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Preliminary Processing of Sunflower Seeds in Azerbaijan Based on the Implementation of New Technologies

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Key words: Sunflower, sowing material, productivity, planting area, seed sorting, oilseeds, efficiency, the pneumatic assortment

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Abstract: The main purpose of the research is to increase the output and improve the quality of condensed sunflower seeds based on the structural synthesis of subclasses of cleaning machines and is the detection of regularities of their activity in the seed-cleaning unit, during the implementation of new sequences in the process of cleaning the sunflower seeds. The annual production of sunflower seeds in Azerbaijan, according to statistics for the last decade is 20,000 tons. The production of this volume is mainly carried out on small farms and the size of the fields that they divide under the sunflower is 1.5-3.5 ha. At the same time, these fields are distributed almost to all economic regions of the country. Seeds are mainly imported to Azerbaijan from the Krasnodar region of the Russian Federation and Ukraine. Seeds are spread without local adaptation and any seed cleaning and sorting resulted in a significant reduction in the efficiency of agricultural production technology, greater waste of sowing material and less harvesting. Therefore, the technology of seed production of sunflower seeds, both locally produced and imported is considered a complex functional system that has a comprehensive impact on their quality and the application of this system is essential in the production of sees in the different zones of the country. The development of such a functional system, adapted to the geography of sunflower seed production in the country with low productivity and low material capacity has been relevant to the economic situation of farmers.

INTRODUCTION

According to the Food and Agriculture Organization (FAO) of the United Nations (UNO), sunflower planting area in 2013 was 25.6 mln. Ha. However, over the past 10 years this indicator has increased by 18.5, 38.4% in 20 years, 84.2% in 30 years, 2.7 times in 40 years and 3.7 times in 50 years. The worldwide collection of sunflower seeds in 2013. constituted 19.2% more than in 2012, reaching a record volume of 44.8 mln tons in all history.

Growth in total savings has been reflected in world prices, since, the second half of 2013 and the first race in 2014. Over the past 10 years, the production of sunflower seeds increased by 71.0% which is 6.6 times, since, 1961. The main reason for the increase in the harvest was the expansion of cultivated areas. This was 17.5 cents per hectare which made up 16.7% more than in 2012 (15.0 cents/per ha) and rose to 10.1% compared to 2011. (15.9 cents per ha) Over the past 10 years, the productivity of sunflower seeds worldwide has increased 1 time and 1.7 times, since, 1961[1].

In 2013, Ukraine and Russia harvested 1,150,000 tons (up to 24.7% of the world's total sunflower production) and 10,554,000 tons (23.6%). The top ten in the world for the production of sunflower seeds also include Argentina, China, Romania, Bulgaria, France, Turkey, Hungary and then Tanzania. Significant changes in the international market have led to the return of the main production site for Eastern Europe. In this regard, Ukraine and Russia produced the sunflower seeds of 22.7 million tones out of total 47,9 mln tonnes in the 2017 business year around the world. It is worth mentioning that the area under cultivation is ahead of the volume of seed production. So, that in 2017, the area under cultivation was 26.5 million hectares with a yield of 47.9 million tons. Thus, the preparation of sowing material with wide genetic potential and meeting agro-technical requirements is relevant[2]. Reconstruction of the structure of the food complex at the expense of increasing the efficiency of use of resource potential, the priority of production of more valuable and energy-intensive products and raw materials is an important issue in improving the food supply of the population of Azerbaijan.

There is insufficient processing capacity in Azerbaijan to meet the needs of the Azerbaijan populations for sunflower production and processing. Increasing the efficiency of sunflower seed production and processing as the main oilseed plant in our country is considered an objective necessity. The share of sunflower in the world in vegetable oil production is slightly over 8%, the fifth after soybean, rape, cotton and peanut. It is an undeniable fact that the production and processing of sunflower seeds are considered high in European countries constituting the bulk of production. In the structure of the production of vegetable oils, the plant competes with only rape (43%), accounting for 48%. The share of sunflower in our country is the same and it only competes with corn oil (46%). However, this product is still supplied through imports from mainly Russia and Ukraine. The local production of the sunflower constitutes a very small part of the national demand (20,81 thousand. t.).

Therefore, increasing domestic production is one of the main priorities of the country's economic development and is reflected in the relevant directives[1]. Considering the consumption structure of vegetable oils in Azerbaijan, there are two interrelated markets sunflower seeds, (raw material for sunflower oil) and sunflower oil market.

MATERIALS AND METHODS

Sunflower seeds are produced in almost all regions of the country. However, as can be seen from Table 1, this volume represents a very small portion of the domestic market. Therefore, more productive sunflower varieties should be planted in the country with the expansion of sunflower fields in the respective regions more effectively. At the same time, the seed material must also meet agro-technical requirements and should be sown after preparation.

Experts considered that it is necessary to implement the following measures such as 15% of the total agricultural land in the country has to be balanced according to the cultivated areas of sunflower seeds, achieving an increase in seeds production by increasing crop yields, bringing the total seed collection 420-440 thousand tons. The appropriate project has been developed to assess the economic efficiency of sunflower sowing and the implementation of this project will include several activities: determination of the location of the crop in crop rotation; variety selection, optimization of seed production and use of agrochemical services[3-5]. The selection of the variety for the production of high and stable sunflower seeds is considered crucial. A wide range of sunflower hybrids is offered today to farmers in the country, making it difficult to choose a productive or lively variety. The main reason for this is that the sunflower seeds are not zoned in the country and imported individually. However, it should be taken into account that the longer the vegetation period, the higher its potential productivity is important in the production of sunflower seeds[6].

The technological map for the determination of production costs has been developed and the largest share in the cost structure is fuel-lubricants constituting of 20.3%, amortization charges of 15.8%, pesticides 14.8% and fertilizers 12.3% (Table 2) (Reports were made for 6 ha of planting).

RESULTS AND DISCUSSION

The cost of 1 cent of sunflower seeds in 2015 was 53.98 man. In the following years, although, the cultivated area remained stable, along with the application

Table 1: Production volumes and productivity indicators of sunflower seeds in Azerbaijan

	Years				
Key indicators	2010	2012	2014	2016	2018
Countrywide: cultivated area, yield	9046	11027	11705	8238	11566
per hectare, cents/ha	17,4	18,2	18,5	20,8	20,6
The cultivated area in Ganja-Qazakh	3576	4953	6260	4816	7260
region, productivity per hectare, cents/ha	20,0	21,1	17,6	21,1	20,5
Cultivated area in Skaki and Zagatala	458	778	792	239	199
region, productivity per hectare, cents/ha	9,1	12,3	10,1	19,6	22,7
Cultivated area in Lankaran region,	556	687	620	456	286
productivity per hectare, cents/ha	11,0	10,5	12,9	13,2	13,2
The cultivated area in Guba-Khachmaz	168	78	78	79	95
region, productivity per hectare, cents/ha	12,5	15,8	16,9	16,7	15,8
Cultivated area in Aran region,	3142	2408	2255	1163	1514
productivity per hectare, cents/ha	17,1	18,6	19,1	22,5	19,9
Cultivated area in Yukhari (Upper)	572	730	996	978	1487
Karabakh region, productivity per	21,2	23,0	23,1	23,4	25,3
the hectare, cents/ha					
The cultivated area in Daglig Shirvan	333	1137	440	220	308
region, productivity per hectare, cents/ha	4,7	8,3	5,0	4,6	5,7
Cultivated area in Nakhchivan	241	256	264	277	287
Autonomous Republic productivity	26,2	26,5	25,1	26,2	26,5
per hectare, cents/ha					

Table 2: Sunflower seed production costs, in batman (man)

	Years				
Indicators	2015	2016	2017	2018	2019
Seed material	30,77	30,77	30,77	30,77	30,77
Fertilizers	87,50	87,50	87,50	87,50	87,50
Pesticides	98,27	98,27	98,27	98,27	98,27
Fuels lubricants	128,72	128,72	128,72	128,72	128,72
Depreciation deductions	100,54	100,54	100,54	100,54	100,54
Technical service and repair	30,16	30,16	28,78	28,78	28,78
Transportation (logistics)	12,69	13,33	14,60	16,35	18,56
Salary expenses	72,17	72,25	72,41	76,68	78,26
Total	560,83	561,54	562,97	567,61	568,69
Other expenses	28,04	28,08	28,15	28,86	28,75
Total direct expenses	588,87	589,62	591,12	596,47	597,44
General agriculture expenses	58,88	58,96	59,11	59,76	58,25
Total production expenses	647,75	648,58	650,23	656,23	655,69
1 ha to cultivated area	1079,59	810,72	650,23	656,23	655,89
1 cent to main cultivated area (seeds)	53,98	38,61	28,27	27,92	27,90

of higher quality seed material (6 ha), the cost of production continued to decline as agro-technical cultivation was followed. Currently, food and seeds provide a specific methodology for the solution of the problem of intensifying the purification of sunflower seeds using mathematical modeling and multidimensional system analysis. Generally, the various functional circuits of aggregates are presented using the methodology known as the interconnected, specific technological operations system and their subsystems[3, 7]. The optimization criteria of the optimized system can be the efficiency and effectiveness of the technological process of their elements (machines, working bodies, etc.) with projected technical and economic indicators and the cost of cleaning the whole seed mass according to the system and aggregate functions (Appendix 1). This approach allows the formation of the goal-minimizing the costs of cleaning the seed by providing a quality separation of the "business" fraction (seeds, commodity and other waste) from the seed material due to their technological limitations[8].

CONCLUSION

A generalized mathematical model of post-harvest processing of sunflower seeds has been established and the object of modeling is the various process of seed-cleaning machines to deliver the ultimate fraction of seed material to high-quality condensation. The sequence of technological operations is determined based on preliminary research results, the analysis of well-known sequencing schemes of cleaning machines as well as the

functional capabilities of working bodies and cleaning machines. Modern modular air-conditioning allows the use of specific process operations performed on various seed-cleaning machines as a system of interconnected special technological operations as described in the final closed multi-graph which includes the seeding machines and the pneumatic sorting unit. The basis of technology advancement is the principle of minimal impact on minimal impact on seeds which is intended to minimize the number of operations and maximize the length of the technology line by reducing transporters. At the same time, the exploitation of existing and large-scale processing units in Azerbaijan is unprofitable. Thus, the annual production capacity of these units exceeds 100,000 tons while the aggregate production in Azerbaijan does not reach 20% of the annual capacity of the unit[9].

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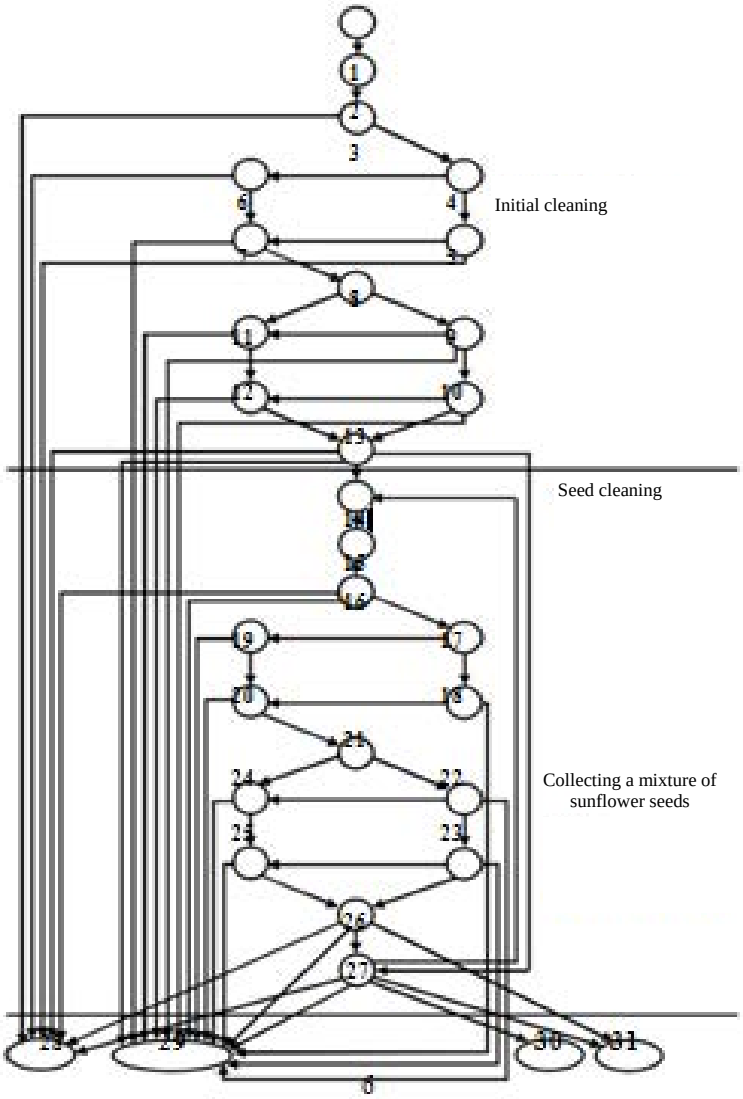
APPENDIX



Appendix 1: The processing and cleaning of sunflower seeds

REFERENCES

01. Ismailova, H.R., 2019. Working out of working bodies in the technological scheme of post-harvest processing of sunflower seeds. Sci. Work ASAU Ganja, 2: 135-138.
02. Basalgin, S.E., 2004. Improving the efficiency of the functioning of seed lines by improving the working process of the air-sieve machine: Abstract. Master Thesis, Russian Academy of Agricultural Sciences, Russia.
03. Sechkin, V.S., 2003. Improving the efficiency of seed production. Mechanization Electrif. Agric., 6: 9-10.
04. Glotov, V.P., 1969. On the reduction of mechanical damage to grain on the production line. Sci. Tech. Bull., 1: 32-36.
05. Ermoliev, Y.I., 1965. Assessing the impact of the performance of the main separators SKNTs VSh-series. J. Eng., 1: 55-58.
06. Lebedev, V.B., 1983. Processing and Storage of Seeds. Kolos Publisher, Russia, Pages: 208.
07. Peretyagin, E.A., 2007. Economic indicators of the functioning of aggregates for the preparation of sunflower seeds. Agric. For. Fish., 1: 121-127.
08. Severov, V.I., 1983. Workshop for post-boar seed treatment, breeding and seed production. Forestry, 9: 36-38.
09. Tarasenko, A.P., V.V. Sheredekin and M.E. Merchalov, 2004. Grain fractionation during post-harvest seed treatment. Mechanization Electrif. Agric., 6: 10-11.