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INTENSIFYING WAYS OF FLAX CULTIVATION IN THE REPUBLIC OF BELARUS

Annotation

The publication analyzes the current state of one of Belarus' traditional sectors of agriculture – flax cultivation. Studies have shown that despite the significant increase of economic efficiency of flax products manufacturing, today the industry is unprofitable. The main reason for this is a low quality of the final product. The article examines the intensifying ways of flax cultivation, which will increase the economic efficiency of this segment of the national economy in the future.

Keywords: flax, yield, gross yield, intensification, efficiency, sales volume, laborisness, profitability.

Introduction

Flax has traditionally been one of the major technical crops grown in the Republic of Belarus for many decades, its important role is conditioned by the high economic value. It provides two types of products during industrial processing: the main product is straw, which is subsequently processed into fiber, and conjugated product – seeds, used to produce oil. The main prerequisites for flax cultivation in Belarus are fertile soil and favorable climatic conditions, as well as existing advanced cultivation technologies and their improvement over many decades. The average soil temperature during plant growth is 17-18^{0}C, air temperature is 21-23^{0}C, temperature difference between day and night is 10-12^{0}C, rainfall during growing period is 300-320 mm. All these criteria match biological needs of the crop. However, in practice, the biological potential of domestic varieties of flax is used less than half. The average yield of fiber across the country was no more than 12 t / ha in recent years, while industrial cultivation of individual organizations makes more than 20 t / ha. All of the above determines the relevance of the research to identify ways to intensify flax cultivation in the country.

Main part

In current conditions of agriculture, linen industry plays an important role in strengthening the agricultural sector of the economy and is an important source of import substitution in food and light industry. Flax is an intensive type of crops; flax cultivation can bring high returns when using modern technologies that involve high level of production mechanization and rational organization of production processes. It is possible to realize the potential of high-quality crops in extensive agricultural production if following the technological requirements for growing and harvesting of this crop.

In recent years, the indicators of industry development in Belarus do not suggest increasing trend both natural and economic parameters. The average sown area of flax in all categories of agriculture amounted to 56.5 thousand hectares in the past five years. There has been a constant tendency in the country to reduce flax sowing over the past eight years. This dynamics has led to the fact that the area reserved for the crop has decreased by about 1.8 times, from 80.2 thousand hectares in 2008 to 45.3 thousand hectares in 2015. This is due to constant intensification of production and increase in the volume of the final products manufacturing from each hectare of crops. Gross yield of flax in all categories of agriculture amounted to 40.4 thousand tons in 2015, accounting for 83.8% in comparison to the figure in 2014 (48.2 thousand tons.), flax seeds -. 6.8 tons, that is 94.6% of the figure in 2014 (7.2 thousand tons). Flax yield was 10.1 t / ha in 2015,

which is 0.6 t / ha less than in 2014, flax seeds yield - 3.4 t / ha which is 0.2 t / ha higher than in 2014. Analysis of flax yield in 2015 suggests a tendency in reduction of the figure in all regions of the republic except Grodno region.

Flax is unprofitable crop for the majority of Belarusian enterprises. In general, agricultural enterprises of the republic lost 14303 million rubles in 2015 due to fiber production and 161 million rubles due to flax seeds production; this underlines negative profitability of this type of products (Table 1) [1].

Table 1 Profitability of flax production in agricultural organizations of the Republic of Belarus in 2015

Type of product	Sold – Total quantity, tons		The profitability of production, %
	in natural weight	in registered weight	
Flax - seed	813	733	-2.9
Linen	22297	20460	-32.3

An important economic component of any production is the cost of the resulting product. Agricultural organizations of the republic spent 44295 million Belarusian rubles to produce linen in 2015. Br. The cost structure for flax cultivation is as follows: salary with extra charges - 9%; seeds - 24%; fertilizers and plant protection products - 34%; costs for maintenance of fixed assets - 7%; labor and services - 8%; cost of fuel and lubricants for technological purposes - 11%; cost of energy resources for technological purposes - 1%; other costs - 2%. The analysis shows that the main cost for flax cultivation is cost of seeds, along with fertilizers and plant protection products.

The most time-consuming process in flax cultivation is harvesting. Harvesting accounts for 80% of all costs associated with the cultivation of the crop. For maximum intensification of harvesting one needs to use large linen packages. It results in minimum dependency on changes in weather conditions, threading process, reduces harvest period and yield losses. It is paramount to harvest crops in timely manner and preserve technological quality of flax stalks before their mechanical changes, resulting in ruffled flax fibers with a minimum content of impurities. Tedding or wrapping stems in ribbon are used to achieve the optimal humidity required by flax factories. Tedding significantly worsens the structural parameters of the layer. In particular, angular disorientation is observed, as well as increasing ribbon thickness and its twisting, and stretching of stems. Deterioration of these parameters leads to safety decrease of mentioned structural parameters when forming rolls and, consequently, to a decrease in output of a long fiber in flax plants by 15-20%.

Wrapping provides similar conditions for maturing stems upper and lower layers of the tape. This technique is particularly effective in high density spacing that happens when straw yield of 3.5 t/ha. Depending on weather conditions and taking into account economic feasibility it is recommended 1-2 wrapping. The first wrapping - 8-12 day grape upon pulling when the rate of wood fiber separability of 2.3-2.5 units. The second wrapping is carried out in cases where the further maturing revealed heterogeneity trusts. In the process of machining trusts obtained with the use of wrapping, significantly reduced the percentage of underdeveloped fibers and improves the quality of long-fiber complexes.

To identify the causes of loss of flax cultivation analyze the yield of flax in the context of households (Table 2) [1].

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Table **2 -** Grouping of agricultural organizations on the yield of flax in 2015

crop productivity, quintals per hectare	Republic Belarus		Region											
			Brest		Vitebsk		Gomel		Grodno		Minsk		Mogilev	
	number of organizations	total	number of organizations	total	number of organizations	total	number of organizations	% total	number of organizations	total	number of organizations	total	number of organizations	total
to 4	8	.3	-		4	8.2	-	-	1	.7	1	.0	2	1.8
4,1-6	16	4.5	-		4	8.2	3	75.0	4	0.8	1	.0	4	3.5
6,1-8	20	8.2	-		4	8.2	-	-	7	8.9	6	4.0	3	7.6
8,1-10	27	4.5	-		1	.5	1	25.0	13	5.1	9	6.0	3	7.6
10,1-12	16	4.5	1	0.0	4	8.2	-	-	4	0.8	5	0.0	2	1.8
12,1-14	13	1.8	1	0.0	4	8.2	-	-	3	.1	2	.0	3	7.6
over 14	10	.1	3	0.0	1	.5	-	-	5	3.5	1	.0	-	
Total	110	00	5	00	22	00	4	100	37	00	25	00	17	00

The analysis shows 65% of agricultural companies growing flax, failed to reach the national average values for yield and about 90% did not realize the possible biological potential of this crop.

Low yields of flax crops caused, both objective and subjective (eliminates) the reasons. The objective reasons include the following: loss of crops of flax in an area of 5.01 hectares due to adverse weather conditions in the spring and summer of 2015; abnormally hot weather and lack of rain in July and August, because of which formed an extremely unfavorable conditions for maturing and stalks of flax spread out timing recovery. This negatively affected the yield and quality of raw flax. Different varieties of flax from seed to seed maturation required the sum of active temperatures (above 10°C daily average) from 1 100 to 1 500°C. Soil moisture from planting to the start of rapid growth should be kept at 60% during the period of rapid growth to flowering - 80% during ripening - in the range of 40-60% of full capacity. Lack of moisture in the soil during the period of rapid growth, including budding and flowering, greatly affects the fiber crop. Soil Drought leads not only to reduce it, but also adversely affects the quality indicators anatomical stem structure: decreasing the number and size of filaments, increasing their lateral dimensions, thicker wood, which leads to lower output fibers and deterioration of its quality. Quality trusts largely depend on the prevailing weather conditions at the time of maturing flax straw. Optimal weather conditions add up in sunny weather, the air temperature 14-20°C, without sharp fluctuations during the day, when straw humidity of 50-60%, which need abundant dew, rain (no rain) in the evening and night hours 1-2 times in Week. Under these conditions, a high activity is observed decomposing pectin microorganisms maceration process is intensive, the curing takes place for 12-15 days, the fiber is soft and durable [2]

Adverse climatic conditions in 2015 have postponed their mark on the quality of the flax. As shown by the analysis of data, in 2015 approximately 1% of the total sales of agricultural organizations of the republic was off-grade flax, 42% were numbers 0.5 and 0.75, respectively, and were absent in the structure of commodity products numbers 1.75 and 2.

An important factor affecting the quality of the final product is the correct crop rotation. The best precursors for the culture are cereals. After their flax straw obtain better uniformity, color, overall length and diameter of the stem than after perennial grasses. This is a consequence of over-focal-nitrogen plant food during the decomposition of sod in the ground. It should not be sown after the flax and clover root crops that leave the soil in significant reserves of nitrogen, resulting in flax lodging.

After analyzing the state of flax industry it can be stated that the main reserves of growth in productivity and quality improvement, and as a result the economic efficiency of flax products manufacturing are as follows:

1. Using highly productive domestic varieties. Domestic varieties of flax, subject to compliance with cultivation technology, are competitive with foreign varieties, provide high potential yield of fiber (25 t/ ha or more), seeds (8-12 t / ha), the fiber content in the linen equals to 32-40%. A share of new domestic varieties (Blakit, Vasilek, Praleska, Borets, Aley, Zakaz, Ritm, Yarok and others.) in sown areas of flax should be about 80%.

2. Improving the qualitative structure of the seed. Scientific research organizations of the National Academy of Sciences of Belarus are engaged in the production of original seeds and uterine elite, which subsequently transferred for the reproduction to flax institutions. Flax institutions of the republic work on reproduction of uterine elite and super elite (elite) with the subsequent passing of seeds to flax cultivating organizations who, in their turn, are engaged in breeding seeds by reproduction. Created modern elite farms provide enough elite flax seeds to flax cultivating organizations of the republic, however due to the high cost of seeds, some farms have to use seeds of a third and older reproductions.

3. The use of modern intensive technologies of flax cultivation. Designed by Republican Unitary Enterprise «Research and Practical Center of National Academy of Sciences of the Republic of Belarus for agriculture» and Republican Unitary Enterprise "Science-practical center of National Academy of Sciences of Belarus for agricultural mechanization" technology of flax production results in 14,0-18,0 t/ ha of fibers and 6.0-8.0 t / ha of seeds. The technology involves the use of complex target mineral fertilizers, micronutrients, protection, machinery systems and mechanisms of the European level for flax cultivation, flax straw, production and harvesting of flax. Technological regulations require harvesting of flax straw to be done within 10-12 days (calendar start date of harvest is 8-10th of August). Then straws become harder and lignification occurs, fibers lose weight, color and main spinning qualities. Subject to normal terms of harvesting, mass maturing of fiber finishes in the 2nd decade of September.

In 2015, in order to comply with technical regulations of flax production, flax cultivation organizations bought 8 additional balers PRL-150A, 2-trailer 2PTS-4.5, 2 units of sowing machinery SPU-6L, 26 tractors "BELARUS" of various classes, 10 trailed flax harvesters, 1 self-propelled turner of flax ribbons and other necessary equipment for soil and flax cultivation.

4. Creating raw material zones. Under the current organization of production of straw and fiber, flax plants are forced to rent land for flax sowing from agricultural enterprises each year. In order to improve the current situation we consider that it is expedient to withdraw flax production from flax factories and farms, which suffer annual losses due to low yields, lack of technology, lack of specialization, and at the same time to increase the production of flax in farms with high profitability of this crop. During summer, flax plants can work as machine and tractor station, helping farms by providing complex, expensive equipment. It is considered to establish the holding

structure in the Vitebsk region in the short term. The prime contractor and a major integrator will be RUPTP "Orsha Linen Mill".

5. Agricultural specialization expansion of oil flax growing. The RUP "Institute of Flax" is working on breeding oil flax seeds. Energy-saving technology of crop cultivation is being developed; the research is conducted on stabilization of linseed oil quality and increase of its shelf life. It is advisable to continue the development of new formulations of feed for livestock, domestic birds and fish with the use of meal obtained after oil extraction. To expand the use of products made from processed seeds of oil flax, in depth market research is necessary along with broad advertising of nutritional and medicinal benefits of flax products.

Conclusion

Analysis of current state and development factors of flax cultivation indicate the possibility of its further intensification in Belarus due to: favorable natural and climatic conditions; broad experience; financial benefits; agronomic feasibility; export-oriented marketing combined with the social importance of this crop for the population. In strict compliance with the technological regulations of cultivation of the modern domestic varieties of flax, it is possible in practice to achieve its biological capacity, namely, to cultivate up 2 tons of natural, domestic, high-quality fiber from 1 hectare of crops.

Agricultural producers of the republic have prospects for intensification of the flax industry. One of the main and primary task for them is to ensure the necessary production volumes of high quality raw material that satisfies the consumers among large processing enterprises of the republic. This requires: the use of modern technology of flax production, which will allow to produce fiber graded 1.75 and above, along with the yield of fiber between 14-18 t/ha; accelerated use of new highly productive and high fiber varieties of flax; the establishment of cooperative-integration structure such as holding that includes enterprises engaged in the entire production cycle, starting from flax cultivation and ending with product marketing; expansion of oil flax production for the use of its products in food, medicine, farm animal feeding, technical purposes.

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ПУТИ ИНТЕНСИФИКАЦИИ ВЫРАЩИВАНИЯ ЛЬНА В РЕСПУБЛИКЕ БЕЛАРУСЬ

Аннотация

В публикации проанализировано современное состояние одной из традиционной для Беларуси отрасли сельского хозяйства – льноводство. Проведенные исследования

показывают, что несмотря на существенные изменения в сторону повышения экономической эффективности производства льноводческой продукции на сегодняшний день отрасль является убыточной. Основная причина такого положения низкое качество получаемой конечной продукции. В статье рассматриваются направления интенсификации льноводства, которые в будущем позволят повысить экономическую эффективность данного сегмента национальной экономики.

Ключевые слова: лен, урожайность, валовой сбор, интенсификация, эффективность, объем реализации, трудоемкость, рентабельность.

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АНАЛЫҚ ПИЯЗДЫ БАҒЫТТАЙ ОТЫРҒЫЗУДЫҢ ТЕХНОЛОГИЯЛЫҚ ҮДЕРІСІН ТЕОРИЯЛЫҚ НЕГІЗДЕУ

Аңдатпа

Қолданыстағы отырғызу сұлбалары мен отырғызу аппараттарының конструкцияларын талдау негізінде мақалада аналық пиязды отырғызу үшін жаңа техно-логиялық шешім табу қажеттігі негізделген. Отырғызу құралдарын жасауда келе-шегі бар бағыттардың бірі анықталып, аналық пиязды агротехникалық талаптарға сай отырғызуға мүмкіндік беретін бағыттауыш құрылғысы бар отырғызу аппараты-ның жаңа конструкциясы ұсынылады.

Кілт сөздер: бас пияз, шынжырлы-қасықты отырғызу аппараты, бағыттауыш құрылғы, қасық, түсім.

Кіріспе

Бас пияз – көкөніс дақылдарының ең көп тараған түрлерінің бірі. Ол әлемнің барлық елдері халықтарының үлкен сұранысына ие. Тағам өнімі ретінде пияздың мәні зор және дастарханнан лайықты орын алады. Пиязды таза күйінде, қуырылған, асылған және қалбырланған түрде қолдана береді, ол ең алуан түрлі тағамдар дайындау мен хош иістендіру үшін таптырмайтын өнім.

Отандық өнеркәсіп осы уақытқа дейін пиязды өсіру мен жинауға арналған арнайы отырғызу машиналарын шығарған жоқ. Өнертапқыштар бас пияз аналықтарын отырғызу үшін басқа машиналардың әртүрлі конструкцияларын осыған бейімдеумен немесе жекеленген тәсілдермен дайындап келеді.

Аналық пиязды оңтайлы мерзімдерде және агротехникалық талаптарға сай отырғызудың пияз өнімділігін арттыру мен тұқым сапасын жақсарту үшін зор мәні бар. Өсімдік өскіндерінің оңтайлы қоюлығын және олардың егілетін егіс ауданы бойынша біркелкі орналасуын қамтамасыз ету, яғни өсімдіктердің арасында тіршілік әрекетінің тең мағыналы және өзара ауыстырылмайтын төрт фактордың (жарық, жылу, су және қоректік элементтер) біркелкі таралуын қамтамасыз ететін жағдайлар туғызу отырғызудың негізгі міндеті болып табылады [1-3].