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ЭФФЕКТИВНОСТЬ ИСПОЛЬЗОВАНИЯ БИОЛОГИЧЕСКОГО ПОТЕНЦИАЛА СОРТОВ ЛЬНА-ДОЛГУНЦА ТОМСКОЙ СЕЛЕКЦИИ ПРИ ПЕРЕРАБОТКЕ ЛЬНОТРЕСТЫ

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Приведены сведения о структуре посевных площадей льна-долгунца в России в 2016–2020 гг. Сорта томской селекции занимают почти 30% от общей площади посевов. Исследования проходили в льносеющих регионах России в 2001–2020 гг. Определена технологическая ценность льносырья изучаемых сортов льна-долгунца при переработке льнотресты различного качества на льноперерабатывающих предприятиях. Изучены показатели по общему выходу волокна, выходу длинного волокна, выходу короткого волокна, номеру длинного волокна, номеру короткого волокна, а также по комплексу указанных признаков. Установлена эффективность использования потенциальных возможностей изучаемых сортов по отношению к данным Госсортоиспытания. По результатам переработки льнотресты и рейтинговой оценки указанных сортов в сравнении с лучшими и худшими сортами установлено, что для низкокачественной льнотресты к числу сортов могут быть отнесены следующие: Томский 18 – по выходу короткого волокна (24,9%), Томский 16 – по номеру длинного волокна (11,08 N), Тост – по номеру короткого волокна (3,42 N) и комплексу признаков (средний индекс рейтинга 9,8 позиций). К группе лучших сортов по общему выходу волокна принадлежат сорта Томский 18 (33,2%) и Тост (32,2%), выходу длинного волокна Тост (13,1%), выходу (23,2%) и номеру (5,20 N) короткого волокна Томский 18 (высококачественная льнотреста). Уровень реализации биологического потенциала, установленного при Госсортоиспытании, всех представленных сортов в производственных условиях при переработке льнотресты по общему выходу волокна и выходу длинного волокна недостаточен. Его значение для сортов Томской школы селекции составляет по общему выходу волокна 65,2–86,3%, выходу длинного волокна 17,6–31,4% (низкокачественная льнотреста), 77,7–94,2 и 30,5–52,2% соответственно (высококачественная льнотреста).

Ключевые слова: лен-долгунец, льнотреста, выход волокна, льноперерабатывающие предприятия

EFFICIENCY OF USING THE BIOLOGICAL POTENTIAL OF FIBER FLAX VARIETIES OF THE TOMSK SCHOOL OF BREEDING IN FLAX STRAW PROCESSING

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The information on the structure of the areas cultivated with fiber flax in Russia in 2016–2020 is presented. The varieties of the Tomsk school of breeding occupy almost 30% of the total area under crops. The study was carried out in the flax-growing regions of Russia in 2001–2020. The technological value of flax raw material of the studied varieties of fiber flax for processing flax of various quality at flax processing enterprises was determined. The indicators for the total fiber yield, long and short fiber yield, long fiber number and short fiber number, and the combination of these features were studied. The efficiency of using the potential capabilities of the studied varieties in relation to the data of the State Variety Testing was established. According to the results of flax straw processing and the rating assessment of these varieties in relation to the best and worst ones, it was found that the following varieties can be referred to as the ones with low-quality flax straw: Tomsk 18 – by the yield of short fiber (24.9%), Tomsk 16 – by the number of long fiber (11.08 N), Tost – by the number of short fiber (3.42 N) and the complex of features (average rating index of 9.8 positions). The group of the best varieties for the total fiber yield includes Tomsk 18 (33.2%) and Tost (32.2%), for the long fiber yield – Tost (13.1%), for the short fiber yield (23.2%) and the number of short fiber (5.20 N) – Tomsk 18 (high-quality flax). None of the varieties presented fulfil the biological potential in the processing of flax straw under production conditions in terms of the total fiber yield and the yield of long fiber, established by the State Variety Testing. Its value for the varieties of the Tomsk school of breeding is 65.2–86.3% for the total fiber yield, 17.6-31.4% for the long fiber yield (low-quality flax straw), 77.7–94.2 and 30.5–52.2%, respectively (high-quality flax straw).

Keywords: fiber flax, flax straw, fiber yield, flax processing enterprises

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The authors declare no conflicts of interest.

INTRODUCTION

In modern conditions, the flax industry is faced with an important task related to import substitution - the creation of a reliable and stable domestic raw material base in the production of fiber flax, capable of meeting the requirements of flax processing enterprises in high-quality fiber products [1-3]. Improving the efficiency of fiber flax production and the competitiveness of its products depends on many factors [4–7]. One of the most important factors is the development of new domestic varieties that have economically valuable traits and a high degree of their manifestation during the processing of flax trees under production conditions [8–10]. Among other varieties of both domestic and foreign origin, these requirements are also met by the varieties of the Tomsk School of Breeding[1] [11–13].

The area sown under these varieties in Russia averaged almost 30% of the total area[2] from 2016 to 2020. Due to various reasons (primarily due to the insufficient amount of seeds of domestic breeding varieties) almost 30% of the area is cultivated with fiber flax varieties of foreign selection (see Table 1) [1, 2, 7]. Taking into account the high prevalence of Tomsk selection varieties in the crops, it is necessary to assess their importance from the position of technological flaxseed fleece in processing for fiber. According to the traditional technology of flax fiber processing for long and short fiber, the technological value is determined by their yield and quality[3] [14]. It is known that the biological potential of the varieties, which is determined by the State Variety Testing, in the practical activities of flax processing enterprises is far from being fully used.

The aim of the research is to determine the technological value of flax straw of the Tomsk breeding cultivars in comparison with other varieties of domestic and foreign origin in primary flax straw processing of different quality; to estimate the efficiency of using biological potential of the mentioned fiber flax varieties by main features in flax straw processing in production conditions.

[1]The State Register of Breeding Achievements Admitted to Cultivation in the Russian Federation. 2016.450 p.

[2]Varietal crops of fiber flax and hemp in 2015–2016. Statistical data "Agency" Len ". 2016–2020.

[3]Patent 2597552 C1 (Russian Federation) The method for assessing the technological value of fiber flax stems / V.A. Romanov, T.A. Rozhmina, M.M. Kovalev S.L. Belopukhov. Appl. 10.03.2015.

Табл. 1. Структура посевных площадей сортов льна-долгунца томской селекции (2016–2020 гг.)
Table 1. Structure of areas cultivated with fiber flax varieties of the Tomsk School of Breeding (2016–2020)

Crop year	Total acres, thousand ha, %	%	Domestic varieties, thousand ha, %	Foreign varieties, thousand ha, %	Grade-out crops, thousand ha,	Cropland acres, thousand ha, %										Total, thousand ha, %
						Tomsk 16	Tomsk 17	Tomsk 18	Tost	Tost 3	Tost 4	Tost 5	In memory of Krepkov	Tomich	Tomich 2	
2016	44,695		27,533	13,880	3,282	1208	9395	3938	6136	234	20	194	–	–	–	21,12
	100	To column 2	61,6	31,1	7,3	2,7	21,0	8,8	13,7	0,52	0,04	0,43	–	–	–	47,2
		To column 4	100	50,2	11,9	4,4	3,4	14,3	22,3	0,85	0,07	0,70	–	–	–	76,7
2017	44,971		24,949	11,600	8,422	500	5607	5076	–	228	64	130	–	1	–	11,596
	100	To column 2	55,5	25,8	18,7	1,1	12,5	11,3	–	0,51	0,12	0,29	–	0,002	–	25,8
		To column 4	100	46,5	33,8	2,0	22,5	20,3	–	0,91	0,26	0,52	–	0,01	–	46,5
2018	44,500		23,308	14140	7,052	723	5567	4092	–	100	47	416	–	–	–	10,945
	100	To column 2	52,4	31,8	15,8	1,6	12,5	9,2	–	0,22	0,11	0,94	–	–	–	24,6
		To column 4	100	60,7	30,2	3,1	23,9	17,6	–	0,43	0,20	1,78	–	–	–	47,0
2019	49,70		26,972	13600	9,128	–	6945	4474	–	407	32	725	24	182	–	12,640
	100	To column 2	54,2	27,4	18,4	–	14,0	9,0	–	0,82	0,06	1,46	0,05	0,04	–	25,4
		To column 4	100	50,4	33,8	–	25,7	16,6	–	1,51	0,12	2,69	0,09	0,07	–	46,9
2020	53,200		32,043	12700	8,457	–	7446	4749	–	438	152	1004	149	3	14	13,940
	100	To column 2	60,2	23,9	15,9	–	14,0	8,9	–	0,82	0,29	1,9	0,28	0,01	0,03	26,2
		To column 4	100	39,6	26,4	–	23,2	14,8	–	1,37	0,47	0,01	0,46	0,01	0,05	43,5
Mean	47,413		26,961	13,184	7,268	486	6978	4466	1227	281	63	494	35	37	3,0	14,048
	100	To column 2	56,9	27,8	15,3	1,1	14,8	9,4	2,7	0,6	0,12	1,00	0,07	0,01	0,01	29,6
		To column 4	100	49,5	27,2	1,9	25,9	16,7	4,5	1,0	0,22	1,14	0,11	0,02	0,01	52,1

MATERIAL AND METHODS

The studies were carried out from 2001 to 2020 in the conditions of flax-growing farms and flax-processing enterprises of the Tver, Smolensk, Pskov, Kostroma, Vologda regions, as well as on the basis of the All-Russian Research Institute of Flax (currently the Federal Scientific Center for Bast Crops). According to a special methodological program, which was developed to establish the standards for the transfer of flax straw of new varieties of fiber flax into fiber, batches of flax of different quality for each variety under study were prepared[4] [5, 7]. The weight of each batch was at least 2 tons. Some batches were represented by low-quality flax-straw (numbers 0.50–0.75), and some were high-quality flax-straw (numbers 1.00 and more). When carrying out control developments at flax processing enterprises, in accordance with the rules of technical operation of flax factories, the optimal operating mode of the equipment was established. According to the current GOSTs, the quality of flax straw, long and short fibers were determined at all production transitions. With normalized humidity and contamination of flax straw and fibers, the total yield, the yield of long and short fibers from each batch were established. The following equipment was used: SKP-10LU flax-straw dryer, MTL-1 crushing and scutching unit, TL-4-2 machine for processing loose pieces, SKP-10KU short fiber dryer, KPAL flax tow scutcher. State variety trials at variety plots of flax-growing regions of the Russian Federation were carried out according to the existing methodology[5]. The experimental data were statistically processed using the methods of mathematical statistics [15].

RESULTS AND DISCUSSION

During the research, the technological value of flax-straw was determined when processing 18 varieties of domestic selection and 12 varieties of foreign ones for fiber. The varieties of Tomsk selection are Tomsky 16, Tomsky 17, Tomsky 18, Toast. The total fiber yield, the yield and the number of long and short fibers were determined in the course of control developments for two groups of flax stands: low-quality and high-quality, separately for each batch of flax of a certain type. 6 varieties were identified with the maximum and minimum values for the total fiber output, long fiber output, short fiber output, long fiber number, and short fiber number according to the average values of the traits. The data are given in table 2, 3 (low-quality flax straw) and table 4, 5 (high quality flax straw). The tables show that both the best and the worst varieties in terms of individual traits do not include the same varieties. For example, the maximum average value of the total fiber yield from low-quality flax straw (see Table 2) was recorded for the Alexandrite variety (30.3%), the long fiber yield - for the Lenok variety (11.1%), the short fiber - for the Diplomat variety (25%), the number of the long fiber - in the Tomsky 16 variety (11.08 N), the short - in the Tverskoy variety (4.0 N) (see Table 3). For the varieties of Tomsk selection, the following pattern is observed: with the maximum value of the output of short fiber, Tomsky 18, the number of the long fiber - Tomsky 16, with the minimum value of the total yield of fiber - Tomsky 16, the yield of long fiber - Tomsky 17, Tomsky 18 (see Table 2, 3). These varieties occupy an intermediate position for the rest of the characteristics. From the data presented in table 4, 5 (high-quality flax straw), it follows that the best varieties in terms of total fiber yield include varieties Tomsky 18 (33.2%), Toast (32.2%), long fiber yield - Toast (13.1%), short - Tomsk 18 (23.2%), short fiber number - Tomsk 18 (5.20 N). The worst varieties in terms of total fibre yield (27.6%) and long fibre yield were Tomsk 16 (16.9%) and short fibre yield was Toast (17.4%).

[4]Order of the Ministry of Agriculture of the Russian Federation No. 23-r dated March 10th, 2016 “The procedure for determining the standards for the conversion of flax straw and hemp into fiber” (As amended by the Decree of the Government of the Russian Federation No. 450 dated 12.06. 2008). 7 p.

[5]The methodology for state variety testing of agricultural crops. Moscow: Kolos, 1985.263 p.

Табл. 2. Сорта льна-долгунца с минимальным и максимальным значением общего выхода, выхода длинного и короткого волокна (низкокачественная льнотреста)

Table 2. Varieties of fiber flax with a minimum and maximum value of the total yield, the yield of long and short fiber (low-quality flax straw)

Variety	Total fiber yield, %	Variety	Long fiber yield, %	Variety	Short fiber yield, %
Varieties with the highest trait value					
Alexandrite	30,3	Lenok	11,1	Diplomat	25,0
Diplomat	29,7	Zaryanka	9,6	Tomsk 18	24,9
A 93	29,5	Alexandrite	9,4	Sursky	23,5
Alpha	29,0	Leader	9,0	Elektra	23,4
Escalina	28,9	Grant	8,7	A 93	23,2
Grant	28,6	Alpha	8,6	Escalina	23,0
Tomsk varieties					
Tomsk 16	22,7		4,0		18,8
Tomsk 17	26,5		3,6		22,9
Tomsk 18	27,6		2,7		24,9
Tost	27,1		6,2		20,8
Varieties with minimum trait values					
Agatha	21,0	Elektra	2,7	Agatha	14,0
Caesar	21,1	Tomsk 18	2,7	Zaryanka	15,7
Susanna	22,4	Susanna	3,1	Caesar	16,8
Tomsk 16	22,7	Lira	3,4	Lenok	17,0
Lira	23,4	Sursky	3,6	Vasilek	18,0
Mogilevsky 2	23,7	Tomsk 17	3,6	Leader	18,7

Табл. 3. Сорта льна-долгунца с минимальным и максимальным значением номера длинного и короткого волокна (низкокачественная льнотреста)

Table 3. Varieties of fiber flax with a minimum and maximum value of the long and short fiber number (low-quality flax straw)

Variety	Long fiber number, N	Variety	Short fiber number, N
Varieties with the highest trait value			
Tomsk 16	11,08	Tverskoy	4,00
Zaryanka	11,00	Aleksim	3,75
Alpha	11,00	Alpha	3,71
Lenok	10,80	Leader	3,50
Vasilek	10,70	Tost	3,42
Tost	10,67	Alexandrite	3,38
Tomsk varieties			
Tomsk 16	11,08		3,00
Tomsk 17	10,24		3,00
Tomsk 18	10,08		3,00
Tost	10,67		3,42
Varieties with minimum trait values			
Sursky	8,96	Praleska	2,00
Alexandrite	9,60	Universal	2,00
Leader	9,70	Susanna	2,25
Impulse	9,73	Mogilevsky 2	2,50
Grant	9,88	Escalina	2,50
Escalina	10,00	Caesar	2,50

Табл. 4. Сорта льна-долгунца с минимальным и максимальным значением общего выхода, выхода длинного и короткого волокна (высококачественная льнотреста)

Table 4. Varieties of fiber flax with a minimum and maximum value of the total yield, the yield of long and short fiber (high-quality flax straw)

Variety	Total fiber yield, %	Variety	Long fiber yield, %	Variety	Short fiber yield, %
Varieties with the highest trait value					
Alpha	33,6	Lira	15,3	Praleska	26,0
Tverskoy	33,3	Alpha	14,5	Elektra	25,5
Tomsk 18	33,2	Alexandrite	13,6	Veralin	23,2
Veralin	33,2	Lenok	13,2	Tomsk 18	23,2
Praleska	33,1	Tost	13,1	A 93	22,6
Tost	32,2	Sursky	12,6	Impulse	22,3
Tomsk varieties					
Tomsk 16	27,1		6,9		20,4
Tomsk 17	31,0		11,2		19,8
Tomsk 18	33,2		9,9		23,2
Tost	32,2		13,1		17,2
Varieties with minimum trait values					
Aleksim	25,3	Elektra	6,3	Susanna	14,4
Susanna	25,5	Tomsk 16	6,9	Aleksim	15,2
Tomsk 16	27,1	Praleska	7,1	Lira	16,1
Smolich	28,2	Sofia	7,7	Tost	17,2
Dashkovsky	28,4	Dashkovsky	8,2	Lenok	17,4
Mogilevsky 2	28,6	Smolich	8,3	Zaryanka	17,6

Табл. 5. Сорта льна-долгунца с минимальным и максимальным значением номера длинного и короткого волокна (высококачественная льнотреста)

Table. 5. Varieties of fiber flax with a minimum and maximum value of the long and short fiber number (high-quality flax straw)

Variety	Long fiber number, N	Variety	Short fiber number, N
Varieties with the highest trait value			
Alpha	12,10	Tomsk 18	5,20
Zaryanka	11,95	Tverskoy	4,00
Leader	11,60	Zaryanka	4,00
Dashkovsky	11,52	Leader	4,00
Aleksim	11,48	Impulse	4,00
Agatha	11,47	Veralin	4,00
Tomsk varieties			
Tomsk 16	11,23		3,20
Tomsk 17	11,02		3,40
Tomsk 18	10,06		5,20
Tost	10,66		3,54
Varieties with minimum trait values			
Grant	10,00	Praleska	2,07
Veralin	10,04	Universal	2,80
Tomsk 18	10,06	Mogilevsky 2	2,84
Sofia	10,46	Grant	2,84
Sursky	10,50	Sofia	3,00
Alexandrite	10,50	Diplomat	3,11

The results of the analysis were obtained by conditionally dividing flax straw by quality into two groups: low-quality and high-quality. The group of high-quality flax straw includes nine numbers (1.00; 1.25; 1.50; 1.75; 2.00; 2.50; 3.00; 3.50; 4.00), a low-quality one consists of only two numbers (0.50; 0.75). In this regard, a more detailed differentiated analysis was carried out with the determination of the average index of the rating assessment of varieties according to the indicated characteristics across the entire rating scale GOST 24383–89 “Flax straw. Requirements for harvesting" to clarify the results. (see Fig. 1, 2).

In this case, the rating was understood as the place (position) occupied by the variety for each characteristic in terms of flax straw numbers, as well as for a complex of characteristics. In this case, the maximum value of the trait was assigned a rating of 1, the minimum value corresponded to a rating equal to the number of studied varieties. The average rating index was calculated as a weighted average, taking into account the number of flax-straw batches rated with a certain number.

Graphical analysis made it possible to distinguish the best varieties by a set of characteristics (a + b + c + d + e): for low-quality

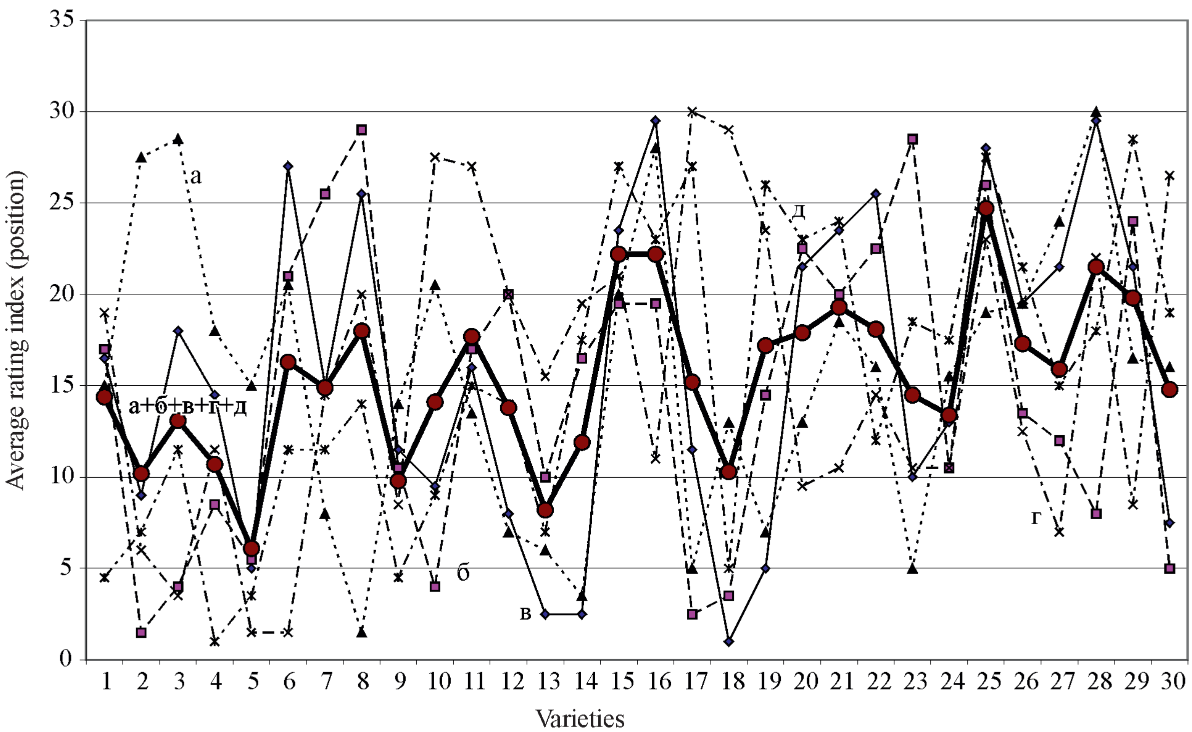

Рис. 1. Средний индекс рейтинговой оценки сортов льна-долгунца:
а – общий выход волокна, %; б – выход длинного волокна, %; в – выход короткого волокна;
г – номер длинного волокна, N; д – номер короткого волокна, N;
а + б + в + г + д – комплекс признаков (низкокачественная льнотреста).
Сорта: 1 – Алексим; 2 – Ленок; 3 – Зарянка; 4 – Тверской; 5 – Альфа; 6 – Томский 16; 7 – Томский 17; 8 – Томский 18; 9 – Тост; 10 – Лидер; 11 – Импульс; 12 – Смолич; 13 – А 93; 14 – Дипломат; 15 – Универсал; 16 – Цезарь; 17 – Сурский; 18 – Александрит; 19 – Эскалина; 20 – Дашковский; 21 – Могилевский 2; 22 – Лира; 23 – Электра; 24 – Вералин; 25 – Сюзана; 26 – София; 27 – Василек; 28 – Агата; 29 – Пралеска; 30 – Грант

Fig. 1. Average rating index of fiber flax varieties by:
а – total fiber yield, %, б – long fiber yield, %, в – short fiber yield, %, г – long fiber number, N, д – short fiber number, N; (а+б+в+г+д) complex of characteristics (low-quality flax straw)
Varieties: 1. Aleksim; 2. Lenok; 3. Zaryanka; 4. Tverskoy; 5. Alpha; 6. Tomsk 16; 7. Tomsk 17; 8. Tomsk 18; 9. Tost; 10. Leader; 11. Impulse; 12. Smolich; 13. A93; 14. Diplomat; 15. Universal; 16. Caesar; 17. Sursky; 18. Alexandrite; 19. Escalina; 20. Dashkovsky; 21. Mogilevsky 2; 22. Lira; 23. Elektra; 24. Veralin; 25. Susanna; 26. Sofia; 27. Vasilek; 28. Agatha; 29. Praleska; 30. Grant

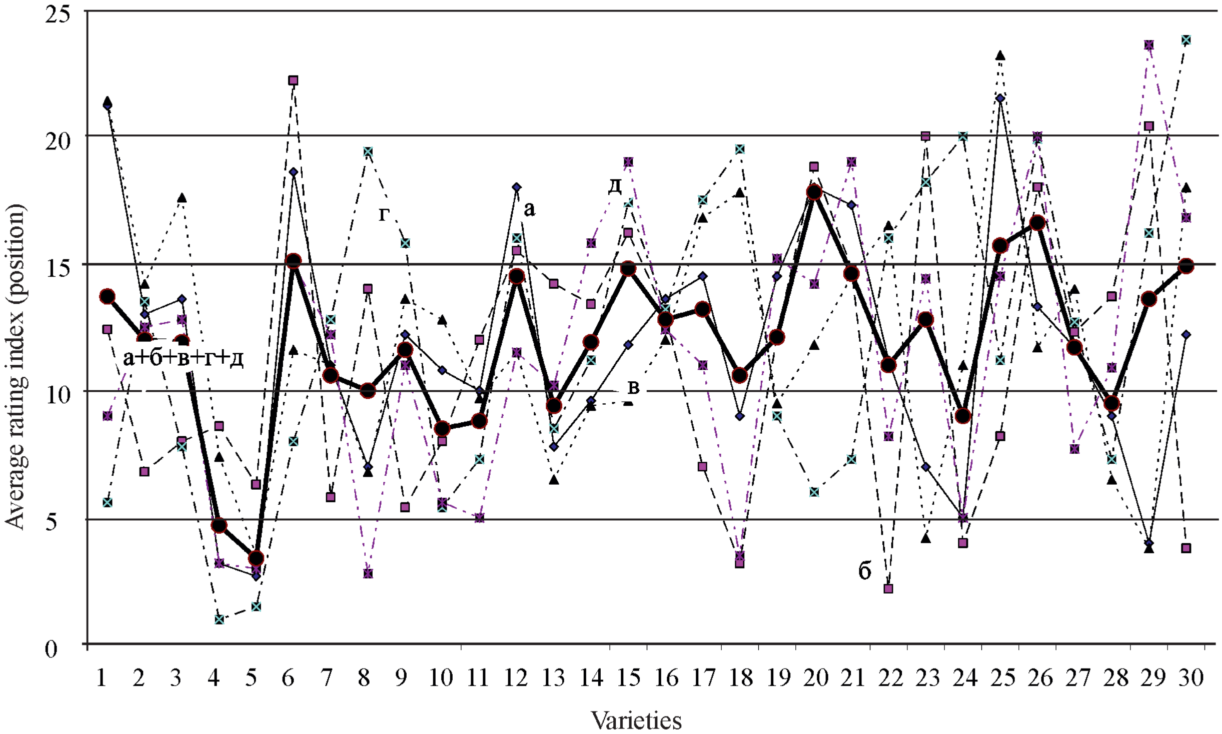

Рис. 2. Средний индекс рейтинговой оценки сортов льна-долгунца (высококачественная треста):
а – общий выход волокна, %; б – выход длинного волокна, %; в – выход короткого волокна; г – номер длинного волокна, N; д – номер короткого волокна, N; а + б + в + г + д – комплекс признаков (высококачественная льнотреста). Обозначение сортов см. на рис. 1

Fig. 2. Average rating index of fiber flax varieties (high-quality flax) by:
а – total fiber yield, %, б – long fiber yield, %, в – short fiber yield, %,
г – long fiber number, N, д – short fiber number, N; (а+б+в+г+д) complex of characteristics (high-quality flax), names of the varieties see fig.1

flax - Alfa, A 93, Toast, Lenok, Aleksandrite, Tverskoy with an average rating index of 6.1, respectively; 8.2; 9.8; 10.2; 10.3; 10.5 positions. Average rating index for high-quality flax of the best varieties: Alpha - 3.4, Tverskoy - 4.7, Leader - 8.5, Impulse - 8.8, Veralin - 9.0, A 93 - 9.4 positions.

Among the varieties of the Tomsk school of selection by a complex of characteristics, the variety Toast (average index - 9.8 positions) (low-quality flax straw) stood out. Varieties Tomsky 18, Tomsky 17, Toast (high-quality flax straw) (average index 10.6, 10.0, 11.6 positions) were only slightly inferior in this indicator to the best varieties.

An equally important issue in determining the significance of a variety in the processing of flax is not only the obtained actual values of the yield and quality of fiber, but also the disclosure of the potential of the variety, established during the State Variety Test, for these characteristics in the practice of flax processing enterprises. The results of flax-straw processing in terms of the total yield and the yield of long fiber obtained under production conditions, as a percentage in relation to the data of the State Variety Test, taken as 100% are presented in fig. 3 (low quality flax seed) and fig. 4 (high-quality). It can be seen from the figures that the level of realization of the potential possibilities of varieties, especially in terms of the yield of long fiber, is clearly insufficient, for low-quality flax straw it is lower than for the high-quality flax straw.

Statistical processing of the data confirmed the significance of the differences between the data of the State Variety Test and the results of processing flax straw in production conditions at a 5% significance level. According to the total fiber yield from low-quality flax-straw, the

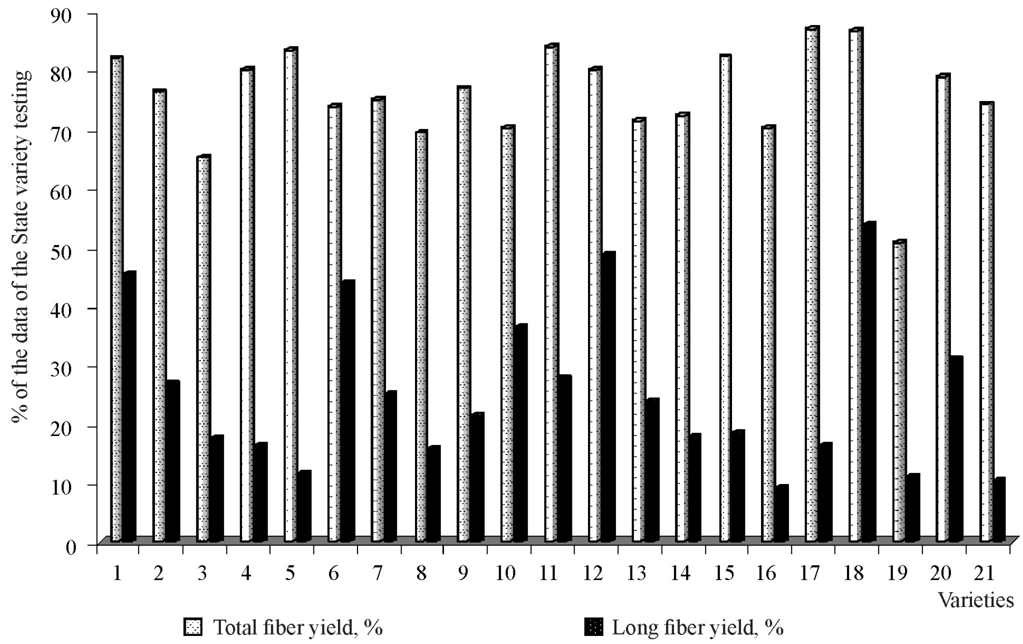

Рис. 3. Уровень реализации потенциала сортов льна-долгунца по общему выходу волокна и выходу длинного волокна из низкокачественной льнотресты, % к данным Госсортоиспытания.

Сорта: 1 – Зарянка; 2. Тверской; 3 – Томский 16; 4 – Томский 17; 5 – Томский 18; 6 – Тост; 7 – Импульс; 8 – Пралеска; 9 – Смолич; 10 – Василек; 11 – Алексим; 12 – Ленок; 13 – А 93; 14 – Дашковский; 15 – Могилевский 2; 16 – Дипломат; 17 – Универсал; 18 – Александрит; 19 – Цезарь; 20 – Грант; 21 – Сурский

Fig. 3. The level of implementation of the potential of fiber flax varieties by total fiber yield and long fiber yield from low-quality flax straw, % of the data of the State variety testing

1. Zaryanka; 2. Tverskoy; 3. Tomsk 16; 4. Tomsk 17; 5. Tomsk 18; 6. Tost; 7. Impulse; 8. Praleska; 9. Smolich; 10. Vasilek; 11. Aleksim; 12. Lenok; 13. A 93; 14. Dashkovsky; 15. Mogilevsky 2; 16. Diplomat; 17. Universal; 18. Alexandrite; 19. Caesar; 20. Grant; 21. Sursky

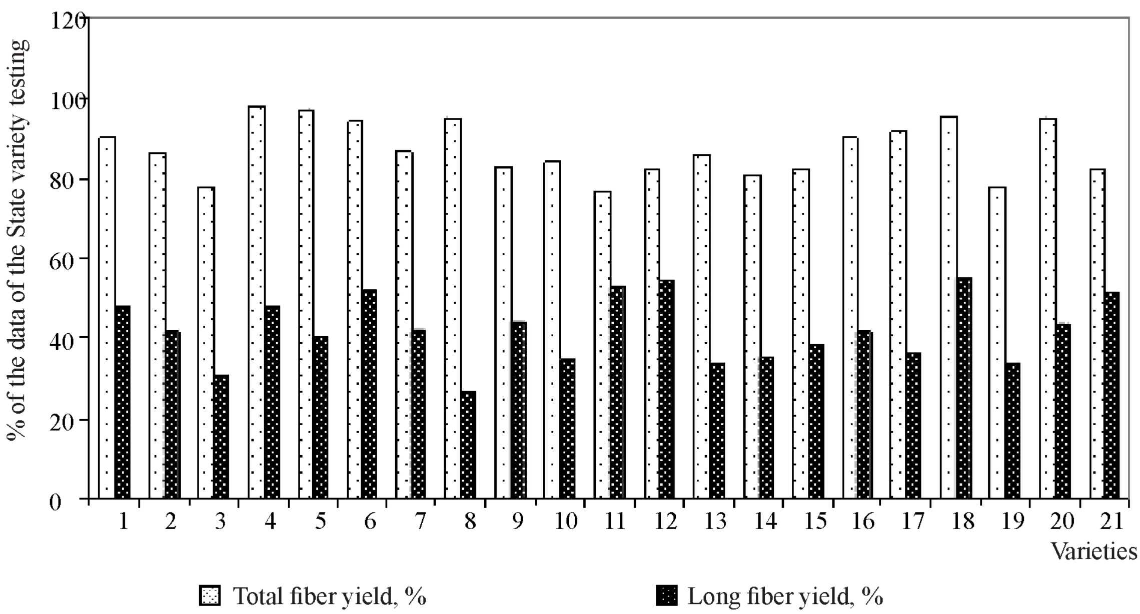

Рис. 4. Уровень реализации потенциала сортов льна-долгунца по общему выходу волокна и выходу длинного волокна из высококачественной льнотресты, % к данным Госсортоиспытания. Обозначение сортов см. на рис. 3

Fig. 4. The level of implementation of the potential of fiber flax varieties by total fiber yield and long fiber yield from high-quality flax straw, % of the data of the State variety testing (names of varieties see fig. 3)

error of the mean difference (Sd) was 0.88%, the Student's coefficient t f = 7.16> t t = 2.05; from high quality - Sd = 0.90, t f = 4.22> t t = 2.05, respectively. As for the long fiber yield, the significance of the differences is much higher: Sd = 1.25, t f = 15.80> t t = 2.05 (low-quality flax tree); Sd = 1.20, t f = 13.40> t t = 2.05 (high quality).

The level of realization of the biological potential of varieties of the Tomsk school of breeding is as follows: from low-quality flax-tree in the total fiber yield Tomsky 16 - 65.2%, Tomsky 17 - 80.1, Tomsky 18 - 83.3, Toast - 73.8%, from high quality - 77 , 7; 98.0; 97.0; 94.2% respectively; for the yield of long fiber for the same varieties and quality of flax - 17.6; 16.2; 11.4; 31.4%; 30.5; 48.3; 40.1; 52.2% respectively.

It is obvious that the existing reserve in increasing the efficiency of using the potential capabilities of varieties consists in improving the quality of flax raw materials, technical re-equipment of the industry, improving the organization of labor both in the production of fiber flax and in the processing of fiber products.

CONCLUSIONS

1. The importance of flax varieties of the Tomsk school of breeding was confirmed in terms of obtaining various numbers of high fiber yield (long and short), characterized by good quality, during the processing of flax straw.

2. Variety Tomsky 18 belongs to the group of varieties with the maximum value of short fiber yield from low quality flax (24.9%), total fiber yield (33.2%), yield (23.2%) and short fiber number (5.2 N) from high quality flax straw. Tomsky 16 is one of the best in terms of long fiber number (11.08 N) (low quality flax straw), Toast has a maximum value in total fiber yield (32.2%), long fiber yield (13.1%) (high quality flax straw), as well as by the number of short fiber (3.42 N) and a complex of features (average rating index 9.8 positions) (low-quality flax straw).

3. The potential possibilities of the varieties of the Tomsk School of Breeding in terms of the total fiber yield are realized in production conditions by 65.2–83.3%, by the yield of long fiber by 17.6–31.4% (flax straw numbers 0.50–0.75) and, accordingly by 77.7–94.2%; 30.5–52.2% (flax straw number 1.00 and more).

4. With the rational organization of the processing of flax raw materials with a simultaneous increase in its quality, a more complete realization of the inherent biological potential in the varieties of the Tomsk School of Breeding in relation to obtaining the optimal amount of fibrous products of the best quality can be achieved.

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