

Results from the testing of the new candidate cotton varieties No 457 and No 535

Valentina Dimitrova* and Minka Koleva

Agricultural Academy, Field Crops Institute, 6200 Chirpan, Bulgaria

**Corresponding author: v.dimitrova66@abv.bg*

Abstract

Dimitrova, V. & Koleva, M. (2023). Results from the testing of the new candidate cotton varieties No 457 and No 535. *Bulg. J. Agric. Sci.*, 29 (1), 62–69

As a result of the selection for earliness, productivity and fiber quality, two new candidate cotton varieties No 457 and No 535 were obtained. The candidate variety No 457 was obtained by remote hybridization, No 535 – by intraspecific hybridization. In 2014 – 2017, both candidate varieties were included in competitive variety trials. In the IASAS (Exclusive Agency for Variety Testing, Approbation and Seed Control) they were tested in 2017 – 2018. The two candidate varieties combined productivity and high fiber quality, which make them very valuable for cotton breeding programs. The candidate variety 457 had high and stable performance by years. In seed cotton yield of 2380 kg/ha, on average for two years, it exceeded the two standards – Chirpan-539 and Avangard-264, respectively by 11.3% and 14.7%, the average standard by 13.0%. It also was superior to them in September harvest and in yield of the fiber/ha. The candidate variety 535, in the state variety testing, in seed cotton yield was inferior to Chirpan-539 variety (standard for productivity) of 3.1% and was equaled to Avangard-264. It exceeded both standards in yield of the fiber per hectare as a result of its high lint percentage. The two candidate varieties were distinguished by high fiber quality and in some respects they exceeded the two standards or were aligned with Avangard-264, the standard for fiber quality. Compared to the standard varieties, both candidate varieties had better fiber consistency (SCI) Index, greater Upper Half Mean Length, and better spectroscopy reflecting the difference RD. Candidate variety No 457 differed with a better fiber uniformity in length than the two standards, while No 535 differed with a finer and stronger fiber. Both candidate varieties are very valuable for the selection of cotton, for inclusion in crosses to improve the productivity and fiber quality of modern cotton varieties. The No 457 in 2020 was approved by the IASAS as a new cotton variety under the name Aida.

Keywords: cotton; *G. hirsutum* L.; candidate varieties; yield; fiber properties

Introduction

In the recent years, a number of new cotton varieties have been created by the Bulgarian selection. Denitsa, Sirius and Philipopolis varieties were new achievements in the cotton breeding for earliness and productivity. These varieties combined high productivity with a number of other valuable qualities for the cotton production and textile industry (Valkova, 2014a; 2014b, 2017). Sirius variety was obtained by the method of experimental mutagenesis, while Philipopolis variety was obtained by intraspecific hybridization. The latest cotton

varieties Tsvetelina (Koleva & Valkova, 2019), Pirin and Perun (unpublished data) were the next higher achievements in this direction. Tsvetelina variety was created by applying the experimental mutagenesis. This variety combined earliness, productivity and high technological fiber properties. It realized more than 3% higher seed cotton yield than the standard varieties – Chirpan-539 and Avangard-264 and ripened 1-2 days before them. Its fiber was characterized by good strength, fineness, uniformity, maturity and length. According to the authors, Tsvetelina variety was of high stability and suitable for cultivation under different conditions and technologies.

The varieties Colorit, Darmi and Natalia were achievements in the selection of productivity and fiber quality (Stoilova & Saldzhiev, 2008a, 2008b, 2010). These varieties were obtained by combining interspecific hybridization of *G. hirsutum* L. × *G. barbadense* L. with intraspecific *G. hirsutum* L.

The aim of the research was to study the productive capabilities and to evaluate the fiber properties of two new candidate varieties of cotton – No 457 and No 535, compared to standard varieties.

Material and Methods

In the period 2014-2017, 8 lines obtained through intraspecific and remote hybridization were included in competitive variety trials. The origin of these Two new cotton candidate varieties No 457 and No 535 have been selected from them. The trials were carried out in the experimental field of the Field Crops Institute in town of Chirpan on type of leached vertisol and were plotted by the block method, in 4 replications and harvest plot of 20 m². 10 plants of replicates were observed. There were accounted: seed cotton yield; boll weight; yield of the fiber; lint percentage and fiber length measured by the “butterfly” method. The results were subjected to two-factor (varieties, years) analysis of variance (Lidanski, 1988). The program ANOVA 123 was used.

The two candidate varieties were included for testing in the IASAS system (Exclusive Agency for Variety Testing, Approval and Seed Control) in 2017-2018. In 2017, they were tested in two locations – Radnevo and Burgas – territorial experimental stations (units) for variety testing at the IASAS. In the next 2018, they were tested at only one location – in Radnevo, typical in soil and climate region for cotton cultivation in southern Bulgaria. The main cotton areas are in this area.

The years of the study were characterized as follows: in terms of temperature security, 2015, 2016, 2017 and 2018 were warm (P=14.3-17.2%), 2014 was average to medium cool (P=66.7%); in terms of rainfall, 2015 and 2017 were moderately wet (P=28.6-33.3%), 2014 and 2018 were wet (P=12.9-14.8%) and 2016 was dry (P=93.1%). The diversity of the years in terms of the rainfall supply was greater compared to the temperature security.

Coefficient of security (P%) determined on the basis of the arrangement of years in descending order, respectively by the temperature sum for May-September and the rainfall sum for May-August ($P\% = n/m + 1 \times 100$, where n was the consecutive number of the year of testing; m – the total number of years included in the descending order /row of years – climatic norm. The period 1989-2018 (last 30 years) was considered as a climatic norm.

Results and Discussion

Candidate variety No 457 was created by remote hybridization from the crossing of the allotetraploid *Gossypium thurberi* Tod. × *G. raimondii* Ulbr. with the variety Darmi – *G. hirsutum* L. and backcrossing of the triple hybrid (*G. thurberi* Tod. × *G. raimondii* Ulbr.) × Darmi with Darmi variety. Selection materials were sown in the field and foreign pollination was also possible. The original plant was selected in F₃BC₁ generation and repeated negative selection was performed in its generation by economically most important traits. In 2010, as selection line No 457, it was included in a control testing. In 2011, No 457 was in preliminary variety testing, and since 2012 it was included in competitive variety trials.

The candidate variety No 535 was obtained by intraspecific hybridization from the crossing of selection line No 37 with the Dorina variety (No 37 × Dorina). Progress variety of interspecific origin (*G. hirsutum* L. × *G. barbadense* L.) was involved in the pedigree of the mother form – line No 37. Line No 37 was obtained from the crossing of the variety Perla-267 × T-073 variety (Romanian variety). Perla-267 variety was derived from the crossing of the Bulgarian varieties Garant (996) × Progress. The paternal form Dorina variety with intraspecific origin *G. hirsutum* L. was obtained through selection in the Romanian line T-89/2. The starting plant was selected in F₂ generation (2008). The progeny was observed for two years (in F₃ and F₄). In 2011 it was in control testing as line No 535, in 2012 – in preliminary variety testing, and since 2013, line No 535 has been included in competitive variety trials.

The results from the competitive variety testing of the two candidate varieties in 2014-2017 at the Field Crops Institute in Chirpan are presented in Table 1. The candidate variety No 457, average for four years, achieved seed cotton yield of 1771 kg/ha, at 1615 kg/ha for the standard Chirpan-539, exceeding it by 9.7%. The boll weight was 0.3 g less than that of the standard. It also exceeded the standard in fiber length by 0.5 mm. It was inferior to the standard in fiber lint percentage average by 1.5%, but as a result of the higher seed cotton yield, the fiber yield of 699 kg/ha was higher than the standard – 662 kg/ha, which was 5.6% more. The candidate variety No 535 in seed cotton yield – 1794 kg/ha exceeded the standard variety Chirpan-539 by 11.1%. Boll weight was 5.2 g and by this trait it was levelled with that of the standard. Its higher productivity was combined with longer fibre – 26.6 mm, by 0.7 mm above the standard variety. In terms of fibre lint percentage, it was insignificantly inferior by 0.4% to the highly lint-percentage standard.

Table 1. Results obtained from the competitive variety testing of the candidate varieties No 457 and No 535 at the Field Crops Institute in Chirpan in the period 2014-2017 (Average for 4 years)

Line No	Origin	Seed cotton yield, kg/ha	In % to Chirpan-539	Boll weight, g	Fiber length, mm	Fiber lint percentage, %
Chirpan-539	Intraspecific hybridization	1615	100.0	5.2	25.9	41.0
457	Remote hybridization	1771	109.7 ⁺⁺⁺	4.9 ⁰⁰	26.4 ⁺⁺	39.5 ⁰⁰⁰
535	Intraspecific hybridization	1794	111.1 ⁺⁺	5.2	26.6 ⁺⁺⁺	40.6
GD 5.0%		81	5.0	0.2	0.3	0.5
GD 1.0 %		107	6.6	0.3	0.5	0.7
GD 0.1 %		138	8.5	0.4	0.6	0.9
Accuracy		3.39		2.99	0.93	0.93

The results obtained from the state variety testing (the IASAS data) are presented in Tables 2, 3 & 4. September harvest, cotton harvested by September 30, was used as the main criterion for determining the earliness of varieties. In 2017, average of the two locations, the candidate variety No 457 in September yield of 1683 kg/ha slightly exceeded the two standards, while the candidate variety No 535 was inferior to them, stronger to Chirpan-539 and less to Avangard-264, to the average standard (the average of the two standards) it was inferior by 3.5% (Table 2). In 2018, in Radnevo experimental station, the candidate variety No 457 in September yield of 2285 kg/ha exceeded the two standards, in the result of which it surpassed the average standard by 22.5%. The candidate-variety No 535 realized a lower September yield of 1760 kg/ha, yielding to Chirpan-539 variety by 4.1%, exceeding Avangard-264 variety by 3.8% and equaling with the average standard. In Radnevo, average for the two years – 2017-2018, the candidate variety No 457 in September harvest significantly exceeded both standards and it was superior to the average standard by 22.5%. The candidate variety No 535 was inferior to both standards, more strongly to Chirpan-539 variety, and by 3.4% less than the average standard.

Average for the two years, from the two stations (locations), the highest September yield of 1984 kg/ha was obtained from the candidate variety No 457, which was 13.2% above Chirpan-539 variety, 18.8% above Avangard-264 variety and 16.0% above the average standard. For the candidate variety No 535 the September yield was significantly lower – 1680 kg/ha, at 1752 kg/ha for Chirpan-539, which was by 4.1% less, 1670 kg/ha for Avangard-264, leveling with it, and by 1.8 % less than the average standard.

At the Radnevo experimental station, average for the two years – 2017-2018, the standard varieties Chirpan-539 and Avangard-264 achieved yields of 2269 kg/ha and 2215 kg/ha, the average standard – 2242 kg/ha, the candidate varieties – 2454 kg/ha and 2166 kg/ha, respectively (Table 2). The candidate variety No 457 exceeded both standards,

Chirpan-539 variety – by 8.1%, Avangard-264 variety – by 10.8%, the average standard – by 9.5%. Candidate variety No 535 in seed cotton yield was inferior to both standards, to Chirpan-539 variety – by 4.5%, to Avangard-264 variety – by 2.2%, to the average standard – by 3.4%.

At the Burgas experimental station the yields were lower compared to Radnevo, this region was less suitable for cotton growing. In 2017 seed cotton yields of 1683 kg/ha and 1714 kg/ha were obtained from the standard varieties, average from the two standards – 1683 kg/ha. The candidate variety No 457 in seed cotton yield of 1818 kg/ha was superior to both standards, to Chirpan-539 – by 6.1%, to Avangard-264 – by 10.0%, to the average standard – by 8.0%. The candidate variety No 535 in seed cotton yield of 1715 kg/ha was leveled with Chirpan-539 variety, outperforming Avangard-264 variety by 3.8% and exceeding the average standard by 1.9%.

Average for the two years, from the two locations, from the candidate variety No 457 seed cotton yield of 2328 kg/ha was obtained, which was 11.3% above Chirpan-539 variety, 14.7% above Avangard-264 variety and 13.0% above the average standard. From the candidate variety No 535 seed cotton yield was slightly lower – 2026 kg/ha, which was by 1.7% below the average standard. The candidate variety No 457 was proven to be more productive than the two standards in the two testing locations over the two years i.e. this variety retained its high productivity under different environmental conditions.

In 2017, candidate variety No 535 in fiber yield of 813 kg/ha average of the two locations, exceeded the two standards, Chirpan-539 variety – by 1.9%, Avangard-264 variety – by 7.1%, the average standard – by 4.5%. The candidate variety No 457 in fiber yield of 787 kg/ha in the same year was slightly inferior to Chirpan-539 by 1.4%, outperformed Avangard-264 by 3.7%, resulting in slightly exceeded the average standard by 1.1%.

In 2018, at the Radnevo experimental station, the candidate variety No 457 showed the highest fiber (lint) yield

Table 2. September harvest and seed cotton yield according to the IASAS data during the period 2017-2019

Location Year	Average standard	Chirpan-539	Avangard-264	No 457	No 535
September yield, kg/ha					
Burgas, 2017					
kg/ha	903	913	894	1044	925
%	100.0	101.1	99.0	115.6	102.4
Average from Radnevo and Burgas, 2017					
kg/ha	1657	1669	1645	1683	1600
%	100.0	100.7	99.3	101.6	96.5
Radnevo, 2018					
kg/ha	1765	1835	1695	2285	1760
%	100.0	104.0	96.0	122.5	99.7
Radnevo, 2017-2018 (Average for two years)					
kg/ha	2088	2131	2046	2304	2018
%	100.0	102.0	98.0	110.3	96.6
Average from the two locations: Radnevo (2017-2018) and Burgas (2017)					
kg/ha	1711	1752	1670	1984	1680
%	100.0	102.4	97.6	116.0	98.2
Seed cotton yield, kg/ha					
Radnevo, 2017-2018 (Average for two years)					
kg/ha	2242	2269	2215	2454	2166
%	100.0	101.2	98.8	109.5	96.6
Burgas, 2017					
kg/ha	1683	1714	1653	1818	1715
%	100.0	101.8	98.2	108.0	101.9
Average from the two locations: Radnevo (2017-2018) and Burgas (2017)					
kg/ha	2060	2091	2029	2328	2026
%	100.0	101.5	98.5	113.0	98.3

of 931 kg/ha, significantly exceeding both standards, Chirpan-539 – by 19.5%, Avangard-264 – by 32.6%, the average standard – by 25.8%. Its high fiber yield was due to the high seed cotton yield in this year. The candidate variety No 535 in this year had lower fiber yield of 772 kg/ha compared to Chirpan-539, outperforming Avangard-264 by 10.0% and the average standard – by 4.3%. This trend was maintained in the fiber yields achieved over the two years, from the two locations.

Average for the two years, from the two locations, the candidate variety No 457 had the highest fiber yield of 859 kg/ha, exceeding both standards, Chirpan-539 – by 9.0%, Avangard-264 – by 17.7%, the average standard – by 13.2%. The candidate variety No 535, on the basis of the two-year average of the two locations, in fiber yield of 792 kg/ha was leveled with Chirpan-539 – 788 kg/ha (higher by 0.5%), surpassed Avangard-264 by 8.5%, resulting in it exceeded the average standard by 4.3%.

In 2017, the candidate variety No 535 had the highest lint percentage – 40.8%, average of the two locations,

exceeding both standards, Chirpan-539 – by 2.4%, Avangard-264 – by 3.5%, the average standard – by 2.9% (Table 3). The candidate variety No 457 had lower lint percentage – 38.0% and it was close to the standard varieties – 38.4% for Chirpan-539 variety and 37.3% for Avangard-264 variety. In 2018 in Radnevo, the highest fiber lint percentage was again reported for the candidate variety No. 535 – 37.5% and the lowest – for the Avangard-264 – 34.5%. Based on the average data for the two years from the two locations, the candidate variety No 535 had the highest lint percentage – 39.1% exceeding the two standards – Chirpan-539 – by 1.4%, Avangard-264 – by 3.3%, the average standard – by 2.3%. Candidate variety No 457 in fiber lint percentage – 37.0% was inferior to Chirpan-539 by 0.7%, but outperformed Avangard-264 by 1.1%, equaling with the average standard.

The results of the fiber technological properties are presented in Table 4. Compared to the two standards (Chirpan-539 – standard for productivity and Avangard-264 – standard for fiber quality), both candidate varieties had a

Table 3. Fiber yield (kg/ha) and fiber lint percentage (%) according to IASAS data, 2017-2018

Location Year	Average standard	Chirpan-539	Avangard-264	No 457	No 535
Fiber (lint) yield, kg/ha					
Burgas, 2017					
kg/ha	623	647	598	682	704
%	100.0	103.9	96.1	109.6	113.2
Average from Radnevo and Burgas, 2017					
kg/ha	778	798	759	787	813
%	100.0	102.5	97.5	101.1	104.4
Radnevo, 2018					
kg/ha	740	779	702	931	772
%	100.0	105.2	94.9	125.8	104.3
Radnevo, 2017-2018 (average for two years)					
kg/ha	822	864	810	912	846
%	100.0	105.6	98.6	110.9	103.0
Average from the two stations: Radnevo (2017-2018) and Burgas (2017)					
kg/ha	759	788	730	859	792
%	100.0	103.8	96.2	113.2	104.3
Lint percentage, %					
Burgas, 2017					
%	37.0	37.7	36.2	37.5	41.1
±		+0.7	-0.8	+0.5	+4.1
Average from Radnevo and Burgas, 2017					
%	37.9	38.4	37.3	38.0	40.8
±		+0.5	-0.6	+0.1	+2.9
Radnevo, 2018					
%	35.7	36.9	34.5	36.0	37.5
±		+1.2	-1.2	+0.3	+1.8
Radnevo, 2017-2018 (Average for two years)					
%	37.2	38.0	36.4	37.2	39.0
±		+0,8	-0,8	0,0	+1,8
Average from the two stations: Radnevo (2017-2018) and Burgas (2017)					
%	36.8	37.7	35.9	37.0	39.1
±		+0.9	-0.9	+0.2	+2.3

better fiber spinning consistency (SCI) Index in both years of study showing that this quality was not affected by the environmental conditions. For the two years, the SCI Index for the two candidate varieties was 126 and 124, respectively, for the standard varieties this property was much lower, for Chirpan-539 – 114, for Avangard-264 – 118, for the average standard – 117.

The two candidate varieties showed better spectroscopy reflecting the RD difference by years (from year to year) and average over the two years.

During the two years of the study, the two candidate varieties in fiber fineness, determined by the micronaire value, were leveled with Avangard-264 variety or had a lower micronaire than it. Lower micronaire value means finer fi-

ber. Avangard-264 variety had finer fiber than that of Chirpan-539 variety. Average for the two years, the candidate variety No 457 in micronaire value of the fiber – 4.61 mic was equalized with Avangard-264 – 4.62 mic, while the candidate variety No 539 had a lower micronaire value – 4.44 mic, its fiber was finer. Both varieties had finer fiber than that of Chirpan-539 variety for each year and average of the two years.

In 2017, the candidate variety No 457 in fiber length – 25.67 mm slightly exceeded the two standards, in 2018 it had a longer fiber length – 27.39 mm exceeding Chirpan-539 by 1.48 mm and Avangard-264 by 0.56 mm. The candidate variety No 535, in 2017, in fiber length – 26.86 mm exceeded the standards by 1.73 mm and 1.32 mm. In 2018, compared

Table 4. Technological fiber properties of the two candidate varieties according to data of the IASAS, 2017-2018

Year	Average standard	Chirpan-539	Avangard-264	No 457	No 535
Index Spinning, consistency (SCI), Index					
2017	115	114	117	121	121
2018	117	114	119	131	126
Average	116	114 (-2)	118 (+2)	126 (+10)	124 (+8)
Micronaire (Mic)					
2017	4.57	4.74	4.41	4.48	4.42
2018	4.92	5.00	4.83	4.73	4.46
Average	4.75	4.87 (+0.12)	4.62 (-0.13)	4.61 (-0.14)	4.44 (-0.31)
Maturity (Mat) Index					
2017	0.86	0.87	0.86	0.86	0.86
2018	0.87	0.87	0.87	0.87	0.86
Average	0.87	0.87	0.87	0.87	0.86 (-0.01)
Fiber mean length, mm					
2017	25.33	25.13	25.54	25.67	26.86
2018	26.37	25,91	26,83	27,39	26,41
Average	25.85	25.52 (-0.33)	26.18(+0.33)	26.53 (+0.68)	26.64 (+0.79)
Uniformity (UL) %					
2017	81.5	81.6	81.3	82.2	81.4
2018	82.4	82.3	82.5	84.1	82.5
Average	82.0	81.9 (-0.1)	81.9 (-0.1)	83.2 (+1.2)	82.0
Short fibers (SFL), 12.7 mm					
2017	9.2	9.4	9.0	8.8	9.2
2018	8,4	8,6	8,1	7,5	8,4
Average	8.8	9,0 (+0.2)	8,5 (-0.3)	8.1 (-0.7)	8.8
Strength (Str), g/tex					
2017	28.3	28.4	28.2	28.2	29.0
2018	27.5	27.3	27.7	27.9	29.0
Average	27.9	27.8 (-0.1)	27.9	27.7 (-0.2)	29.0 (+1.1)
Elongation (Elg), %					
2017	7.1	7.1	7.2	7.1	7.5
2018	7,1	7.3	6.9	6.9	7.0
Average	7.1	7.2 (+0.1)	7.1	7.0 (-0.1)	7.3 (+0.2)
Spectroscopy with reflectance of the difference RD					
2017	81.1	80.4	81.9	82.6	82.1
2018	81.5	81.9	81.0	82.9	82.2
Average	81.3	81.2 (-0.1)	81.5 (+0.2)	82.7 (+1.4)	82.1 (+0.8)
(+b)Yellowness					
2017	8.9	8.9	8.9	8.9	8.8
2018	8.2	8.3	8.0	8.2	8.1
Average	8.5	8.6 (+0.1)	8.5	8.5	8.5
Color Grade (C Grad) Upland					
Radnevo (2017)	–	21-1	11-1	11-1	11-1
Burgas (2017)	–	11-2	11-2	11-1	11-1
Radnevo (2018)		21-1	21-1	11-1	21-1

to 2017, it had a slightly shorter fiber exceeding the standards by 0.49 mm and 0.42 mm. On average over the two years, the two candidate varieties had fiber lengths of 26.53 mm and 26.64 mm, respectively, exceeding both standards, Chirpan-539 by 1.01-1.12 mm, Avanguard-264 by 0.35-0.46 mm, the average of the two standards -by 0.68-0.74 mm.

The candidate variety 457 differed with better fiber uniformity in length than the standard varieties in the two years of the study, average 83.2%, compared to 82.0% for the standard varieties. The candidate variety 535 was leveled with the standard varieties.

The candidate variety 535 outlined with stronger fibre than the standard varieties during the two years of the study. The average fibre strength was 29.0 g/tex, at 27.9 g/tex for the standards. The candidate variety 457 in fiber strength was aligned with the standards.

The two candidate varieties in the fiber elongation were aligned with the standard varieties. They had a low content of short fibers – 8.1-8.8%, as in the standard varieties.

Summarized results from the analysis show that candidate variety 457 distinguished by higher and stable from year to year productivity. In seed cotton yield and fiber (lint) yield it exceeded both standards. The boll weight was smaller than that of the standard varieties and its high productivity was due to the accumulation and retention of a larger number of bolls. Higher fiber (lint) yield per hectare was the result of higher seed cotton yields. The candidate-variety No 535, in the state variety testing, in seed cotton yield was inferior to Chirpan-539 variety – standard for productivity, on average over the two years by 4.1%, and was equal with Avanguard-264 variety. In yield of fiber per hectare it exceeded both standards as a result of its high lint percentage. It exceeded both standards by this trait.

The two candidate varieties were distinguished by high fiber quality and in some respects they exceeded the two standards or were aligned with Avanguard-264 variety, the standard for fiber quality. Compared to the standard varieties, the two candidate varieties had a better fiber consistency (SCI) Index, which means better spinning, greater upper half mean length, and better spectroscopy with reflectance of the difference RD. The candidate variety No 457 had better fiber uniformity than both standards. The candidate variety No 535 had a lower microner value, which means finer fiber.

Candidate variety No 457 has been approved by the IASAS as the new cotton variety Aida in 2019 and certified in 2020. Candidate variety No 535 continued testing one year more, in 2020, and confirmed its qualities. In 2021 it was presented for approval by the IASAS as a new cotton variety.

Compared to the two standards (Chirpan-539 – standard for earliness and productivity and Avanguard-264 – standard for fiber quality) both candidate varieties were distinguished by a higher SCI Index (consistency) of spinning – 126 and 124 (the average of the two standards was 116, 114 for Chirpan-539 and 118 for Avanguard-264).

Line 535 had lower microner of the fiber than both standards – 4.44 mic, at 4.87 mic for Chirpan-539 and 4.62 mic for Avanguard-264. Line 457 in fiber fineness – 4.61 mic was equal to Avanguard-264, but had finer fiber than Chirpan-539.

Both lines had longer fiber than the two standards, by 1.0 mm and 1.1 mm, respectively above Chirpan-539 and 0.3 mm and 0.4 mm above Avanguard-264. Line 457 had better fiber uniformity – 83.2% compared to 81.2% for both standards, while line 535 (82.0%) was equal to the standards. Line 535 had higher fiber strength – 29.0 g/tex, at 27.8-27.9 g/tex for the standards. Line 457 was equal to the standards. Both lines had low content of short fibers – 8.1-8.8%, as in the standard varieties – 8.5-9.0 %.

Conclusions

Candidate varieties No 457 and No 535 combined productivity and high fiber quality, making them very valuable for cotton breeding programs.

Candidate-variety No 457 emerged as early and highly productive, showing high and stable productive from year to year. In terms of seed cotton yield of 2380 kg/ha average for the two years of the study it exceeded the two standards Chirpan-539 and Avanguard-264, respectively by 11.3% and 14.7%, the average standard – by 13.0%. It also surpassed both standards in September harvest and in fiber yield per hectare by 9.0% and 17.7%, respectively.

Higher productivity the candidate variety No 457 combined with a number of valuable technological fibre properties. Compared to the two standards, its fibre had a better spinning consistency, greater upper half mean length and better uniformity in length, with better spectroscopy.

The candidate variety No 457 due to its high productivity and high technological fibre qualities in 2019 was approved for the new cotton variety Aida and certified in 2020.

The candidate variety No 535 had lower productivity than Chirpan-539 variety – standard for productivity, by 4.1% on average, but exceeded both standards in fibre yield due to its high lint percentage. This candidate variety also differed with a number of valuable technological fibre properties such as very high lint percentage, good spinning consistency, lower micronaire value and higher strength than both standards.

Both candidate varieties possess fiber properties that are highly regarded by the textile industry. They are also very valuable for the cotton breeding for involving in crosses to improve the productivity and fiber quality of modern cotton varieties.

References

- Koleva, M. & Valkova, N.** (2019). Tsvetelina – a new high yielding cotton variety. *Field Crop Studies, XII (1)*, 93-10, (Bg).
- Lidanski, T.** (1988). Statistical Methods in Biology and Agriculture. *Zemizdat, Sofia*, 185-187, (Bg).
- Stoilova, A. & Saldzhiev, I.** (2008a). Colorit – a new cotton variety. *Rastenievadni nauki (Bulgarian Journal of Crop Science)*, 45 (3), 283-286, (Bg).
- Stoilova, A. & Saldzhiev, I.** (2008b). Darmi – a new cotton variety. *Rastenievadni nauki (Bulgarian Journal of Crop Science)*, 45 (3), 279-282, (Bg).
- Stoilova, A. & Saldzhiev, I.** (2010). Natalia – a new cotton variety. *Rastenievadni nauki (Bulgarian Journal of Crop Science)*, 47(4), 373-378, (Bg).
- Valkova, N.** (2014a). Denitsa – a new high yielding cotton variety. *Field Crop Studies, IX (2)*, 227-232, (Bg).
- Valkova, N.** (2014b). Characteristics of Philipopolis cotton variety. *In: Jubilee Scientific Conference, 90 years Maize Institute, Kneja. Proceedings “Selection and Genetic and Technological Innovations in Cultivation of Cultural Plants”, September 10-11, 2014, Kneja*, 206-214, (Bg).
- Valkova, N.** (2017). New cotton variety Sirius. *Rastenievadni nauki (Bulgarian Journal of Crop Science)*, 54 (1), 40-45, (Bg).

Received: May, 15, 2021; Approved: September, 16, 2021; Published: February, 2023