

ПРОДУКТИВНОСТЬ МИНИКЛУБНЕЙ КАРТОФЕЛЯ В ЗАВИСИМОСТИ ОТ ОБРАБОТКИ РЕГУЛЯТОРОМ РОСТА БАЙКАЛ ЭМ 1 ПРИ РАЗНЫХ СПОСОБАХ ОРОШЕНИЯ

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Представлены результаты исследований по изучению влияния регулятора роста Байкал ЭМ 1 на полевую всхожесть и урожайность миниклубней картофеля оздоровленного биотехнологическим методом при различных способах орошения. Установлено, что использование препарата Байкал ЭМ 1, обеспечивает повышение продуктивности растений в среднем на 0,5 т/га при дождевании и 2,3 т/га при капельном орошении.

Ключевые слова: картофель, регуляторы роста веществ, миниклубни, биотехнологический метод, урожайность, дождевание, капельное орошение, всхожесть, Байкал ЭМ 1.

PRODUCTIVITY MINITUBERS POTATOES DEPENDING ON TREATMENT WITH THE GROWTH REGULATOR, BAIKAL EM-1 FOR DIFFERENT IRRIGATION METHOD

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The results of studies on the influence of growth regulator Baikal EM-1 on the germination and yield of potato minitubers of received biotechnological method for different irrigation methods are shown. It is found that the use of the drug Baikal EM-1 provides the increase of plant productivity on average by 0.5 t/ha under sprinkler irrigation and 2.3 t/ha under drip irrigation.

Keywords: potatoes, growth regulators substances, minitubers, biotechnological method, yield, sprinkler irrigation, drip irrigation, germination, Baikal EM 1.

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PRODUCTIVITY OF THE *SILYBUM MARIANUM* DEPENDING ON DIFFERENTIATION OF ELEMENTS OF THE TECHNOLOGY GROWING IN THE SOUTH OF UKRAINE

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The results of researches of *Silybum marianum* grown on the irrigated lands of south of Ukraine are given in the article. The optimal values of depth of soil tillage, sowing terms, row-spacing and doses of mineral fertilizers influencing the productivity of the investigated crop are defined. Through the usage of dispersible and cross-correlation-regressive analysis equity participation of factors on the indices of the productivity is set and the optimal range of width of row-spacing and doses of nitric fertilizers is found.

Keywords: *Silybum marianum*, soil tillage, row-spacing, terms of sowing, mineral fertilizers, productivity.

Introduction. The favorable soil-climatic terms of the South Steppe of Ukraine and ARE Crimea, which very look like terms in other world districts of cultivation of volatile-oil-bearing plants and medical plants, allow to rear the large set of these cultures, enable with success to replace the imported perfume products, spiciness's, medicinal preparations domestic, and also to a great extent to extend their assortment and bring a cost down. Medical properties of plants depends on a presence in them the matters various after a chemical structure and therapeutic action. The table of contents of these matters enables to the medical plants to execute the various vital functions of man: satisfaction of necessities in the nutritive, mobilization of protective forces of human organism. It is led to by scientific researches, that not all possibilities of medical plants are presently used. On information which is resulted in the special literature, with 2000 types of plants of flora of Ukraine are deep were studied for the purpose of their use in scientific medicine near 500

kinds, and 230 kinds are used only. This circumstance compels to extend scientific researches on the medical plants, to study more detailed than property already the known kinds, their reaction on different elements of technologies of growing.

Material and method. The task of researches was to study influence of basic agrotechnical factors (systems of soil tillage, space-rowing, terms of sowing and background of mineral feeding) on productivity of plants of *Silybum marianum* at its growing under the conditions of irrigation in the South of Ukraine.

The field and laboratory researches were conducted during 2010-2012 in the Institute of Rice NAAN of Ukraine. Experimental areas were laid using the method of split areas in according to existent methods of experimentalism. Soil is represented by dark-chestnut solonchous residual soil. Humus content in 0-20 cm layer of soil was 2.06%.

As for weather conditions the years of researches differed both by temperature and by the

precipitations. For example, 2010 and 2011 were characterized by favourable weather conditions, and in 2012 the sharp deficit of precipitations was marked on the background of the high air temperature.

Agrotechnics of experiments was generally accepted for growing *Silybum marianum* on irrigation lands except for the explored factors.

Results and discussions. Depth of till soil poorly affects productivity of *Silybum marianum*. After the analysis of level of productivity of the explored culture the set tendency from positive influence on productivity of plants of expansion of spaces between rows from 30 to 45, and, especially, to 60 cm. In addition, exposed conformity to the law of decline of productivity of *Silybum marianum* at the delay with sowing and moving of its terms from the third ten-day period March on the third ten-day period April, and the burst performance of plants was at sowing at the end of March. The mineral fertilizers substantially multiplied the indexes of productivity of *Silybum marianum*, however much this increase was disproportionate, as it is comparative with the unfertilized variant at the use of $N_{45}P_{45}$ productivity grew on 34.1 %, and it is comparative between areas with bringing $N_{45}P_{45}$ and $N_{90}P_{90}$ – an increase was 16.9 % only.

Analysis of the got productive data showed that productivity of *Silybum* has changed under the influence of the explored factors; however this influencing was not similar.

Comparison of plants productivity indices concerning to the factor A (soil tillage) shows unimportant influencing of replacement of shallow soil tillage (depth 14-16 cm) with ploughing depth 20-20 cm. Under such change of soil tillage element productivity of *Silybum* grew from 11.2 to 11.7 cwt/ha, or by 4.5 %. It is necessary to notice that such increase is insufficient from the point of view of recouplement of additional outgo of fuel for conducting of ploughing, in comparison to shallow soil tillage.

There was the tendency of positive influence of expansion of spaces between rows from 30 to 45 cm on plants productivity in the years of researches, and, especially, to 60 cm. For example, at row-spacing 30 cm productivity of *Silybum* made 10.7-11.1 cwt/ha, at the increase to 45 cm this index was multiplied by 4.7-5.4 % (or to 11.2-11.7 cwt/ha). Expansion of spaces between rows from 30 to 60 stimulated greater increase of productivity – by 1.1-1.3 cwt/ha (or by 10.3-11.7 %). Consequently, taking into account the biological features of the crop it is found, that the best productivity of plants was formed at sowing with the row-spacing of 60 cm.

Concerning the terms of sowing regularity of productivity decline of *Silybum marianum* was found at the delay of sowing and moving of its terms from the third ten-day period of March to the third ten-day period of April. Maximal productivity at the level of 13.5-14.2 cwt/ha is defined at sowing at the end of

March, row-spacing 45-60 cm and conducting of ploughing with depth of 20-22 cm. Minimum values 8.5-8.9 cwt/ha were shown in the areas with shallow soil tillage with depth of 14-16 cm, row-spacing 30-45 cm and move of sowing terms to the end of April. It is necessary to notice that difference between the best and the worst variants was 51.7-67.1 %, that testifies to substantial influence of sowing terms on productivity of plants of *Silybum marianum*.

The mineral fertilizers (factor D) positively affected productivity of *Silybum marianum*. For example, in a variant without the fertilizers the productivity made up 8.8 cwt/ha, and on areas with bringing in $N_{45}P_{45}$ and $N_{90}P_{90}$ it rose up to 11.8 and 13.8 cwt/ha. It is necessary to underline that the increase of plants productivity was disproportionate. For instance, in comparison with the unfertilized variant, the use $N_{45}P_{45}$ provided growth of *Silybum* productivity by 34.1%; and comparing areas with bringing-in $N_{45}P_{45}$ and $N_{90}P_{90}$ – an increase was only 16.9 % (or 2.0 times less), that testifies to the decline of recouplement of mineral fertilizers and needs clarification of their doses on the planned level of productivity.

Using variance analysis it was proved, that the rate of influencing of factors has substantial differences in relation to forming of plants productivity of *Silybum marianum* on the irrigated lands.

Soil tillage (factor A) and row-spacing (factor B) have an insignificant influence on productivity of the explored crop – only 3.3 and 5.3%, accordingly. Influence of sowing terms (factor C) substantially grew to 26.2 %, that exceeds first two factors 4.9-8.0 times. The greatest influence on plants productivity during the experiment had mineral fertilizers, as a rate of their influence was 39.2 %.

When analyzing indices of combination of factors ABCD, the most influencing one constituted 5.2 %, that proves the positive influence of optimization of all explored elements of growing technology on irrigated lands. The least couple co-operation 0.5% is marked for connection of factors A and D (soil tillage and background of mineral feeding), and the most one at the level of 2.6 % – between factors C and D (terms of sowing and background of mineral feeding).

Using the correlation-regressive analysis there was defined the difference of influence on productivity of *Silybum marianum* of theoretically calculated quantitative characteristics of the factor B (row-spacing) and factor D (background of mineral feeding) (figure 1).

When width of spaces between rows is expanded from 30 to 60 cm there can be observed substantial increase of plants productivity, which the lines of polynomial trend represent. Under the range from 65 to 73 cm increase of productivity is substantially slowed, and after the point of 76 cm – the decline of the explored index is marked. Consequently, the results of statistical experimental data analysis

proved, that 60 cm is the optimum width of spaces between rows for *Silybum*, and its growing with the greater width of spaces between rows causes the decline of plants productivity.

Similar tendency was observed at comparison of theoretical line of trend of explored culture productivity level with the doses of nitric fertilizers.

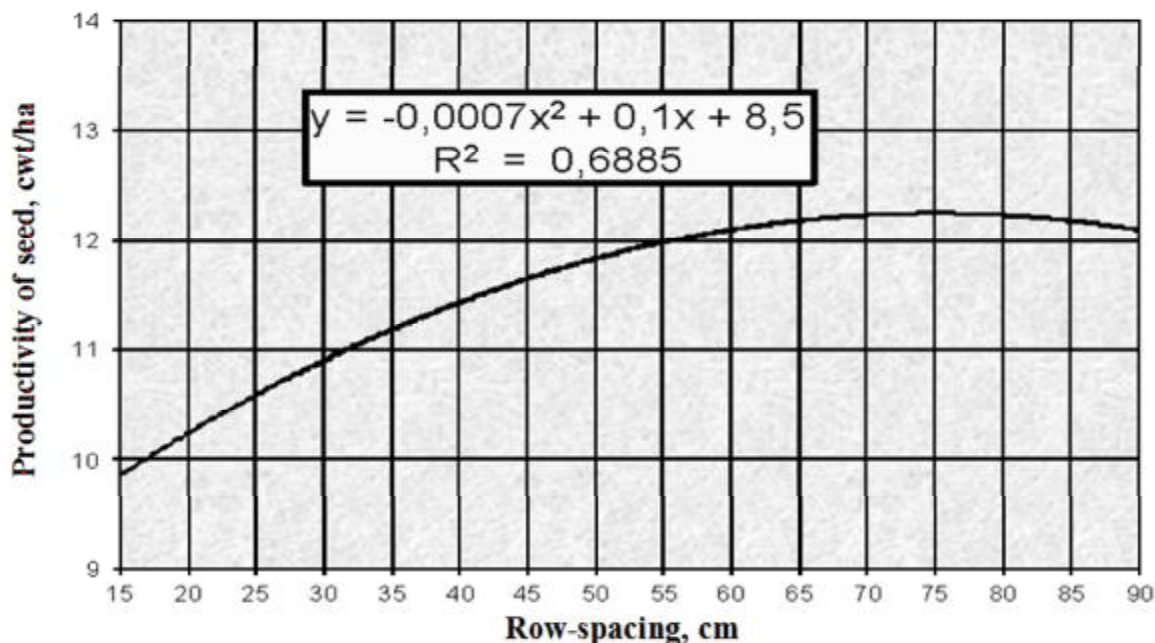


Figure 1. Correlation-regressive dependence between the indices of productivity of seed of *Silybum marianum* and width of row-spacing

Under the increase of nitric fertilizers dose from 30 to 90 kg of agent per 1 hectare growth of productivity was swift, that is conditioned by substantial stimulant action of this most important element on productivity of plants. In the range from 130 to 165 kg of a/ha substantial deceleration of growth of productivity indexes was noticed, and after exceeding of N_{168} – negative action of increase of nitrogen dose on the explored index shows up. Thus, taking into account the results of correlation-regressive analysis it is possible to draw a conclusion that the highest efficiency is shown by the use of nitric fertilizers with a dose from 30 to 90 kg of agent per 1 ha.

Depth of soil tillage poorly affects productivity of *Silybum marianum*. According to the analysis of productivity level of the explored crop the tendency was observed from positive influence on plants productivity of expansion of spaces between rows from 30 to 45, and, especially, to 60 cm. In addition, the regularity of productivity decline of *Silybum* was found at the delay with sowing and moving of its terms from the third ten-day period of March to the third ten-day period of April, and the burst performance of plants was at sowing at the end of March. The mineral fertilizers substantially multiplied the productivity indices of *Silybum*, however this increase was disproportionate, as comparing the unfertilized variant and the use of $N_{45}P_{45}$ productivity grew by 34.1%, and comparing areas with bringing-in of $N_{45}P_{45}$ and $N_{90}P_{90}$ – the increase was just 16.9 %.

Using the analysis of variance it was proved that soil tillage and row-spacing have an insignificant influence on productivity of the explored crop with the rate of influence – just 3.3 and 5.3 %. The terms of sowing had an influence on productivity of plants at the level of 26.2 %, and the greatest value from the point of view of productivity level forming had mineral fertilizers, as the rate of their influence was 39.2%. Using the correlation-regressive analysis we found out that the optimum range of row-spacing makes up 15-60 cm, and for the doses of nitric fertilizers – from 30 to 90 kg a/ha.

It is led to by the analysis of variance, that till soil that width of spaces between rows have an insignificant influence on productivity of the explored culture with the particle of influencing – only 3.3 and 5.3%. The terms of sowing had an influence on productivity of plants at the level of 26,2%, and the greatest value from the point of view forming of level of productivity was had by the mineral fertilizers, as a particle of their influencing was 39.2%. By the correlation-regressive analysis is set, that the optimum range of width of spaces between rows makes 15-60 cm, and for the doses of nitric fertilizers – from 30 to 90 kg d.r./ha.

Conclusions. By the biochemical analyses considerable differentiation of organic acids is proved in the butter of seeds of the *Silybum marianum* linoleic acid (56.45%) spotted with advantage and, opposite, by minimum maintenance of penta-decanoic (0.03 %) and linolenove (0.04 %) acids.

The presence of 2,3-degidrosilibin, maintenance of which from the common amount of dominant flavolignan is 2.5-3.0%, is exposed in the garden-stuffs of plants of *Silybum marianum*. On biochemical composition the Yugoslav variety is perspective for the industrial growing.

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ПРОДУКТИВНІСТЬ РОЗТОРОПШІ ПЛЯМИСТОЇ ЗАЛЕЖНО ВІД ДИФЕРЕНЦІАЦІИ ЕЛЕМЕНТІВ ТЕХНОЛОГІЇ ВИРОЩУВАННЯ НА ПІВДНІ УКРАЇНИ

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Результати досліджень *Silybum marianum*, вирощених на зрошуваних землях півдня України, наведені в статті. Визначено оптимальні значення глибини обробітку ґрунту, посівні строки, міжряддя і дози мінеральних добрив, що впливають на врожайність досліджуваного врожаю. Завдяки використанню дисперсної і крос-кореляції, регресивного аналізу пайової участі факторів на показники продуктивності, встановлено оптимальний діапазон ширини міжряддя та дози азотних добрив. Строки сівби впливали на продуктивність рослин на рівні 26,2 % і найбільший вплив чинили мінеральні добрива, частка їх впливу становила 39,2 %. Встановлено, що оптимальний діапазон ширини міжряддя є 15-60 см, доз азотних добрив від 30 до 90 кг д.р.

Біохімічними аналізами доведена значна диференціація органічних кислот в олії з насіння розторопші значний відсоток лінолевої кислоти (56,45 %) у плямистої, і навпаки, мінімальний вміст пентадеканової (0,03 %) і ліноленової (0,04 %) кислот. По биохимическому составу югославское разнообразие является перспективным для промышленного выращивания.

Ключові слова: *Silybum marianum*, розторопша, обробіток ґрунту, міжряддя, строки сівби, мінеральні добрив, врожайність.

ПРОДУКТИВНОСТЬ РАСТОРОПШИ ПЯТНИСТОЙ В ЗАВИСИМОСТИ ОТ ДИФЕРЕНЦИАЦИИ ЭЛЕМЕНТОВ ТЕХНОЛОГИИ ВЫРАЩИВАНИЯ НА ЮГЕ УКРАИНЫ

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Результаты исследований *Silybum marianum*, выращенных на орошаемых землях юга Украины, приведены в статье. Определены оптимальные значения глубины обработки почвы, посевные сроки, междурядья и дозы минеральных удобрений, влияющие на урожайность исследуемой культуры. Благодаря использованию дисперсной и кросс-корреляции, регрессивного анализа долевого участия факторов на показатели производительности, установлены оптимальный диапазон ширины междурядья и дозы азотных удобрений.

Ключевые слова: *Silybum marianum*, обработка почвы, междурядья, сроки посева, минеральных удобрений, урожайность.

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