UDC 631.361.8
DOI 10.31521/2313-092X/2021-2(110)-10

Ukrainian Black Sea Region Agrarian Science
Vol. 25, No. 2

Justification of the introduction of a seed separator for vegetable and tomato crops as part of a technological line

D. Babenko,
кандидат технічних наук, професор, ORCID ID: 0000-0003-2239-4832
N. Dotsenko,
доктор педагогічних наук, доцент, ORCID ID: 0000-0003-1050-8193
O. Gorbenko,
кандидат технічних наук, доцент ORCID ID: 0000-0001-6006-6931
N. Kim,
кандидат технічних наук, старший викладач ORCID ID: 0000-0001-9471-8272
Миколаївський національний аграрний університет

Abstract. Directing the production of seeds of vegetable and fruit crops can provide an opportunity to introduce industrial and intensive mechanisms, which are designed for complex mechanization and automation of production processes in seed production. Improvement and development of the field of seed production of vegetable and fruit crops will help to ensure agricultural production with seeds of own production, which will significantly contribute to the reduction of the cost price and the increase in the productivity of the production of various crops. In current conditions, it is difficult to create specialized farms that produce seeds of vegetable and melon crops, at the same time, obtaining their own seeds by producers growing melons and other crops will make it possible to reduce the costs of producing these crops. the creation of modern seed-separating machines and flow lines that meet the requirements of modern production and belong to complex technical systems requires conducting scientific research on the interaction of working bodies with the technological mass of fruits, the laws of technological processes. It is important to substantiate the principles of operation, structural parameters and kinematic modes of machines and their constituent parts. Taking this into account, conducting such studies is relevant and expedient, and they have important national economic significance.Thus, the purpose of the article is to substantiate the implementation of the improved design of the separator of seeds of vegetable and tomato crops as part of the technological line, to conduct comparative tests of the basic and experimental separators according to the main indicators of the technological process to confirm the effectiveness of the introduction of the sample into the technological line. The test of the improved design of the seed separator in various technological configurations was carried out on the basis of the technological line for the selection of seeds of vegetable and tomato crops: with a serial separator, with an experimental separator, complete with a MOS-300 machine. Comparative characteristics of such indicators as productivity, seed loss, the content of impurities in seeds, and seed damage are given. The implementation of a seed separator in the technological line for extracting seeds of melon crops is substantiated

Keywords: vegetable and vegetable crops, separator, technological line, selection of seeds

INTRODUCTION

Specialization and concentration of seed production of vegetable and fruit crops can make possible the introduction of industrial and intensive technologies designed for complex mechanization and automation of production processes in seed production. The development of the field of seed production of vegetable and fruit crops will contribute to providing agricultural producers with seeds of their own production, which

Article's History:
Received: xx.xx.2021
Revised: xx.xx.2021
Accepted: xx.xx.2021

Suggested Citation:
Babenko, D., Dotsenko, N., Gorbenko, O., & Kim, N. (2021). Justification of the introduction of a seed separator for vegetable and tomato crops as part of a technological line. *Ukrainian Black Sea Region Agrarian Science*, 25(2), 80-87.

will have an impact on reducing the cost price, increasing the production of such crops as watermelon, melon, cucumber, and tomatoes. But taking into account the fact that in modern conditions it is difficult to create specialized farms that produce seeds of vegetable and melon crops, and obtaining their own seeds by producers who grow melon crops, cucumbers, and tomatoes will allow to reduce the costs of producing such crops.

The natural and climatic conditions of the south of Ukraine make it possible to provide the country with vegetable crops of its own production and to create a raw material base for the processing industry in this area. In the specialized farms for the production of seeds of vegetable crops that existed in Ukraine, technological lines were used, equipped with machines and equipment taking into account the culture (watermelon, melon, cucumber, tomatoes) whose seeds were obtained. Currently, such technological complexes are practically not used, and for obtaining seeds, farms receive separate machines for seed selection, or complete small technological lines (depending on the capabilities of the farm). The use of such machines in labor-intensive seed production processes leads to large losses, and the efficiency of seed selection is low.

This situation is caused by the lack of theoretical and experimental processes for the selection and finishing of seeds of vegetable and fruit crops, which has an impact on the development of machines and technological lines.

Thus, the creation of modern seed-separating machines and flow lines that meet the requirements of modern production and belong to complex technical systems requires conducting scientific research on the interaction of working bodies with the technological mass of fruits, the laws of technological processes. Such studies will make it possible to substantiate the principles of action, structural parameters and kinematic modes of machines and their working bodies. Taking this into account, conducting such studies is relevant and they have important national economic significance.

At one time, a serious structure was created for the production of seeds of vegetable and melon crops. Large farms were working, the main type of activity of which was the production of seeds and which had a decent material and technical base for this, cleaning machines, even of imported production, etc. The domestic designs of machines for the separation of seeds of various crops, which are currently implemented in our country, do not meet the necessary parameters and the quality of the technological process. It is very important to have high-tech seed processing equipment [1]. The territorial differentiation of the production of the main vegetable crops in the regions of Ukraine, the peculiarities of the formation of the balance of vegetables and their supply to the population were studied, the problems and prospects of the development of the industry as a whole were indicated [2].

The organization of production of elite and reproduction seed production of vegetable and melon crops is relevant, in order to obtain high-quality varietal seeds [3]. Research was carried out in the field of the development of a machine for preparing the soil for planting melons [4]. Protected cultivation of cucumber provides higher productivity and higher quality than open cultivation [5]. The question of storage and processing of fruits, stages of scientific support of the field of melon growing were considered [6]. Methodical approaches for determining the competitiveness of various varieties of melon crops of domestic breeding compared to foreign analogues are given, and the coefficients of competitiveness are determined [7].

A device for extracting the seeds of agricultural crops was patented, which was also tested on vegetable crops [8]. To determine the optimal parameters of machines for the selection of seed mass of vegetable and tomato crops, a modeling method is presented, which is based on the nonlinear canonical distribution of a random vector. A block diagram of the procedure for calculating the parameters of the canonical decomposition is presented [9]. The method was tested on the basis of the technological process of seed selection using an experimental sample of a pressure-separating type machine [10]. The use of the method of determining the qualitative composition of the crushed seed mass of vegetable and melon crops (watermelon, melon) in the process of seed selection made it possible to determine the percentage content of the components of the crushed technological mass [11]. The results of experimental studies of a laboratory device of a new design for the separation of melon seeds from the technological seed mass are presented [12]. The article presents the structural-technological scheme of the selection of seeds of vegetable and fruit crops and the analysis of shortcomings in the operation of the machine and the technological line [13], and the factors that have the greatest influence on the quality of the technological process are established [14].

A sample of a machine for mechanical extraction of seeds from melon is presented, consisting of a frame, a loading hopper, a crushing and extraction unit, a seed transport auger, brushes for cleaning and seed extraction. A conclusion was made about the effectiveness of the sample application based on cleaning efficiency, extraction efficiency, machine productivity, power consumption, seed damage and operating costs [15]. An experiment was conducted on the injury of melon seeds during their selection, the studied characteristics were the percentage of peeled and not broken seeds, peeled but broken seeds, unpeeled seeds and unpeeled but broken seeds [16]. Research was also conducted on post-harvest processing of vegetable seeds [17]. However, the issue of implementing a seed separator for vegetable and fruit crops as part of the technological line is insufficiently researched.

The purpose of the article is to substantiate the implementation of the improved design of the vegetable and melon seed separator as part of the technological line, to conduct comparative tests of the basic and experimental separators according to the main indicators of the technological process to confirm the effectiveness of the introduction of the sample into the technological line.

STUDY OF THE FUNCTIONING OF THE DESIGNS OF SEPARATING DEVICES

When conducting theoretical and experimental studies of various designs of separating devices, it was found that when the sieve is placed horizontally, when the angle between its working surface and the horizontal is zero, differential movement should be reported to it. That is, during one period of oscillations, the sieve must have different accelerations and speeds in order to obtain the movement of the separated mass in the desired direction. However, in further theoretical analysis of the separation process, the authors make the following assumptions:

– all types of separators moving horizontally are reduced to one kinematic scheme with a symmetrical speed diagram;

– the force of inertia acting from the side of the working surface on the crushed mass is neglected;

– to intensify the separation process, instead of optimizing the kinematic and dynamic modes, it is suggested to use a stream of water sprayed through nozzles.

The main disadvantages of oscillating flat sieves include:

– high speed of movement, which requires high-quality execution, careful care and lubrication of parts;

– due to the movement of large swinging masses, inertial separators must be carefully balanced;

– compared to other types of separators (rotary and roller), they are more energy-intensive, requiring more energy to set them in motion.

The advantages of inertial separators include: sieves that oscillate horizontally take up relatively little space; convenient for maintenance and repair – replacing the sieves when switching to processing another crop takes up to 30 minutes.

In the course of the analysis of the designs of inertial separators for the selection of seeds of vegetable and melon crops, it was noted that the final cleaning of the seeds is not carried out, but the selection from the crushed mass of seeds, pulp and pulp. That is, from a technological point of view, all of them are sieves, the product above the sieve is the crust, and the product below the sieve is the seed, pith and pulp. The final cleaning of seeds from impurities is carried out on separate machines located in the technological line after the seed separators.

We propose to use a two-screen system as a separating device for extracting seeds of vegetable crops, in which large particles of bark will come from the first sieve, and seeds from the second; pulp; the pulp and juice will be the by-product of the second sieve. As the analysis of the work of the existing separators showed, the main losses of seeds occur in the output of the "big crust". It is a seed that is not separated from the finely ground seed particles. In order to intensify the process of additional extraction related to the seed crust, the mode of operation of the inertial separator was adopted. When the separated mass slides over the surface of the sieve, it will rub against the edges of the holes and, as a result, the content of seeds associated with the crust will decrease.

Separation of seeds is carried out on the second sieve. At the same time, the seeds are an aboveground product, and the pulp, pulp, and juice are under-ground products. To intensify the process of the passage of the pulp and pulp through the holes of the sieve, it is suggested to use the mode of the vibrating conveyor. In this version, at certain stages, an additional force will act on the pulp and pulp particles, and the total force of normal pressure will be equal to the sum of the force of normal pressure from the force of gravity and the force of inertia. It should also be taken into account that when separating the seeds of melon crops, the ratio of seeds to impurities is 1:9.

The following assumptions were made during the theoretical analysis:

– the separated material moves as a flat particle, the coefficient of resistance to movement does not depend on the thickness of the layer moved along the sieve;

– air resistance, when a particle is detached from the surface of the sieve, does not affect the law of movement of elements of the separated mass;

– the resistance to the movement of both the pulp and the peel, as well as the seeds, is characterized by the coefficient of specific resistance, which is numerically equal to the coefficient of friction of freshly isolated seeds, the sticking of particles of the separated mass is not taken into account;

– when the seeds move, a non-elastic impact of the products is possible (the fall is carried out on the layer of pulp and crust); as well as elastic shock (falling of seeds on the surface of the sieve);

– we neglect the recovery coefficient of the pulp and crust upon impact;

– we neglect the change in the angle of oscillations of the sieve during the rotation of the crank.

Experimental studies carried out in laboratory conditions substantiated the main structural and kinematic parameters of the melon seed separator, in which the quality indicators of the technological process (seed purity, seed injury and seed loss) have optimal values. However, a real pile of seeds differs from products processed in a laboratory. It additionally contains soil particles, small stones, plant remains. In order to justify the possibility of using the proposed

design of the separator as part of the technological equipment for the selection, washing and drying of seeds of melon crops, tests were conducted.

TESTING OF THE IMPROVED DESIGN OF THE SEED SEPARATOR IN VARIOUS TECHNOLOGICAL CONFIGURATIONS

The collection of cucumber seeds and melon crops for seeds is carried out when they reach biological maturity. Due to the differences in mechanical, technological and biological qualities of the fruits of different crops, their harvesting also has some differences. Cucumber fruits are collected using a specialized harvester, which ensures selection of fruits from the windrow, separation of plant residues from seeds, cleaning of the pile from soil particles and loading of products into a vehicle. The harvester has a needle-type working body for pricking fruits, a stem separator, an aspiration cleaning device and a system of conveyors that combine the working bodies into a single technological complex.

A specialized LSB-20 or LSB-30 technological line can be used to separate cucumber seeds, clean them from impurities, and dry them. This technological line can be considered basic, and the equipment configuration may vary depending on the needs of manufacturers and product processors.

Harvesting of such melon crops as watermelon, cantaloupe, and pumpkin is also carried out in one continuous way. Before the start of harvesting, the fruits are rolled with a UPV-8 stacker-roller. The seeds of melon crops are collected from the swath with a pick-up machine PBV-1. The pick-up consists of a frame resting on running wheels, on which a mesh drum with a fruit cutter and an unloading cellular conveyor are installed.

Moving along the swath, the harvester unloads the seed fruits inside the cellular drum, which moves them to the unloading conveyor, which ensures the reloading of the products into the vehicle.

In addition, in some farms of Ukraine, obtaining seeds is carried out with the use of machines and equipment manufactured according to individual requests.

Such equipment has low technological reliability, the difficulty of reconfiguring machines during the transition from processing one culture to another, low corrosion resistance of metal structures of machines.

A small annual loading of line equipment should be included among the features of the operation of the equipment for the selection of seeds of vegetable and fruit crops. But for a more complete loading of such technological equipment, farms carry out processing in "conveyor mode", that is, after loading the processing of cucumbers into seeds, they switch to obtaining watermelon, melon and pumpkin seeds.

The analysis of the technology of collecting and processing seeds of cucumber and melon crops, as well as the equipment in use, shows the need to modernize existing and develop fundamentally new machines.

Machines for separating seeds – separators, which are basic in technological lines, require special attention.

In addition, it is necessary to conduct research on the process of interaction of working bodies with a technological product to create effective structures.

The melon seed separator, intended for cleaning seeds from pulp and crushed peel particles, is a component part of the design of seed separators (Figure 1).

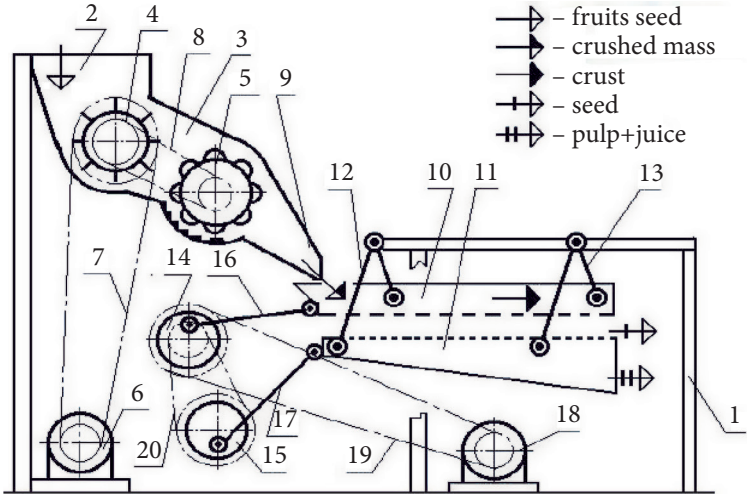

Figure 1. *Design scheme of the experimental sample of seed separators:*
1 – frame; 2 – receiving hopper; 3 – grinding chamber; 4 – grinding drum; 5 – wiping drum;
6 – electric motor; 7 – V-belt transmission; 8 – V-belt variator; 9 – tray; 10, 11 – the last grates;
12, 13 are the last ones pendants; 14, 15 – crank and connecting rod mechanisms; 16, 17 – hinged rods;
18 – electric motor; 19 – V-belt transmission; 20 – V-belt variator

The seed separator includes a receiving hopper for seed fruits 2 mounted on a common frame 1, connected to a crushing chamber 3. Inside the chamber there are grinding 4 and wiping drums 5. The drums are driven by an electric motor 6 through a V-belt transmission 7 and a V-belt variator 8. The crushed mass is removed from the chamber through tray 9. A separator is installed on frame 1 and consists of two screen sieves (10; 11) swinging in antiphase. The screens are suspended on hinged suspensions 12, 13. To provide the screen with oscillating motion, two crank-and-connecting mechanisms 14, 15 are used, kinematically connected to the screens by articulated rods 16, 17. The rotation of the cranks is carried out by an electric motor 18, through a V-belt transmission 19 and a V-belt variator 20. KKU-2A potato harvester variators are used as V-belt variators 8 and 20.

The technological process of seed selection is as follows: the fruits are loaded with a special conveyor into the hopper 2 of the chopper 3. Crushed by drums 4; 5 mass enters the sieve of the separating sieve 10. The dimensions of the cells of the upper sieve for cucumber are 5x15 mm. On its surface, the shredded crust (over-sieve product) is removed from the technological zone. Seeds, pith and small pieces of bark equal in size to the seeds (grated product) fall on the surface of the sieve of the second screen 11 with the size of the holes. Seeds with impurities on its surface are fed for further cleaning, and pulp, juice and other small impurities fall into the pallet and from it into the pump.

During the tests, the screen separator was tested as part of a technological line for the selection of seeds of vegetable and tomato crops, where it was installed in place of the rotary separator; and as part of the experimental line, while cam rollers were used as a shredder. In comparison with the serial model of the line, the pulp wiper, melon seed separator and seed grinder were excluded from its composition. Additional cleaning was carried out on the MOS-300 hydroseparation machine, designed for washing the seeds of any vegetable crops from impurities.

The following adjustments are provided in the separating device:

– the rotation frequency of the cranks and, therefore, the vibration frequency of the rattle was changed by V-belt variators 19; 20;

– the angle of inclination of the grates was changed by adjusting the lengths of hinged suspensions 12; thirteen;

– partitions were installed to change the length of the working part of the separating part of the sieve along the movement of the technological product

The structural and technological diagrams of all three sample lines with an experimental separator are shown in fig. 2-4.

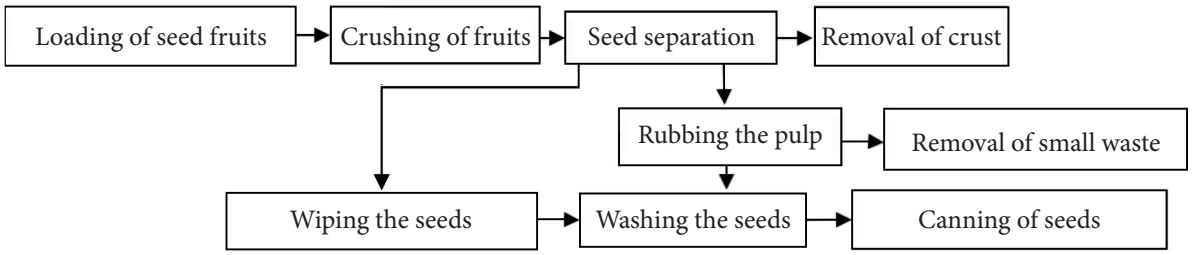

***Figure 2**. Technological line with a serial separator*

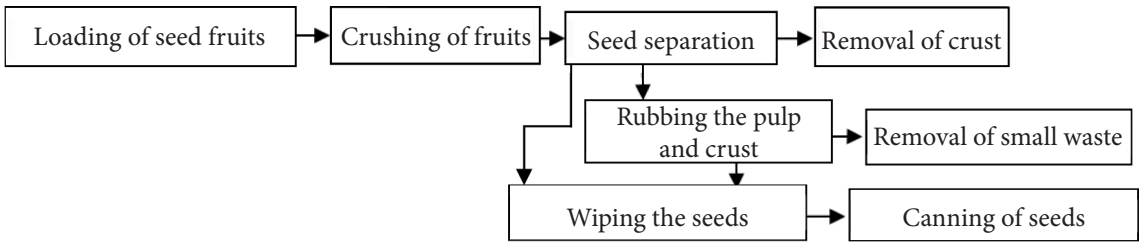

***Figure 3**. Technological line with an experimental separator*

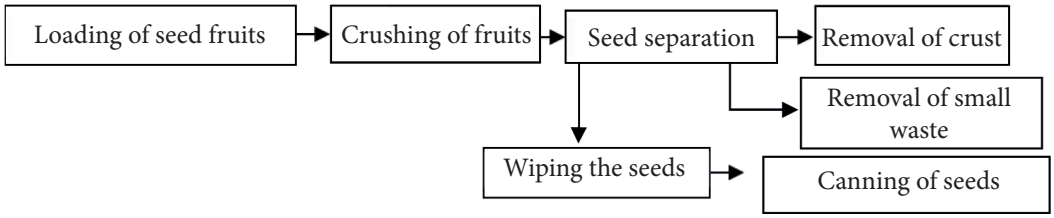

***Figure 4**. Technological line with the MOS-300 machine*

During the tests, the performance and quality of the technological process of both the separator itself and the entire line as a whole were determined.

The comparison was made with a serial sample of the separator. The results of comparative tests of separators are shown in Table 1.

Table 1. Results of comparative tests of separators

Name of indicators	Unit of measurement	The value of indicators			
		serial separator		experimental separator	
Culture		Cucumber	Watermelon	Cucumber	Watermelon
Capacity of the seed separator, kg/s	kg/s	2.625	6.197	3.089	8.778
Output ratio	%	not determined			
crust, flesh				38.2	42.1
seed				4.622.53	
pulp, juice				57.18	55.38
Seed purity in the "Seeds" output	%	75.17	77.73	78.33	82.9
Lose the seeds of everything	%	5.9	5.51	5.0	6.1
in output "crust"		5.9	5.51	5.0	4.5
in the output "pulp; juice"		none	none	none	1.6
Seed crushing	%	3.5	none	2.1	none

Comparative characteristics of a line with a serial separator, a line with an experimental separator, and a line with an experimental separator and additional seed cleaning on the MOS-300 machine in Table 2.

Table 2. Results of comparative studies of the seed production line with serial and experimental separators

Name of indicators	Unit of measurement	The value of indicators					
		serial separator		experimental separator			
				In the baseline		With the MOS-30 machine	
Culture		Cucumber	Watermelon	Cucumber	Watermelon	Cucumber	Watermelon
Productivity per hour of prime time	t	8.4	21.24	9.8	27.2	not determined	
Seed losses, including return	%	6.7	6.01	5.02	6.15	3.87	5.52
The content of impurities in the final product	%	12.8	12.7	11.2	7.2	2.3	3.7
Seed injury	%	4.4	None	4.1	None	3.5	None

As can be seen from the data in Table 1, both separators have quite high indicators, the values of which are within the limits of agrotechnical requirements and the technical task for the development of technological equipment. However, the experimental sample has a higher bandwidth. In terms of seed purity, the experimental separator also has higher characteristics. The loss of watermelon seeds at the exit of the "rind" in the experimental sample is slightly higher than in the serial one. This is due to the more rigid kinematic mode of operation of the upper screen. However, these losses can be returned to the seeds that are separated from the peel, or in the seed wiper and melon seed separators or in the MOS-300 machine. The test results are given for the "Vognyk" variety watermelon and the "Vognyk" variety cucumber "Competitor". Injury to watermelon seeds, as in the case of laboratory experimental studies, is recognized as statistically insignificant and is within the limits of experimental error.

As can be seen from the data in Table 2, the experimental sample of the line with the MOS-300 machine has the best performance quality indicators of the technological process. The content of impurities in the final product and the amount of losses for this technological option are minimal. This is due to the fact that the cleaning of seeds and their separation from impurities actually takes place in two stages, in the first stage, separation is provided by an inertial, vibrating mechanism, and in the second one, hydroseparation is carried out.

During the operation of the experimental separator as part of the baseline, the improvement of

quality indicators is associated with the optimization of its kinematic modes, and the equipment that provides additional cleaning of seeds after the separator is similar to the serial sample. Therefore, it can be concluded that the wiper, seed separator and grinder have the same effect on the quality indicators of the technological process in both the basic and the new version.

CONCLUSIONS

According to the results of laboratory experiments, two samples of the screen separator were refined and tests were carried out both of the experimental samples themselves and of the separators as part of the seed production lines. At the same time, the productivity was: when working on a cucumber, 8.4 t/h for serial equipment and 9.8 t/h. for experimental. When working on watermelon, productivity values are 21.24 and 27.2 t/h, respectively.

As a result of tests of the screening separator in the composition of various constructions of technological equipment for obtaining seeds of melon crops, confirmation of the correctness of the conclusions made based on the results of theoretical and laboratory experimental studies was obtained. During the design revision of the documentation, it is necessary to provide for the adjustment of the frequency of oscillations of the upper screen (inertial separator) within 25-30 (1/s), and of the lower screen (vibroseparator) at the level of 35-50 (1/s).

During the tests, the expediency of using cam grinding rollers and additional hydraulic cleaning of the seed heap was confirmed. At the same time, it was established that the seeds of the "Vognyk" variety of watermelon are the most suitable for seed processing, and the least - the cucumber of the "Competitor" variety. However, for all processed crops, seed purity after hydroseparation is not lower than 95%, with injury not exceeding 5%. The seed purity is 82.9% for watermelon and 78.3% for cucumber. The content of impurities in the final product is 3.7 and 2.3%, respectively.

REFERENCES

[1] Mishanchuk, T. (n.d.). *Vegetable and melon products: problems in the industry. Agrarian week. Ukraine*. Retrieved from https://a7d.com.ua/plants/1656-ovochevo-bashtanna-produkciya-problemi-galuzi.html.

[2] Sukhiy, P.O., & Zayachuk, M.D. (2012). Current status and prospects for the development of vegetables in Ukraine. *Scientific Notes of the Crimean Federal University Named After Vernadsky*, 1, 113-117

[3] Kaziev, M.-R.A., & Guseinov, Y.A. (2016). Organization of seed production of vegetable and melon crops in the Republic of Dagestan. *Mountain Agriculture*, 3, 143-146

[4] Temirov, I., Ravshanov, Kh., Fayzullaev, Kh., & Ubaydullaev, Sh. (2021). *Development of a machine for preparing the soil for sowing melons under the film*. Retrieved from https://iopscience.iop.org/article/10.1088/1757-899X/1030/1/012169.

[5] Pal, A., Adhikary, R., Shankar, T., Kumar, A., & Maitra, S. (2020). *Cultivation of Cucumber in Greenhouse*. Retrieved from https://www.researchgate.net/publication/346935525_Cultivation_of_Cucumber_in_Greenhouse.

[6] Lymar, A.O., & Lymar, V.A. (2012). *Melon growing in Ukraine*. Mykolaiv: MSAU.

[7] Shabla, O.S. (2012). Methodical approaches to determining the competitiveness of domestic varieties of melons. *Taurian Scientific Bulletin*, 80, 156-161.

[8] Rosaboev, A., Yuldashev, O., Toderich, K., Khaitov, B., Imomkulov, U., & Pardaev, O. (2016). *Seed cleaning mashine for agricultural crops*. IXTIROGA. Patent №IAP 06249. 04.03.2016.

[9] Shebanin, V.S., Atamaniuk, I.P., Gorbenko, O.A., & Dotsenko, N.A. (2020). Determination of optimal parameters of machines for seed mass separation of vegetable and melon crops. *Bulletin of Agrarian Science of the Black Sea Region*, 2, 95-103. doi: 10.31521/2313-092X.

[10] Shebanin, V., Atamanyuk, I., Gorbenko, O., Kondratenko, Y., & Dotsenko, N. (2019). Mathematical modelling of the technology of processing the seed mass of vegetables and melons. *Food Science and Technology*, 13(3), 118-126.

[11] Babenko, D.V., Gorbenko, O.A., Dotsenko, N.A., & Kim, N.I. (2015). Study of the qualitative composition of the crushed mass of seeds of vegetable and melon crops. *Bulletin of Agrarian Science of the Black Sea Region*, 3, 236-241.

[12] Pastushenko, S.I., Gorbenko, O.A., & Ogienko, M.M. (2008). Laboratory-experimental studies of the process of melon seeds separation and processing of technological mass by hydro-pneumatic separator. *Scientific Bulletin of the National Agrarian University*, 125, 349-355.

[13] Babenko, D.V., Gorbenko, O.A., Dotsenko, N.A., & Kim, N.I. (2016). Research of means of mechanization of obtaining seeds of vegetable and melon crops. *Bulletin of Agrarian Science of the Black Sea Region*, 4(92), 137-142.

[14] Babenko, D.V., Gorbenko, O.A., Dotsenko, N.A., & Kim, N.A. (2020). Optimization of structural and kinematic parameters of the separator of seeds of vegetable and melon crops. *Bulletin of Agrarian Science of the Black Sea Region*, 3(107), 105-112.

[15] Neamtallah, M., Kholief, R., Hegazy, R., & Abdelmotaleb, I. Manufacturing and evaluation of prototype for melon seed extraction. *Misr Journal of Agricultural Engineering*, 34, 699-724. doi: 10.21608/mjae.2017.96458.
[16] Okokon, F., Ekpenyong, E., & Ukpoho, A. (2005). *Shelling characteristics of melon seeds*. Retrieved from https://agris.fao.org/agris-search/search.do?recordID=FI2005025523.
[17] Kuchi, V., Prasanna, V.S.S.V., Praveena, J., & Mani, A. *Postharvest Processing of Vegetable Seeds*. Retrieved from https://www.researchgate.net/publication/349412081_Postharvest_Processing_of_Vegetable_Seeds.

Обґрунтування впровадження сепаратора насіння овоче-баштанних культур у складі технологічної лінії

Д. В. Бабенко,
кандидат технічних наук, професор, ORCID ID: 0000-0003-2239-4832
Н. А. Доценко,
доктор педагогічних наук, доцент, ORCID ID: 0000-0003-1050-8193
О. А. Горбенко,
кандидат технічних наук, доцент ORCID ID: 0000-0001-6006-6931
Н.І. Кім,
кандидат технічних наук, старший викладач ORCID ID: 0000-0001-9471-8272
Миколаївський національний аграрний університет

Анотація. Спрямування виробництва насіння овоче-баштанних культур може надати можливість впровадження індустріальних та інтенсивних механізмів , які розраховані на комплексну механізацію та автоматизацію виробничих процесів в насінництві. Удосконалення й розвиток царини насінництва овоче-баштанних культур допоможе забезпечити сільськогосподарське виробництво насінням власного виробництва, що суттєво сприятиме зниженню собівартості, збільшенню продуктивності виробництва різноманітних культур. В актуальних умовах створення спеціалізованих господарств-виробників насіння овоче-баштанних культур є складним, водночас отримання власного насіння виробниками, що вирощують баштанні та інші культури дасть змогу знизити витрати на виробництво цих культур. створення сучасних насіннє-відокремлювальних машин і потокових ліній, що відповідають вимогам сучасного виробництва і належать до складних технічних систем, вимагає проведення наукових досліджень щодо взаємодії робочих органів з технологічною масою плодів, закономірностей технологічних процесів. Важливим є обґрунтування принципів дії, конструктивних параметрів і кінематичних режимів машин та їх складових частин. Зважаючи на це, проведення таких досліджень є актуальним та доцільним і вони мають вважливе народногосподарське значення. Таким чином, метою статті є обґрунтування впровадження покращеної конструкції сепаратора насіння овоче-баштанних культур у складі технологічної лінії, проведення порівняльних випробувань базового та експериментального сепараторів за основними показниками технологічного процесу для підтвердження ефективності впровадження зразка в технологічну лінію. Проведено випробування доопрацьованої конструкції сепаратора насіння в різних технологічних комплектаціях на базі технологічної лінії виділення насіння овоче-баштанних культур: з серійним сепаратором, з експериментальним сепаратором, в комплекті з машиною МОС-300. Наведено порівняльні характеристики таких показників, як продуктивність, втрати насіння, вміст домішок в насінні, травмування насіння. Обґрунтовано впровадження сепаратора насіння в технологічну лінію виділення насіння баштанних культур

Ключові слова: овоче-баштанні культури, сепаратор, технологічна лінія, виділення насіння