter wheat varieties, namely Khersonska 99 and Ovid. **Results.** After the release of plants in the tube, the daily growth of dry matter increases by 1.9-3.4 times compared with the previous interphase period. Mostly it grows in 2016 – 3.2-3.4 times in the Khersonska 99 variety and up to 1.9-3.5 times in the Ovidij variety, when in the beginning of spring, the smallest biomass was observed in these crops. Dry biomass of winter wheat crops in the ear staining phase is 78.9-84.5% of its total amount in the milk ripeness phase and reaches 116.1-142.8 centners per hectare in Khersonska 99 and 124.0-150.8 c / ha in Ovidij variety. The largest leaf assimilation area happens in the ear stapling phase – 44.1 – 52.0 thousand m<sup>2</sup> / ha in Khersonska 99 and 46.8 – 54.3 thousand m<sup>2</sup> / ha in the Ovidij species. **Conclusions.** In all years of research and after all predecessors FP (photosynthetic potential) was higher by 6.0-10.6% in Ovidij variety compared to the Khersonska 99 variety. By black steam it was 8.2-12.0% higher than after a sider pair and 14,5-17,0% higher than after flaxseed.

**Key words:** biomass, variety, photosynthesis, Khersonska 99, Ovidij.

**Kosenko N.P., Pohorielova V.O. Photosynthetic activity of tomato plants depending on the scheme of sowing and fertilization in the Southern Steppe of Ukraine**

**Purpose** is to determine the influence of sowing and fertilization schemes on the leaf area and the photosynthetic potential capacity of tomato plants for the irrigation of the Southern Steppe in Ukraine.

**Research methods.** In the course of research was used the complex of field, laboratory, comparative-calculation, mathematical-statistic methods and system analysis. **Research results.** It is established that the area of the leaf surface of tomato plants increases from the phase of «flowering» to «fruiting», with a gradual decrease in the «achievement» phase. Indicators of the photosynthetic potential of the Yuvileynyy variety, on the average of the experiment, dominate the Lehin variety depending on the interphase period. Under the sowing scheme 50+100 cm, the value of the photosynthetic potential was higher by 48.0%. The use of fertilizers contributed to an increase in leaf area and photosynthetic potential. The largest indicator of photosynthetic potential during the period of «fruit-forming-reaching» 2132.6 thousand m<sup>2</sup>\*days/ha was noted in the Yuvileynyy variety for the combination of mineral and organic fertilizers with Plantafol for the scheme of sowing 50+100 cm. **Conclusions.** The choice of variety, the scheme of sowing and fertilization of tomato plants has a significant impact on the photosynthetic activity of tomato plants.

**Key words:** tomato, leaf area, photosynthetic potential, interphase period, sowing scheme, fertilization.

**Kosenko N.P. Serheev A.V. The productivity of carrot (*Daucus carota* L.) mother roots depending on the elements of technology**

**Purpose.** Improvement of basic elements of the technology of cultivating mother roots the carrots at drip irrigation in the conditions of the south of Ukraine.

**Methods.** The researches were based on complex use of field, calculated-comparative mathematical-statistical, methods and system analysis. **Results.** The studies concluded that root crops productivity at early sowing was by 8,6% more, than at sowing in the second ten-day interval of June. Fertilizer application of calculated dose promotes increase of productivity of root crops by 16,0% compared with control (without fertilisers). Increase of plant density of growing from 0,6 to 1,0 million pieces/ha promotes growth of productivity of mother root crops by 19,9%. **Conclusions.** The highest productivity 60,2 t/ha and it's received at sowing in the first ten-day interval of June, fertilizer application of calculated dose and density of growing 1,0 million plants by hectare.

**Key words:** carrots, mother root crops, stecklings, drip irrigation, productivity.

**Nesterchuk V.V., Kokovihin S.V., Mrinskiy I.M., Karashchuk G.V., Kotovska Ju.S. Influence of differentiation of density of standing of plants and a fertilization background on efficiency and quality of seeds of the sunflower hybrids in the conditions of the south Ukraine**

**Purpose.** To investigate influence of density of standing of plants and complex fertilizers on productivity and quality of seeds of hybrids of sunflower at cultivation in not irrigation conditions of the South of Ukraine. **Methods of researches.** Field, laboratory, analytical, mathematic-statistics. **Research results.**

Advantage of cultivation of a hybrid the Megasan which has generated average productivity of seeds 2,41 т/а with the maximum growth on 8.7–13.8 %, to 2.62-2.74 т/а at density of standing of plants of 50 thousand/а and processing of crops by preparations of Vukсал and the Master is proved. Application of microfertilizers provides a gain on all investigated hybrids, especially a preparation the Master. Among studied factors the greatest relative density drops to hybrid structure - 35.1%. The maximum contents of fat in seeds have been fixed at hybrids the Megasan – 36.9 % and Dariy – 35.4 %. The conditional exit of sunflower-seed oil about 1 hectare of an area under crops of a maximum level – 1078 kg, has reached at cultivation of a hybrid the Megasan at density of standing of plants of 50 thousand/а and processing of crops by a preparation the Master. **Conclusions.** At sunflower cultivation on dark-chestnut soil in not irrigation conditions of the south of Ukraine the highest productivity within 2.5–3.0 т/а the hybrid forms the Megasan. It is proved that at cultivation of investigated culture density of standing of plants should be corrected depending on genetic potential of hybrids – for hybrids the Megasan and Jason optimum density is 50 thousand/а, and for a hybrid of Dariy – 40 thousand/а. Processing of crops of sunflower by complex fertilizers provides a productivity gain on 10.7–20.9 % and improves quality of seeds, and the greatest efficiency characterises complex fertilizer the Master.

**Key words:** sunflower, hybrids, density of standing of plants, fertilizers, productivity, potency of influence of factors, quality of seeds.

**Tyshchenko O.D., Tyshchenko A.V., Kuts H.M., Pilyarska O.O. About the root system of Lucerne**

The article gives a literature review about the root system of alfalfa. It is known that longevity, growth, formation of the above-ground mass, productivity depend on the development of its root system. In alfalfa, the stem root is distinguished with developed lateral roots. But there are other forms of the root system, which are formed in many varieties of variable and yellow alfalfa. They form several developed branched main roots, as well as long-rooted-stem type. For a number of ecotypes crescent-shaped and northern, root-growing and rhizome root systems are characteristic. The most complete characterization of the forms of the root system of alfalfa is provided by a wide unified classification of the genus *Medicago* L. *Falcago*, which provides for five forms of the root system in alfalfa: core, rod-branched, rod-fibrous, highly branched, rod-rhizome. When studying five species of alfalfa (Institute of Irrigated Agriculture of the National Academy of Agrarian Sciences of Ukraine), there was a core and rod-branched, but the rod-branched predominated and its share was different, depending on the genotype. The core-branched form of the root system of alfalfa, as a single concept, has its own peculiarities in terms of the number of lateral roots in their thickness, the branching character, since these indicators together determine the value of alfalfa as a precursor. There is a different amount of microelements (nitrogen, phosphorus) in large and small roots. Although there is no consensus on this issue. The petty roots of alfalfa, as physiologically more active, have a major role in restoring soil fertility. The difference in the accumulation of roots in the range of 12,8–52,2% is observed in varieties that differ sharply among themselves according to the morphological parameters of the root system. Therefore, after different varieties of alfalfa, different amounts of organic mass, gross nitrogen, phosphorus, and potassium are smelted into the soil, which to

varying degrees improve the agrophysical and agrochemical properties of the soil.

**Key words:** alfalfa, root system, growth and development, aboveground mas.

**Shpak T.M., Shpak D.V., Petkevich Z.Z., Palamarchuk D.P. New early-grated rice of Lazurit**

**The purpose of the research.** To introduce and recommend in the rice farms early grain rice Lazurit. **Methods.** The research was conducted in the conditions of 2013-2017. on the fields of the Rice Institute of the National Academy of Sciences of Ukraine, according to the generally accepted technology of growing rice. Early-aged varieties of rice Lazurit, was created under the program "Creation of breeding material of rice with high potential of productivity, quality and adaptive properties of plants". **Results.** The article describes the characteristics of a new early-seasoned rice variety Lazourit. The general information about early varieties with its agrobiological, morphological, agrotechnical and ecological characteristics is presented. The created variety of rice Lazurit is characterized by high technological indicators of the quality of grains and grains, adapted to the conditions of the South of Ukraine. **Conclusion.** The quality of rice Lazurit is expedient to use both in production and as a valuable source material in the selection process.

**Key words:** rice, duration of vegetation period, variety, grain quality, early maturity, yield.

**Ushkarenko V.O., Chaban V.O., Kokovikhin S.V., Shepel A.V., Kovalenko V.P. Economic and energy efficiency of technology for growing sage in drip irrigation in the Southern Steppe of Ukraine**

**The aim** of the research was to determine the influence of the depth of the main tillage, feeding background and sowing dates on the indicators of economic and energy efficiency of growing sage under drip irrigation in the south of Ukraine.

**Methods.** Field experiments were conducted in accordance with the methodology of the research case during 2011–2018 in the experimental field of PE "Agrofirma-Dodola" Beryslav District of Kherson Region. Mineral fertilizers were applied in the form of granular superphosphate and ammonium nitrate in the areas by hand according to the experimental scheme. Agricultural technology in the experiment was generally accepted for the conditions of the Southern Steppe of Ukraine, except for the factors that were accepted for study.

**Results.** The maximum rates of conditional net profit – 336 thousand UAH/ha were obtained for growing crops on the background of  $N_{60}P_{90}$ , sowing in the first term with a row spacing of 45 cm and plowing to a depth of 28-30 cm. In other years, the use of significant differences between the studied depths no main tillage was detected.

**Conclusions.** It was determined that the cultivation of sage in the fourth year led to losses on all unfertilized varieties. The maximum profitability was obtained for plowing to a depth of 28-30 cm, fertilizer application at a dose of  $N_{60}P_{90}$ , sowing in the first period of formation of row spacing of 45 cm from the first to the third year of use. Under these conditions, the studied economic indicator increased to 435%. Correlation-regression analysis proved that the maximum conditional net profit and the minimum cost of 1

kg of sage inflorescences are formed in the second and third years of use. The worst values - net profit below 82 thousand UAH/ha and cost up to 27 UAH/kg were obtained in the fourth year of use in the version without mineral fertilizers. The coefficient of energy efficiency in the cultivation of sage exceeded 4 in the second and third years in the variants with nitrogen-phosphorus fertilizers and sowing in the first decade of December, and in the fourth year it was less than one.

**Key words:** sage, drip irrigation, economic efficiency, energy assessment, fertilizers, tillage, sows period, row spacing.

**Vozhegova R.A., Maliarchuk A.S., Piliarska O.O., Kotelnikov D.I., Corn productivity under different systems of main treatment and fertilizer under irrigation conditions of southern Ukraine.**

**A research purpose** was determination of influence of different methods and depth of basic treatment of soil in a crop rotation and fertilizer on agrophysics properties of soil, maintenance in soil of nutritives and impurity of sowing and further influence of variable factors on the productivity of corn in a зерно-пропашном crop rotation on irrigation of south of Ukraine.

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 carried out during 2009-2016 in the research fields of the Askanian SARS IIA NAAS of Ukraine in the area of the Kakhovka irrigation system.

Studies have shown that the lowest level of density of  $1.14 \text{ g/cm}^3$  was observed during chisel tillage by 28-30 cm, which is higher than the control by 8.6%. And the maximum density of  $1.28 \text{ g/cm}^3$  was recorded at zero tillage, which is higher by 10.3% compared to the control. At the same time, with chisel loosening at 28-30 cm, the number of weeds was  $8.9 \text{ pcs/m}^2$ , with a mass of  $28.7 \text{ g/m}^2$ , or less by 21.7% and 9.8% respectively compared to the control, and the highest level of weediness of crops was observed at zero tillage for corn against the background of its long-term use in crop rotation respectively  $20.3 \text{ pcs/m}^2$  with a weed weight of  $237.2 \text{ g/m}^2$ , which exceeds the control by almost 2 times the number of weeds and 7.5 times the vegetative weight. On average, by factor A, the use of plowing at 28-30 cm in the system of differentiated tillage system ensured the formation of corn yield at the level of 10.4 t/ha. Replacement of plowing with deep chisel tillage by 28-30 cm led to a slight increase in yield by 0.4 t/ha at  $NIR_{05}$  0.33 t/ha. At the same time, the lowest productivity indicators of 9.11 t/ha were recorded under the conditions of sowing the crop in previously uncultivated soil, which is on average 14.1% lower than differentiated tillage.

**Key words:** stocking density, weediness, productivity, maize, tillage.