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**YIELD OF EARLY POTATO VARIETIES PLANTING TUBERS
UNDER TREATMENT WITH CHEMICAL MEANS
IN THE CENTRAL PART OF THE NORTHERN FOREST-STEPPE OF UKRAINE**

Викладено результати досліджень варіювання врожайності та якості насінневої фракції картоплі залежно від обробки садивних бульб препаратами способом дрібнокрапельного нанесення перед садінням (Актара, Матадор Супер, Тирана, Броня, Престиж) і вегетуючих рослин (Конфідор Максі) ранньостиглих сортів в умовах центральної частини Лісостепу України.

Вивчено формування та якісний склад насінневої фракції картоплі ранньостиглих сортів української селекції Подолянка, Повінь, Тірас, Серпанок і Глазурна залежно від обробки садивних бульб протруйниками інсектицидного та інсекто-фунгіцидної дії.

Проаналізовано реакцію генотипу сорту на обробку препаратами.

Рекомендовано на насінневих посадках картоплі для збільшення кількості непошкоджених стандартних насінневих бульб враховувати генотип сорту.

Ключові слова: сорт, генотип сорту, препарати, картопля, бульба насіннева, врожайність.

The problem statement and analysis of recent research and publications. Potato is fourth ranked – behind wheat, corn and rice in the worldwide production of plant food. Potato is of particularly importance in providing food in our country, being especially valuable and irreplaceable in humans daily nutrition. Therefore, increasing potato production and stabilizing it over the years to meet the population needs, is one of the important problems of modern agriculture.

There are three crucial inextricably interrelated factors in the problem of productivity and stabilizing the production of crops increase, including potatoes, they are genotype varieties - seeds - growing technology and each of them can not be regarded as more or less important.

The national breeding has created a large number of potato varieties that are of high performance in their agronomic traits, group resistance to diseases and pests, suitable for cultivation in different soil - climatic zones of Ukraine [3, 12, 13].

Seed is one of the main factors of food potato growing technology. It carries biological and economic characteristics of sorts. Therefore, the quality of planting tubers (seed) depends largely on the variety level of genotype yield potential implementation. Thus, searching ways to improve the technology of high-quality planting material is an urgent issue in the area of seed potatoes.

Formation of high-yielding properties and qualities of seed potato is achieved through using special measures tubers preparation for planting, care during the growing season, harvesting and post-harvest treatment and storage in the system of potato seed growing.

Besides, the DSTU 4013-2001 requires peculiar size and shape of planting tubers, tubers affected with diseases like wet rot blight, blackleg, dry rot (fomoz, fusarium) and others [16].

Potato crops protecting from diseases and pests is an important link in the seed production technology chain in improving of planting material quality.

To obtain planting tubers of standard sizes thickened planting, the use of large planting tubers, early harvesting, late summer planting, etc. are recommended [1, 2, 3, 5, 9, 10]. However, these measures do not always produce the desired results. Often, depending on weather conditions and the level of farming, planting crops in production have a significant number of deformed and rot damaged tubers. These tubers are usually used for consuming. Therefore, it is important to ensure maximum yield of intact seed tubers fraction during the seed growing [11, 14, 15, 17]. It is impossible to get ones without plant protection products application the range of which is constantly increasing.

Thus, the necessity of conducting research on obtaining maximum yield of standard seed tubers under their treatment with protectants.

The research purpose. To study the changes in the yield of seed potato tubers and its structure under early ripening varieties treatment with protectants in terms of the central part of the Northern Steppes of Ukraine.

The research methodology. Experimental studies were conducted on the experimental field of Bila Tserkva National Agrarian University, whose lands which are located in the Central part of the Northern Steppes of Ukraine.

In 2009-2013 the field experiments on studying the influence of insecticides on the productivity of individual plants and potatoes yield depending on the genotype of the variety was conducted in eight-field rotation of the department of genetics, seed production and breeding. The predecessor was winter wheat.

The soils of the experimental plots were typical black soil humus, of large-scale particles medium loam soil texture. According to the analysis they are characterized with the following indicators: in the plow layer of 0-30 cm humus content is 3, 63 %; N - 7,6 mg P₂O₅ – 13,9 mg K₂O - 15.1 mg per 100 g of soil; the sum of absorbed bases – 25,3 mg. equivalent, hydrolytic acidity - 2.15 mg. equivalent per 100 g of absolutely dry soil.

Organic fertilizers (40t/ha) in the form of litter strawy cattle manure containing N_{0,40-0,45} P_{0,116-0,262} K_{0,4-0,6}, were introduced in autumn in course of autumn plowing. Mineral fertilizers - containing NPK nitroammophoska with 16 % of each element of a rate N₉₀P₉₀K₉₀ kg/ha of active ingredient were spread in spring before planting potatoes by scattering over the surface of the soil.

The studies were conducted on the elite material of Podolyanka, Povin, Tyras, Serpanok and Glazurna early potato varieties.

Before planting the tubers were treated with protectants by small dropapplying of the following solutions: Aktara - 0.2 kg of the drug per 15 liters of water; Matador Super, Tyran and Bronya - 0.75 l per 15 liters of water, Prestige - one liter of the drug dissolved in 15 l of water and applied on a tonne of potato tubers.

The Konfidor Maxi was applied in plants treatment for growing plants at the rate of 0.05 l/ha and it served as a control.

Potato planting was carried out in accordance with the scheme of the experiment, the tubers were planted in pre-formed crests followed with wrapping and final ridges forming with KFK -2.8 milling cultivator.

The crops care comprised two pre- and two after-sprouting treatment cultivation and bushes hilling before the lines closing.

To protect crops from disease during the growing season of potato Rydomil Gold MTs fungicide at the rate of 2.5kg/ha was applied. The first fungicide treatment was performed in the phase of the tops closing in the lines when plant height is 15 - 20cm. The second treatment was performed in 14 days after the first one, and the third one – in 14 days after the second one.

Agrochemical soil analysis was performed according to the conventional method [8]: humus - by Tyurin, salt extraction Ph – by potentiometric method, hydrolytic acidity – by Kappen, nitrogen - by Keldal, mobile phosphorus - by Kirsanov, Potassium metabolism - on fire photometre by Peive .

The harvest accounting was performed gravimetrically by fields. The yield structure was determined at harvesting and after the treatment period [8].

The obtained data were processed by dispersion analysis for multifactor experiment using the PC software packages Statistica for Windows 5.0. [5, 7].

Results and discussion. Seed tubers fraction yield capacity is one of the important indicators producers are concerned in growing potatoes.

On average, the highest yield of seed fraction potato tubers during the research time was obtained under planting tubers treatment with Bronys in Podolyanka (23.9 t/ha) and Glazurna (18.9 t/ha) varieties; with Tyran (21.0 t/ha) and Matador Super in Serpanok variety (8.8 t/ha), and in Tyras variety Konfidor Maxi treatment (8.8 t/ha) in growing plants in a variety (figure 1.).

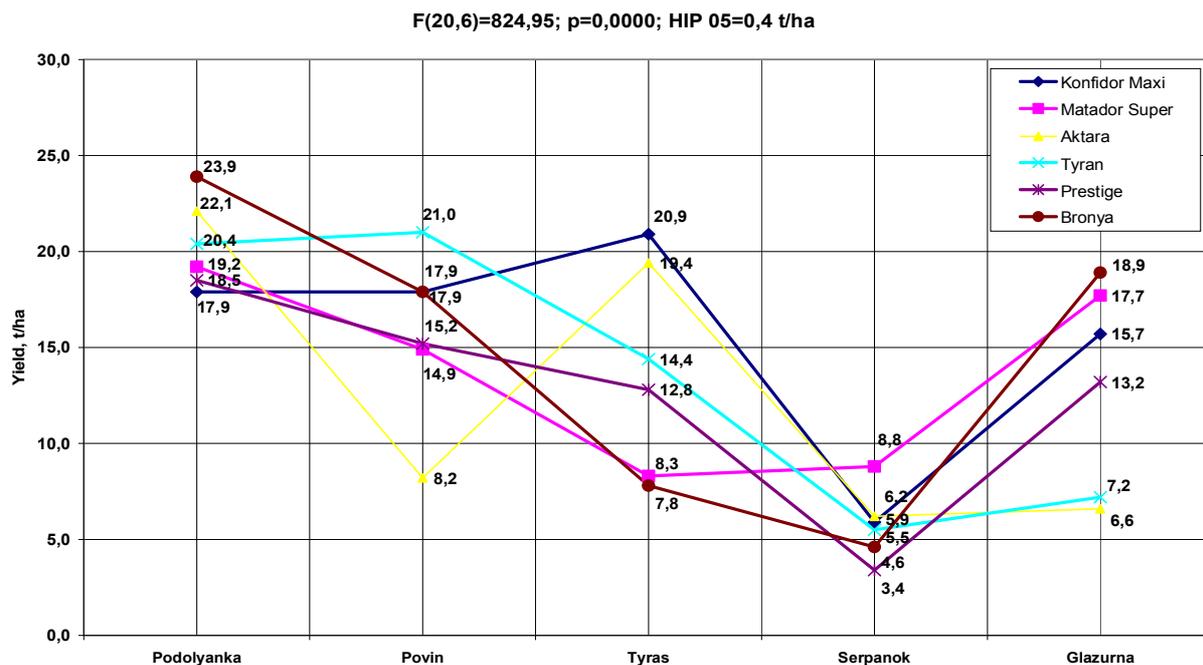


Figure 1. The yield of seed tubers fraction depending on the genotype of the variety and drugs treatment, t/ha.

The main condition of high-productive potato growing is the use of healthy, high-quality planting material with the necessary economic and biological parameters [3, 4]. Thus, it is not enough to get a seed fraction yield of potato tubers. One needs to know its qualitative composition.

In the course of analyzing the structure of the seed tubers fraction yield in Podolyanka variety (figure 2) we have found that under treatment the growing plants with Konfidor Maxi standard (intact) seed tubers output was 46.1 %, standard (with signs of rot) - 44.3% and distorted - 9.6% of the yield nearly the same standard (intact) seed tubers quantity (45.5 %) was obtained under planting tubers treatment with Bronya, however, the percent of standard (with signs of rot) increased by 10.2 % and no distorted tubers were found. The Standard (intact) tubers output in planting tubers treatment with Konfidor Maxi was significantly reduced versus treatment growing plants of Podolyanka variety with Aktara and Prestige and was 23.9 and 31.3 %, and standard tubers percent (with signs of rot) up to 74.9 and 68.7 %, respectively, while the number of distorted tubers was 1.2 and 0.0 %. Under treatment with Matador Super and Tyrana standard (intact) tubers output increased to 59.0 and 76.8 %, standard output (with signs of rot) reduced to 39.8 and 23.2%, the percentage of distorted tubers was 1.2 and 0.0 %, respectively.

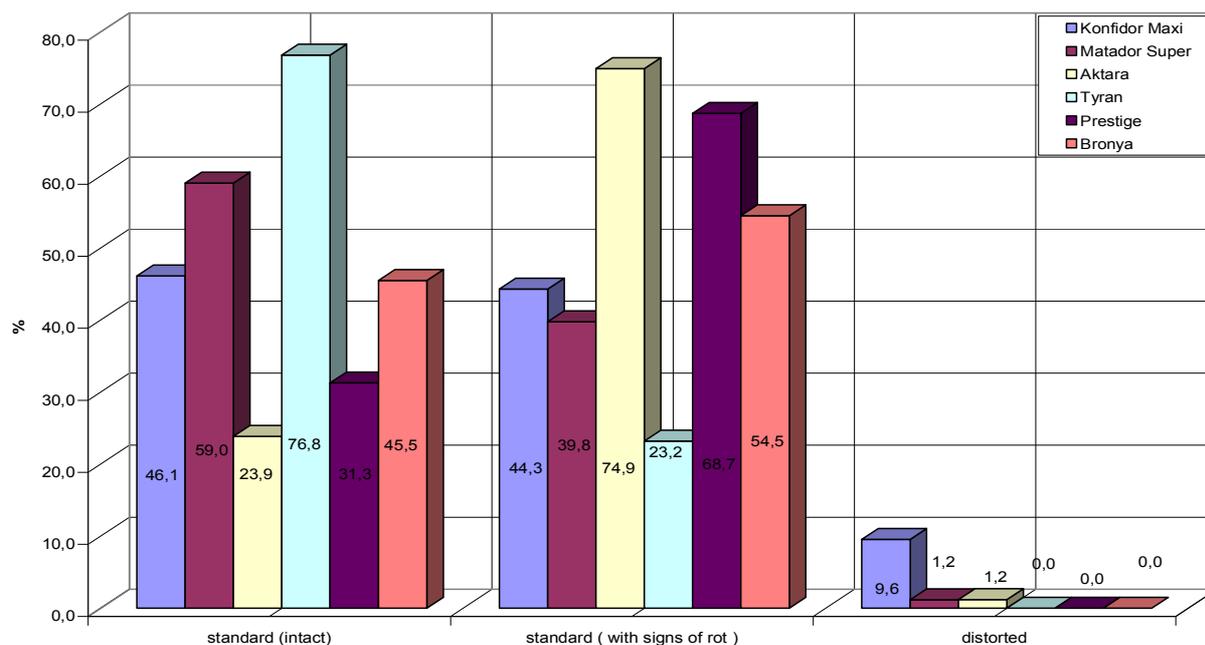


Figure 2. Yields structure of Podolyanka variety seed fraction grade tubers, depending on treatment with various preparates, %.

Thus, in Podolyanka variety the highest yield of standard (intact) seed tubers was obtained under planting tubers treatment with Tirana (76.8 %).

As for the structure of the seed fraction yield in Povin variety (figure 3.) there has been found out that under growing plants treatment with Konfidor Maxi standard (intact) seed tubers output was 67.5 %, standard (with signs of rot) 27.0 % and distorted ones made 5.5 %, similar to the standard (intact) seed tubers (60.7 %) output was obtained under planting tubers treatment with Prestige. However, the percent of standard (with signs of rot) increased by 9.2 % and distorted tubers number decreased by 2.4%. Standard (intact) tubers output significantly reduced versus Povin variety growing plants treatment with Konfidor Maxi under planting tubers treatment with Aktara, Super Matador, Bronya and Tirana and was 56.2, 53.3, 49.5 and 49.4 % and standard (with signs of rot) tubers percent up to 37.9, 31.7, 25.9 and 46.2 %, respectively, while the number of distorted ones was 5.9, 15.0, 24.6, and 4.4 %.

Nearly the same percentage of the standard (intact) tubers is formed under the treatment with Bronya and Tirana but the standard (with signs of rot) ones output was 20.3 %, lower and the distorted tubers made 20.2 % more than under Tirana treatment.

Thus, Povin variety gave the highest yield of standard (intact) seed tubers obtained under planting tubers treatment with Prestige (60.7 %) and growing plants treatment with Konfidor Maxi (62.5 %).

In Tiras variety the amount of standard (intact) seed tubers output was 76.0 %, standard (with signs of rot) - 21.2 % and 2.8% of distorted ones under growing potato plants treatment with Konfidor Maxi (figure 4.). Rather close amount of standard (intact) seed tubers output (79.3 and 78.9 %) was obtained under planting tubers treatment with Aktara and Tyran but under by the tubers treatment with Aktara the percentage of the standard (with signs of rot) was by 8.0 % lower and the amount of distorted tubers increased by 4.6 % and under tubers treatment with Tyran the number of standard rate (with signs of rot) tubers is almost the same (21.1 %), and no distorted tubers were observed. The standard (intact) tubers output was 13.9, 23.0 and 23.9 % lower compared with growing plants of Tyras variety treatment with Konfidor Maxi under planting tubers treatment with Prestige, Matador, Super and Bronya, and the percentage of the standard (with signs of rot) increases to 30.1, 30.7 and 46.3 %, respectively, while the number of distorted ones was 7.3, 16.4 and 2.6 %.

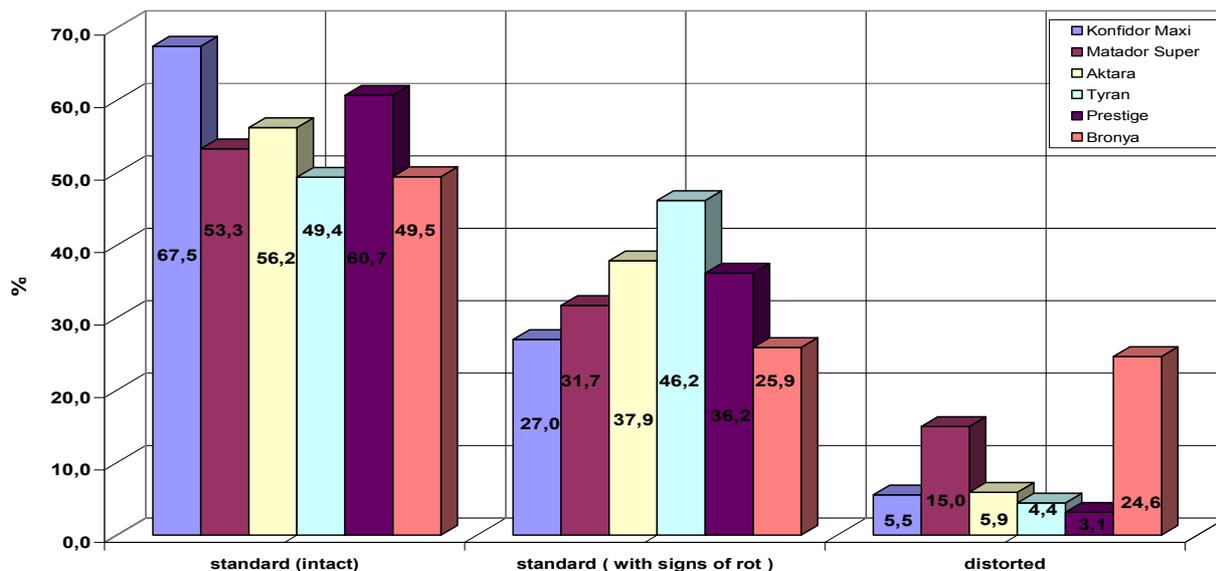


Figure 3. Yields structure of Povin variety seed fraction grade tubers, depending on treatment with various preparates, %.

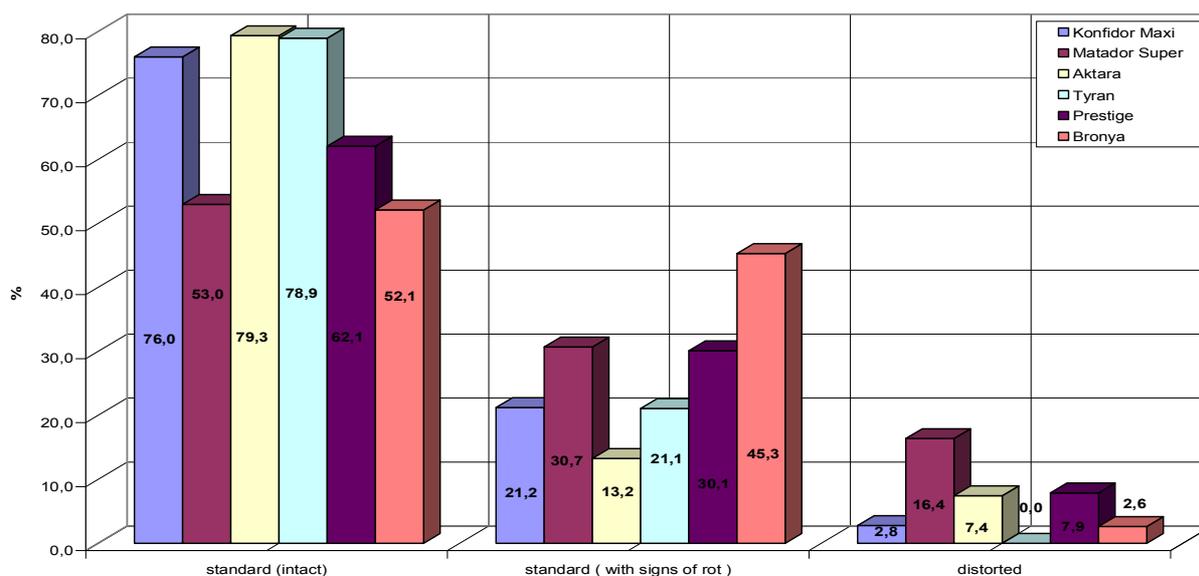


Figure 4. Yields structure of Tyras variety seed fraction grade tubers, depending on treatment with various preparates, %.

Thus, in Tyras variety the highest yield of standard (intact) seed tubers obtained under planting tubers treatment with Tyran (78.9 %) and Aktara (79.3 %) and under treatment of growing plants with Konfidor Maxi (76.0 %).

In Serpanok variety under growing plants treatment with Konfidor Maxi the amount of standard (intact) seed tubers output was 79.4 %, standard ones (with signs of decay) - 14.4 % and distorted ones was 6.2% (figure 5). A close amount of standard (intact) seed tubers output (76.1%) was received under planting tubers treatment with Tyran, however, the there was a reduced the percentage of standard (with signs of rot) tubers by 4.0 % and increased number in distorted ones by 7.2%. Significantly reduced standard (intact) tubers output versus Serpanok variety growing plants treatment with Konfidor Maxi in planting tubers treatment with Matador Super, Bronya, Prestige, Aktara , and makes 55.6, 55.4, 41.1 and 29.1 % and the percentage of standard (with signs of rot) ones increases to 42.1, 37.9, 58.9 and 29.1%, while the number of distorted ones was 2.3, 6.7, 0.0 and 41.7 %, respectively.

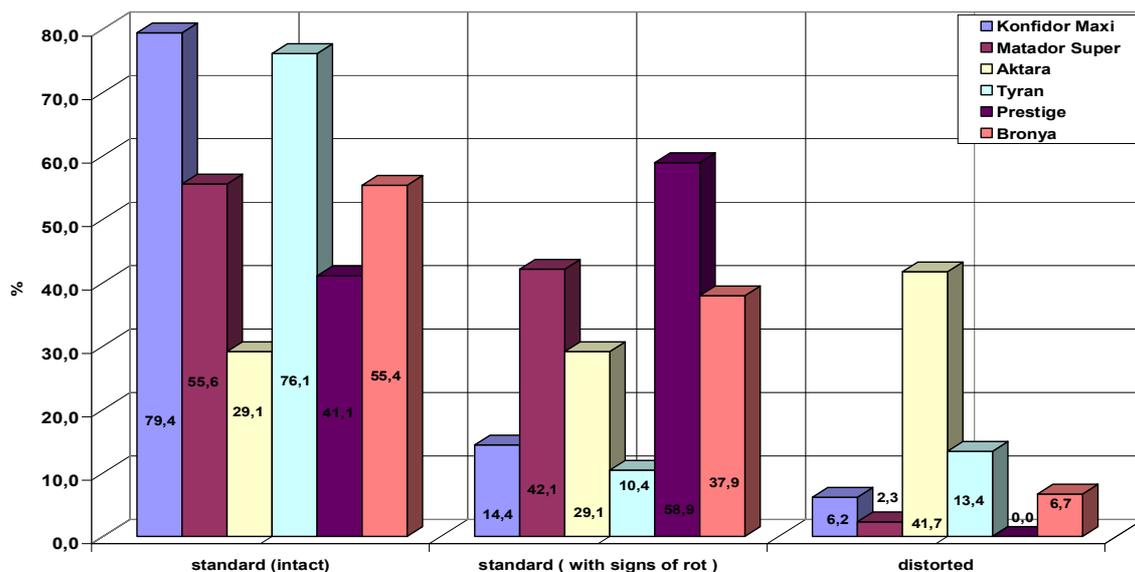


Figure 5. Yields structure of Serpanok variety seed fraction grade tubers, depending on treatment with various preparates, %.

In Serpanok variety the highest yield of standard (intact) seed tubers obtained under planting tubers treatment with Tyran (76.1 %) and under of growing plants treatment with Konfidor Maxi (79.4 %).

Under of Glazurna variety growing potato plants treatment with Konfidor Maxi standard (intact) seed tubers output was 34.5 %, standard (with signs of rot) tubers - 65.6 % and no distorted ones (figure 6). Significantly higher yield of standard (intact) seed tubers (78.8 , 59.4 and 41.7%) was received under planting tubers treatment with Bronyya, Tyran and Matador Super. Decrease in the percentage of standard (with signs of rot) tubers - 15.7, 18.4 and 41.1% was observed, but under tubers treatment with these preparates the percentage of distorted tubers increases by 5.4 , 22.2 and 17.2 % respectively compared to the growing plants treatment with Konfidor Maxi. A reduced output of standard (intact) tubers by 15.7 and 15.2 % compared to growing plants treatment with Konfidor Maxi in Glazurna variety under the treatment of planting tubers with Aktara and Prestige and was 18.8 and 19.3 %, respectively, the percentage of standard (with signs of rot) tubers increased to 78.1 and 69.6% and the number of distorted ones increased to 3.1 and 10.9 %.

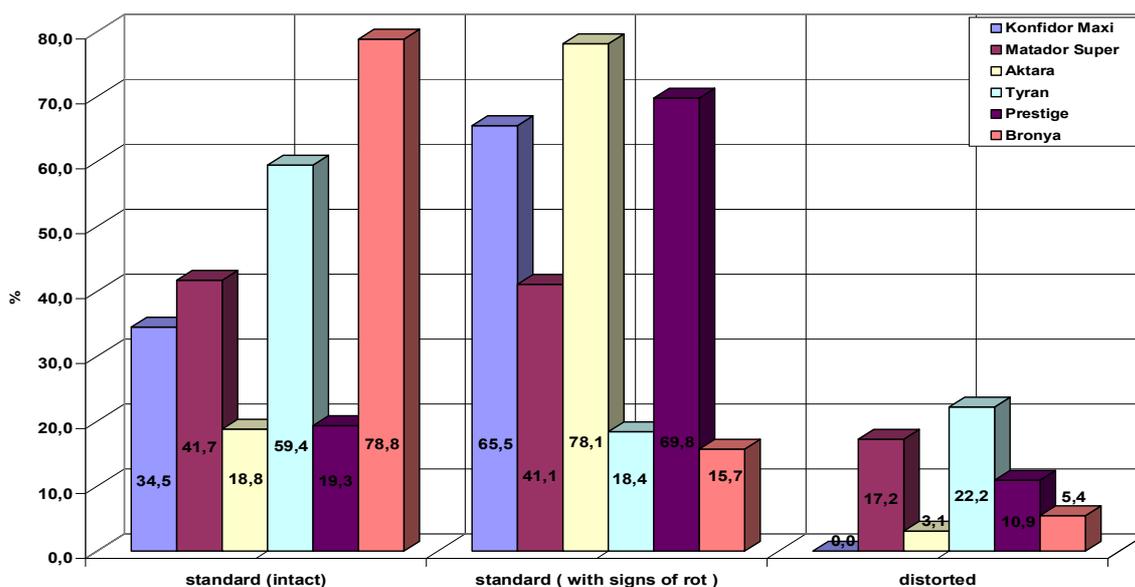


Figure 6. Yields structure of Glazurna variety seed fraction grade tubers, depending on treatment with various preparates, %.

Thus, the highest yield in standard (intact) seed tubers in Glazurna variety was obtained under planting tubers treatment with Bronya (78.8%).

Conclusions and recommendations for further research. In order to increase the standard output (intact) in seed tubers seed potato crops it is necessary to use the preparates considering the genotype of the variety.

In potato seed growing the main indicator is the standard output (intact) seed tubers per unit area, so increasing this share considering the genotype of the variety as well as soil and climatic conditions is the prospect of our future research.

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Выход посадочных клубней картофеля в зависимости от генотипа сорта и обработки протравителями в Лесостепи Украины

Ю.В. Баранчук

Изложены результаты исследований варьирования урожайности и качества семенной фракции картофеля в зависимости от обработки посадочных клубней препаратами способом мелкокапельного нанесения перед посадкой (Актара, Матадор Супер, Тирана, Броня, Престиж) и вегетирующих растений (Конфидор Макси) раннеспелых сортов в условиях центральной части Лесостепи Украины.

Изучены формирование и качественный состав семенной фракции картофеля раннеспелых сортов украинской селекции Подольянка, Повинь, Тирас, Серпанок и Глазурна в зависимости от обработки посадочных клубней протравителями инсектицидного и инсекто-фунгицидного действия.

Проанализирована реакция генотипа сорта на обработку препаратами.

Рекомендовано на семенных посадках картофеля для увеличения количества неповреждённых стандартных семенных клубней учитывать генотип сорта.

Ключевые слова: сорт, генотип сорта, препараты, картофель, клубень семенной, урожайность.

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SUMMARIES

Evolution of cereal crop of wheat In Ukraine on the different systems of agriculture to the XX century

I. Prymak, M. Voytovik, O. Prymak

The evolution of cereal crop of wheat is reflected at the primitive, extensive and partly transitional systems of agriculture in Ukraine. Concentrated attention on the grain growing of the three-field period, productivity and part of sowing areas of wheat. The presented results of archaeological researches, the basic elements of agrotechnics of wheat and possibility of export of grain of this cereal crop. The rapid evolution of wheat is set relatively to Pridneprov'e at the scythian epoch, and in VI-V cent. It was the leading plant in the south of Ukraine. The tribes of scythians grew wheat in the first millennium on the average and low Pridneprov'e and in the pool of Dnestr both for own needs and for an export. On the XVI cent. on the south of Russia the basic areas of plough-land were under sowing of winter rye. In the second half of XVIII v. A winter and fervent wheat was sown on the old-arable fat black grounds.

Scientists assume that tripil'ska hard wheat to a certain extent genetically was connected with the bulk of the Kuban wheats, that tribes of epoch of tripil'ska culture are next to millet, barley, sowed rye and different types of wheat. Research workers do not eliminate, that as early as antiquity to Ukraine some hard wheat was got from Asia Minor and greek Mediterranean. Some of them are Turk, Biloturka, Arnautka.

General collection of grain of wheat in the greek settlements of the black Sea coast would not provide an export to Greece in such considerable sizes without bringing in of harvest of wheat from numerous scythian settlements of the South. Such development of production of grain of wheat in the south was provided through passing (orientation from the VII cent. B.C.) to arable agriculture with application of ferrous instruments.

In XI-XII cent. in the Ancient Rus' there was growth of quantity of urban population and expansion of bread trading in the state, that required the improvement of agricultural technique of growth of areas under grain-crops. Except for wheat, grew rye, barley, millet, oat, pea, lentil, buckwheat, hems, flax. This is evidenced by archaeological finds and studies by scientists.

Literary pam"yatniki testify to the comparatively high culture of agriculture in Drevnerosiyskiy to the state. Yes, in "Russkoy of pravde" (XI-XII of item) specified on vessels with breadstuffs, among which were also m"yaka and hard (polba) wheat (next to rye, oat and barley). In "Voproshanii Kirikovom" a wheat is pointed right behind a pea and lentil.

Comparatively good development of wheat in Pridniprovja is fixed by scientists in a scythian epoch. Orientation from the VI-V cent. B.C. in the south of Ukraine leading cereals was wheat.

Scythian agricultural tribes grew wheat in the first millennium B.C. on the average and low Pridniprovja and in the pool of Dnestr (as well as in the north Greater Black Sea area) not only for the personal consumption but also for an export. In the XVI cent. on the south of Russia at the steam and swidden systems of agriculture dominant position was occupied by winter rye.

The Russian steppe hard wheat was grown in the different places of country under the different names: on Volga – "Biloturka", in Petersburg is "Kubanka", in Ukraine and in the north Greater Black Sea area are "Arnautka" and "Turk".

Key words: evolution, wheat, systems of agriculture, export, productivity, grain-crops, sowing areas.

Soft winter wheat lines grain productivity obtained from the interbreeding of parental forms of different ecological and geographical origin

L. Burdeynyuk-Tarasevych, M. Lozinskiy

The article deals with the number peculiarities of main ear grains forming and the number of grains of secondary ears in the lines of soft winter wheat of different eco-geographical origin in contrasting of hydrothermal indicators years of research. There have been established the correlation between the number of grains head and of the main ear and its weight and number of grains from the main ear and number of grains of secondary ears of plant mass and weight of grains per plant.

Productive capacity is the most important property of the variety. Therefore, one of the main areas of winter wheat breeding is genetic varieties increase in productivity as the main factor characterizing their economic value.

The study aims at a comparative evaluation of soft winter wheat lines by the number of grains of the main ear, number of grains of secondary ears and determining the rules of their reaction to changing growing conditions. It was also important to detect correlations between the number of grains from the main ear with its weight and the number of grains of the main and secondary ear ears with a mass of plants and grain weight per plant.

The degree of correlation between the structure elements yield was determined by the analysis of 25 plants in a threefold repetition, selected at the beginning of full ripeness of wheat.

The correlations between the number of grains from the main ear and the plant mass were characterized as positive, varied significantly depending on the selection of parental forms and years of research. The strength of the relation between these traits in 2011 varied from mild to significant. In 2012, the correlations were tighter and varied from moderate (17 CC) to strong in line 54 CC. Stable and known for its strength the correlation was observed in lines 26 CC and 29 CC.

Having analyzed the correlation between the number of grains of the main ear and grain weight per plant we found a positive relation, which changed the conditions significantly, and the selection of the original parental forms. depending on the genotypes involved in the hybridization strength of correlation in 2011 ranged from mild to significant ($r = 0,20 \pm 0,186 \dots 0,63 \pm 0,127$). In 2012 there have been established a much closer correlation ($r = 0,42 \pm 0,159 \dots 0,88 \pm 0,072$).

The study has given reasons to make the following conclusions.

Significantly higher rates than in the better class standard of Bilotserkivska Napivkarlykova (39.2 pc), the number of grains of the main ear was observed in lines derived from crossing varieties of steppe ecotypes Odessa 162 with radiomutant of bilotserkivska 47 (squarehead) of steppe ecotypes.

Significantly higher rates (64.9 units) of the number of grains of secondary ears than in the standard sort of Bilotserkivska Napivkarlykova (57.4 pc) were observed in lines 22 CC obtained by crossing varieties of steppe ecotypes Donetsk beardless variety of geographically distant sort of Sentury (USA).

Correlations between the number of grains of the main ear and its grain weight, the mass of the plant and grain weight per plant were described as positive, which varied significantly depending on the selection of parental forms and years of research. The most close ties (significant, strong and very strong close to the functional) were determined between the number of grains of the main ear and its grain weight.

Correlation between the number of grains per plant and plant weight and grain weight per plant in most lines were positive and were characterized as strong and very tight, close to functional.

Key words: winter wheat, crossing lines combination, ecotype, the number of grains of the main ear, number of grains of the secondary ear, grain mass, plant mass, the correlation coefficients.

The history and results of breeding of winter triticale in RTSAU named after K.A. Timiryazev

V. Pylnev, V. Rubets, V. Igonin

Triticale is a relatively new, artificial allopolyploid hybrid of wheat and rye species. Its positive traits, such as high productivity, flexibility, endurance, has attracted the researchers attention. This culture could be a possible solution for the grain and forage production in Central area of Non-black earth Zone.

However, the modern varieties of triticale usually have significant drawbacks. The most important ones is a low gluten content and quality; the possibility of pre-harvest seeds germination in the ears. These problems make it difficult to work with triticale and limit its practical application.

In 2003, the work with a collection of varieties of different origin was started, for their study and propagation. First of all, the direction of future works had been determined and a theoretical model for a variety of non-chernozem zone had been developed. It was decided to conduct the selection of grain varieties for the feed industry, the production of fermentation and baking.

The approximate parameters for a winter triticale cultivar model in Nonchernozem Zone may be such as : the shoots height no more than 120 cm (47,24'), the yield no lower, and the vegetation period no longer than that of the standart (the "Victor" cultivar), significant winter hardiness and resistance to the *Fusarium nivale*, a large number of productive shoots, large grain, and the protein content of not less than in standart.

The first breeding nursery was founded in 2005 (with the elite seeds from the NIISX of North-West), and in 2007 the breeding material for selection (hybrid nursery F2) were obtained. Individual selection of elite ears was conducted by their phenotype. Then the selection process has begun, by using the techniques, adopted for self-pollinated crops.

Currently the breeding station has no technical possibility of creating the artificial infectious provocative background. Therefore, the one significant aspect of the selection process is the usage of tandem selection on the natural provocative background. The disease resistance were evaluated first, and then (during the phase of yellow ripeness) the morphological characteristics were evaluated between the resistant samples. The final selection were carried out by the grain morphological characteristics, after the threshing . However, the natural provocative background was actually presented only in 2008, 2009 and 2013. To solve this problem, the attempts to use molecular markers to assess the parameters of triticale forms were made. The joint work with the sub-department of Molecular Biology has been conducted.

The samplings in early generations of the triticale, were considered as ineffective. So we practice the repeated sampling in late parts of the process widely. This is due to the complex composition of triticale genome, which is formed itself as a distant hybrid. In total, 14,000 samples were studied for eight years of the nursery existence. Of those, 145 samples were transferred to the control nursery, and 30 best samples were transferred to the state cultivars testing. The evaluation of selection samples has been conducted by the conventional methods during the growing season.

In 2013, the new and promising cultivar (Timirazyevskaya 150) has been transferred to the state test. The cultivar has been obtained by the individual selection from the hybrid combination 24h (♀Fidelio x ♂Doktrina 110). The varieties plants are green and have a height about 77-123 cm. The spike is long, thick, red, drooping heavily, have a long aristas with long spines on top. The glumes pubescent, long, narrow, strongly sloping shoulder or missing,

pitching a long tooth, tooth missing from the midrib. The straw under the spike is very pubescent.

The grains of Timirazyevskaya 150 are relatively short, wheat-like, half-glassed, large (1000-grain weight 43.0 - 43.2 g) and have red colour. For three years of testing the cultivar showed the high grain yield (57.8 - 96.0 kg / ha, and the standard Viktor has 51.8 - 82.0 c / ha), high resistance to lodging (4.5-5 points at standard - 4-5 points), high hardness (5 points, 4 points in standard), relative resistance to snow mold on the standard level (4-9 points), grain protein content at the level of the standard (average 14.5%), immune to powdery mildew and high resistance to brown leaf rust. The length of the growing season is at the level of the standard (318 - 321 days).

Parallel to the selection and evaluation of new varieties, the new and improved technologies of their cultivation are developed. The main directions were related to the optimization of plants with nitrogen nutrition at the different stages of ontogenesis, the choice of effective crop protection chemicals and their applications, the application of growth regulators for the yield increasing. Together with other departments, we are working on the triticale baking qualities evaluation.

The supporting breeding of the previously created winter hexaploid triticale varieties are conducted. Several contracts for the seeds production of our triticale varieties were concluded.

Also, scientific research related to winter hexaploid triticale biological features were conducted by the department. Undergraduate and graduate students are greatly involved in researchs.

The graduate student, E.A. Komarova, held the anatomical study of stems from a number of triticale varieties. This study was related to the actual problem of triticale – the low resistance to lodging. The anatomical features, that distinguish the resistant forms of triticale were determined. Relationships between some elements of plant anatomy and productivity components of ears were found.

The great unsolved problem in triticale breeding is the strong pre-harvest sprouting grains per ear, which reduces the attractiveness of this crop for farmers. The graduate student, Nguen Thi Thu King, conducted an assessment of pre-harvest grains sprouting in the triticale's spikes. The grading system, fully suitable for the mass application in breeding process was proposed.

The great work on the allocation of contrasting (by the grains sprouting resistance) triticale lines was conducted by the graduate student, M.S. Bajenov. Together with the Department of Plant Physiology, the study about the influence of environmental factors on seed dormancy were conducted. And together with the Center of Molecular Biotechnology, the study about the influence of R / D substitution on pre-harvest sprouting resistance were conducted.

The studies about of the depth of seed dormancy, the structure of triticale embryo starch during germination, the influence of the intravariety sampling on the pre-harvest sprouting resistance, and many others, were also conducted by the department.

Also, the cycle of studies, dedicated to the biology of triticale flowering, are conducted now. The studies about triticale's propensity to xenogamy (by the reaction of different varieties on self-pollination), selective fertilization, heterogamii extent and the range of pollen transfer, propensity of spontaneous hybridization with wheat and rye and the influence of biological and mechanical blockage of the unit vectors on the purity of crops were conducted in this frames. We pay special attention to this line of research, because many issues related to the peculiarities of flowering, pollination and fertilization of triticale still not been fully clarified. And they are directly associated with both the selection and the practical issues of this seed culture.

Together with the Department of Genetics and Biotechnology, the primal triticale forms being created now by the hybridization of different varieties of durum wheat, turgidum wheat, soft wheat with diploid rye. The isolated nuclei culture had been applied. The F1 hybrid sterility

had been overcome by the pollen of constant forms. The same work can determine the wheat and rye ability to distant hybridization.

The study of inheritance by a number of triticale agronomic traits, are conducted.

The optimization of the fusarium-resistant elite plants selection methods, are conducted.

Key words: triticale, variety, plant breeding, seed production, hybridization, blossoming biology, seed dormancy, sprouting in spike.

The winter wheat development and crops formation number in cenosis

V. Hahula

The article deals with the theoretical and practical analysis and evaluation of the impact of the fertilizers doses variety and tillage methods on the formation of standing crops density of winter wheat as one of the most important factors which, in combination with others, can have a positive impact on the value of the productivity, structure elements, products quality. In addition, crops density is an efficient way to regulate microbial processes in the soil as well as use of moisture, nutrition elements and sunlight by crops.

Varying crops density during the growing season can change its morphotype, height, forming vegetative and generative organs, agrophytocenoses density and, therefore, consumption of nutrients and water from the soil, photosynthesis, can be regulated which will result in and regulating the value of the yield.

Crops can respond to changing their density in two ways – in partial loss of the crop during the growing season, or change the nature of growth and development.

The study was conducted in 2011-2013, in a stationary field experiment at the experimental field of Bila Tserkva NAU. During the research quantitative and qualitative comparison methods were used as well as abstract-logical and analytical method.

The dynamics of the variability of the number of plants from emergency to ripening grain was studied in multivariate field experiment. Podolyanka, Yasochka and Bat'ko winter wheat varieties were taken the A factor varieties of winter wheat; fertilizers doses - for B factor and tillage methods - for C factor.

Determination of the number of plants that survived from emergency to maturation, including all variants of multivariate experiment showed that the 79.1% of plants kept clean in Yasochka variety, 81 % in Podolyanka variety, - on 85.1 % - in Bat'ko variety of the plants . In the process of growing under our technology 14.9-20.9 % of the plants died on average. The dead plants make irrevocable lost and unaccounted reserve of the grain yield.

We have determined the part of the contribution of each gradation multivariate of the multifactor experiment in density stand of plants formation per 1 m² during grain ripening with the three factors dispersion analysis the amount of species variance. The analysis showed that the impact of the share of total variation accounted for 43.6 %. The unregulated factor made a significant impact here. A crucial role is probably played by the temperature of the air and soil, soil moisture, dry winds climate effects, pests and diseases. The rate experiment options in forming the number of plants per 1 m² is 23.7 %.

Impact share of factor A (genotypes varieties) in the formation of this index in the phase of full ripeness is 15.8 %, the share of B factor (doses of fertilizers) is 10.4%, share of C factor influence (soil management) is 1.7 %. The share of the total impact of the factors interaction in the formation of plant density before harvesting is 4.7%. The share of the experiment controlled factors influence on the formation of standing plant density before harvesting is 51.7 % which is considered to a weak effect. We have the reserves to increase this share impact due to new, more drought-resistant, winter-hardy, pests and diseases varieties resistant. Due to agricultural practices aimed at preserving soil moisture and application of effective, easily digestible, complex fertilizers

1. Plant density is influenced by the studied factors such as variety, fertilizers rates and cultivation methods.

2. Crops stand density in the communities depends on farming practices both human regulated and random unregulated.

3. The greatest influence in shaping the number of plants per 1 m² depending on the development phase is made by emergency phase on the variety and fertilizers dosage, the impact on tillage methods is much lower.

4. While the tendency of variation in the crops density formation in the stages development remained, cultivation methods had nearly negligible effect on the density of plants standing.

Key words: crops density, cenosis, growth phase, the growing period, agrotechnical steps, wintering, earing, maturation, sort, fertilizers, tillage methods, dispersion analysis, share of influence.

The variability of elements of the productivity of ear spring barley depending on the sort genotype and degree of defeat illnesses

V. Sabadyn

Resistant varieties – one of the important components of integrated protection. The main areas in breeding is to improve productivity and product quality, resistance to diseases, pests and adverse environmental conditions. Breeding success in the creation of resistant varieties is determined using proven in this particular region sources and donor stability of barley against major diseases.

Weather conditions in April-June 2010 and 2012 promoted the development and spread of causative agents of diseases, optimal moistening – 1.1 and 1.3 respectively. Weather conditions in 2011 contributed to the moderate development of diseases due to high temperature and low rainfall 9 – the lack of moisture.

Development of *Erysiphe graminis* f. sp. *hordei* in 2010 was 23.7%, in 2011 – 7.8%, 2012 - 25.6%. The average lesion of sorts *Drechslera graminea* Ito by years was low: 4.1%, 9.0% and 4.9% respectively. Development of *Bipolaris sorokiniana* Shoem. for 2010-2012 – 23.9%, 14.1%, 42.2%; *Drechslera teres* Ito. – 26,3%, 9,3% and 10,7%.

In collection nursery garden spring barley was studied 170 samples of different origin. For 3 years on the provocative backdrop against pathogen of powdery mildew (*Erysiphe graminis* f. Sp. *Hordei*) was selected highly resistant and resistant varieties of spring barley: Eunova (Austria), Danuta, Barke, Adonis, Marnie, Bojos, Landora, Serva (Germany) Nansy (Sweden), Yevroprestyzh (Ukraine), Henley, Bojos (Czech Republic) and others.

On the artificial infectious background of leaf spot pathogens of spring barley: dark brown (*Bipolaris sorokiniana* Shoem.), Striped (*Drechslera graminea* Ito.) and netted (*Drechslera teres* Ito.) was studied the stability of sorts. As a result, was selected varietie, that have shown resistance to certain diseases as well as to the complex. These classes are Sontsedar, Hadar, Aeneas, Aspect, Etiquette, accomplishments, Star, Yevroprestyzh (Ukraine); Zadonskiy, Rubicon (Russia); Burstine (Belarus); Celinka, Delta (France); Eunova, Secuwa, Panowama (Austria); Madeira, Serva, Landora, Ria, Danuta, Makay (Germany); Nansy (Sweden); Dominique (Netherlands); Sebastian, Torgal, Genley, Ballini, Vivaldi, Kangu (Czech Republic) and others.

The number of grains in the ear is closely related to the productivity and is determined by the environmental conditions during periods of laying, ear differentiation, flowering and seed formation and can be changed widely.

The amount and weight of grains in the ear is caused hereditarily, but it is determined by the influence of different environmental conditions. The intensity of disease lesion effect is influenced by decrease in weight of grain. On formation of a larger amount of grains have an important influence other environmental conditions, especially weather.

As a result of our research, we have identified three sorts. According to the number of grains of the main ear they were at the level of the standard Commander and exceeded it from 0.1 to 2.7 units (after about three years): Eunova (Austria), Danuta, Serva, Barke, Adonis, Marnie (Germany) Yevroprestyzh (Ukraine), Henley, Bojos (Czech Republic).

Cultivars that showed high stability and resistance to pathogens, had higher grain weight ear compared with varieties that have a high degree of damage. As a result of research, we have selected varieties, that by mass of grain of a main ear exceeded the grade-standard Commander on 0,01-0,18 g. There are such sorts as Eunova (Austria), Danuta, Serva, Barke, Adonis, Marnie (Germany), Nansy (Sweden) Yevroprestyzh (Ukraine), Bojos (Czech Republic).

Key words: spring barley, sources of stability, Erysiphe graminis, Drechslera graminea, Bipolaris sorokiniana, Drechslera teres, amount of grains from a main ear, mass of grain from a main ear.

High-quality indexes and productive properties triploid hybrid of sugar beet «Alexandria» depending on the size of factions and methods of preparation of seed

V. Glevaskiy

On forming of root crops of sugar beets is a number of important factors with high technological indexes, one of the major is quality of sowing material. In fact the use of seed of sugar beets of high quality – makes this culture crop highly technological and highly profitable.

Quality of seeds is the aggregate of signs and properties of sugar beet seeds, which characterizes their accordance the set requirements to sowing material. Sowing qualities are formed at creation of hybrids, growing of seed and preseed preparation on seminal factories. Pre seed treatment is the finishing stage of preparation of seed and quality of sowing material depends on his technological mode.

In this connection actual is a study of features of forming of harvest of triploid CHS the hybrid of sugar beets depending on the methods of preparation of seed and growing of him in concrete ground-climatic terms. For using of encrusted and dragee seeds his quality must answer to modern standards. With the purpose of decision of scientific and practical problems, related to growing of sugar beets at sowing of dragee and encrusted seeds of CHS the hybrid of sugar beets of different factions, and our researches were conducted.

The aim and task of researches. Study of features of forming of harvest of of triploid hybrid of sugar beets, depending on the methods of preparation of dragee and encrusted seeds of different factions in concretely ground - climatic terms.

Experiments from determination of sowing qualities and productive properties of dragee and encrusted seeds of different factions of CHS the hybrid of sugar beets depending on technology of preparation conducted in 2012-2013 in laboratory and field terms educational-scientific experimental center of BNAU. In the field experiments the registration plottage was 25 m²., repeated fourfold.

Researches conducted, using the seed of triploid hybrid of sugar beets «Oleksandrija». The chart of experience included the following variants: 1) bitten-into seeds - (control), 2) encrusted seeds (faction 4,5-5,5 mm), 3) encrusted seeds (faction 3,5-4,5 mm), 4) dragee seeds (faction 3,0-3,5 mm), 5) dragee seeds (faction 3,6-4,0 mm), 6) dragee seeds (faction 4,0-4,5 mm).

In the article deals with the information in relation to the increase of sowing qualities and productive properties of seed of triploid hybrid of sugar beets. The problem was settled with carrying out tests, in which certainly optimum faction of seeds at growing in concretely ground climatic terms. Technology of preparation of dragee and encrusted seeds of large factions of CHS of hybrid of sugar beets with the use of aggregate results of researches provides its laboratory germination, leveling and one shoot at the level of 90% and higher, field germination – 72-81%, collection of sugar – 7,4 – 8,7 t/ga.

On the average for 2012-2013 years the lowest germination of seeds in laboratory terms was observed in dragee faction 3,0-3,5 mm – 82% and the greatest at the encrusted seeds, faction 3,5-4,5 mm – 96%.

Dragee seeds, faction 3,6-4,0 mm made on the third day of germination – 65%, on fourth (energy of germination) – 77%, on tenth (germination) – 88%. In faction 4,0-4,5 mm on the third day germinated seeds 75%, on fourth – 85%, and on tenth – 91%, that had the best indexes among factions of dragee and bitten-into (control) seeds.

Quality of the encrusted seeds in laboratory terms was the best after dragee and it is bitten-into (control). So seeds in faction 4,5-5,5 mm germinated on the third day - 80%, on fourth (energy of germination) – 94% and on tenth (germination) – 95%. The best result was by the encrusted seeds, faction 3,5-4,5 mm, where germinated on the third day - 81%, on fourth – 94% and on tenth (germination) – 95%.

On the average for 2012 – 2013 researches it was set that the least stairs on the 14 day - 53%, on the 16 day -55% and on the 18 day - 57% of the dragee seeds of faction had 3,0-3,5 mm, and most of stair at the encrusted seed faction 4,5-5,5 mm on the 14 day - 71%, on the 16 day -74% and on the 18 day - 81%. For years the leadthrough of researches amount of stairs of dragee seeds of factions 3,6-4,0 mm and 4,0-4,5 mm yielded to the encrusted seed of faction 3,5-4,5 mm and factions 4,5-5,5 mm on 6%. And that is why, it is possible to draw conclusion, that at the insufficient amount of fallouts in a period, «sowing is a stair» the germination of the encrusted seed is higher then of dragee seeds.

Key words: sugar beet, triploid hybrid, inlaid seeds, fraction of seeds, germination of seeds, dragee seeds.

Influence of monogermity of elite seed of sugar beet ChS components on the quality of hybrid seed

D. Adamenko, V. Polishchuk

Scientific research with seed production and seed growing issues of sugar beet are closely associated with the development of selection work. With the changing of work directions in selection are changed and scientific researches with seed production and seed growing. At first of polyspermous sugar beet seed production system is developed. With the creation of monospermous varieties-populations – are methods of seed production of beet that related to this form, then anizoploid hybrids, and in recent years – hybrids are based on cytoplasmic male sterility.

In recent years in connection with requirements increasing to the quality of seed, particular of monogermity and monospermity is emerged the need to establish the dependence of monospermity of the elite of ChS component on hybrid seed monospermity.

Monogermity is the ratio of sugar beet seed that were given one sprout at germination to the total number of germinated seed, expressed in percentage. Monospermity is the ratio of monospermous fruits of sugar beet number to the total number of fruits, expressed in percentage.

There is a close correlation – $r = 0,85-0,95$ between the monospermity and monogermity. With such dependence of seed monospermity increasing will be accompanied of its monogermity increase. The difference between monogermity and monospermity can reach from 0 to 8%. Monospermity (monogermity) is determined primarily of genetic basis of the variety or hybrid; they are less undergoing of modification variability.

Sugar beet cultivation by the intensive technologies great importance is gained, along with the similarity, seed monospermity. It was from her largely depends density and uniformity of sowing, yield, cost and quality of roots, the cost of labor on their cultivation.

Seed material of monospermous sugar beet is a mixture of monospermous fruits that by the germination is not always gives one seedling. In seed parties of monospermous sugar beet the

content of impurities of polyspermous glomeruli is predetermined of genetic or mechanical impurities. To the genetic impurities are related single glomeruli that were formed on separate monospermous or polyspermous seed plants due to insufficient selection in the breeding process. To the mechanical impurities are related seed impurities of polyspermous pollinators by the joint cultivation and harvesting of hybrid seed – mixture of ChS component and polyspermous pollinator (intentional impurities) and impurities of polyspermous glomeruli, which came to the party of monospermous seed from mechanical causes of clogging in the process of growing, seed plants harvesting, processing, storage, transportation and handling of basic and ordinary seed (unintentional impurities).

Institute of Sugar Beet researches are established that for seed of domestic monospermous varieties and hybrids is characterized the presence of impurities of polyspermous glomeruli of the three mentioned species that are placed in parties of seed locally mainly.

The results are analyzing, it should be noted that the weather conditions of growing season of seed plant are adversely affected on seed plants growth and development in 2013. Accordingly, a significant share of seed plants is prematurely dried, which negatively affected on the level of seed productivity.

The results are analyzing, it should be noted a slightly different of seed productivity. In particular, the mass of 1000 seed is varies within 12.1-14.5 g. Moreover the difference of this index between variants of roots using, that are derived from the elite seed with the 100% of seedily and twospermous seed were not found.

Regarding to hybrid seed monospermity is found that between the samples of seed were obtained from elite seed with different levels of fertility, there are some differences. Thus, for seed that obtained from base seed with 100% of monospermity, index of fertility is fluctuates within 86–96 percent. Monospermity of hybrid seed is obtained from twospermous samples on 3–5 percent is lower.

The differences between variants is not established except of ChS component of VChS 63, for which this index is in the 26–36% range to the energy of germination and similarity concerning.

It is established that level of fertility is influencing on the indexes of monospermity of seed plants. The difference of quality parameters of seed in the research's variants is not set.

Key words: seed production, seed growing, monospermity, sterility, ChS hybrids, sugar beet.

Influence of spray fertilization by micronutrients on indexes of photosynthetic productivity of sugar beet

L. Karpuk

Photosynthesis process regulation i.e. its productivity increasing – is one of the most effective methods of influence on the sugar beet productivity, and for them - an important means of yield level increasing.

Researches have established that on the efficiency of sugar beet photosynthesis is significantly influence the timing of micronutrients foliar feeding, types and norms of their application. Observation of the growth and development of sugar beet plants assimilation surface on the date of registration when microelements is making in the closing leaves in a row phase was showed that leaf surface area depending on the term, types and norms of microelements application on average was ranged between 34.5 to 46.6 thousand m²/ha.

On the control variant (without feeding), average for research years, the leaf surface area was 34.5 thousand m²/ha and its higher value was obtained in the variant of Reakom-plus-beet application in the norm of 7 l/ha – 46.6 thousand m²/ha, that is caused by optimal area of plant nutrition and the best leaf surface assimilation apparatus formation. The smallest value of the leaf surface index, relative to the control, was obtained in the areas with Reastim-humus-beet and

Reakom-plus-beet micronutrients application in the norm of 3 l/ha, respectively, 37.5 and 35.5 thousand m²/ha. That is, on leaf surface increasing a significant influence had as a form of micronutrients and the norm of application. On a variant with using for foliar feeding Reastim-humus-beet at the application norms of microelements increasing from 3 to 7 l/ha the leaf surface area was increased on 7.0 thousand m²/ha, and on the plots with Reakom-plus-beet application the leaf area was increased on 11.1 thousand m²/ha.

According to the research results on the variants with the application of various types of micronutrients with different norms, on the first of September the photosynthetic potential was average and was within 1.03-1.40 million m² × days/ha. So, on the variant with the application of Reakom R-beet (standard) micronutrient in the norm of 5 l/ha the index of photosynthetic potential was 1.15 million m² × days/ha, which is on 0.12 million m² × days/ha higher than on the control variant (without application).

High indicators of photosynthetic potential were obtained in variants with Reastim-humus-beet and Reakom-plus-beet microfertilizers application in the norms of 5 and 7 l/ha. In comparison with the application norm of 3 l/ha these indicators were increased on 0.06–0.34 million m² days/ha.

Reakom R-beet, Reastim-humus-beet and Reakom-plus-beet microfertilizers foliar feeding application amid a general background of fertilizer is establishing appropriate conditions for the photosynthetic process intensity increasing, especially pure photosynthetic productivity. The most favorable were areas in which the feeding was carried out in closing leaves in a row phase with the norm of micronutrients application of 5 and 7 l/ha. At Reakom R-beet application in the recommended norm of 5 l/ha for the production the pure photosynthetic productivity was 5.67 g of dry matter/m² leaf area per day, at Reastim-humus-beet application in the norms of 5 – 5.96 and 7 l/ha – 6.26 g dry matter/m² leaf area per day respectively. After Reakom-plus-beet application in the norms of 5 and 7 l/ha, the pure photosynthetic productivity was respectively – 6.50 and 6.61 g dry matter/m² leaf area per day. Given that in these variants there was a high photosynthetic potential (1.15–1.40 million m² × days/ha) and has created a favorable physiological background for productive work of each plant cell by the expense of micronutrients application, it were created the necessary conditions for a high level of photosynthesis process passing.

At the second period of micronutrients application were also determined the indicators of photosynthesis productivity. It should be noted that the indicators of leaf surface area in all variants were almost in a par, as in the variants after the first term of micronutrients foliar feeding were in the range of 32.1 to 50.6 thousand m²/ha. Photosynthetic potential value (0.96–1.52 million m² × days/ha) and pure photosynthetic productivity (4.65–6.31 g dry matter/m² leaf area per day) were lower in comparison with the first period of micronutrient application.

Summing up it should be noted that foliar feeding application in closing leaves in a row phase is delivers the productivity of photosynthesis increasing, particularly in variants where used Reakom R-beet microfertilizer at application norm of 5 l/ha, Reastim-humus-beet at application norms of 5 and 7 l/ha and the Reakom-plus-beet at the same norms, which resulted the high indicators of leaf area from 38.4 to 46.6 thousand m²/ha, the photosynthetic potential of 1.15 to 1.40 million m² × days/ha and pure photosynthetic productivity from 5.67 to 6.61 g dry matter/m² leaf area per day, and this in turn is impact on sugar beet final productivity. On pure photosynthetic indicators productivity it is possible to predict the sugar beet productivity depending on the norms and types micronutrient application in feeding.

Key words: sugar beet, microfertilizer, foliar feeding, photosynthetic productivity.

Growth and development features of biological forms of sugar beet which depend on sowing norm of seeds

L. Karpuk, M. Kykalo

Two factors influence on plants growth and development: the organism nature and the existing conditions in the nature. As numerous researches show, each beet field was linked with the soil fertility, and estimated before root harvesting is different plant groups by weight presence. Near of 70-80% crop plants present average and below average and about 20-30% higher than the average plant mass. The large number of plants average and below average weight reduces sugar beet yield.

Productivity of sugar beet field agrophytocenoses in the system of production is determined primarily by element: variety (hybrid) – seed. Therefore, an important role in the formation of high yield and technological properties of roots is belonging of sugar beet hybrids. Development and implementation of high-performance technology of sugar beet growing became possible because of the creation by breeders genetically highly monogerm varieties and hybrids that are based on CMS. To the State Register of Plant Varieties of Ukraine in 2009 year were included more than 120 monogerm varieties and hybrids of sugar beet of domestic and foreign companies with a common selection. In Ukraine on the large areas are grown national monogerm varieties and monogerm hybrids that by the complex of features (productivity, environmental stability, resistance to diseases, especially rotting of roots crops) have high potential seed plants, and their productivity in the conditions of Ukraine are competitive. In addition, they are adapted to the zonal variations of high-productivity technology of sugar beet production. Operational implementation of this technology into production will enable to increase the yield of sugar per hectare. Very important is the study of the features of growth and development of sugar beet new hybrids in relation to a particular area (microzone).

During research years was not noticed in average a significant difference for the duration of shoots occurrence that depends on the biological form of sugar beet. Thus, on the first day of germination the number of their shoots in the variant of Ivanovo-Veselopodilsky ChS 84 triploid hybrid was 53.4% (for seed norm 8.6 pc./m), but in diploid hybrids were 51.6–53.4%, and on the eighth day was respectively 99.3 and 99.0–99.5%. Almost the same was the intensity of shoots occurrence with a norm of seed sowing of 8.6 pc./m and 7.1 pc./m.

On average over the four research years the highest field's germination was observed in Ivanovo-Veselopodilsky ChS 84 triploid hybrid with the seeding rate of 8.6 pc./m and 7.1 pc./m it was –70%. It is shown the tendency of field germination decreasing in diploid hybrids (from 70 to 68–69%) and its increase – with a lower norm of sowing.

The results of the research found that the growth and development of plants in the studied biological forms of sugar beet were uneven.

Monitoring of the dynamics of sugar beet plants depends on the biological forms and shows that the power of their growth in the initial period of growth was higher in triploid hybrids than in the diploid. Since the mass of 100 plants in the phase of the first pair of true leaves, during year in average was on 1.0–2.9 g, which is higher in triploid, than diploid hybrids. The biggest mass of 100 plants was observed in Umansky ChS 97 and Ukrainian ChS 72 hybrids – 74.4 g per seeding rate of 7.1 pc./m. Minimum weight of 100 plants was observed in fields where was sown Leopard diploid hybrid – 70.6 g per seeding rate 8.6 pc./m and 72.6 g per seeding rate 7.1 pc./m. Within the limits of one biological form of sugar beet the difference on this indicator is not observed practically, but a significant difference is obvious and depends on the norms of seeding.

Thus, in the Umansky World 97 triploid hybrid the mass of 100 plants on average per years was 73.3 g, while in the Ukrainian ChS 72 diploid hybrid – 73.5 g.

Regarding to the infestation of different sugar beets forms by Black foot, it must be noted that in average during research years was observed a tendency to greater infestation of plants by Black foot in triploid forms than in the diploid. This index in the Ukrainian ChS 72 diploid hybrid of seeding rate was 10.0–10.2%, while the Ivanovo-Veselopodilsky ChS 84 triploid hybrid – 10.7–10.9%. That is, if the higher the rate of seeding, so it would be the higher index of affection of plants by Black foot.

Key words: sugar beet, biological form, seeding norm of seed, plants growth and development, field germination.

Agrobacterium-mediate transformation of sugar beet by in planta method

S. Bohulska

Sugar beet is one of the most important agricultural crops in Ukraine. While growing the sugar beet more than a half of all the expenses accounts for weed control. Yield losses are estimated at an average of 25-30%.

Nonselective herbicides are used for destruction of all kind of weeds on agricultural land. For this purpose such products as roundup, arsenal, basta are used.

Genetic engineering techniques have opened the possibility to insert into the sugar beet genes that provide new properties for this culture that previously could not be implemented in traditional breeding. Taking into consideration the variability of genotypes, low regeneration and transformation potential of beets, there are some difficulties for genetic engineering manipulations aimed at improving the genotype of the crop. Despite this, in recent years sugar beet plants resistant to herbicides were obtained.

As a result of conducted research the GM sugar beet lines resistant to herbicides and allowed to grow in the U.S., Japan, Australia, the Philippines, Canada and Russia were received by the Firm Monsanto. Line ACS-BVIII III 1–3 (T120–7 is resistant to the herbicide with the active ingredient phosphinothricin and line H7 -1 is resistant to the herbicide with the active ingredient glyphosate, obtained by the method of plants transformation with *A. tumefaciens*.

Currently in molecular plant biology more attention is paid to the development of methods of transformation, which help to prevent long-term manipulations with plants recipients. It is shown that it is possible to obtain transgenic plants without any treatments in vitro. In genetic transformation of plants natural system Ti- plasmid (tumor inducing) of soil agrobacteria *Agrobacterium tumefaciens* is used, that allows you to insert relatively large gene constructs in the genome of dicotyledonous and some monocotyledonous plants.

Bechtold and co-authors proposed a transformation method, called in planta. This method is based on vacuum infiltration of a suspension of *Agrobacterium tumefaciens* with plant recipient. Modification of the method is inoculation of plant recipients flowers with the suspension *Agrobacterium*, containing surfactant Silwet L- 77.

Research objective was transformation plants of sugar beet in planta method and get the forms of sugar beet resistance to the herbicide with the active ingredient phosphinothricin.

The following tasks were set for the achievement of the objectives: 1) to optimize conditions of *Agrobacterium*-mediated transformation in planta; 2) conduct analysis resistance to the herbicide received sugar beet forms.

For transformation they used the strain *Agrobacterium tumefaciens* LBA4404 with a plasmid containing the bar-gene that determines resistance to the herbicide with the active ingredient phosphinothricin - Basta. Plasmid has selective antibiotic resistance genes and placed under 35S CaMV promoter of cauliflower mosaic virus.

As a recipient sterile parent forms of hybrids of sugar beet Abatysa, Avtorytetnyi and Avatar were taken. Taken sterile form, it gives an opportunity to control the process pollination and fertilization these forms by isolating and subsequent pollination. So, for *Agrobacterium*-

mediated transformation of plants flowers with bisexual, using sterile form, that gives the opportunity process synchronize fertilization and the embedding into genome of the plants T-DNA.

5 plants of the hybrid Abatysa, 4 plants of the hybrid Avtorytetnyi and 4 plants of the hybrid Avatar totally survived. Accordingly, the frequency of transformation was the following: Abatysa - 1.4; Avtorytetnyi - 1.3, Avatar - 1.4.

To study the inheritance of genetically modified sign, beet plant resistance to the herbicide with the active ingredient phosphinothricin, the crossing of the derived forms was made.

After pollination of resistant sterile plants with not resistant to the herbicide sterile binder 68 resistant plants of the hybrid Abatysa, 58 resistant plants of the hybrid Avtorytetnyi and 64 resistant plants of the hybrid Avatar were obtained.

It has been shown that transgenic sugar beet plants phenotypically did not differ from normal plants (non-transgenic). It means that inserted into the genome of plant construction bar has no effect on the expression of functional and structural genes of plants.

Key words: sugar beet, phosphinothricin, agrobacterium, transformation, in planta method.

Influence of hydrothermal conditions on vegetation productivity of maize hybrids of different maturity groups under forest-steppe zone of Ukraine

M. Grabovskiy, T. Grabovskay, S. Obrajyy

The article presents the results of studies on the effects of hydrothermal conditions of the growing season on yield of green mass corn hybrids that are in different maturity groups.

In modern conditions, the significance is the increase in corn production by creating a silage pipeline of cultivation in the area of Central forest-Steppe zone of Ukraine hybrids that have different maturity groups. Proper selection of plastic hybrids of corn silage direction, with stable yields, will not only increase productivity of this culture, but also get high quality silage at content of dry substance in plants 28-30 % with part of ears 45-50%. Global and regional climate changes necessitate revision of the basic principles of growing corn for silage, including the use of new hybrids of different maturity groups.

During the growing season of maize plants within three years of research hydrothermal conditions were different, especially in the period of formation, filling and forming grain that gives an opportunity in more depth to estimate plasticity of investigational hybrids and expose their biological and agroecological features of growing.

The data of our research show that favorable conditions for normal growth and development of corn were only under moisture years (2011 and 2013) when HTC ranged from 1,03-1,88. The green mass yield formation of early hybrid Tovtryanskiy 188 SV was at level 44,0-45,4 t/ha, mid-early hybrid Bilozirskiy 295 SV – 48,3-49,7 t/ha, middle hybrid Monica 350 MV – 52,7-54,1 t/ha and middle hybrid Bystriza 400 56 MV,5-58 6 t/ha.

In droughty 2012, when the hydrothermal coefficient decreased to 0,24-0,92, yield hybrids on average diminished on 9,9-14,5 t/ha or in relative terms 18,8-25,1%. Herewith most middle-maturing forms reduced the productivity, that testifies their plants have an increase demand to moisture conditions. However, the trend of increasing the yield of early maturing forms to medium preserved in all the years of research.

In our study found a strong correlation between the hydrothermal regime during the growing season and the processes of grain formation in hybrids of different maturity groups, especially in the second half of the growing season ($r = 0,72-0,86$), indicating a strengthening of the role of climatic factors in forming the corn productivity in the forest-Steppe zone of Ukraine. Clear evidence of this is oscillation of the productivity of green mass of hybrids after years depending on the terms of moistening.

In years with the deficit of moisture and uneven distribution of precipitations during a vegetation period dependence between the sum of precipitations and productivity has the clearly expressed character.

All investigated hybrids of corn negatively react on worsening of moisture terms, especially middle-maturing Monica 350 MV and medium Bystrica 400 MV. Reduction HTC in July 2013 to 0.67 resulted in shortage of green mass yield of the hybrid: 1,4-2,2 t/ha compared to 2011.

Selection of corn hybrids, genetic potential of that maximally answers the agroclimatic conditions of the forest-Steppe zone of Ukraine, is one of the effective methods of modern crop that allows increasing productivity of crops by activation of biological potential of agroecosystems and their constituent elements at all levels, replacing a large part of human energy internal energy of biological processes.

The central areas of the forest-Steppe zone of Ukraine are characterized by unstable moistening, and the degree of moisture determines different levels of the productivity. In moist years the yield of green mass of corn is approached to 58.6 t/ha and in droughty to 34.5 t/ha. Middle-maturing hybrid Monica 350 MV and medium Bystrica 400 MV have the highest productivity but in unfavorable on agroclimatic indexes years, they significantly reduced productivity compared with more early maturing forms.

Key words: corn, productivity, green mass, hybrids, hydrothermal coefficient (HTC).

Intsuhtu effect on performance of structural elements in a varieties of winter rape

Y. Ivko

Shows the impact intsuhtu the formation of the stem height, number of pods on the main inflorescence, pod length and number of seeds in a pod in different genotypes of winter rape. We found that most samples observed inbreeding depression. Comparing plant height stem, which were obtained from the seeds, which was formed with the free pollination and plants (I1) - from seeds obtained by selfing compulsory, it should be noted that all samples had lower height of the stem plants I1 compared with open blossoms. Most clearly apparent inbreeding depression in grade Trabant (Germany). The height of the stem in the first - generation intsuht was - $69,7 \pm 3,2$ cm, 20.2 cm smaller compared to the free pollination - $89,9 \pm 2,2$ cm. Significant reduction in the height of the stems of plants intsuht first - generation versus free plant pollination found in samples Landar (Ukraine) - $76,8 \pm 3,6$ cm, compared to $88,4 \pm 2,7$ cm Donhon - $79,4 \pm 4,9$ cm, compared to $90,2 \pm 1,1$ cm Astrid (Germany) - $87,9 \pm 3,0$ cm, compared to $99,8 \pm 2,1$ cm in the remaining researched samples observed weaker inbreeding depression and reduce the height of the stem varied in the range from 3.0 to 9.0 cm depending on the genotype of the variety (hybrid).

The impact of the first generation of the formation intsuhtu number of pods on the main inflorescence was different. There is both an increase and decrease in the formation of this trait in plants I1. Most clearly expressed in plant varieties depression Champion Ukraine - $13,4 \pm 1,4$ units. comparison of $24,9 \pm 1,1$ - plants for free pollination.

Significant reduction in the number of pods on the main inflorescence plants intsuht first - generation versus found in samples Donhon - $20,8 \pm 2,8$ units. Versus Nadia - $20,2 \pm 1,3$ pcs., Compared to $28,2 \pm 2,1$ pcs., Astrid - $17,4 \pm 2,2$ units. compared to $25,5 \pm 1,4$ units. and Landar - $24,8 \pm 2,1$ units. compared to $27,4 \pm 2,0$ pc.

In samples Champion Ukraine, Donhon, Vectra, Astrid intsuht the first generation of a decrease in the length of the pod. Most clearly apparent inbreeding depression in grades Champion Ukraine and Vectra. The length of the pod in the first - generation intsuht grade Champion of Ukraine was $5,9 \pm 0,2$ cm, compared to $7,1 \pm 0,2$ cm, grade Vectra - $6,6 \pm 0,3$ cm, compared with $7.5 \pm 0,2$ cm.

One of the main structural elements of performance is the number of winter rape seeds in pods. Of the 10 subjects in seven samples, an increase in the number of seeds in a pod in plants intersuited first - generation compared with open blossoms.

Depression of this trait in plants (I1) versus free plant pollination found only in grade Champion Ukraine - $25,4 \pm 1,1$ units. comparison of $27,4 \pm 0,7$ pcs., Anna - $27,7 \pm 3,5$ units. comparison of $28,9 \pm 1,5$ pcs., Kronos - $20,6 \pm 1,9$ units. comparison of $21,0 \pm 1,1$ units.

Established that intersuit the first generation affects the formation meromes and accompanied by depression, in which different genotypes of winter oilseed rape reduces the height of the stem (to 20.2 cm), number of pods on the main inflorescence (up 11.5 pc.), Pod length (to 1.2 cm), number of seeds in a pod (up to 2.0 pc.) compared to autbrydynhom. Top incompatibility height stems found in a variety Trabant, Donhon, Landar, the number of pods on the main inflorescence found in variety Champion Ukraine, Donhon, Astrid, Nadia for pod length and number of seeds in a pod - Champion of Ukraine.

We need to continue research in the next - generation intersuit to identify and create a collection both incompatibility and winter rape compatibility lines for further breeding.

Key words: intersuit, inbreeding, inbreeding depression, intersuit-generation, selection, rape winter.

Forming sowing qualities of millet seeds depending on the influence of a predecessor and fertilization

S. Poltoretskyi

Today, in seed studies there is a sufficient amount of material on seed heterogeneity but agrotechnical side of this problem is not fully researched. This is especially true about millet seed. In this regard it is important to develop the theoretical foundations of sowing qualities and yielding properties of seeds depending on a number of agronomic conditions, including the selection of predecessors. It helps to understand more the causes of declining field similarity, to identify the new opportunities of prediction for increasing quality of seeds and their derivatives – seed productivity and yield of millet seed.

The aim of the research was to improve elements of technology growing high-quality seeds of millet by selecting predecessors that will provide improvement of yielding properties of millet seeds in conditions of unstable moistening of southern River Right-Bank Forest area.

Field studies were made during 2005-2007 on the experimental field of educational and research complex of Uman National University of Horticulture, which is situated in Mankivka natural agricultural region of Middle Dnieper-Bug river district in Right Bank Forest-Steppe province of Ukraine.

There are three-factor field experiment: influence of a predecessor, aftereffect of fertilized ground, a fertilized ground of millet. Influence on sowing and yielding seed properties was carried out by all these factors:

Factor A (predecessors): peas, winter wheat, sugar beet, buckwheat.

Factor B (fertilized ground of a millet predecessor): without fertilizer (control); millet predecessor: peas N₅₀P₅₀K₅₀; winter wheat N₆₀P₆₀K₆₀; sugar beet N₁₅₀P₁₅₀K₁₅₀; buckwheat N₄₅P₄₅K₄₅.

Factor C (fertilized ground of millet): without fertilizer (control), N₆₀P₆₀K₆₀.

Sowing quality of seeds formed on maternal plants was tested in laboratory conditions, in autumn, during the period of harvest, and by its planting for next year (first seed offspring, 2006-2008) on the fertilized ground N₆₀P₆₀K₆₀, the predecessor was winter wheat.

For sowing we used mid ripening millet variety Zolotyse. Method of sowing is the usual line, seeding rate – 3.5 million units, similar seeds/ha.

As a result of research the following conclusions were:

the highest seed yield was formed in variants of fertilized predecessors, followed by millet sowing on the fertilized ground (according to the level of 44.9 – 46.5 kg/ha) that is significantly different (at 2.0-12.0 kg/ha) of similar indicators for other variants of predecessor fertilizing and directly millet seed sowing;

among the studied factors the greatest influence on the yield of maternal plant seeds in average for years of research had the direct fertilization of millet (41.7%) and predecessors (33.5%) and predecessors themselves (15.9%). The effect of interacting these factors was much less;

the most valuable seeds with high viability and vitality are formed after the fertilized peas and winter wheat, followed by millet sown on fertilized ground;

the weather conditions of vegetation year of maternal plants had a significant influence on quality of sowing material – the more disadvantaged conditions were in which the process of seed formation was, the higher its vitality, viability and yielding properties were.

Key words: millet, seeds, predecessor, fertilization, sowing qualities, harvest properties.

The sewage sludge fertilizing influence on increasing dynamics of willow energy biomass

V. Lopushnyak, G. Hrytsulyak

Growing willow energy in Ukraine is suitable for low-agricultural land. A promising trend of growth productivity planting of willow energy is the use of sewage sludge. This is solving of two problems – providing renewable energy resources and utilization of sewage sludge as a source of pollution.

Sewage sludge is characterized by a high content of basic agrochemical characteristics of natural humus compounds, it can be used as traditional organic fertilizers. The composting of sewage sludge with organic and mineral materials is an effective way to improve the sanitary condition and obtain high quality agrochemical fertilizer.

The purpose of research was to study the characteristics of growth, development and performance of willow energy plants with different sewage sludge application rates and composting on their basis.

To evaluate the growth, development and productivity of willow energy at different rates of sewage sludge application as fertilizer, we have incorporated a field experiment, comprising ten choices of 3 reps. The scheme of planting 0.33 m X 0.70 m. Variants of the experiment: 1. Control – no fertilizer; 2. Fertilizers – N₁₀₀P₁₀₀K₁₀₀; 3. SALT – 40 t/ha, 4. SALT – 60 t/ha; 5. SALT - 80 t/ha; 6. Compost SALT + sawdust (3 : 1) – 60 t/ha; 7. Compost SALT + straw (3 : 1) – 20 t/ha; 8. Compost SALT + straw (3 : 1) – 40 t/ha; 9. Compost SALT + straw (3:1) – 60 t/ha; 10. Compost SALT + straw (3 : 1) + cement dust 10 % – 40 t/ha.

Willow saplings propagate vegetatively and are about 20 – 25 cm long and 0.8 – 1.8 cm thick. Cuttings should be at least 5 dormant, clean and healthy buds. The top of the cuttings need to be treated with paint, with the addition of antifungal agents. They must be planted in the ground in early spring as soon as the stable frost stopped. Before planting seedlings must be soaked in water for 24 – 48 hours, that helps to adapt the temperature and it must absorb such a quantity of water, through which the willow is able to grow without watering several weeks after planting in the ground.

After 1.5 - 2 weeks after planting in the ground, there are first sprouts of the buds and intensive growth of vegetative shoots begins. Even in the early stages of their regrowth we noted a positive trend of growth in ways which have made composts of sewage sludge with straw at a rate of 40 – 60 t/ha.

These results for the three years of research are the highest rates of shoot length variants which were 6 and 10. Both of these options were more intensive in development of the main

shoot from the first days after landing, so we can say that the dynamics of growth depends on the background of power plant and the nutrients in the soil.

Further studies were performed to determine the vegetative mass of plants. For our study were selected the freshly cut shoots of plants in the second and third year of vegetation. They were weighed and dried to constant weight. The most productive option for the release of dry energy willow biomass were options 5 and 6, which brought SALT normally 80 t/ha compost from SALT + sawdust (3 : 1) 60 t/ha, respectively. In version 5 content of dry biomass 29.0 t/ha, and moisture content 29.4 %. In accordance to variant 6 content of dry biomass willow 33.7 t/ha, and moisture content - 17.6 %. However, in terms of productivity, this option is highest.

Growth dynamics, development and accumulation of plant biomass willow intertwined with the supply energy background. Making compost from sewage sludge at the rate of 60 t/ha promotes vigorous plant growth from 291 cm to 432 cm and the dynamics of growth of willow biomass energy to 33.6 t/ha compared with other options, which brought fresh sewage sludge to a rate of 40 – 80 t/ha.

Key words: willow energy, biomass, sewage sludge compost.

The Ultragumat's influence on the growth, development and productiveness of seedlings of strawberry (*Fragaria ananassa* L.)

V. Kalitka, M. Karpenko

Productivity of strawberry crops in Ukraine is 20-40 %, and the number of high-quality commercial product suitable for fresh consumption is 30-60 % of the gross output. In the conditions of potential bioclimatic changes of the Southern Region of Ukraine the problem of stability of strawberries' agrocenosis in the unfavorable abiotic and biotic factors is very actual. One of the ways to reduce the negative impact of these factors on the growth, development and fruiting of strawberry is to use the plant growth regulators (PGR).

Reduction of operation's term of wild strawberry's plantations in open ground up to 1-2 years and enhancement of these areas in the protected ground, that can led to increasing needs in plant material, the quality of which in spite of planting dates allows to return faster to the newly established plantations. Regulators of plant growth also help in solving this problem. It was evidenced by the results of research on the cultivation of strawberry seedlings in the Krasnodar region of Russia. But in the southern Steppe of Ukraine such research is practically absent, and the problem of the use of plants growth regulators in cultivation of strawberry seedlings with closed root system is poorly highlighted.

The purpose of our research was to establish the impact of natural growth regulator Ultragumat on the growth and development of seedlings in strawberry garden. Researches were made in 2011-2013 on the experimental field and in the laboratory of plant physiology and biochemistry in the Tavria state agrotechnological University agricultural technologies and ecology Research Institute. The uterine plantations of wild strawberry Honey varieties were used for our experiments. Outlet were separated from the mother plant in the phase of formation of the embryonic roots and were planted in cassettes with the size of cells 3,5x3,5 cm and volume of 50 cm³. Uterine plants were cultivated by solution of Ultragumat (0,05%), and sockets after landing in a cassette were watered twice with a solution of Ultragumat in the same concentration. Water was used in the control. Seedlings were grown in shady polyethylene greenhouses, equipped with mist proceeding, where the relative humidity below 80 % was supported during 21 days. The dew was supported on the leaves during the first 10 days by using sprinklers every hour on 2-3 min.

Plants which were grown using Ultragumat had a 13,8 – 36,7 % more number of roots and 7,8 - 16,5 % longer root system, as compared with the control. It is found that due to complex

cultivation of uterine plants and irrigation in the rooting of cuttings, accommodation rudiments of roots and roots in the zone of the rhizogenesis was more steady. Due to action of Ultragumat 11,6 - 22,9 % more leaves on the plant were formed, and the area of leaf surface increased by 10,1 - 50,1 %, compared to the another situation where growth regulator is not used. Impact Ultragumat on the formation of a sheet surface depends on the way of its use and the period of sockets rooting. The greatest effect provides spraying uterine plants and two-time irrigation during rooting them in cassettes. The accumulation of dry substance in the roots of seedlings grown with using of Ultragumat causes the high frost resistance of plants, especially for the southern Steppe zone of Ukraine, which has a snowy winters with extreme variations in temperature.

It is found that the spraying of uterine plants and irrigation sockets during rooting with solution Ultragumat stimulates the biosynthesis of plastid pigments, increases photosynthesis productivity by increasing the pigment Fund and leaf area, functional activity of chlorophyll-a.

In this way, the use of plant growth regulator Ultragumat in growing strawberry seedlings by cassette method provides intensification of the growth and development of plants, stimulates root system formation. Ultragumat of natural origin by the character of the action on the plants can be considered to be anti-stress drugs.

Key words: strawberry, seedling, the regulator of growth, productiveness, pigments.

Varieties of tomatoes productivity depending on the landing age of the seedlings and spatial location on the area

O. Knyazyuk, I. Pantylymon, T. Piskorska

Tomatoes are one of the most important and most common vegetables. The introduction of new technologies of intensive cultivation provides the ability to increase the yield and quality of fetus.

We were studying methods of obtaining high yields of highly differently ripening domestic breeding tomato varieties for a long period. Biometrix (plant height, leaf area) of submitted tomato varieties that characterize there growth and development during the growing season were the best plants planting seedlings in phase of 7-8 real leaves.

According to the phenological observations we can see the next appearance of tomato's real leaves. The first real leaf of seedlings appeared in 15-17 days. The fourth real leaf of early-ripening tomato variety Anastasia appeared 25 days after sowing, which is 12 days earlier than its appearance in the middle-ripening variety Jubilee Tarasenko. In 7-10 days after the formation of the fourth real leaf of tomato started the the main stem growth and the formation of lateral shoots. Phase of flowering and the formation of the first fetus of tomato starts the most rapidly in the early-ripening variety Anastasia in 44 and 53 days respectively.

At the beginning of the growing of tomatoes, before we plant them in the open soil, we determined their individual biometric parameters (height of plants, thick of stems, area of the leaf), which can characterize the growth of represented varieties .

According to the average data , the maximum height of the main stem of plants were characterized by the middle-class tomato Tarasenko - 39.4 cm at planting seedlings into the soil during the phase of 3-4 real leaves. The height of the early tomato variety Anastasia was lower then 2 - 5cm.

The stem in the middle-class tomato is thicker (0.54-0.67 cm).

The largest area of leaf of tomato seedlings before planting in open soil was formed in the middle-class variety Jubilee Tarasenko during 7-8 leaf stage of development is 733 cm² for one plant, early-maturing variety of Anastasia in the phase of 5-6 leaves is 680 cm².

Biometric parameters of leaf area of plant tomato seedlings in two months after their planting showed its small size of their controlled variant compared with transplanting in the phase of 5-6 real leaves.

It can be explained by the greater length of seedling survival of control variant, yellowing and extinction of the lower leaves, decrease of assimilation of the surface.

So, the intense rate of growth of leaf surface occurred in the form of transplanting in phase of 5-6 real leaves, whereas during transplanting in the phase of 3-4 real leaves, they were slower because their nature biometric indicators were worse. The height of the main stem of tomato plant was the highest of the both varieties (according to 69.7 and 74, 8 cm), but the stem was thicker in the phase of 3-4 real leaves.

Crop capacity of tomatoes of different varieties was the highest during planting phase of 7-8 real leaves. Its value was 15 and 16.5 kg cm / 5 m², 2.3 and 2.8 kg compared with variants where seedlings are used in the phase of 3-4 real leaves.

Researches has established that the maximum crop capacity of tomatoes was provided by the planting of 45×20×15 cm of middle-class Jubilee Tarasenko - 17.9 kh/5m², what is increased into 1.4 kg compared with a control variant. The plan of planting tomatoes was optimal for early ripening variety Anastasia (yield 17.5 kh/5m²) and the increase of crop capacity compared with controls was 2.5 kh/5m².

So, the highest crop capacity of tomatoes was obtained by the transplanting in the phase of 7-8 real leaves. We should note the highest marketability of fetus (94.3 - 97.3%), especially in areas where seedlings are planted in the phase of 3-4 real leaves. The optimal plan of the transplanting tomato can be considered 45×20×15 cm.

The growth and development of plants, flowering and fetus formation of early ripening variety of tomato Anastasia was accelerated to 12-18 days compared to the middle-grade Jubilee Tarasenko, so you can get earlier production of marketable products.

Key words: varieties of tomatoes, productivity, seedling, spatial location.

Peculiarities of growth and development of plants and yield Muscat pumpkin, depending on the age of seedlings in the seedling cultivation way

V. Lendel

In the article the results of research of growing Muscat pumpkins seedling way, growth and plant development, yield depending on the age of seedlings in conditions of forest-steppe of West. It is established that the age of seedlings affect the value of the crop and gives an opportunity to receive early products, on 17-20 days earlier for the first time of sowing seeds in open ground. The optimal age of seedlings defined 20 days, which provides the highest yield of fruit pumpkin – 37,6 t/ha We found that yields fruit Muscat pumpkin to some extent depended on the age of nursery plants – 16%, from the year conditions of growing – 44%.

The experimental part of the research was carried out during 2010-2013. Seedlings Muscat pumpkin grew by different plant age: 15, 20, 25 (control), 30 days in spring and film greenhouses cassette way. For studies used a variety Gilea. The composition of the mixture consisted of sod, lowland peat, rotted compost in the ratio 1:1:2. The seeds were sown with 20 April directly in the cell cartridges size 12×12 cm long, 1-2 pc. Seeds top covered rundowns, watered and covered with agrovolan. Planted seedlings in the second decade of may according to the scheme 70×120 cm when the soil warms up to 12°C.

We established that biometrics seedlings grow depending on the duration of cultivation. On average for the years of researches for the period transplanting the greatest height 25.7 cm was in plants the age of 30 days. It is explained by the large size of plants, and the best lighting conditions. According to this indicator the length of stem plants age of seedlings - 25 (control)

and 20 days, amounted to 23,6 and 20,5 see Seedlings at the age of 15 days was the lowest and amounted to 15,4 see.

The vegetation period and its duration crops, as well as Muscat pumpkin is a genetically determined basis.

Based on the data obtained in the result of the research conducted for the growth and development of plants pumpkin nutmeg in conditions of open ground after transplanting, found that the length of the growth period of plants depends on the age of seedlings and the timing of its landing in the open ground. The shortest period, from planting seedlings before flowering 13 days in plants the age of 30 days, and technical ripeness was reached on the 29th day after planting in open ground.

As show results of researches, establishment of optimal age of seedlings on the duration of the periods indicated advantage marked plants at the age of 20 days. The bloom is on the 20th day, and the harvest of 36 days from planting of the seedlings into the open ground. The development of seedlings at the age of 15 days, has been slower, so the number of days from planting seedlings to bloom here, the largest - 24 days and technical maturity 43 days, respectively.

During the research was observed differences in the level of productivity depending on the age of seedlings. The obtained results confirm that productivity of fruits pumpkin nutmeg depends on the individual performance of plants.

The lowest yield was observed in 2013, and the highest in 2011 and 2012 Comparing moisture conditions during the years it should be noted that the most favorable for the growth and development of plants pumpkin nutmeg and formation of high harvest was 2011. Results of studies in 2011 productivity of fruits amounted to 40,7 t/ha provided a variety Gilea 20 daily seedling, and for 15 daily – 38,9 t/ha, 25 daily – 37,4 t/ha and 30 daily – 36,3 t/ha, respectively.

In 2012, the highest yield 38.4 t/ha is obtained from planting seedlings at the age of 20 days (control). Seedlings at the age of 15 days gave productivity of fruits – 36,7 t/ha, 25 days – 1,2 t/ha and 30 days – 34,9 tons/ha.

Productivity of fruits in 2013 34.9 t/ha accounted for planting seedlings in the age – 20 days. Seedlings at the age of 15 nights – 33,2 t/ha, 25 days – 33,0 and 30 days – 9,5 t/ha, respectively.

We have found that the productivity of fruits pumpkin nutmeg to some extent depended on the age of nursery plants – 16%, from the year conditions of growing – 44%. The share of influence of other unaccounted factors amounts to 38%.

So, experimental studies have established that the sowing time and age of seedlings cassette affect the value of the crop Muscat pumpkin and give the opportunity to receive early products, 17-20 days earlier for the first time of sowing seeds in open ground. The optimal age of seedlings is 20 days. Productivity of fruits Muscat pumpkin to grow seedlings way was the highest in the variant with planting at the age of 20 days and accordingly was 37,6 t/ha.

Key words: Muscat pumpkin, age of seedlings, growth and development, productivity.

Estimation of chicory root varieties of Uman selection by the yield and root mass

V. Mykolayko

At the present stage of agroindustrial complex development of Ukraine to get in the required range of natural foods is growing need for plant raw material increased that will help to diversify the range of food and defense mechanisms of the human body and longevity increase.

In recent years in Ukraine Chicory Root crop area was decreased to 600 hectares due to the absence of the concerned owner and industry processing, and the products consumed by the population was imported from abroad, as market evidenced.

Chicory Root (*Cichorium intubus* L.) – is a valuable food and industrial crop that has healing properties. Along with the cultivation of other highly technical agricultural crops chicory is economically viable culture, raw material of which is used in food, pharmaceutical industry and other industries. Products of its processing are part of a range of food products, including dietary nutrition.

Root chicory is contain 16-24% inulin, which promotes toxins and radionuclides release, 2–5 % of fruit sugars, 1.2 % – protein, 0.6% – fats, acrolein, furfural, valeric acid, intybin essential oil – tsykoriol, vitamins A, B1, B2, B12, PP and more than 30 mineral elements.

Inulin that contained in chicory is primarily positively influence on gastrointestinal activity, bifid bacteria activity promotes, growth of Salmonella bacteria inhibits and cholesterol content levels optimizes. Therefore, it is used in pharmacology for the manufacture more than 40 medications that are used in the treatment of the stomach, liver, kidneys, heart, nervous system diseases.

Chicory Root is biennial plant. In the first year of life root forms for industry, and also a valuable nutritious and healing food for farm animals. In 100 kg of roots is contained 25.7 kg of feed units, while fodder beet are containing them just 14.5 kg. The land mass is well eaten by animals in the fresh and silage form. In the second year chicory is form a stem that blooms and fruits form.

The results of the researches are indicate that Umansky 95, Umansky 96, Umansky 97, Umansky 99 varieties are different from control (Umansky 90) by the greater mass of root, and hence and yield.

During the research years the root mass per plant, on average, ranged from 287–405 g.

It should be noted that for research years the root mass of Umansky 90 variety in 2011 was 386 g, which is on 23.6% more than in 2010 and 25.6% higher than in 2012. In Umansky 95 variety the highest index was in 2011, which was 371 g, which is on 9.4% more than in 2010 and 15.9% higher than in 2012.

The high index of Umansky 96 variety was recorded in 2011 – 364 g, which is on 1.9% more than in 2010 and 19.8% higher than in 2012.

In an average years of research the root mass in Chicory Root on the control (Umansky 90) was 323 g, in Umansky 95 – 340 g, which is on 5.3% more, Umansky 96 – 338 g, which is on 4.6% higher, in Umansky 97 – 358 g, which is on 10.8% more, in Umansky 99 – 379 g, which is on 17.3% more compared to the control.

Thus, Chicory Root varieties of selection of Uman experimental breeding station IBCISB Umansky 95, Umansky 96, Umansky 97, Umansky 99 on average over three research years, compared with control (Umansky 90) are root mass greater on 4.6-17.3% formed.

The yield increase of Chicory Roots varieties of Uman experimental breeding station IBKITSB selection of Umansky 95, Umansky 96, Umansky 97, Umansky 99 on average by research years in comparison with control (Umansky 90) was 8–22 % on the variety depending.

The yield of Umansky 95 variety with index of 36.3 t/ha in 2011 was higher than in 2010 on 6.7% and on 20.6% compared with 2012. Productivity, which provided by Umansky 96 variety in 2011, with the index of 38.3 t/ha is enabled somewhat exceed the yield in 2010 and significantly exceed this index in 2012.

However, by the stable yields in research years is Umansky 99 variety characterized. The highest index was in 2011 – 39.7 t/ha, that on 6% more than in 2010 and on 18.1% more than in 2012.

Key words: variety, root crop, chicory root, root mass.

Features of symbiotic productivity varieties of beans which depend on sowing methods in conditions of western forest-steppe

O. Ovcharuk

Beans refers to the agricultural cultures, which play an important role in the complex process of circulation of substances. The ability of root nodule bacteria (*Rhizobium*) fix atmospheric nitrogen in symbiosis with leguminous plants important for human economic activities. The legumes ability to fix molecular nitrogen plays a valuable role in the life of the biosphere of the planet Earth, as there is a connection between nutrition and schedule. Important role in increasing the symbiotic plant productivity have beans which make the accumulation of mass nodules that affects the general and active symbiotic potential.

The experimental part of the research was carried out during 2009-2013 on the experimental field Podilsky State Agrarian-Technical University.

The assess of the symbiotic productivity of crops beans was determined by dynamics of accumulation of mass nodules on the root system of plants beans. In particular, we found that as the number of nodules, and their weight grew during flowering plants beans, and in the period of forming the seeds, all of these processes have been reduced both in quantity and weight measurement.

The lowest flowering total mass nodules 195,8 mg/plant, average for the period of studies was established in crops varieties Kharkovska shtambova that visualise normal string method of sowing (inter-row spacing of 15 cm). At the same time the mass of the active nodules was poor, the weight of which was on average 122,5 mg/plant. The highest values were wide-row sowing way on the variant varieties Mavka and was 294.3 and 215.1 mg/plant, respectively.

The results were obtained from material quantity and mass of nodules and dynamics of its development during the vegetation periods. We calculated the total and active symbiotic potentials analyzed crop beans which depen on the cultivar and sowing methods (table 1).

Table 1 – General and active symbiotic potential of beans varieties depend on the time of sowing and collection period, thousand kg of day/ha (average for the years 2009-2013)

The method of sowing	Grade	General symbiotic potential	Active symbiotic potential
<i>Regular line (row spacing 15 cm)</i>	Kharkovska shtambova	3,07	1,46
	Nadiia	3,89	1,65
	Bukovinka	3,96	1,71
	Mavka	4,15	1,92
	Podolyanochka	4,02	1,86
<i>Regular line (row spacing 30 cm)</i>	Kharkovska shtambova	3,41	1,67
	Nadiia	4,18	2,27
	Bukovinka	4,23	2,32
	Mavka	4,36	2,44
	Podolyanochka	4,27	2,36
<i>Wide-row (row spacing of 45 cm)</i>	Kharkovska shtambova	3,54	1,72
	Nadiia	3,67	2,08
	Bukovinka	3,83	2,11
	Mavka	4,57	2,65

	Podolyanochka	4,32	2,37
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So, as a result of the carried out calculations it was found that these figures according to the factors of our experience ranged: General symbiotic potential 3,07-4,57 thousand kg of day/ha and active symbiotic potential 1,46-2,65 thousand kg of day/ha.

So, as a result of the calculations, it has been discovered that indicators depend on sowing methods and varietal beans. Lowest-common symbiotic potential in the experience of 3,07 thousand kg of day/ha was identified for crop varieties Kharkovska shtambova while sowing normal lowercase way with width of 15 cm between rows, and the lowest active symbiotic potential 1,46 thousand kg of day/ha was found on the same version. The highest rates of symbiotic potentials: General (4,57 thousand kg of day/ha) and active (2,65 thousand kg of day/ha) reached from the variety Mavka with wide-row sowing way with width of 45 cm row spacing.

Key words: beans, grade, ways of sowing, inter-row spacing, phases of growth and development, symbiotic performance.

Influence of technological factors on the formation of medicinal calendula plant productivity in the western steppes

S. Suhar

Individual plant productivity is the effective rate, which reflects the effectiveness of the use of soil and climatic potential and growing use of technological measures in order to intensify the processes of growth and development of plant body. In this regard, the magnitude of the absolute values of individual productivity, we can objectively select the best options for growing interaction of technological measures that are in the soil and climatic conditions of the region may determine the level of productivity and quality of medicinal calendula in the production of medicinal crops.

Hereditary characteristics, age and physiological and biochemical changes in plants, as well as seasonal and diurnal variations of intensity major environmental factors (temperature, humidity, level ground and air power, etc.) cause they almost continuous and very significant changes in the intensity and localization of growth processes.

In our experiments, we investigated the growth rate. Growth rate - an important indicator of physiological state that is affected by abiotic environmental factors: light, temperature, nutrients, moisture, mechanical stress, the resistance of soil particles and so on. Plant growth is also influenced by the waste products of other coenotic single-species relationships with plants and weeds, physiologically active substances (antibiotics, growth substances) secreted by microorganisms.

Medicinal calendula, like most herbs at the beginning of growing season growing relatively slowly - 2-3 cm per decade. In the second half of vegetation growth rate increases significantly and 7-10 cm root growth rate during the growing season uniform and an average of 2 cm per decade.

Weather conditions directly affect vegetation periods in the growth processes of drug culture. Sowing with row spacing of 60 cm allows calendula intense form aerial parts (20-25% increase), which is beneficial to the individual performance of the plant. Determination of relative growth allowed to visualize the trends in increments of main shoot and root ontogeny of medicinal plants.

Based on these results it is possible to note the direct and indirect effects on the growth of calendula environmental factors mediated by changes in other physiological processes. Calendula plant has erect stems branching. Each twig ends generative buds, including the number of branches corresponds to the generative organs. According to our observations, a

medicinal plant for vegetation with natural fertility of the soil is able to generate 11-134 inflorescences.

Actual data and the biological productivity of medicinal calendula revealed potential drug culture to form buds when grown without the use of pesticides and fertilizers.

On average, in versions with 60 cm row spacing observed maximum values of individual plant productivity. Individual performance material in this case is 13.43 grams, which is higher than that of the other similar options to 2,41-9,21 g. The same dependence is observed with respect to the distance between plants in the row. Increasing the value of this factor contributes to a significant increase in both the total number of inflorescences per plant, and the overall performance of a plant. For a distance between plants in a row within 5 cm, the total number of clusters is $28,16 \pm 11,49$ pcs., and the overall performance of the plant - $4,19 \pm 1,70$ g, while the version with the distance between plants in a row within 20 cm, these figures increase to $91,36 \pm 34,34$ pcs. and $13,76 \pm 5,13$ g, respectively. A slight increase in individual productivity indicators observed by planting calendula for medicinal thermal regime of the soil 6-8 °C at a depth of seeding.

Key words: medicinal calendula, yield, individual productivity, sowing, row spacing and distance between plants in a row.

Sweet cherry varieties selected by irrigated horticulture Institute of NAAS named after M. Sidorenko

N. Turovtseva, N. Turovtsev

Sweet cherry is a widespread fruit crop in the South of Ukraine. It opens fruit season since the third decade of May.

For the current moment the State register of plant varieties of Ukraine contains a great amount of varieties, created due to Ukrainian plant selection breeders. The most important success has been done by the employees of Irrigated Horticulture Institute named after M. Sidorenko NAAS. There are 45 sweet cherry varieties of the Institute selection in the State register of 2010, 72.6% of the varieties amount listed in the Register of plant varieties is appropriate for the cultivating in Ukraine.

The main stage of horticulture intensification is improvement of the existing assortment of fruit crops, particularly sweet cherry, which is very popular in Ukraine. The most important tasks of the modern selection is creating of extra- rare ripe and extra-late sweet cherry varieties with the aim to prolong a season of fruit consuming. The outstanding problem is producing capacity increasing and resistance to unfavorable factors of environment and also creating self-fertile varieties.

To distinguish new promising sweet cherry varieties of Irrigated Horticulture Institute named after M. Sidorenko selection, which meet requirements of modern intensive horticulture.

For the purpose to study in details the variety peculiarities of sweet cherry it was started the garden at the Agrobiological complex of Melitopol State Pedagogical University named after B. Khmelnytsky in 2001, where 26 sweet cherry varieties were planted. These varieties were selected by Irrigated Horticulture Institute named after M. Sidorenko NAAS. 11 varieties among them are included into the State register of plant varieties of Ukraine for the period since 1954 till 2002, 5 varieties for the period since 2005 till 2007 and 10 new promising varieties.

The research is implemented according to the common method.

Producing and biological specifications of the varieties regionalized in the period since 1954 till 2002 are covered in the scientific works.

5 sweet cherry varieties selected by Irrigated Horticulture Institute named after M. Sidorenko NAAS and included to the State register of plant varieties of Ukraine in 2005-2007

and 10 new promising varieties are described. The authors of varieties are N. Turovtsev, V. Turovtseva.

Zodiak variety. Yield – 180 dt/ha, fruit weight – 8.4-10.0 g, fruit color – dark red, there are many grey dots under skin, but they are not remarkable, flesh - dark red, juicy, semigristly, sour sweet, maturation date – 10-12 June, table use.

Lyubimitsa Turovtseva variety. Yield - 137 dt/ha, fruit weight – 12 g, fruit color – dark red, flesh – dark red, juicy, gristly, maturation date – 25-28 June, has good transportability and universal use.

Temporion variety. Yield – 137 dt/ha, fruit weight – 8-11 g, fruit color – dark red, almost black, flesh - dark red, juicy, sour sweet, gristly, maturation date – 25-30 June, universal use.

Totem variety. Yield – 138 dt/ha, fruit weight – 8.5-10 g, fruit color – dark red, there are many grey dots under skin, but they are not remarkable, flesh – dark red, juicy, gristly, sour sweet, maturation date – 18-20 June, universal use.

Era variety. Yield – 183 dt/ha, fruit weight – 8-10 g, fruit color – dark red, flesh - dark red, soft, juicy, semigristly, sour sweet, maturation date – 3-8 June, dessert use.

Effektnaya variety. Yield – 149.5 dt/ha, fruit weight – 8-10 g, fruit color – dark red, there are many grey dots under skin, but they are not remarkable, flesh - dark red, juicy, sour sweet, semigristly, maturation date – 10-12 June, universal use.

Udacha variety. Yield – 138 dt/ha, fruit weight – 8-9 g, fruit color – dark red, flesh – red with white veins, juicy, sour sweet, gristly, maturation date – 26-28 June, universal use.

Avangard variety. Yield – 151 dt/ha, fruit weight – 9-10 g, fruit color – dark red, flesh - dark red, juicy, gristly, maturation date – 22-23 June, universal use.

Bigarreau Turovtseva variety. Yield – 158 dt/ha, fruit weight – 9-11 g, fruit color – dark red, there are many grey dots under skin, but they are not remarkable, flesh - dark red, juicy, gristly, sour sweet, maturation date – 28-30 June, available for the high quality processing products and has good transportability.

Seyanets Turovtseva variety. Yield – 146 dt/ha, fruit weight – 10-12 g, fruit color – dark red, there are many grey dots under skin, but they are not remarkable, flesh - dark red, juicy, gristly, maturation date – 23-24 June, has good transportability and universal use.

Modnaya variety. Yield – 138 dt/ha, fruit weight – 9-10 g, fruit color – pink and yellow, there are many white dots under skin, but they are not remarkable, flesh – cream-colored, juicy, gristly, sour sweet, maturation date – 18-20 June, table use and all kinds of processing.

Novinka Turovtseva variety. Yield – 195 dt/ha, fruit weight – 10-12 g, fruit color – dark red, flesh - dark red, juicy, gristly, sour sweet, maturation date – 10-15 June, the variety is remarkable for its good transportability and has universal use.

Trudovaya variety. Yield – 185 dt/ha, fruit weight – 9 g, fruit color – dark red, flesh - dark red, juicy, gristly, sour sweet, maturation date – 7-15 June, universal use.

Vizitka variety. Yield – 180 dt/ha, fruit weight – 8.5 g, fruit color – dark red, flesh – dark red, juicy, gristly, maturation date – 12-15 June, transportable, universal use.

Pamyatnaya variety. Yield – 161 dt/ha, fruit weight – 9-10 g, fruit color – dark red, flesh - dark red, juicy, gristly, maturation date – 9-12 June, universal use.

Conclusion. The new promising sweet cherry varieties are distinguished, such as Effektnaya, Udacha, Avangard, Bigarreau Turovtseva, Seyanets Turovtseva, Modnaya, Novinka Turovtseva, Trudovaya, Vizitka, Pamyatnaya, the varieties are able to yield every year high quality fruit.

Key words: sweet cherry, variety, yield, fruit weight, fruit color.

Click beetles (Elateridae, Coleoptera) in Central Forest-Steppe of Ukraine

N. Shushkivska

The Steppe biocenosis in the last years due to failure of crop rotation, growing weeds that are teeming in fields, including via rhizomatous weeds because of activities of protection and the reduction of fertilizers, increases the amount of beetle larvae – wireworms. In this regard, the elucidation of the species composition of beetles in different biocenoses is extremely important for effective control of larvae.

Beetles and larvae of click beetles are different in the quality of the individual phases of development: the adult beetles live on the ground in the herbage and larvae – in soil, litter or rotten wood. The peculiarity of the life cycles Elateridae is a relatively short period living adult stage (more than two–four weeks) and very long period of larval stage (three-five years). Adults feed on pollen and nectar of flowering plants, drink dew, some are predators or gnaw leaves of plants. The larvae of click beetles (called wireworms), often found in large numbers involved in the processes of soil formation by affecting the porosity of the soil, increasing its aeration, especially in the upper layers. Much of the soil types wireworms are predators, limiting the number of other groups of insect pests in litter in forest and arable soil layers. The larvae of many species developing in the plow layer soil are dangerous pests for sown seed crops and stairs. Wireworm damage grain, oil, various technical, vegetables, melons, fruit and berry crops. The greatest harm is caused to maize, sunflower, beets, barley, tobacco, potato and others.

They feed during growing season and damage the germinating crop seed, that dies and does not constitute sprouts, then gnaw the young plant roots penetrate inside, causing their extinction, underdevelopment and ugliness. During the growing season damaged roots are infected by pathogens and are susceptible to root rot lesions, leading to deterioration of storage and as a raw material.

Information about the fauna of click beetles in steppes of Ukraine are quite numerous in the works, but part of the data is somewhat outdated. Besides more attention was paid to the larvae as they can cause considerable damage to crops. However, it is known that adults do not migrate far from the larval habitats, so you can use them as a kind of reference point for more detailed research on the presence of larvae. The aim of the study was to determine the species composition and forest-steppe habitats beetles in the Ukraine, to identify among them the dominant crop pests. Established that beetles fauna is characterized by the stability of species composition. As a result, eight-year survey we have found 18 species of adult beetles from 9 families. In agrocenosis are represented by 11 species of 6 genera. Number of species is dominated with the genus *Agriotes* (7 species) and *Selatosomus* (3 species).

Among them are representative of typical dendrofil – *Ampedus sanguineus* L. Adults live mostly hidden. They were found in the trough of molasses. Their larvae develop in rotten wood. This group belongs to *Crepidophorus multilatus* Rosh. The larvae of this species predators in hollows and develop broad-leaved trees. At the edge of the forest and forest belts found *Cidnopus minutus* L., larvae belong to the second ecological group consisting of the species developing in forest soil and litter. This kind of tendency to go beyond the limits of the forest cover and spread to the edges of wood and shelter belts. A significant number of identified beetles belonging to the group evrybiontiv larvae are evenly distributed in the soil under forest cover and open habitats. This species from different genera: *Agrypnus murinus* L., *Selatosomus aeneus* L., *Selatosomus latus* F. Their larvae are primary pests to crops. Adults do not cause harm, eat pollen and nectar of flowering plants, often lick sweet selection of aphids and can eat them, showing the ability to predatory mode of supply. In species dominated the fourth environmental group – residents of open habitats – meadows and arable land. This includes the majority of economically important species of wireworms that significant harm or may harm

the field crops. The most important are *Agriotes sputator* L., *Agriotes ustulatus* Schall. and *Melanotus brunnipes* Germ. In the forest, on perennial legumes and soy found in a large number *Adrastus rachifer* Geoffr. In the cultural field is capable of forming cells to 30 larvae per m². As the number of adults revealed predominant genus *Agriotes*. It accounts for 40,2 % of all identified beetles. Moreover, only 2 species (*A. sputator* L. and *A. ustulatus* Schall.). The percentage of sorts *Adrastus* is 36,1 %. Important in economic terms are beetles genus *Melanotus* (5,7 %) and *Selatosomus* (4,9 %). The basic number of adult beetles was found in perennial leguminous grasses (43,4 %) and in forest (40,2 %). Far fewer beetles inhabited crops of soybean, lupine, rape.

Key words: click beetles, wireworms, biocenosis, edges of wood, shelter belts, perennial leguminous grasses.

Selection features of tobacco in order to increase heterosis effect

M. Hlyudzyk

Our purpose is the plant-breeding process reduction and increase of application possibilities of different selection methods. The development of method is begun because of a plant-breeding method application and apomixis selection method for the purpose of fixing an effect of heterosis. On the basis of previous experiments, possibility of plant-breeding process reduction is set on 4-6 years with fixing heterosis effect and the brief chart of seed production with introduction in short terms a new varieties.

Actuality of theme is conditioned to the necessity of domestic tobacco industry as for raw material of tobacco, which is not grown in our country. Therefore main conception is the creation of new varieties. For this decision it is necessary to define scientifically grounded researches with the use of different plant-breeding genetic methods, and properly set up production of sorts-apomikt with a brief plant-breeding process and fastened effect of heterosis. For this purpose necessary to pick up paternal forms with high ability.

Basic experiments were executed by the Transcarpathion state experimental station of APV NAANU institute in the Carpathians region. It is a typical area of the tobacco growing in the Transcarpathion area with proper ground condition and climatic terms which stipulate the production of raw material. The sorts of domestic selection and world collection are used as the raw material.

The most attracted sorts of own selection are Spectrum, Berley 9/10, Braviy 200, Simvol 4, Berley 7, Zhovtolistiy 36 and sort of the Hungarian selection Pologi shargo. It is found that after the statistical working on the biometrical quantitative features of first generation hybrids, only minor part deserves attention for a further plant-breeding process. From the biometrical indexes of quantitative signs the height of plants, amount of sheets and their sizes, were taken into account. The height of plants does not influence directly on the productivity, however determines the process of leaves collection. The optimum size of plants varies within the limits of 155-185 cm of paternal forms, and hybrid forms with the biddest effect of heterosis on this feature - 185-230 cm.

It is also found that among the studied hybrid combinations of the best selected paternal form of Pologi shargo/Braviy 200 have advantage after the height of plants 231 cm against 180. The same effect was from combination Spectrum/Braviy 200. Within the limits of 205-204 cm against 180 cm from the best paternal pair of such combinations as Berley 7/Braviy 200, Berley 7/Berley 9/10 and Berley 9/10/Braviy 200. It is found that as a result of the detailed analysis of hybrid combinations, that in spite of importance of maternal form, which has important dominant signs, Braviy 200 is the valuable component in paternal form. Berley 7 and Berley 9/10 in maternal form gives high indexes after the growth of plants.

After the amount 21-27 pieces leaves of maternal and paternal forms, exceeding results of the followings combinations: to 26 pieces from hybrids Berley 7/Pologi shargo, Pologi

shargo/Spectrum; to 30 pieces from the hybrid form Berley 9/10/Spectrum, that characterized with the most obvious effect of heterosis.

During the detailed analysis of such characteristic as length of leaves which are from 46 to 61 cm of the maternal form and exceeding of hybrids on 20-22 cm (Berley 7/Simvol 4, Simvol 4/Berley 7, Berley 7/Pologi shargo and Berley 7/Berley 9/10). From this characteristic studied paternal forms of sort Berley 7 are leading with length of leaves 60 cm and 81 cm for maternal form in combination with the sort Simvol 4, but their leaves were not so large as Pologi shargo and Berley 9/10.

The index of width of leaves was taken into account, where parameters are set from 23 to 27 cm of maternal and paternal form and advantage of hybrid forms from 31 cm (Zhovtolistiy 36/Berley 9/10), to 41 cm (Berley 7/Berley 9/10, Berley 7/Braviy 200).

A leader of this characteristic was also selected sort Berley 7 and Berley 9/10, which in maternal form provided the high indexes of heterosis effect in a pair with a sort Braviy 200. During research were used hybrids with a greater amount and size of leaves. Leaves with larger width had more advantage as a potential index of the productivity increase. The apomiktiv method means that hybrids which had reproduction by this method had the high indexes of the productivity had the more attractive appearance and combination of basic morphological characteristics of optimum size.

Used varieties of tobacco have a broad range of morphological characteristics and most of them are good component for obtaining a high index of heterosis for quantitative characteristics.

Performance of tobacco hybrids heterosis is connected with inheritance of complex quantitative characteristics which in general determine the capacity and the development of hybrid, depending on where the component mating the genetic potential.

Important role in the selection performance takes the research-based selection of original forms and their place in the genetic crossing. In the selection of sorts and genetic crossing result it should be noted that a number of characteristics that are correlated with yield and quality controlled in most cases from the parent form.

Key words: tobacco, varieties, crossbreeding, hybrids heterosis.

Analysis of resistant of *Solanum tuberosum* L. cultivars to *fusarium* spp. rots and efficiency of microbiological preparations

V. Borodai, N. Voytseshyna, V. Koltunov

The rhizosphere and endophytic bacteria, which comprise the group of microorganisms promoting plants growth (Plant Growth-Promoting Bacteria-PGPB), are used successfully as biocontrol agents against many pathogens. Using methods based on artificial potato tubers infection provides rather effective model system at early selection stages of evaluation of samples resistance to pathogens. Despite a significant number of papers devoted to the study of plant resistance to potato late blight and alternariose, dealing the issue of resistance of potato cultivars of modern Ukrainian selection to the *Fusarium* spp. dry rot were deficiently understood.

The research has conducted in the Industrial Biotechnology laboratory of the Department of Biodiversity and Ecobiotechnology of National University of Life and Environmental Sciences of Ukraine for 2011-2013.

The following biological preparation was performed for protect potato tubers from rot deceases: control - water treatment; Chemical control - Rovral AkvaFlo, biological control - Fitotsyd-R (based on *Bacillus subtilis*, PE "BTU-Center", Ukraine), Ekstrasol (associative bacteria consortium, Russia, All-Russian Research Institute of Agricultural Microbiology); Planryz (based on the bacteria *Pseudomonas fluorescence*, made in State Inspection

biolaboratory for Plant Protection in Lviv region). The potato tubers of Ukrainian selection: early grades Serpanok and Povin, middle early – Oberig and Zelenuy Gay, middle late - Kalynivka and Buluna, late-season – Chervona Ruta and Dgerelo Poliske were the objects of investigation.

The evaluation of biological efficiency and resistance of potato varieties to *Fusarium* spp. has studied in artificial infection methods of contamination by conventional methods. The degree of inhibition of pathogens growth expressed as a percentage and calculated by the formula Abbott. Statistical analysis of the results of research conducted using the program of Microsoft Excel.

The significant differences in the reaction of varieties had deficiently observed in the early stages of the pathological process at the inoculation of tubers by *Fusarium* sp. However, the symptoms appeared on the second day in the relatively susceptible varieties Povin and Oberig in a dull grayish-brownish spots, slightly dented inward and visible light sclerostenosis tuber. The disintegration of tissues and destruction of cells of resistant varieties Serpanok and Poliske Dzerelo were observing for 3-4 days.

The application of microbiological preparations Ekstrasol, Fitotsyd-R and Planryz proved effective in delaying the progression of *Fusarium* sp. dry rot. The disease progression slowed in 1, 4-1, 9 times in tuber tissue treated with biologic preparation. The biological effectiveness ranged from 32, 2 to 77, 1% for the 2nd day in the relatively susceptible varieties Kalynivka and Povin, the remaining grades - 13, 3-39,4%. The efficiency of biological preparations against rot decreased for two weeks to a slight degree, it was in averaged 25.5% on the 15-day of study.

Biological preparations are slightly given up of chemical control – Rovral Aqvaflor, and in some cases, delayed disease progression even greater extent. In most resistant varieties Serpanok and Poliske Dzerelo the area of inoculation for 15 days was in control 9, 6-12, 2% compared to the relatively susceptible varieties Oberig and Povin (17, 8-23, 7%).

Key words: potato, varieties, microbial preparations, stability, *Fusarium* spp., biological efficiency.

Biological features of causative agent of powdery mildew of various winter wheat varieties in conditions of central forest steppe zone of Ukraine

A. Kryvenko, T. Panchenko

The powdery mildew is one of the dangerous diseases of wheat, which can cause decrease of grain yield and quality. The mildew damaged the winter wheat in the vegetation period on the experimental fields of the Bila Tserkva national agrarian university during 2010-2012.

The causative agent of the disease is the fungus *Erysiphe graminis* DC. *F. tritici* March. It strikes the unstable varieties and the sporulation on these varieties is going faster. The plants resistance to the fungus depends on their age. The older winter wheat is getting less resistant to the fungus. The contamination of the plants depends on the weather condition, which affects the fungus development cycle. The development cycle of the *Erysiphe graminis* DC. *F. Tritici* begins with powder like white incrustation on the leaves and sprouts. It is created by the superficial mycelium, sticking to the surface of the damaged plants by means of appressorium, and by short unbranched conidium carriers with unicellular oval conidia, located on their top like a chain. The conidia cause the contamination of the plants by erysiphosis during their vegetation. If weather conditions favorable, the contamination can occur several times per vegetation.

At the end of the vegetation, some visible small black drops emerge on the mycelium. These are the mycothalli – cleistothecia, the wintering sexual stage of these fungus. In spring or beginning of summer, the mature cleistothecia burst and the liberated ascospores contaminate the plants for the first time by the powdery mildew.

The mycothalli of erysiphic fungus are a transition form from cleistothecium to perithecium. They are spherical, closed, however their asci are located not irregularly but in a

bunch or solid sphere. If the asci capsules burst, the ascospores get out actively. The damage records of the winter wheat by the powdery mildew were carried out by means of the five-mark grading scale of Y.Y. Heshela.

During the trial period, the winter wheat has been damaged by the powdery mildew throughout vegetation period. The varieties Ermak and Poliska 90 were affected most of all at the beginning of booting ranging between 64,4-73,2%, with disease development degree 2,03-2,23% and after earing 95,3-97,2 and 2,13-2,34%. More immunity to the powdery mildew was shown by the varieties Podolyanka (St) and Elegia at the beginning of booting. Their yield was 34,9-44,2% and the disease development degree 1,08-1,85%, and one week after earing 55,7-68,1 and 1,71-1,99%.

The damage of the winter wheat varieties by the powdery mildew fungus was influenced by the weather conditions during trial period. In 2010, some slight increase of average daily temperature by +3,3°C was noticed compared to average of several years. Also the precipitation index decreased by 54,8%. The winter wheat was insignificantly damaged by the powdery mildew during vegetation period.

The spring 2011 was early and favorable. During spring months, the weather was warm with insignificant deviation from the many years' indexes. This fostered the fast development of pathogen on the grain crops and the increased precipitation in May-June caused the epiphytotic development of powdery mildew fungus.

As to the vegetation 2012, some insignificant trend for increase of the average daily temperature by +2,6°C compared to the average of many years was noticed as well as not even distribution of precipitation during vegetation period by 10,5%. The disease development was on average level compared to the trial years.

Thus the main damage from powdery mildew was observed in 2011 whereas in 2010 and 2012 the damage was moderate.

The most yield increase was shown by the winter wheat (43,8 centner/ha) standard variety Podolyanka (St). Good yield (41,4-41,6 centner/ha) was shown by the varieties Poliska 90 and Ermak. The least yield was shown by the variety Elegia (40,4 centner/ha).

Key words: winter wheat, powdery mildew, productivity.

Correlation dependence populations abundance *Coccinella septempunctata* L. and sucking pests of cereal crops

I. Syaska

The article considers biological methods control pests of cereal crops. Analysis of the literature made it possible to conclude that the most effective use of coxysynelid is achieved in the fight against sucking pests of cereal crops and sugar beet. The most active among them are *Coccinella septempunctata* L., *Agony variegata* Goeze. and *Adonia bipunctata* L. Larvae of entomophagous two or three weeks, destroy about a thousand individuals of aphids and imago - every day 100 larvae and adults of aphids.

Main ways application entomophags against pests include: seasonal colonization, introduction and acclimatization, internally areal resettlement, creation of conditions for their reproduction.

Research of species diversity of sucking pests of crops (winter wheat and barley) was performed on 4 test plots (2.5 ha each) farm "Bronne", located on the territory Bereznovsky region of Rivne region. Accounting pests was carried out on the territory with a total area of 10 ha squares method.

To increase the population size of ladybugs we used their seasonal colonization. Seasonal colonization provides for massive artificial breeding and release of entomophagous in nature. Populations of entomophagous are often in small amounts and cannot restrain reproduction of

the pest. Mass release of insects is carried out in the early phase, damaged entomophages. In the future they will be expected to reproduce themselves.

Investigating pests of crops, we determined the degree occupancies for six-point scale according to the method Omelyuty V.P. In the phase of milk ripeness of winter crops we conducted census of cereal aphids, counting on their ears, looking into each field of 100 stems. Analysis of the results accounting made it possible to determine the average population of aphids varies from 0 to 3 points, and the average is 1.5 points. The most common areas for a large accounting cereal aphids - 27% of plants affected by this pest. Least distribution characteristic for barley aphids - 9% of plants affected.

Simultaneously, we conducted a study of species diversity of ladybirds. The results showed that among populations Coccinellidae, dominated *Coccinella septempunctata* L. - 38% of all koktsynelid - an average of 24 imago at 100 waft of a butterfly net. Natural populations of entomophagous was not enough to deter the reproduction of aphids.

Plots of winter crops affected by aphids, colonized by larvae *Coccinella septempunctata*. Land area of 1 m² with plants winter crops affected by sucking pests settled larvae *Coccinella septempunctata* and over time determine the degree occupancies of pest of areas, while comparing the results of the control area.

Results reflect the dependence between number of large cereal aphids and number of koktsynelid. It is proved the efficiency of using *Coccinella septempunctata* L. in the fight with a lot of cereal aphids provided the density of larvae ladybugs at least 10 individuals per plant. Correlation dependence between the number of large populations of cereal aphids and larvae of *Coccinella septempunctata* L. is already evident on the 5th day of the experiment. In particular, inappropriate to use insecticides against the pest in the degree of colonization 1 point and density of 10 larvae *Coccinella septempunctata* per plant. If the degree colonization of large cereal aphids 2-3 points, and the density koktsynelid least 15 larvae per plant, then there is a complete destruction of the pest entomophages already through three days.

Colonization of *Coccinella septempunctata* L. density of 5 larvae per plant was not effective. Note that the experiment not taken into consideration the activities of natural populations of imago and larvae of *Coccinella septempunctata*.

The results can be used in the development of technologies for growing organic agricultural products.

Key words: cereal crops, sucking pests, entomophages, *Coccinella septempunctata* L.

Coriander fruits field germination depending on the variety, sowing methods and seeding norm in the central forest-steppe of Ukraine

I. Pokotylo

Introducing coriander into the forest-steppe central zone crop rotation will improve economic level of crops growing, to predict the prospect of greater stability of modern crop rotations and their biological conformity with the grown crops, to use coriander as a good predecessor for winter wheat and other important crops.

While defining the role and influence of the studied factors (variety, row spacing, seed rate) and duration of the interphase period of "sowing-germination" on field germination, one needs to know the amount of water they need to absorb for mass soak, as it can be related to its amount in soil and competition among its fruits sown according to different placement schemes based on row spacing and seeding norms.

Coriander fruits absorb water in the amount of 120-130 % of its mass in soaking. A denser placement in the line created some competition for the moisture to soak between them. Narrowing row spacing and equal seeding amounts cause changing in quantity and spatial placement and thus creates different conditions for soil water use. Increasing the seeding rate

under the same row spacing changes the density of fruit per area unit, which again reinforces the competition in the fruit for germination and soaking moisture.

At the same time a closer fruit placement can be the cause of their higher intoxication through the emission of specific inhibiting substances. In this case, a allele role of coriander seed and root system emissions are displayed through the change in the field germination. In addition, too close placement, conditioned with on higher and high coriander fruits sowing standards, may cause emission of a certain amount of heat, which can also affect the field germination. The degree coriander field germination changes depends on these mechanisms involved. Field germination of coriander fruits is a comprehensive index of the impact of weather conditions, row spacing, seed rate of the studied varieties.

Mathematical processing of the results of field germination suggests asserting a sort of impact on the field germination of coriander. Comparing Oksanit and Nectar sorts for their field germination under same row spacing and seedingrates, the difference between the varieties on this indicator is proved.

Since the variety and, especially, row spacing play a significant role in changing coriander fruit field germination, it is therefore appropriate to examine the significance of seeding rates in its regulation as well. First we should note the general pattern in the change of field germination dependence on seed of coriander fruits growth rate from 1.5 to 2.5 million/ha. The essence of this pattern can be formulated as follows: regardless of the variety and row spacing the increase in the coriander fruits sowing rate in the central Forest Steppes of Ukraine reduces field germination. It should be noted that this reduction is not in mathematically provable in all cases, but the nature of the changes, their consistency in all the experiment versions were repeated annually.

Under planting Oksanit varietiy with the sowing rate of 2.0; 2.5 million/ha germinated fruit the difference in field germination at 45 cm row spacing, compared to 1.5 million/ha germinated was 0.5; 0.8 %; at 30 cm - 0.2; 0.3%; at 15 cm - 0.3; 0.5% average according to the data of three years experiment.

In Nectar sort these figures are the following: 0.3 ; 0.5%; 0.5; 0.8 %; 0.2; 0.3 % with LPD_{0,05} C-factor - 0.5 units. If we compare coriander fruits field germination dependence on the sowing rate of Nectar, the increase in norm to 2.0 and 2.5 million/ha compared to 1.5 million/ha, caused reduce in germination at 45 cm row spacing by 0,3-0 , 5%; at 30cm - by 0.5-0.8 %; at 15cm - by 0.2-0.3 % with LPD_{0,05} C-factor - 0.5 units. As one can see, the difference in the change in the field germination in Nectar is not similar to the one of Oksanit variety not only in its character direction, but in the systemic nature of the process as well.

The conducted research of the role of Oksanit and Nectar coriander varieties, different row spacing and seeding rates in improving coriander fruit field germination reveal the dependence of coriander fruit field germination on the varietiy, row spacing, seed rate and weather conditions.

Conclusion: the highest field germination of coriander fruit was observed under traditional row sowing in both varieties with 15 cm inter-row spacing and seeding rate of 1.5 million ha of germinated fruit.

Key words: coriander, variety, inter-row spacing, seeding rate, field germination.

Productivity of sugar beet hybrids under the conditions of right-bank forest-steppe of Ukraine

L. Vyshnevskya, L. Kononenko, A. Sichkar

Under these conditions, it is important to investigate the growth and productivity of different hybrids of sugar beet after organic nourish sources. Therefore, the growth and yield of different sugar beet hybrids were investigated in crop rotation, where all crops are grown by

nutrients of organic mass of sideline products of preceding crops, green-manured fallow and postharvest green manuring.

Analysis of the nutrition balance in the crop rotation shows that nitrogen, phosphorus and potassium in the soil layer of 0-60 cm is sufficient for implementation of the yield of water, which is obtained by crops, due to the precipitation and constant deposits of moisture in the lower soil layers (0-150-200 cm).

Hybrids of sugar beet were grown in the third field of six-field crop rotation. The preceding crop was winter wheat, which was grown on green-manured fallow. The amount of nitrogen after tillage of green manure crop in the soil layer of 0-40 cm (top + root mass) is 300-340 kg/ha, phosphorus 65-80, potassium 180-220 kg/ha. We don't calculate the nitrogen that leave in the soil, nodule-forming and associative bacteria. There are other sources of nitrogen. Wheat except of yield in crop rotation 60-65 hwt/ha, makes with grain 140-160 kg/ha, phosphorus 56-64, potassium 90-120 kg/ha. Nutrient status of sugar beet was sufficiently high. It is important to note, because the majority of farms that cultivate sugar beets on small areas due to the lack of funds does not have the possibility to use heavy rates of fertilizers. Such farms should use the optimum variants of organic and biological technologies broader, they need such hybrids of sugar beet, which would more fully use this organic background and natural potential of Ukrainian soil and would respond to the application of certain elements of modern technology of cultivation of this crop.

As a result of previous researches at the Department of Plant Growing of Uman NUH was used such optimized variant of technology of sugar beet growing: primary soil tillage consisted of wheat stubble ploughing with shredded straw by the disk harrow. The first tillage was carried out on the day of harvesting preceding crop, the second - after the germination of weeds. Plowing was done by plough with coulter on the depth of 24-26 cm. In autumn plough-land was aligned by cultivator.

During the vegetation, the determination of dynamics of root mass accumulation and sugar content of roots was conducted.

The most intensive root mass accumulation during this period was observed in hybrids Bilotserkivskyy MS – 57-78 g and Shevchenkivskyy – 99 g. Obtained data indicate that these hybrids accumulate mass in the second half of the growing season, which indicates their late maturity. Hybrid Umansky MS – 76 should be noted, which has stable increments of root mass regardless of its growing in different years.

The yield of hybrids depends on many factors, both agro technical and hereditary. During the creation of equal conditions of growing, genetic potential of hybrids created by domestic breeders is in the forefront.

On average for two years the highest sugar content showed hybrids Umansky MS – 76 and Slovyansky MS – 94 – 16.2 %. The lowest sugar content had hybrid Bilotserkivskyy MS – 57 – 14.4%. Accordingly, during this period, sugar harvest amounted in hybrid Ukrainsky MS – 70 – 59.2 hwt/ha , Slovyansky MS – 94 – 56.8 , Umansky MS – 76 – 57.1 hwt/ha.

On the basis of conducted researches we recommend maximal use the hybrids that are adapted to the appropriate growing conditions in Man'kivka Natural Agricultural District. These are hybrids Umansky MS – 76, Ukrainsky MS – 70, Slovyansky MS – 94.

Key words: sugar beet, hybrid, crop capacity.

Growing different crops in the rotation of "Colos" agricultural farm of Skvyra District, Kyiv Region depending on the formation of microorganisms and fungi amount, changes in soil biological activity of potential nitrogen fixation activity

L.Tsentylo, V.Tkachuk, V. Hahula, T.Panchenko

The research aimed at conducting monitoring of agrochemical and microbiological status of soils in "Colos" agricultural farm of Skvyra District, Kyiv Region after growing different crops for its results use in the management of growth and development of plants grown in the

approved rotation on the farm .

For this purpose we planned to determine the content of nitrogen, phosphorus and potassium in the farm soils, their acidity, to conduct microbiological monitoring, which would include the study of the number of microorganisms involved in the transformation of phosphorus, increasing the overall biological activity of the soil, the potential activity of nitrogen fixation, number of nitrogen fixators, nitrogenators, bacteria which use mineral nitrogen compounds, fungi composition and their amount.

The farm soils are characterized with increased and high content of exchangeable potassium, which gives rise to a decrease of its content and doses under growing crops in the rotation. At the same time, one should pay attention to the decreased and very low light hydrolyzed nitrogen in these soils, indicating the need for organic fertilizers in the form of manure, manure peat, manure soil composts, introducing syderal rotation crops, use of mineral nitrogen and its small-rate introducing, foliar plant nutrition. It is also obvious to use of microbial preparations from nitrogen-fixing bacteria for seed treatment will both improve the species composition of the microbiota and its strength.

The research analysis shows that the amount of bacteria which use mostly organic compounds (nitrogen fixators - the final product of NH_3) are at the same level in the field number 7. As for fields 3 and 4, a rather high divergence (from $4,33 \pm 2,03$ to $2,0 \pm 0,58$) was revealed between them which emphasizes the weak intensity of the amonification process, which means that the following nitrification can provide plants with a sufficient amount of nitrate nitrogen. This is confirmed by the results of microorganisms accounting in the KAA environment. We have studied the biological activity of the soil, the potential activity of nitrogen fixation, the amount of bacteria nitrogen fixator microorganisms, amonifixators, bacteria using mineral nitrogen under certain crops, like this winter rape and soft winter wheat , sown after different predecessors.

The data of our study show that by growing winter rape after the winter barley and wheat soft winter the soil biological activity and potential nitrogen fixation activity did not differ or varied slightly despite the fact that differences in the number of microorganisms in the soil were quite significant. Thus, the amount of nitrogen fixators in soil in winter rape under its sowing after winter barley and soft winter wheat was at respectively 118.7 and 187.3 million/g of soil, i.e., the difference was 68.6 million/g soil. Moreover, the soil in winter rape under followed by sowing soft winter wheat, was inhabited with nitrogen-fixing bacteria better than under its sowing after winter barley. This obviously caused a larger potential of nitrogen fixation activity in winter rape under its subsequent sowing after soft winter wheat. Thus, under winter rape sowing after soft winter wheat it made 7.7 mg of nitrogen g/soil per hour, which is more than 0.6 CIM higher compared with sowing this crop after soft winter wheat. The same pattern is detected in the amount of amonificators, bacteria using mineral nitrogen and fungi.

Having changed the crop and the predecessor, after which it was grown, some regulation of the biological activity of the soil, the potential activity of nitrogen fixation, the number of nitrogen-fixing, amonifixating microorganisms, bacteria that use mineral nitrogen and mushrooms is possible in some way.

These studies show the superiority of the biological activity of the soil, the potential activity of nitrogen fixation, number of nitrogen fixators, amonificators, bacteria using mineral nitrogen in the soil under soft winter wheat, which was sown after its predecessor - pea seeds compared with the predecessor of buckwheat.

Key words: crop rotation, winter wheat, winter barley, peas, seeds, bacteria, fungi, nitrogen fixer, bacteria.

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