UDC 631.527:633.15:662.63

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SELECTION OF CORN ON TECHNICAL OBJECTIVES IN UKRAINE NUBiP

Analyzes source material selected parental components with high performance and high content of starch and protein.

Created test hybrids, which then can be used in breeding practice for maize hybrids using for technical purposes.

Key words: *cornstarch, bioethanol, line test hybrids, testers, mating, selection, technology, fuel.*

Every year more and more acute question of finding competitive alternative to oil and oil products stocks which every year more and more rapidly reduced. Under the present rate of consumption of liquid fuels industry, automobiles - and other modes of transport, the most optimistic forecasts, the oil reserves will last for another 70-90 years.

Therefore, the search for alternative energy sources is now one of the major problems of mankind. One solution to this global issue is the use of ethanol fuel instead of gasoline. Ethanol is produced from starch crops, including corn. Modern corn hybrids have a starch content of 74-86%, which is quite receptive to the use of grains for this purpose [4].

To create hybrids with high starch content, breeders need a competitive source material. More than 20 known monogenic mutations corn governing the biosynthesis of starch, but the greatest effect on its fractional composition causing mutations **wx, ae та su_2.** Currently, the national maize hybrids with starch and amylopectin amiloznoho types in Ukraine are not available, although the prospects for their creation and multi-use is very broad [1, 2].

Acute fundamental need and opportunity in addressing this problem by using biochemical effect of modifying the starch-corn endosperm gene structure and made basis for implementation research.

The aim was to analyze the source material selection and parental components with high performance and high content of starch and protein in the selection of corn hybrids for technical purposes.

In the research objectives included: analysis and evaluation of source material, followed by crossing selected signifies our strong parental components; inclusion in crossing sample grades: **wx, ae та su_2**.and determining the value of the test hybrids and their subsequent use for technical purposes; determining in vitro the content necessary components for use in technical purposes; advice on selection and values of the source material and use it to create hybrids for technical purposes.

Of the large number self-pollinating lines allocated five best in agronomic characteristics, is included in the crossing of testers carrier starch-modifying genes and, based on established high-test hybrids with a high starch content. Created test hybrids in the future can be used in breeding practice to produce corn hybrids for technical purposes.

Experimental studies were conducted in 2012-2013. In the OP "ADS NUBiP Ukraine," which is in Kyiv region.

As source material were taken self-pollinating lines Ак-135, Ак- 143, Ак-145 -breeding NUBiP Ukraine and Бг-251, Fc 1412; testers carrier starch-modifying genes were lines: AC 43 **su_2**, ВК 69 **wx**, AE 392 **ae** for standard was adopted hybrid Oster ST.

Accounting planting area - 4.9 m^2 samples were sown in a 3-time repetition for self-pollinating lines and hybrids.

All selected self-pollinating line characterized by a high starch content, which is very valuable in obtaining hybrids, which use corn for biofuel production.

Evaluation of new lines on complex agronomic traits is one of the most important tasks of selection. It has several features that are relatively easy to define

determined by eye or need for their simple measurement equipment and significant labor costs (continuation of certain phases of development, the number of leaves on the stem, number of leaves on the main stem, plant height, height of attachment principles, panicle length, fork length legs, the number of branches in panicles, etc.). In assessing the lines drawn attention to this figure as homogeneity or uniformity of plants within the line.

For the main indicators of quality and productivity of the starting material (Table 1) all self-pollinating line is early or medium (FAO 180-200) have toothed grains, formed a yield of 2.8 t / ha (Бг 251) to 3.6 t / ha (Ак 143) with starch content of 62.3% (АС тестер **su_2**) to 73.4% (Ак 135) and 9.9% from protein (ВК 69 тестер **wx**) to 13.2% (Бг 251).

Table 1.

Name of self-pollinating lines	FAO Group	Type grains	yield capacity , t / ha	Starch content,%	The protein content, %
АС 43 (tester su_2)	180	odontoid	3,1	62,3	13,5
ВК 69 (tester wx)	190	odontoid	3,3	66,7	9,9
АЕ 392 (tester ae)	180	odontoid	3,2	55,3	13,4

Basic quality and yield the original material (2011)

АК 135	180	siliceous	3,5	73,4	11,4
Ак 143	190	Siliceous-odontoid	3,6	72,2	12,5
Ак 145	200	Siliceous-odontoid	3,1	73,5	11,1
Бг 251	200	odontoid	2,8	72,3	13,2
Fc 1412	190	odontoid	2,9	71,7	12,4

Included in the study self-pollinating lines with high and average total (ZCP) and specific (CPS) matching ability, plant height is between 158 cm (Бг 251) to 184 cm (Ак 143), the height of attachment of economically valuable beginning is between 32cm (Ak 145) to 58 cm (Ak 143), which contributes to their mechanized harvesting (table 2).

Table 2.

The combination ability and basic biometric indicators self-pollinating lines (2011)

Name of self-pollinating lines	FAO Group	The combination ability		Biometric performance		
		ZCP	CPS	Plant height, cm	The height of the attachment plug, cm	Number of leaves, pieces
АС43 (тестер su_2)	180	The average	The average	179	52	12
ВК 69 (тестер wx)	190	The average	high	168	49	12
АЕ 392 (тестер ae)	180	The average	high	175	51	10
АК 135	180	Висока	high	181	50	12
Ак 143	190	The average	high	184	58	12
Ак 145	200	The average	high	152	32	10
Бг 251	200	high	The average	158	45	12
Fc 1412	190	high	The average	178	42	12

Hybrids with short growing period have enabled high yields of corn growing in the North-steppe and Ukraine Polissya zone..

Between the growing season and yield a direct relationship, in the reduction of the growing season reduced productivity and culture. However, when growing early-ripening hybrids in forest-steppe and Polessie can provide such a yield, in which corn cultivation will be very profitable. In addition, by reducing the growing season, the plants do not get in adverse conditions during harvesting. Corn has a relatively low humidity compared to Medium or late hybrids and requires no additional costs for final drying.

Table 3 shows that the length of the growing season hybrids averaged 100-108 days. This indicates that they belong to the Early and Middle groups.

The height of the stems in test hybrids with waxy tester based on wx ranged from 205 cm to 145 x Ak VC 69 to 230 cm in hybrid Fc 1412 x VC 69. The height of attachment agronomic ear ranged from 56 to 84 cm. According to this indicator all hybrids relating to undersized, but we can say that they are suitable for mechanical harvesting. Number of leaves on the main stem - 12.

The height of the plants in the test hybrids with high amylose content tester based su2 ranged from 210 cm to 227 hybrid Ak143hAS43 cm in hybrid Fcl412xAC43. In terms of height, to include all hybrids tall and appeared at the level of the standard.

Height of attachment agronomic plug varied in the range of 56 to 76 cm. By this measure to include all hybrids are stunted but suitable for mechanical harvesting. Number of leaves on the main stem- 12p.

From these data show that the height of plants in test hybrids with high amylose content tester based on AE ranged from 209 cm to 145 x Ak hybrid AE 392 to 231 cm in hybrid Fs1412hAE 392. For height to include all hybrids tall and exceeded this standard indicator.

Height of attachment agronomic plug hybrids in this group varied in the range of 64 to 76 cm.

Table 3.

The length of the growing season and the main biometric performance test hybrids based on wx,, ae and su2 (2012)

Selection name	The base tester	The length of the growing season, days	The height of the stem, cm	The height of the fork attachment, see	Number of leaves on the stem, pc
Остер СВ(St)		104	212	64	12
АК 135 х ВК 69	wx	101	216	60	12
АК 143 х ВК 69	wx	101	213	72	12
Ак 145 х ВК 69	wx	106	205	56	12
Бг 251 х ВК 69	wx	105	210	68	12
Fc 1412 х ВК 69	wx	100	230	84	12
АК 135 х АЕ 392	ae	103	214	66	12
Ак 143 х АЕ 392	ae	103	217	66	12
Ак 145 х АЕ 392	ae	108	209	64	12
Бг 251 х АЕ392	ae	101	218	68	12
Fc 1412 х АЕ 392	ae	102	231	76	12
АК 135 х АС 43	su_2	101	211	58	12
Ак I43 х АС 43	su_2	101	210	**64**	12
АКI45 х АС 43	su_2	106	212	**56**	12
Бг 251 х АС 43	su_2	**101**	**213**	**68**	12
Fc 1412х АС 43	su_2	**100**	**227**	**76**	12

The final stage of work was to determine the yield of hybrids and the content of starch and protein. The test results of series hybrids with starch and amylopectin amylose types indicate that their productivity and the vast majority of grain quality characteristics depend on the specifics of a particular hybrid combinations. This imposes special demands on the parental lines in breeding corn for technical purposes. They must be reliable donor performance and characteristics of the grain, consistently reproduce donor properties in different weather conditions and match growing as more economically valuable traits within a single genotype.

Table 4.

Productivity and highlights the quality test hybrids with waxy tester based on wx (2012)

Hybrid combination	genotype tester	Yield, t / ha	± до St	Content,%			
				albumen	± до St	Starch	± до St
Остер СВ(St)	-	7,8	-	9,5	-	72,2	-
АК135 х ВК69	wxwx	8,1	+0,3	10,9	+1,4	75,8	+3,6
Ак143 х ВК69	wxwx	8,7	+0,9	9,8	+0,3	76,1	+3,9
Ак145 х ВК69	wxwx	9,4	+1,6	12,1	+2,6	74,2	+2
Бг251 х ВК69	wxwx	7,9	+0,1	12,3	+2,8	74,5	+2,3
Fc 1412 х ВК69	wxwx	7,5	-0,3	8,6	-0,9	73,0	+ 1,2
$НИР_{0,05}$		0,37					

All carriers of mutations wh distinguished very low amylose starch.

Among hybrids obtained (Table 4) separated Ak 69 and 145hVK

Ak 143h VC 69, which were characterized by high performance standard and exceeded the yield respectively 1.6 and 0.9 t / ha; by starch content exceeded the standard hybrids: Ak143hVK 69 (3.9%); AK135hVK 69 (3.6%) BG 251hVK 69 (2.3%), and hybrids and Ak145hVK69 Bh251hVK69 exceeded the standard for protein content by 2.8% and 2.6% respectively.

Significant differences in yield and starch content are noted among test corn hybrids based on mutations su2 (Table 5). In particular, the yield and starch content exceeded the standard hybrids ,: Ak145hAS43, Ak143hAS 43 respectively by 2.0 and 1.4 t / ha and 3.2 and 2.9% in starch content, the highest protein content of hybrids formed Bh251hAS43 (13, 4%) and AK135hAS43 (12.6%).

Table 5.

Productivity and highlights the quality test hybrids with vysokoamiloznym tester based su2 (2012)

Hybrid combination	genotype tester	Yield, t / ha	± до St	Content,%			
				albumen	± до St	Starch	± до St
Остер СВ (St)	-	7,8	-	9,5	-	72,2	-
АК 135 х АС 43	su_2 su_2	7,9	+0,1	12,6	+3,1	74,3	+2,1
Ак 143 х АС 43	su_2 su_2	8,2	+1,4	10,1	+0,6	75,1	+2,9
Ак 145 х АС 43	su_2 su_2	8,8	+2	10,3	+0,8	75,4	+3,2
Бг 251 х АС 43	su_2 su_2	8,3	+0,5	13,4	+3,9	73,9	+1,7
Fc1412x АС 43	su_2 su_2	8,5	+0,7	8,9	-0,6	71,9	-0,3
$НИР_{0,05}$		0,35					

Significant productivity allowances in relation to the standard (Table 6), recorded in hybrids Ak145 hAE392 and Ak143hAE392 (1.5 and 0.8 t / ha, respectively). The high content of starch and protein distinguished hybrid combinations: AK135 hAE392, Ak145 hAE392 and Bh251's AE392.

Table 6. Productivity and highlights the quality test hybrids with high amylose content tester based on AE (2012)

Hybrid combination	genotype tester	Yield, t / ha	± до St	Content,%			
				albumen	± до St	Starch	± до St
Остер СВ(St)	-	7,8	-	9,5	-	72,2	-
АК135 хАЕ392	aeae	7,9	+0,1	14,6	+5,1	73,4	+1,2
Ак 143хАЕ392	aeae	8,6	+0,8	12,6	+3,1	73,8	+1,6
Ак145 хАЕ392	aeae	9,3	+1,5	12,9	+3,4	74,2	+2
Бг251хАЕ392	aeae	7,2	-0,6	12,5	+3	73,6	+ 1,4
Fc 412 хАЕ392	aeae	7,7	-0,1	13,0	+3,5	71,6	-0,6
$НИР_{0,05}$		0,33					

Findings

All created hybrids can be seen as a promising material for analytical breeding corn starch amylopectin and high amylose content types, and can later be used for technical purposes.

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