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ASSOCIATIVE ANALYSIS OF COMBINATION CAPACITY OF HIGH EXPERIMENTAL LINES OF SUGAR CORN FOR WASTES AND ITS STRUCTURE

O. Ye. Klimova*, Ye. I. Bielikov, *Candidates of Agricultural Sciences*
SE Institute of Grain Crops of NAAS, 14 Volodymyra Vernadskyi Str., Dnipro, Ukraine, 49027,
**e-mail: klimbok17@gmail.com*

The results of estimation of combining ability of high-drought-tolerant lines of sugar corn for yield and its components are highlighted. The genotypes with high estimations of the effects of GCA on the complex of signs, the expression of which increased for the intensification of drought were highlighted. It was found out that lines KC210-3, KC416-2, RKC46, RKC18, RKC28, RKC98, RC27-5 can be donor of high drought-resistance. The samples with high donor properties of the characteristics of the structure of yield are noted. Hybrids tolerant to drought were selected, which exceeded the standard by yields of molds of technical maturation of 2.50-4.22 t/ha. The optimal combination of high yield and stability of its implementation due to increased homeostaticity of their genotypes provided them with high selective value, indicating the promising use in production.

Keywords: *sugar corn, drought tolerance, lines, hybrids, signs, combining ability, donors.*

Sugar corn as a culture of a warm monsoon climate is marked by increased moisture and low drought tolerance. In this regard, the production of stable high yields of sugar corn in the zone of risky agriculture of the forest-steppe and the Ukrainian steppe, where it has become most widespread, without increasing its drought-tolerance is impossible, and breeding plays the main role in the solution of this issue. Increasing the yield and adaptive potential of linear material and creating hybrids tolerant to it is a priority direction for the selection of this biotype of maize. Increasing the tolerance of hybrids to drought at the present stage is actualized by global warming and climate change, its arrigation and the growth of the frequency of droughts of varying intensity [1]. Therefore, the task of creating highly hybrid hybrids with genetically determined resistance to drought, as the most suitable for cultivating under the conditions of hydrothermal provision of various natural and ecological zones, becomes of particular importance. Generated hybrids should be characterized by high homeostaticity, which is based on the wide norm of reaction of genotypes and high level of stabilization of their yields.

The expression of heterosis in F1 is due to the genetic value of cross-linking components and is based on the postulates of the polygenic control of quantitative characteristics. For the genetic regulation of the biological potential of the productivity of parental forms and elements of its structure, as well as for the development of rational programs for the creation of highly productive and adapted to different agroclimatic conditions of the hybrids, a method of genetic analysis, based on the evaluation of the general (GCA) and specific (SCA) Combination Ability of the linear material [2]. These indicators give an opportunity to quickly and objectively evaluate inbound lines and to find among them valuable for practical selection of samples. According to literature data, the overall combining ability is determined by the cumulative effect of additive effects of genes, and specific – by dominant effects, epistasis, and the interaction of genes with the environment [3–5].

In studying the genetic value of the source material, it was found that the yield of hybrid sugar maize slightly depends on the heterozygosity of the testers, but is determined by the combined ability of the components involved in crossbreeding and is determined by the genetic organization of the production process in the hybrid offspring [6, 7]. Recurrent reciprocal selection within the populations of the I and II cycles of selection in this subspecies of corn contributed to an increase in

the genetic value of the newly created lines [8]. The adequacy of the estimates of the combination ability of samples of this culture in dialysis and pharynx crossings is confirmed [9].

The analysis of the combining ability of inbred lines provided the selection of the best inlecture on samples of sugar (type su1 and sh2) and maize corn with optimally balanced and high effects of GCA of several characteristics of yield structure [10–12]. The selection of solutions of high-oscillatory sucrose solutions, in addition to increasing the stability of selected lines to drought, provided an increase in the assessments of the effects of GCA and the stability of their manifestation [13]. Genotypes with high drought tolerance properties were identified among recombinant corn lines, the effects of which were increased under drought conditions or remained stable high in contrasting cultivation conditions [14]. Involvement in cross-linking of components with high combining ability for yield variability of technical motility and the stability of adaptive reactions led to the creation of highly heterosomal combinations with complex tolerance to stress factors [7].

The purpose of the research was to evaluate and allocate the best combinations of sugar corn lines created in the laboratory for the selection of maize hybrids for food use, which according to the indexes of drought resistance (IP) was diagnosed in previous years as high-drought tolerance (IP = 0.90–0.99).

Material and methods of research. Dedicated values for drought tolerance 28 lines were involved in analyzing crossbreeding as maternal forms. As parent components, the following lines were used: low-dampness – KTS421-2 (IP = 0.63), high-dampness – KC208-5 (IP = 0.93) and medium hardness – КЦ907-2 (IP = 0.76). The 84 experimental hybrids obtained were studied in control nurseries of the selection crop rotation of the Synelniki breeding and experimental station in 2015 and 2016 at a density of 40,000 plants per hectare. according to recommended methods. The area of the land is 4.9 m^2. Repeat 3 times. Agrotechnics – common to the zone. The statistical validity of the obtained yield data, its structure and estimates of the parameters of combining ability was determined in the system of complete tectroads [15], and the homeostatic and selective value of the hybrids – according to the method of V. V. Khangildin [16].

Weather conditions of years of research were marked by contrast. Vegetation of corn according to the data from the Synelniki Meteorological Station in 2015 was carried out with moisture supply typical of the conditions of the northern steppe, which was close to the norm (204.3 mm against multi-year values of 205.0 mm), and amounted to 99.7 % of long-term indicators. During June – July (during the period of intensive plant growth, the formation of generative organs and the pouring of grain) the amount of precipitation reached 78.5 % of the medium-long-term data. For the estimated periods in 2016, only 180.4 and 56.5 mm of precipitation fell, or 88.0 and 60.0 % of the norm. The average daily air temperature during vegetation was 7.4 and 17.0 %, while in June – July by 7.5 and 10.0 %, respectively, exceeded the norm. In 2015, according to the assessment, there is an average drought. In 2016 there was intense drought, especially in the critical period of corn development. This is confirmed by indicators of hydrothermal coefficients (HGC). In 2015, the HGC during the growing season was at 0.81 for the average long-term indicator of 0.88, and in 2016 it declined to 0.69. In June – July 2015, the HGC was 0.72, indicating that the drought is increasing compared to multi-year indicators, and in 2016 it was equal to 0.42, which bordered with the value for acute-arid conditions.

Research results. According to the results of the dispersion analysis of the matrix of the phytocross crossings of the lines, the character of the genetic control of the yield of the cobs and its structure – the number of cobs per plant, the mass of the cleared cobs, and also the constituent structures of the cobs – their length, diameter and the number of rows of grains on the cob in the experimental hybrids were investigated. These individual characteristics, besides influencing the level of yield and are elements of the adaptation of genotypes to drought, determine the hybrid technology, its market attractiveness and commercial value. The existence of significant differences ($F_{0,05}$ actual > $F_{0,05}$ theoretical) on the estimated attributes was established. This proves that the difference between the potato hybrids is due to the genotypes of the lines, which makes it possible to divide the genotype controlled dispersion of quantitative attributes into the component dependent on both

parents (GCA lines and GCA testers) and the component of their interactions – SCA lines.

According to the results of the analysis (Table 1), it was concluded that there is significant differential of the components of cross-breeding both in general and in the specific combining ability of the assessed characteristics in different years. Thus, the genotypic variability of yields by 83.90 and 85.59 % depended on GCA of testers and on 11.22 and 13.23 % of the GCA lines. Contributions of the interaction of both components, their SCA in the genotype variability of the characteristics were less significant and only 2.87 and 3.19 % influenced the formation of yield.

1. Determination of signs of components of the combination ability of parental forms

Features	Year	GCA lines		GCA testers		SCA	
		ms	%	ms	%	ms	%
Yields of corn cobs	2015	2,74	11,22	20,91	85,59	0,78	3,19
	2016	4,56	13,23	28,93	83,90	0,99	2,87
Cobs on the plant	2015	0,02	10,00	0,17	85,00	0,01	5,00
	2016	0,03	9,38	0,28	87,50	0,01	3,12
Weight of the cob	2015	543,60	57,45	256,07	27,07	146,53	15,48
	2016	764,88	45,49	709,60	42,20	206,98	12,31
Length of the cob	2015	2,42	14,04	13,27	77,10	1,53	8,86
	2016	8,60	9,79	75,71	86,26	3,49	3,97
Diameter of the cob	2015	0,07	3,66	1,46	73,54	0,38	19,89
	2016	0,31	7,52	3,03	88,24	0,78	18,93
Number of rows on the cob	2015	5,53	8,34	58,51	88,24	2,27	3,42
	2016	5,30	8,03	58,50	88,59	2,23	3,38

The highest efficiency in the formation of the yield of hybrids in the dry conditions of the northern steppe of Ukraine belongs to the mass of the coca, compared with the number of cabbage on the plant, the dispersia of which was lower relative to the mass of cabbage. The latter is characterized by the highest level of combining ability among the studied trait. The GCA of the testers was higher compared with the lines of GCA in relation to the determination of the number of cobs per plant. The parameters of the data of the attributes in the assessed complex were 85.00 and 87.50 %, and 10.00 and 9.38 %, respectively, with low values of contributions to the formation of the SCA. The variability of the weight of the duct under these conditions at 57.45 and 45.49 % was determined by the action of the GCA lines and by 27.07 and 42.20 % by the influence of the GCA of the testers. Relative values of the variation of lines and testers on the characteristics of GCA on this feature changed their levels depending on the conditions of the year – the values of the modalities of GCA lines were intensified in favorable conditions, while the value of the variants of GCA testers increased in abnormally arid conditions. Specific combining ability influenced the determination of the manifestation of the "mass of the cocaine" sign a little more than the GCA. Its share accounted for 12.32 to 15.48 % of the genotype variability of the trait.

The analysis of the variance of elements of the structure of the cobblestone indicates the specifics of the peculiarities of their manifestation, depending on the components of the combining ability of the material being evaluated. The strong influence of GCA testers in the determination of the length of the swaths, their diameter and the number of rows of grains on the swing have been noted. They provided 73.54 to 88.59 % of the genotype variability of the signs. The share of the effects of GCA of the lines accounted for 3.66 to 14.04 % of the total variability of the diagnosed signs. In favorable conditions in 2015, the relative values of the variation in the length of the shell lines were higher than that of the ducts, which indicates a stronger determination of the long-swelling in these conditions with the overall combined ability of the lines. In arid conditions, on the contrary, GCA testers provided greater contributions to the formation of the trait. The relative importance of the number of rows of grains on the swinging both for the GCA lines, and for the GCA testers and SCA were practically equivalent in both years. This characteristic is constant and is determined by the genotypes of the lines, and the conditions of cultivation practically do not

affect its variability. The most important among these features was the interaction of lines and testers in diameter of the cobblestone. It was 18.93 and 19.89 %, which determined this figure in hybrids, while the length of the swaths and the number of grain rows were only 3.38–8.86 % determined in F1 by this component of the combining ability.

Regarding the contribution of the addictive and dominant action genes to the formation of the studied complex of signs, in their inheritance, the genes of additive action occupy the leading place for certain control of the signs by dominant hereditary factors. The mean squares (ms) indicate the effect of the combined action of lines and testers, ie additive genes on the yield of hybrids at 30.3 and 33.5 times, was stronger than the effect of non-inferior hereditary factors that were controlled by SCS of cross-linking components. Along with this additive action of germs of GCA testers is approximately 7 and 8 times higher than the additive action of GCA lines.

The level of dispersion of the characteristics of the yield structure also depended on the genotype of the estimated linear material and changed considerably over the years. Thus, the variations in the GCA of lines and testers by the number of tubers due to the additive action of genes in 19,0 and 31,0 times exceeded the variants of the SCA, that is, the nonadiative effect of genes with an advantage of more than 8.5 and 9.3 times the additive values GCA of testers compared to indicators of GCA lines. The weight of the canines was also overweight on the side of the additive component of the combination ability, which by the sum of the values of the variation of the lines and testers of FCA at 5.5 in 2015 and 7.1 times in 2016 exceeded the significance of the non-aberrant action of the genes. According to this feature, the additive factors of GCA lines in 1.1 and 2.1 times were higher compared to the additive effects of GCA testers.

In the genetic control of the signs of the structure of the canines, the additive components of the combination ability are 10.3 and 24.9 times in the length of the canines, 4.0 and 4.3 times in diameter, and 28.1 and 29.7 times in the number of rows of grains per cats were predominant non-adventitious. Additionally, the GCA testers 'genes' effect at the same time in both years was 5.5 and 8.8 times on the first sign, in 20.8 and 9.8 times in the second and in 10.6 and 11.1 times in the third sign exceeded the addiction of the GCA lines.

In connection with the fact that the additive effect of genes in the genetic control of signs plays the most an important role in the creation of hybrids, we have made a detailed analysis of the effects of the overall combinative ability of high-dampness lines on the estimated features. The classification of the lines by the level of both individual attributes and their aggregates made it possible to isolate the most valuable for synthesis of tolerant to drought hybrids of linear material (Table 2).

The maximum high values of the effects of GCA on the productivity of the varnish of technical maturation in both years of research (0.44–1.55 and 1.21–1.74 t/ha) are characteristic for the lines KC804-1, RKC18, RKC28, RKC98, KC27-5, KC807-4. They ranked 1–7 in the ranked ranks of the best in terms of the combined ability of the lines. The KC210-3, RKC70, KC804-2, KC416-2, RKC46, RKC47 lines are characterized by significantly higher, but lower than those in the previous group, the effects of GCA (0.10–0.37 and 0.59–0.94 t/ha). According to the absolute values of these assessments, they ranked 8–13 in rank. A special place was occupied by the line KC804-3, which showed the highest value of the GCA effect (2.35 t/ha) on the more favorable background of hydrothermal support, and on drying it was reduced and remained at a sufficiently high level (1.55 t/ha) According to this indicator the line occupied 1 and 4 places in ordered rows. It is able to provide the synthesis of hybrids with high buffering properties, since its genetic potential can be realized in hybrid offspring in conditions of moderate and intense drought. Other drought-tolerant lines of this cross-sectional matrix were characterized by low GCA effects, indicating their reduced suitability for use in the selection of sugar corn for high yields.

Highly valuable in arid conditions under the combined ability of the sign "number of swaths per plant" were the lines RKC18, KC804-3, RKC98, KC27-5, RKC47, КЦ807-4 with the effects of GCA 0.04–0.13 and 0.09–0,15, according to which they were awarded 1–5 and 1–6 places in the

2. Effects of GCA of the best lines of corn sugar on yields, its elements and components of the structure of the tubers

Lines	Effects GCA (g_i^z*) sings												Amount rank to collections signs-place	
	yield of cobs, t/ha		cobs the plant, pcs.		mass of cobs, g.		length of the cobs, cm		diameter of the cobs, cm		rows of grains, pcs			
	of the year													
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
КС210-3	0,37[8]	0,94[8]	-0,21[8]	-0,11[11]	14,74[2]	24,78[2]	0,42[10]	1,72[3]	0,05[10]	0,29[6]	0,17[12]	0,27[11]	50–*10*	42–*6*
КС804-1	1,55[2]	1,69[2]	0,12[2]	0,01[9]	7,41[8]	4,79[10]	0,72[7]	1,19[7]	0,08[8]	0,09[12]	1,37[5]	1,36[4]	32–*5*	45–*7*
КЛС70	0,31[9]	0,42[12]	0,04[5]	0,05[8]	4,41[11]	3,29[11]	0,11[13]	0,45[12]	0,11[6]	0,29[11]	1,04[8]	1,18[7]	52–*11*	61–*10*
КС804-2	0,18[10]	0,84[9]	-0,03[6]	0,00[10]	17,07[1]	25,62[1]	0,70[8]	1,67[4]	0,03[12]	0,39[3]	0,74[10]	0,86[8]	47–*8*	63–*11*
КС416-2	0,10[12]	0,30[13]	0,05[4]	0,06[7]	8,41[6]	8,27[9]	0,24[12]	0,52[11]	0,18[3]	0,26[8]	1,46[4]	1,34[7]	42–*7*	53–*8*
RKC46	0,18[10]	0,65[10]	-0,04[7]	0,01[9]	7,41[8]	9,62[8]	0,32[11]	0,70[8]	0,04[11]	0,07[13]	2,81[1]	2,60[1]	48–*9*	55–*9*
RKC18	1,05[4]	1,60[3]	0,04[5]	0,14[2]	13,41[3]	14,62[4]	0,55[9]	1,60[5]	0,10[7]	0,27[7]	0,84[9]	0,66[9]	37–*6*	30–*3*
RKC28	0,62[6]	1,29[6]	0,07[3]	0,06[7]	4,57[10]	13,95[3]	0,82[6]	2,34[1]	0,15[4]	0,25[9]	0,15[13]	0,11[12]	42–*7*	40–*4*
КС804-3	2,35[1]	1,55[4]	0,12[7]	0,08[6]	8,07[7]	11,29[7]	1,25[2]	0,69[9]	0,13[5]	0,33[4]	0,64[11]	0,60[10]	27–*3*	40–4
RKC98	0,44[7]	1,21[7]	0,07[3]	0,15[1]	6,41[9]	13,62[6]	0,92[4]	2,34[1]	0,27[2]	0,51[1]	2,17[3]	2,10[3]	21–*1*	21–*1*
КС27-5	0,71[5]	1,37[5]	0,04[5]	0,09[5]	9,07[5]	15,29[3]	1,32[1]	2,15[2]	0,13[5]	0,32[5]	1,18[7]	1,22[6]	29–*4*	26–*2*
RKC47	0,13[11]	0,59[11]	0,04[5]	0,10[4]	10,74[4]	13,95[5]	1,12[3]	1,29[6]	0,07[3]	0,22[10]	1,26[6]	1,34[5]	32–*5*	41–*5*
КС807-4	1,47[3]	1,74[1]	0,13[1]	0,13[3]	1,41[12]	2,95[12]	0,89[5]	0,62[10]	0,29[1]	0,44[2]	2,29[2]	2,36[2]	24–*2*	30–*3*
НІР $_{0,05}$	0,08	0,03	0,03	0,03	2,57	2,31	0,21	0,20	0,04	0,04	0,13	0,18	-	-

** The rank of lines for the effects GCA in an ordered series;*
Σgi ≠ 0, since the effects of GCA of the presented lines are taken from the matrix of crossings of 28 lines.

years of study. The increased parameters of assessments (QZP = 0,04–0,07 and 0,05–0,06) were characterized by the lines RKC70, KC416-2, RKC28, and KC210-3 – low absolute values of the attributes, as evidenced by high reliable negative indicators in both years of research. The unstable KC804-1 line, in which the effects of GCA decreased from high in 2015 to the lowest in 2016, was unstable. The combined capacity of the KC804-2 line was at the level of the average values, and in RKC46 it was raised from low to high under stress.

The following lines, such as KC210-3, KC804-2, KC416-2, PKC46, PKC18, KC804-3, PKC98, KC274, PKC98, KC27-5, PKC47 with the effects of GCA were found to be the best in such conditions of growing according to the indicators of the general combining ability of the masses GCA 6.41–10.07 and 8.27–25.62 g. The value of their ranks was within the range of 1–9 places. At the same time, the interaction of genetic systems for controlling the values of GCA effects sub-signs of the number of caches and their mass in the lines KC210-3, KC804-2, PKC46 provide the high effects of GCA on claw productivity were due to the significant compensatory properties of the mass of swaths in these lines, which offset the low and average combining ability of the number of cabbage per plant. In the lines KC804-1, PKC70, PKC28 the lower values of the GCA effects were recorded on the weight of the swathes, which decreased in more dry conditions. GCA effects of the KC807-4 line on the basis of this feature changed from low in conditions of more favorable humidity to increased due to intense water-heat stress. The combination of high parameters of combining ability with regard to the number of caches and the low and high effects of GCA on the weight of the cocoons provided the high significance of the effects of GCA on the yield line.

A wide range of variability of high-impact GCA effects on the length of the swaths is established for virtually all studied lines. The best ones were KC804-1, KC804-2, PKC28, RKC98, KC27-5, PKC47, KC807-4. Their effects of GCA ranged from 0.70 to 1.32 in 2015 and from 0.62 to 2.34 cm in 2016, which corresponded to 1–9 rank. The remaining lines, with parameters of the sign of 0.11–0.55 and 0.45–1.72 cm, ranked 10–12.

The lines KC416-2, RKC28, KC804-3, PKC98, KC27-5, KC807-4 according to the high-efficiency GCA (0.13–0.29 and 0.36–0.44 cm) on the diameter of the ovens are identified as such that they are capable of providing a thickening of the hybrids created. According to the rank they took 1–5 and 1–9 places respectively for years. The high combination ability (the effects of GCA = 1.18–2.81 and 1.22–2.60) in the number of rows of grains on the swingbed is established in the lines KC804-1, KC416-2, RKC46, RKC98, KC27-5, RKC47, KC807-4. The effectiveness of these lines is evidenced by their ranks, according to the lines they occupied places from 1 to 7 and from 1 to 6.

The combination in the genotypes of the lines KC98, KC27-5, KC807-4 of high parameters of GCA for the length of the cob, its thickness and number of rows of grains, in the lines KC804-1, RKC47 on the length of the tuber and the number of rows of grains, and in the line RKC28 in length and the diameter of the cockpit reinforced the effectiveness of their combinational ability by the weight of the swathes and therefore the constituent structures of the swaths of these lines are indirectly due to the mass of swaths. provided in their genotypes the high values of the overall combining ability of the cultivators of technical maturation.

It should be noted that in conditions of extreme drought in 2016, the expression of the effects of GCA in most of the above high-drought-tolerant lines along the yield and a number of selective-valuable features increased, indicating an increase in the parameters of absolute values of the productivity attributes in the hybrids synthesized with their participation as opposed to geno-types created for the use of unsustainable drought parental forms. This is due to the positive effect of processes of reformatting the productive capacity of tolerant to drought genotypes for the growth of arid conditions.

Diagnostics of the combined ability of aggregate signs of yield of the lines made possible the selection of the best of them (KC804-1, RKC18, RKC28, KC804-3, RKC98, KC27-5, RKC47, КЦ807-4) with the smallest sum of rank of the effects of GCA of the assessed attributes – accordingly they occupied 1–7-th place in rank ranks.

When allocating valuable for the combined ability of high-dustable lines, attention was drawn to the specific features of their combination with other samples. Their detail allowed to allocate lines with high donor properties for a number of individual characteristics in accordance with the high levels of their manifestation when inherited in the test krosas. With the participation of the best of them, 12 high-heterozygous hybrids are synthesized, which combine in their genomes the maximum possible conditions for the specific conditions of the economic-useful signs (Table 3) and ensure the stabilization of yield in conditions of limiting humidification under the effects of drought of different intensity.

3. Characteristics of tolerant to drought hybrids, created on the basis of lines with high combining ability (2015–2016)

Hybrid	Cobs the plant, pcs.	Mass of cobs, g.	Length of the cobs, cm	Diameter of the cobs, cm	Rows of grains, pcs	Yield of cobs, t/ha	To the standard	Drought tolerfnce index	Hom*	Sc^{z}**
КС210-3 x КС421-2	1,16	174	20,2	4,58	18,4	9,55	+1,40	0,97	3,95	9,26^{9}
КС804-1 x КС421-2	1,26	177	18,5	4,30	17,9	10,73	+2,58	0,87	4,96	10,29^{3}
КС416-2 x КС421-2	1,17	184	21,1	4,69	17,9	9,34	+1,19	0,93	3,75	8,87^{12}
RKC46 x КС421-2	1,22	183	20,6	4,72	23,1	10,00	+1,85	0,98	4,39	9,80^{5}
RKC18 x КС421-2	1,28	173	19,8	4,62	17,4	10,27	+2,12	0,95	4,39	9,76^{6}
RKC28 x КС421-2	1,17	193	20,6	4,51	16,7	9,76	+1,61	0,96	3,81	9,37^{8}
КС804-3 x КС421-2	1,29	169	19,9	4,63	15,6	9,98	+1,83	0,86	2,21	9,17^{10}
RKC98 x КС421-2	1,27	189	22,0	4,82	19,1	9,73	+1,58	0,98	3,27	9,54^{7}
КС27-5 x КС421-2	1,31	192	20,5	4,59	16,7	9,44	+1,29	0,97	3,00	9,06^{11}
КС807-4 x КС421-2	1,48	181	21,3	4,91	20,4	12,37	+4,22	0,89	5,30	10,39^{1}
КС804-1 x КС208-5	1,26	182	21,1	4,58	18,1	10,65	+2,50	0,91	5,01	10,01^{4}
КС804-3 x КС208-5	1,35	201	23,0	4,55	17,1	12,00	+3,85	0,85	4,78	10,32^{2}
Konkurent (standard)	1,11	172	16,4	3,95	16,7	8,15	0,00	0,77	1,29	6,28^{13}

* *Homeostatic.*

** *Selective value (z – rank of the line of selection value).*

It was established that high-dampness hybrids were synthesized when crossing the lines KC210-3, KC416-2, RKC46, RKC18, RKC28, RKC98, КС27-5 with a weakly drought-resistant line КС421-2, 93-0,98), and the lines КС804-1, КС804-3, КС807-4 created drought-resistant combinations (IP = 0,85–0,89). For their genotypes high and increased donor properties are signs of drought-resistant.

Testcrosts of the lines RKC18, КС804-3, КС27-5, КС807-4 formed 1.28–1.48 cobs on the plant. They are donors of a high number of tubers on the plant. Good donor properties for the size of the cobs were marked by КС28, КС27-5, КС804-3, which provided in the hybrid descendants of the swathes of mass 192–201 g. In the remaining combinations, the weight of the cocoon was 169-189 g. The length of the coca in the evaluated combinations varied from 18.5 to 23.0 cm. The lines КС416-2, RKC46, RKC28, RKC98, КС27-5, КС807-4, КС804-3 provided in F1 the maximum (20.5–23.0 cm) length of the swathes and in the call In this regard, they are attributed to the donor-guilty donor. Highly dusted lines, as a rule, were donor high-density pigs-hybrids were formed with a diameter of 4.30–4.91 cm. The high donor powers were marked by the lines of the RKC46, RKC98, КС807-4 – the newly formed hybrids formed a diameter of 4.72–4.91 cm. Tubers with a large number of grain rows (20.4–23.1 pcs.) Were detected in combinations obtained when crossing RKC46 and КС807-4 lines as multi-donor donors. Other lines in most cases, when combined, showed the mediocre significance of the trait – there were 17.1–19.1 rows of grains in the packers. Along with this, testcrosts of the lines RKC18, RKC28, КС804-3 with high GCA attributes were formed by cavities in which the number of grain rows was 15.6–17.4.

It was determined that the high-dampness of the hybrid KC27-5 x KC421-2 and the drought-resistant KC804-3 x KC208-5 formed a high yield when combined with high values of the number of swaths per plant, their mass and length, while in the drought-resistant hybrid KC807-4 x КЦ412-2 high yield was provided by the joint action of such important features as the number of swaths, their length, diameter and number of rows of grains.

The most suitable for obtaining commodity products of sugar corn in the zone of limited and unstable wetting of the northern steppe among high-heterosomal and drought tolerant samples were hybrids KC804-1 x КЦ421-2, KC807-4 x KC421-2, KC804-1 x KC220-5-5, KC804-3 x KC208-5 with a yield of 10,65–12,37 t/ha of conditioned swing-outs without a wrap. By yield, they exceeded the standard hybrid competitor by 2.50–4.22 t/ha, or by 30.7–51.8 %. They noted higher values of homeostasis (Hom = 4.78–5.30) and selection values (Sc = 10.01–10.39). For these hybrids, 1–4 grades of breeding value are characteristic. In their genomes there is a large number of positively dominant alleles that control high environmental sustainability and determine stable high yields and homeostaticity at different levels of hydrothermal provision.

Other high-yielding drought tolerant hybrids investigated yielded the above-mentioned yields, which reached 9.34–10.27 t/ha. Their homeostaticity (Hom = 2.21–4.39) and selective value (Sc 8.78–9.80) were also lower. This group of hybrids is smaller than the first, adapted to arid climatic conditions and especially to weather fluctuations. The lowest yields (8.15 t/ha) had a medium-dense, flat hybrid Competitor with a homom 1.29 value and a Sc value of 6.28 units.

For the selected best tolerant to drought hybrids, synthesized based on the best combination lines ability, characterized by increased stability of the heterogeneity of the gene-type, which was maintained at a high and stable level in a changing growing environment.

Conclusions Summing up the above, it can be stated that in the process of studying the combinational ability of high-dampness-resistant line material of sugar corn, 13 lines with high values of the effects of GCA on the set of characteristics that form the crop are allocated. The lines KC210-3, KC416-2, RKC46, RKC18, RKC28, RKC98, KC27-5 are identified as high drought-tolerance donor, and KC804-1, KC804-3, KC807-4 provided drought resistance of hybrids F1. Among the best combinations of genotypes, a number of lines with high donor properties characterized the structure of yield and structure of the cobs. The given data analysis of the combining ability of inbred lines shows that when using hybridized sugar corn hybrids for selection of high-stability of linear material, the criterion for its selection should be a complex of sub-signs of productivity, both individual and macro, created by the association of their resultant, which increases the power of the analysis.

It has been proved that in heterogeneous selection of sweet corn for the combination of high potential of yield of commodity products with a significant level of genetic defense of the process of forming products from unfavorable environmental factors, hybrids with the value of each of the complex features of the yield structure close to the adaptive norm, characteristic for the specific conditions of cultivation, are preferred.

Selected in the course of research high-heatherosensitive tolerant to drought hybrids prefered 30.7–51.8 % yield level of the standard. They are characterized by increased values of homeostasis (Hom = 4.78–5.30) and selection values (Sc = 10.01–10.39 t/ha). They combine in their genomes the maximum possible levels of economically useful features and provide a stable yield level for the effects of drought of different intensity. They can be grown in farms of different forms of ownership for the receipt of commodity products.

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