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KARPUK L., VACHNIY S., Doc. of Agricultural Sciences
KRYKUNOVA O., Cand. of Agricultural Sciences
PAVLICHENKO A., assistant
Bila Tserkva National Agrarian University
DORONIN V., Doc. of Agricultural Sciences
KRAVCHENKO Yu., Cand. of Agricultural Sciences
DORONIN V., Junior Research Fellow
Bioenergetic Crops and Sugar Beet Institute of the Ukrainian National Academy of Agrarian Sciences
POLISHCHUK V., Doc. of Agricultural Sciences
Uman' National Horticulture University
SHEVCHENKO T., Cand. of Agricultural Sciences
Ukrainian National Academy of Agrarian Sciences

QUALITY OF SUGAR BEET SEEDS AND THE WAYS OF ITS INCREASE

У статті розглянуті питання щодо підвищення якості насіння цукрових буряків. Доведено, що якість насіння формується як шляхом вирощування насіння, так і його переробкою на насіннєвих заводах. Одним з важливих елементів технології вирощування насіння гібридів на основі цитоплазматичної чоловічої стерильності є забезпечення синхронізації цвітіння і запилення батьківських компонентів через чеканку насінників, що істотно впливає не тільки на рівень урожайності насіння, але і на його якість, особливо енергію проростання і схожість. Доведено, що ефективним способом поліпшення якості насіння є його стимулювання в процесі попередньої підготовки до сівби на заводі.

Ключові слова: насіння, цукрові буряки, чеканка, додаткове запилення, стимулювання насіння, схожість, урожайність.

Introduction. In the global market to ensure the competitiveness of the sugar beet is necessary to create the conditions to ensuring the high technological level of growth, which meets the requirements of sustainable development, to implement the high environmental standards for the sugar beet processing, to orient the consumers in own market. In the intensive agriculture the sugar beet productivity is depend by many factors: soil and climatic conditions, the implementation of high-productivity hybrids, the qualitative pre-seeding processing of seeds, the usage of modern techniques and technologies, fertilizers, reliable plant protection, high tech improvements on the factories etc. All of these factors can significantly to reduce the sugar beet productivity, but without the using of high quality seeds of new hybrids is not possible to achieve the maximum yield of culture.

The quality of sugar beet seeds is caused by the complex of genetic factors that are controlled by plant breeders and environmental and agrotechnological conditions of their growing and methods of post-harvest and pre-seeding seed preparation with modern technology using [Doronin V.A., 2003]. Therefore, we are focusing only on those methods that directly influence on the yield and quality of sugar beet seeds by its cultivation of plantings and without plantings methods and during of its pre-seeding preparation. The most important indicators of seed quality are viability, energy germination, germination, one sprouting, uniformity and stability by the size and forms.

Among the many factors that influence on the growth, development and yield formation and quality of seeds are of great importance the processes of controlled regulation of flowering and pollination of seed plants, especially by the seed growing of hybrids that based on cytoplasmic male sterility (CMS). Without the problem solving of the methods improvement of the directional regulation of growth processes is almost impossible to avoid the formation of a large number of small seeds that under the current standard [ISO 4231-2003] does not apply to the seeds and by the post-harvest purification of heap is lost. Also, these methods are aimed on the limiting of the growth of tall plants that improves the conditions of seed harvesting, reduces the losses, and increases the yield and quality.

In order to limit the growth of sugar beet seed plants is used: the manual, mechanical and chemical minting. This method is provide more productive seed plants by the way of growth limiting of the cen-

tral stem, in the results the nutrients are more actively entering the side stems, which improves their growth and development and, ultimately, to increase their productivity [Balan V.M. et al., 2001].

With the removal of the apical meristem of the central stem is suspended its growth and development. But at the minting is removed not only the point of growth, but also some part of the stem with fruit placed on it, as a result is passes the redistribution of nutrients and other substances that needed for the growth of both central and side stems. Instead, that these substances came to the point of growth and expended on the growth and development of the central stem and the formation of new small fruits, they come to the fruit that remaining on the stems of seed plants. By the using of minting are formed larger seeds, and it accumulates more nutrients also. Application of this agriculture method in the early phase of stem formation is accelerate the start of seed plants flowering for 2-3 days. It is friendlier and ends at an earlier term, and this in turn for 2-3 days accelerates the maturation of seeds. Also is observed a positive effect of the minting on the seed quality, especially when the minting is done in the late phase of stem formation [Yukhnovsky I.A., 2003].

Analysis of recent research and publications. According to the data of V. Faydyuk in applying the seed plants minting the yield of hybrid seed Ukrainian MS 70 is increased to 0.09 t/ha similarity – 3 % [Faydyuk V.V., 2003]. In Odessa region (Ukraine) for without planting way of seed growing by both manual and mechanized minting in the early phase of stem formation has provided the increase of the yield of seed to 0,15-0,35 t/ha, in compared with the control – without minting [Zaryshnyak A.S. et al., 1996]. In irrigated conditions of Crimea at the farm "Zarichniy" on the area of 1.1 hectares the minting in the phase of mass stem formation has provided the increase of the seed yield of varieties-populations to 0.57 t/ha, and its similarity to 3 % [Balan V.M. et al., 2003]. So, the earlier conducted researches by the growing of ordinary seeds of the varieties-populations and hybrids of sugar beet that based on CMS as plantings and without plantings ways are demonstrate the high efficiency of minting as the method of directional regulation of seed plants growth and development and their flowering, pollination and fertilization. The modern hybrids of sugar beet have a high potential of seed productivity, but for a more complete its implementation should to create the favorable conditions of mating components growing. Therefore, the actual was to study the process of growth and development regulation of mating components, the synchronization of its flowering and yield forming of base seed by the criterion of maximum seed productivity.

One of the most perspective ways to improve the quality of seed is its pre-sowing preparation in the seed plants that including seed cleaning from impurities that do not relate to the main crop seeds, sizing, polishing, sorting by the aerodynamic properties and specific gravity, stimulation, pelleting and encrusting. The stimulation of the intensity of seed germination is possible with the using of mechanical methods of seeds preparation on the seed plants by the way of removal the artificial barriers to seed germination, the usage of growth stimulants and microelements. However, the most perspective way to increase the intensity is to initiate the passing of start phase germination with the following of its suspension, which was the goal of our research.

Materials and methods. By the research program was envisaged to studying the features of seed quality formation by the growing of seeds, and it's pre-preparation in the seed plants. The researches were conducted at the Institute of bioenergy crops and sugar beet NAAS, Umansky Experimental Station, Uman National University of Horticulture and Vinnytsia seed plant Company "Ahrohrad B" in 2013-2015.

The field experiments were conducted according to the scheme: 1. No minting – control 2. Minting of 50 % of plant pollinator 3. Minting of 50 % of plant pollinator and 100 % of plants CMS component. In the process of studying the optimal terms of minting and study its effectiveness on the processes of flowers formation, the synchronous of flowering and productivity of seed plants the studies were performed on the paternal and maternal components of triploid hybrids of sugar beet Umansky MS 97 simultaneously. The minting was carried out in the period of mass stem formation by manually when the plants were 60-70 cm in height. At the same time was removed the top of the main stem for 5-10 cm. The square of scoring plot was 56 m^2, the repetition in three-time.

For stimulate the seed under the production conditions is using the 12 parties of calibrated seed of diploid hybrids Ukrainian MS 72, Westo and triploid Dobroslav, Alexandria. The stimulation of seed was performed by the method of Institute of bioenergy crops and sugar beets. In the control variant was sown the not stimulated seeds.

In the laboratory conditions were stated: the energy germination, germination and the seeds purity [ISO 2292-96], the mass of 1000 fruits and one sprouting and one seeding [ISO 4232-2003]. The selection of the average seeds samples was performed in accordance with applicable [ISO 4328–2004]. In the field conditions on the seed plants were determined: the number of flowers by the variations of the experiment was determined by the way of calculation, the seeds yield determined by the way of heap weighing from the calculation plots and from the individual seed plants. The statistical processing of the experimental data was carried out by the methods of variance and correlation analysis set out in the book of B. Dospyehov [Dospyehov B.A., 1979] with using the appropriate computer software.

Results and discussions. By the researches is established that the minting of seed plants mating components has a positive effect on the processes of growth and development and, especially on the synchronicity of the flowering and flower formation. As a result of the suspension of the tops growth of the stems is the redistribution of nutrients, improves the supply of flowers that are formed, and this is contribute of additional formation of high-quality seeds and thus an increase of its productivity.

The experiments are conducted with the plants of CMS component and fixative of sterility of triploid hybrid Umanskyy MS 97 in isolated breeding houses (Pic. 1).

Pic. 1. **The flowering of basic components in the breeding house**
(after the minting in the depths of picture and without its holding in the foreground).

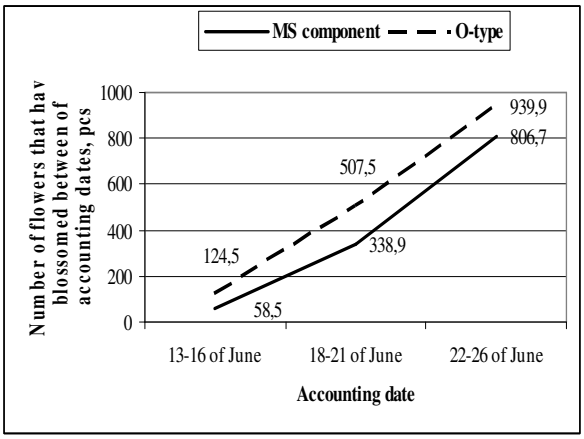
In the variant of without minting (control) the variability of the number of flowers, during the flowering, by the date of accounting was in the MS component from 58.5 to 806.7 pc./plant in the fixative of sterility from 124.5 to 939.9 pc./plant (Pic. 2a).

During the all dates of account of fixative of sterility in (O-type) flowers were more than in the MS component, that indicating on the nonsynchronicity of flowering mating components, and this ultimately negative affect on the degree of tying seeds, its germination and seed production.

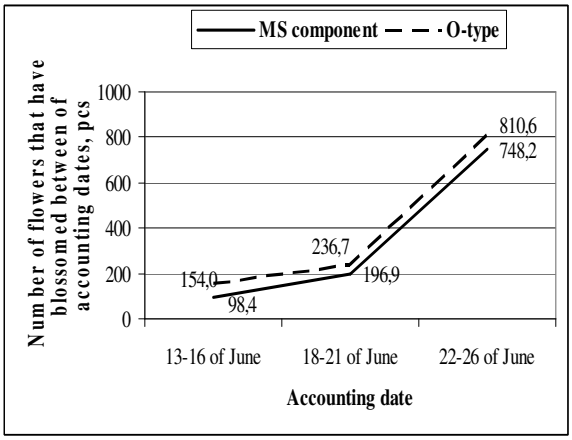
The minting of 50 % of the plants of fixative of sterility was somewhat reduced the intensity of its flower formation during the whole flowering period, in compared with the control (Pic. 2b). Thus, if at the beginning of flowering without minting was formed 124.5 flowers/plants, then with the minting – 98.4. The similar results were obtained in the last date of accounting.

In the plants of MS component without their minting there is a significant increasing the intensity of flower formation in the early phase of the stems formation and a slight decrease in the other two phases – 154.0-748.2 pc./plant. That is, the minting of 50 % of plants of fixative of sterility is ensured the synchronous flowering of both components at the beginning of flowering, and at its end.

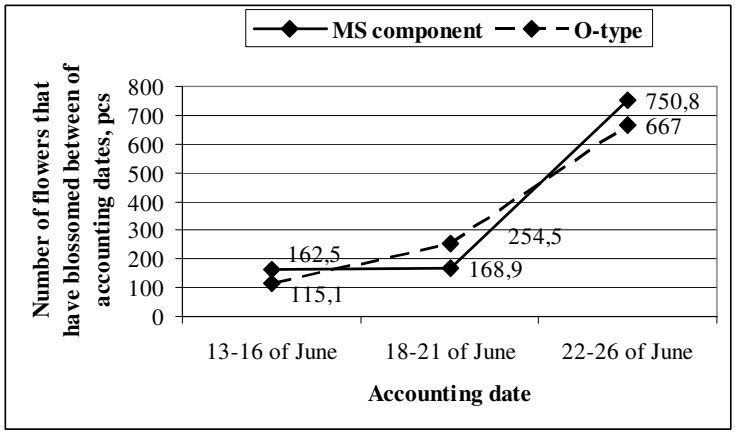
In the variant of the minting of 50 % of the plants of fixative of sterility and 100 % plants of its sterile analogue (MS component) was a negligible deviation of variation of the number of flowers of the two components that make for a fixative of sterility 115.1-667.0 pc./plant and 162.5-750.8 pc./plant for the MS component (Pic. 2c).



a) without minting – control



b) by the minting of 50 % of the plants of fixative of sterility



c) by the minting of 50 % of plants of fixative sterility and 100% of plants of MS component

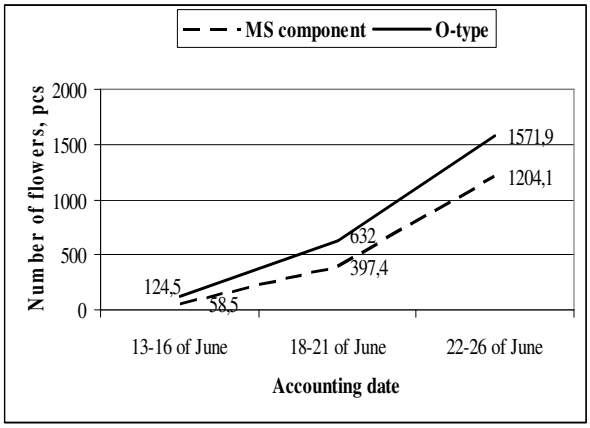
Pic. 2. **The intensity of the flower formation of mating components** (average of 2013-2015).

So the minting of the plants of the fixative of sterility and of both components of breeding is provided the synchrony of flower formation and respectively – the flowering. Without minting the flowering of seed plants of fixative of sterility is began and finish more early in 2.1 times and held intensive on the start of flowering and 1.3 times – at the end of flowering, than seed plants of the MS component, than the flowering of mating components are not held synchronously (Pic. 3a).

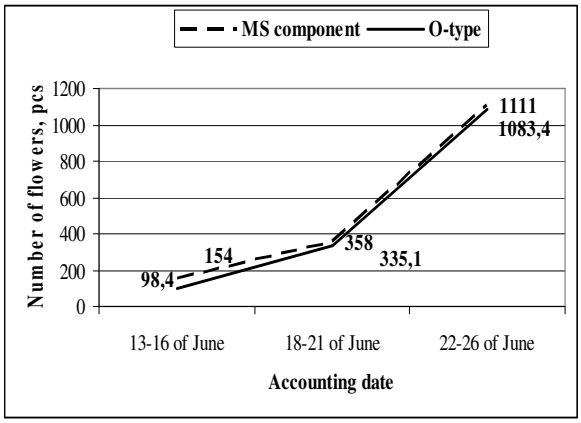
The minting of 50 % of the plants of fixative of sterility is ensured the extension of its flowering and more synchronous flowering of components (Pic. 3b). The flowering of fixative of sterility held more intensively only in 0.64-1.03 times. At carrying out the minting of all plants of MS-component and 50 % of fixative of sterility is provided the most synchronous its flowering (see Pic. 3b). In the beginning of flowering and his completion the number of flowers of MS component and fixative of sterility O-type were almost identical. Thus, on the last date of accounting the number of flowers that bloomed in the MS component was 1082.2 pc/.plant, in fixative of sterility – 1038.3 pc./plant.

In the process of studying the influence of plants minting of diploid MS component on seed production is established that this method contributes to a significant increase the yield of the baseline seed (Table 1).

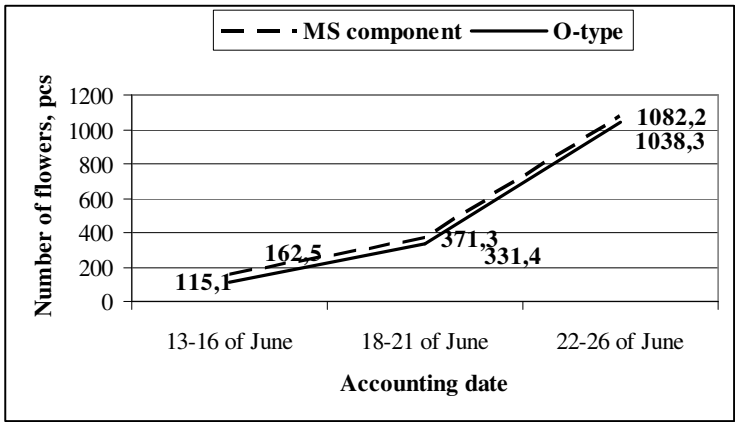
By the minting only the 50 % of the plants of fixative of sterile the yield of baseline seed of MS component is increased to 0.17 t/ha. By the minting the 50 % of the plants of fixative of sterility and 100 % of plants of MS component the yield is increased in compared with the control at 0.20 t/ha. That is, the both methods of minting are provide the significant increase of yield of MS component seeds, but there is no the significant difference between them.



a) without minting – control



b) by the minting of 50% of the plants of fixative of sterility



c) by the minting of 50 % of plants of fixative sterility and 100 % of plants of MS component.

Pic. 3. **The dynamics of mating components flowering** (average of 2013-2015).

Table 1 **– The yield and quality of baseline seed of MS component depending on the process of flowering regulation of components** (average of 2013-2015)

Variant	Yield of seeds, t/ha	Degree of tying, %	Energy of germination, %	Germination, %	Mass of 1000 pc., g
Without minting – control	1.47	86.6	76	81	12.0
The minting of 50 % of pollinator	1.64	91.0	85	87	13.1
The minting of 50 % of pollinator and 100 % of MS component	1.67	91.0	87	90	13.1
LID_{05}	0.11	1.4	3.3	3.5	0.7
P, %	2.2	0.5	1.6	1.5	1.7

An important factor that influences on the indicators of seed productivity and, especially on the seed quality is its degree of tying, which depends on the synchronicity of flowering the components of hybrid. In our researches, this feature is varied in the range from 86.6 to 91.0 %. Thus on the degree of tying seeds is affected the minting as a fixative of sterility, and the both parental components. Providing the synchronization of components flowering is contributed more substantially increase of the degree of tying seeds in compared with control that respectively influenced on its germination. Thus, the minting only 50 % th of the plants of fixative of sterility is ensured the increase of seed germination on 6% in compared with the control, and the minting of both components of 50 % of the plants of one seed fixative of sterility and 100 % of plant of MS component is provided the receiving of higher seed germination – 90 % with the indicator on the control variant – 81 %. In addition with the increase of yield and seed germination is significantly increased the mass of 1000 fruits, that indicating about the active income in the side stems of the nutrients on which are formed the basic part of the fruits.

The similar results were obtained with the yield and seed quality of fixative of sterility that based on the directional regulation of flowering process of the hybrid components. The yield of seed is increased to 0.17-0.20 t/ha, seed germination is increased from 82 % (control) to 87-90 % (in variants with minting). The highest index of germination is observed in the variant, where were spent the minting of 50 % th of plants of fixative of sterility and 100 % of plants of MS component (Table 2).

Table 2 – **The yield and quality of O-type basic seed depending on the directional regulation of the process of flowering** (average of 2013-2015)

Variant	Yield of seed, t/ha	Degree of tying, %	Energy of germination, %	Germination, %	Mass of 1000 pc., g
Without minting – control	1.48	88.8	78	82	12.2
The minting of 50 % of pollinator	1.65	93.4	85	87	13.3
The minting of 50 % of pollinator and 100 % of MS component	1.68	93.7	87	90	13.5
LID_{05}	0.04	1.7	2.6	3.1	0.4
P, %	1.4	0.5	0.9	1.3	0.8

The increase of seed germination is caused by the better pollination of O-type plants, as evidenced by the degree of tying seed which increased on 4.6-4.9 % in compared with the control. The minting is positively impact on the mass of 1000 seeds of MS component and fixative of sterility. The significant increase of the mass of 1000 fruits in variants with directional regulation of the process of flowering is caused by the better redistribution of nutrients.

The restriction of the central stem growth in resulting the nutrients are active entering in the side stems, where is forming the basic mass of the seeds, improves their growth and development and, ultimately, decreasing the number of fruits of the diameter less than 3.50 mm, that does not apply to the seeds and by the post-harvest treatment of heap is losing. It is established that the regulation of the process of flowering the number of fruits of fraction with the diameter 3.00-3.50 mm are decreased to 1.7-2.0 times of MS component and in 1.9-2.2 times of fixative of sterility and the yield of seeds of sown fractions increased accordingly – on 8-10.4 % and 9.7-11 % (Table 3). So, without minting the number of seeds of fraction 3.00-3.50 mm of MS component was 24.3 %, while both in the minting only of 50 % of the plants fixative of sterility was 14.3 % and by the minting of 50 % of plants fixative of sterility and 100 % of plants of MS component – 12.3 %.

Table 3 – **The influence of regulation of the process of flowering and fertilization on the fractional structure of seeds** (average for 2013-2015)

Variant	The content of fractions of seed, mm,%			
	more than 5.50	4.50-5.50	3.50-4.50	3.00-3.50
MS component				
Without minting – control	3.7	14.7	57.3	24.3
The minting of 50 % of pollinator	5.7	17.7	62.3	14.3
The minting of 50 % of pollinator and 100 % of MS component	5.3	18.7	63.7	12.3
O-type				
Without minting – control	4.3	12.3	60.7	22.7
The minting of 50 % of pollinator	5.7	16.7	66.0	11.7
The minting of 50 % of pollinator and 100 % of MS component	5.7	16.7	67.3	10.3

By the minting of both components is obtained the highest yield of sown fractions of seed – 82.4 %. By the minting of 50 % of the fixative of sterility is observed somewhat lower yield of sown fraction of seeds in compared with the minting of both components that due to a high content of fine fraction – less than 3.50 mm. The similar results were obtained by the fixative of sterility.

Thus, the directed regulation of processes of flowering and flower formation of seed plants mating components has a positive effect on the processes of growth and development and, especially on the synchronicity of flower formation, flowering and seed degree of tying and consequently on its yield and quality. The yield of seed and its quality are significantly increased in compared with the control (without minting)

as a MS component and fixative of sterility. Along with the increase of yield are increases the yield of sown fractions of seeds by the reducing of fruits with diameter less than 3.50 mm.

In the process of sugar beet seeds growing is not fully manage to achieve the desired results with the quality of seed with the high its different qualities that is caused by the biological characteristics of culture (the phase of sugar beet seed plants flowering passes not evenly during 20-40 days depending on the weather conditions of cultivation areas). According to this all selection and seed companies in the world and in our country are prepared for sowing of the sugar beet seeds on the seed plants only. During the pre-seed preparation is passes very difficult technological chain that includes the stimulation of the seed. All technological operations are aimed at receiving of maximum of seed quality.

According to the program of scientific-researches works of Institute of bioenergy crops and sugar beet were obtained the researches that aimed on the factors establishing that contribute to rapid of seed germination at low temperatures and the development of the method of seeds preparation on the seed plants with high germination and reliability that ensuring the high field germination and accelerated the development of young plants in the field. As is known the field germination of seeds is dependent on many factors and, primarily, from the laboratory germination of sown seeds, which in turn depends on several factors, biological features of hybrid, soil and climatic conditions of seeds growing, post-harvest and presowing preparation.

As is known, not all of seeds give stairs after sowing. According to the data of Ovcharov K.E. [Ovcharov K.E., 1969] for the germination of seeds of some kinds need to remove the shells, for others - reducing the content in them of inhibitors, for the third – the enrichment of metabolites, for the fourth is necessary the influence of water, light, temperature and other physical factors. The response reaction of seeds on mentioned actions is depends on the natural features of seeds and their physiological state, and the conditions of germination. For sugar beet seeds are inherent almost all of the above mentioned methods of increasing the intensity of its germination.

The increasing of the intensity of germ germination of sugar beet seeds we conducted two ways of stimulation: mechanical way – by reducing the mechanical noise – pericarp of seed, which is achieved by the way of seeds polishing and by the way of the initiating passing of the initial phases of germination with followed its suspension. The latter is one of the most perspective ways to increase the intensity of seed germination.

In the process of studying the effectiveness of stimulation by the mechanical way in order to reduce the seed injury and increase the degree of seed polishing it carried out in stages.

It was established that in the process of uncalibrated seeds polishing the removing of 26.7 % of the mass of pericarp is ensure a significant increase of the intensity of seed germination (Table 4).

So, after the 48 hours of seeding it is sprouted the 32 % of fruits or on 19 % more than on the control, where the seeds are not polished. The similar dependence is observed after the 72 and 96 hours after seeding. And even after 120 hours after sowing was the significant difference by the number of sprouted seeds.

The repeated sequential polishing of seeds is ensure the removing of pericarp mass to 30.1 % in compared with the control, which contributed to the increase of the intensity of its germination, and especially in the early stages. The removal of 31.7 % of mass of pericarp is leads to a slight injury of the seed that does not influence on the reducing of the intensity of its germination.

Table 4 – **The intensity of seed germination depending on the degree of polishing** (average 2014-2015)

Variant	Pericarp removed, %	Germinated seeds (%) through the hours after seeding				
		48	72	96-energy of germination	120	germination
Control, the original sample	0	13	60	76	77	78
After 1 polishing	26.7	32	80	82	82	83
After 2 polishing	30.1	56	86	87	87	88
After 3 polishing	31.7	52	87	88	88	89
LID_{05}	2.5	5.6	2.8	3.4	3.2	3.3

The final stage of seeds preparation for pelleting is seeds polishing by the technological fractions and sorting it by specific mass. It was established that during seeds polishing by the technological fraction in diameter less than 3.75 mm is removed 5.3 % of mass pericarp, and the intensity of germination through 72 hours after seeding is increased on 17 % in compared with the control (Table 5).

Table 5 – **The intensity of calibrated seeds germination depending on the degree of polishing** (average 2014-2015)

Variant	Pericarp removed, %	Germinated seeds (%) through the hours after seeding				
		48	72	96-energy of germination	120	germination
Control, the original sample	0	13	60	76	77	78
Fraction of seeds in diameter <3.75 mm						
for polishing	0	24	71	74	74	74
after polishing	5.3	50	77	78	79	79
after pneumatic table	0	34	98	99	99	99
Fraction of seeds in diameter > 3.75 mm						
for polishing	0	27	85	88	89	89
after polishing	8.8	57	91	91	91	92
after pneumatic table	0	59	98	98	98	99
LID_{05}		3.3	2.4	2.7	2.5	2.5

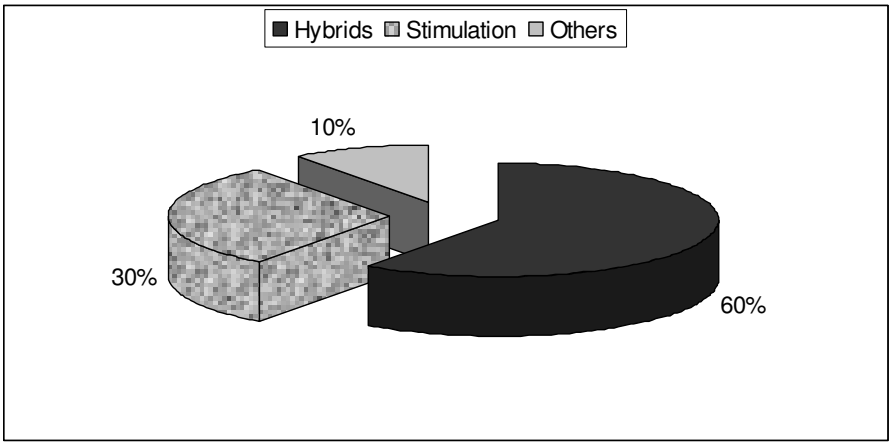
The sorting of this seed by the specific mass is ensure the receiving of calibrated seeds with the germination of 99 %, which is quite suitable for the preparation of high-quality pelleted seeds. The similar results were obtained by the polishing and sorting by specific mass by the seed of technological fraction in diameter more than 3.75 mm.

Along with the mechanical method of the intensity increasing of seed germination was studied the possibility to improve it through the stimulation the passage of the initial phases of germination with its subsequent of the suspension.

In order to determine the optimum regime of stimulation the researches were carried out with the seeds of two domestic triploid hybrids. How to set by the results of the research, the hybrids Alexandria and Umanskyy MS 97 are reacted differently on the stimulating of the seeds. At the stimulating the passage of the initial phases of germination of hybrid Alexandria, the optimal term at which the number of sprouted incrusted seeds through the 48 hours after seeding was on 22 % higher, and its germination was on 6 % higher than on the control is the stimulation by the fourth regime. At the stimulating the passage of the initial phases of germination of hybrid Umanskyy MS 97 by all regimes is not received the positive result on seed germination. The intensity of germination through the 48 hours after seeding, it increased to 6-44 % in compared with the control. In this article the content of the method is not disclosed because is being prepared the materials for patenting, and shown only the results of laboratory tests.

It is established that pelleting shell with the protective preparations is provide the mechanical barrier for seed germination and, especially in the early stages – 48 hours after sowing. In these conditions the stimulation of seeds before it pelleting is positively influence on the intensity of pelleted seeds germination. In all variants with stimulation except the variant where the stimulation was performed by the first regime of germinated seeds of both hybrids was higher than on the control.

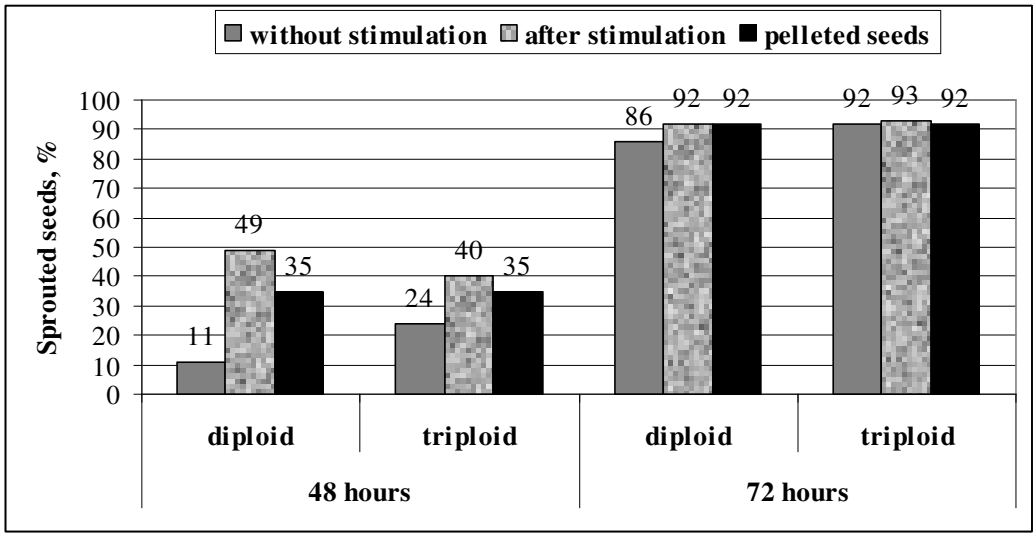
The analysis of influencing factors on the number of sprouted encrusted pelleted seeds through the 48 hours is showed that the share of impact of factor "stimulation" is significantly increased, in compared with the impact on the calibrating seeds and was 30 %, a factor hybrid – 60 %, other factors – 10 % (Pic. 4).



Pic. 4. **The share of influence factors on the number of sprouted encrusted pelleted seeds after 48 h.**

The verification of developed method of seed stimulation germination which provides the awakening of germ in the early stages with its subsequent the suspension in a production environment is confirmed the results of laboratory research on the effectiveness of this method. Checking the effectiveness of stimulation was performed with the using of 12 parties of calibrated seeds of diploid and triploid hybrids that prepared for pelleting that in the process of storage partially lost the energy of germination and germination.

The seeds stimulation is ensure the significant increase of the intensity of its germination of different sugar beet biological forms in the laboratory conditions (Pic. 5).



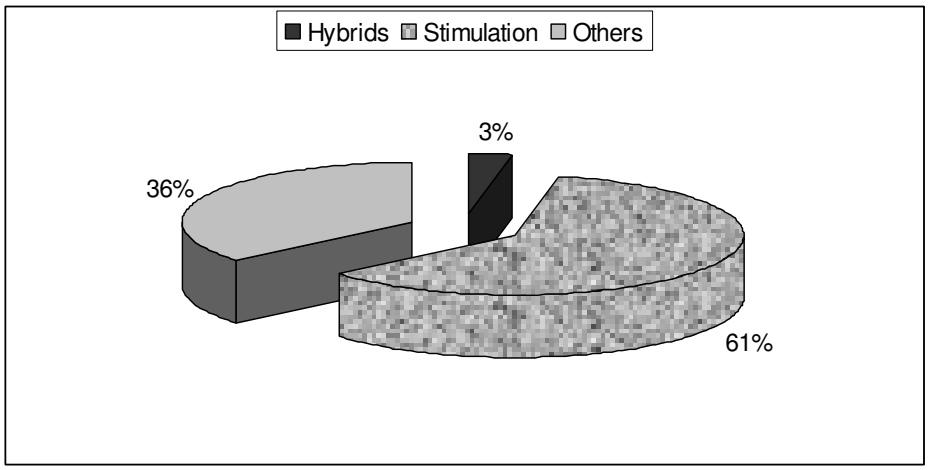
Pic. 5. **The intensity of seed germination of different biological forms depending on its stimulation** (average of 12 parties of seeds, 2014).

Thus, an average of diploid hybrids if without the stimulation through the 48 hours after seeding are sprouted the 11 % of calibrated seeds, after the stimulation – 49 % or on 38 % more than on the control. The similar results were obtained by the triploid hybrids. After the pelleting of stimulated seeds the intensity of its germination was significantly higher in the diploid and triploid sugar beets. Even through the 72 hours after seeding the intensity of calibrated and pelleted seeds of diploid hybrids germination after the stimulation was higher than on the control. In triploid hybrids through of 72 hours after seeding the difference in the number of germinated seeds was not or it equals to control.

It is established that the stimulation of calibrated seed is significantly affected on the increase of its energy of germination of both biological forms of sugar beet. Thus, if energy of germination of calibrated seeds of diploid and triploid hybrids before stimulation was 90 %, then after stimulation, it increased by 4 % (LID_{05} stimulating factor = 1.2 %) and amounted to 94 %. It is significantly increased the germination of seeds after stimulation of both biological forms of sugar beet. It is not established the significant differences with energy of germination and germination of seeds depending on seed party that was studied as diploid and triploid hybrids. After the pelleting of stimulated calibrated seed the germination energy and germination of both biological forms of beets were the same as before the pelleting, but significantly higher in compared with control. Thus, the germination energy and germination of pelleted seeds of diploid hybrids were identical and were 95 %, that respectively on 5 and 3 % higher than on the control and in triploid hybrids these indicators of pelleted seeds were equal and amounted of 94 %, which is on 4 and 2 % more than on the control – respectively.

When determining the factors that influence on the laboratory germination of seeds is revealed that the factor "stimulation of seed" was the most significant and amounted of 61 % (Pic. 6).

The influence of biological forms of beet was insignificant and constituted only 3 %, and the influence of other factors (presence of filled fruits but dead and others) was significant and amounted only 36 %.



Pic. 6. **The share of influence of factors on seed germination**
(average of 12 parties of seeds, 2014).

Conclusions: 1. The directional regulation of processes of flowering and flower formation of seed plants of mating components has a positive effect on the processes of growth and development and, especially on the synchronization of flowering, and the degree of tying seed and consequently its yield and quality. The yield of seed and its quality are significantly increased in compared with the control (without minting) as a MS component of the fixative of sterility.

2. The increasing of seed yield is caused by the increasing of mass of 1000 seeds and decreasing the seed in diameter less than 3.50 mm. By the minting is observed a higher yield of seed and sown fractions 3.50-4.50 4.50-5.50 mm, especially in the minting of both components – 50 % of the plants of fixative of sterility and 100 % of plants of MS component.

3. With the purpose of regulation of the process of plant growth and development the components of the crossbreeding is advisable performed the minting of 50 % of fixative plant and 100 % of plants of MS component that provides the greatest synchronicity of flower formation and flowering of hybrid components and respectively – the productivity of seed plants.

4. It is established that in the process of polishing the uncalibrated seed the removing of 24.7 % of the mass of pericarp has provided the significant increase in the intensity of seed germination. Through the 48 h after sowing the number of seeds that sprouted is up by 32 % in compared with the control, where the seeds are not polished.

5. It is proved that the pelleted shell with protective agents is creating a mechanical barrier to seed germination and especially in the early stages – through the 48 hours after sowing. Under these conditions, the stimulation of the seed before pelleting is positive effect on the intensity of the pelleted seed germination. In all variants with the stimulation except the variant where the stimulation was performed during 2 hours with the moisture content of the seed 35 % the number of germinated seeds of both hybrids was higher than on the control.

6. The optimum time of stimulation is passage of the initial phases of germination of hybrid Alexandria in which the number of sprouted encrusted tablets through the 48 hours after seeding was on 22 % higher and the energy of germination and seed germination, respectively – on 7 % and 6 % higher than on the control was the fourth regime of stimulation.

7. After the pelleting of the stimulated calibrated seed the germination energy and germination of both biological forms of beet was the same as before pelleting, but was significantly higher in compared with the control.

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Пути повышения качества семян сахарной свеклы

Л.М. Карпук, С.П. Вахний, Е.В. Крикунова, А.А. Павличенко, В.А. Доронин, Ю.А. Кравченко, В.В. Доронин, В.В. Полищук, Т.В. Шевченко

В статье рассмотрены вопросы повышения качества семян сахарной свеклы. Доказано, что качество семян формируется как путем выращивания семян, так и его переработкой на семенных заводах. Одним из важных элементов технологии выращивания семян гибридов на основе цитоплазматической мужской стерильности является обеспечение синхронизации цветения и опыления родительских компонентов через чеканку семенников, что существенно влияет не только на уровень урожайности семян, но и на их качество, особенно на энергию прорастания и всхожесть. Доказано, что эффективным способом улучшения качества семян является его стимулирование в процессе предварительной подготовки к севу на заводе.

Ключевые слова: семена, сахарная свекла, чеканка, дополнительное опыление, стимулирование семян, всхожесть, урожайность.

Quality of sugar beet seeds and the ways of its increase

L. Karpuk, S. Vachniy, O. Krykunova, A. Pavlichenko, V. Doronin, Yu. Kravchenko, V. Doronin, V. Polishchuk, T. Shevchenko

In the article were discussed the issues of the importance of quality seeds by the sugar beets growing. It is shown that the quality of the seed is forming as by the seeds cultivation and by his processing on seed plants. The one important element of the technology of hybrids seed growing based on the cytoplasmic male sterility is to ensuring the synchronization of flowering and the pollination of the parental components through the minting of the testes, which significantly affects not only on the level of seed yield, but also on its quality, especially on the sprouting energy and germination. It is shown that an effective way of improving the quality of seeds is its stimulation in the process of the pre-seeding preparation in the plant.

Key words: seeds, sugar beet, minting, additional pollination, seed stimulation, germination, yield.

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