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PERFORMANCE INHERITANCE AND COMBINING ABILITY OF SPRING BARLEY ACCESSIONS

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In 2019–2020 at the Plant Production Institute named after V.Ya. Yuriev of NAAS, features of the inheritance and combining ability for the plant performance plant traits were elucidated in 22 cultivars and three lines of spring barley. Based on this, gene interaction types and effects were determined depending on the cross combination and cultivation year, and a possibility of obtainment of transgressive segregants was proven. Depending on the year conditions, different types of gene interactions for the performance were observed in F_1: from positive to negative dominance. Parents Khors and Troian showed a high general combining ability (GCA); Troian also had a high specific combining ability (SCA).

Key words: *spring barley, performance, inheritance, dominance degree, gene interaction type, general and specific combining abilities (GCA and SCA).*

Introduction. In combination breeding, the availability of starting material with desirable characteristics for recombination is one of the main problems. To select components for crossing, it is necessary to know their breeding and genetic peculiarities, so elucidation of inheritance patterns and combining ability of starting material is of great importance.

Literature review and problem articulation. A lot of researchers have demonstrated different types of gene interactions in the inheritance of quantitative traits in F_1 spring barley: from negative dominance to positive overdominance. In particular, similar results were obtained in AA Dontsova's [1], AS Kuznetsova and IV Kurkova's [2], SP Vasylkivskyi and VM Gudzenko's [3], YeH Fyllypov and AV Paramonov's [4] experiments. M. Mandic et al. [5] found that the productive tillering capacity as one of the performance-determining components was only inherited by heterosis and positive dominance. The performance was only inherited by heterosis in the experiments carried by MAF Habouh [6], K. Madhukar et al. [7], S. Pesaraklu et al. [8], S. Medimagh, MEl Felah [9], and M. Patial et al. [10]. There are also data that both growing conditions [11, 12, 13] and cross combinations [6] influence gene interaction types in the inheritance of quantitative traits by F_1 barley.

To characterize the genetic peculiarities of starting material for breeding, one should determine the combination ability for different traits. Researchers have published ambiguous data on levels of the general and specific combining abilities of certain traits, including yield capacity, performance and their consituents [3, 7, 14, 15, 16, 17, 18, 19]. In particular, similar results were obtained by S. Pesaraklu et al. [8] on the inheritance of the grain number and weight from the main spike and by S. Singh et al. [20], A. Kumari et al. [21] on the performance. Different levels of the GCA and SCA as well as additive and non-additive effects of genes depending on growing conditions were established by G. Akhmedova et al. [13]. Prevalence of additive genes in the performance was shown by NI Aniskov, DV Garris [22], Z. Jalata et al. [23].

M. Patial et al. [24] revealed non-additive effects of genes in inheritance of all quantitative traits in barley, with the SCA prevailing. This means that selections are only feasible in later generations. S. Medimagh, MEl Felah [9] identified the best hybrid combinations and individual accessions by levels of heterosis and GCA. Y.Y. Han et al. [25] pointed out that it was important to determine the combining abilities in early generations to plan further breeding process.

Thus, the ambiguity of different researchers' results justifies a study of gene interaction types in the inheritance of quantitative traits in barley, in particular of the performance and combining abilities of parents, depending on genotype and growing conditions.

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Purpose and objectives. To establish the gene interaction types in the performance inheritance, to evaluate the combining abilities and effects of genes for this trait in spring barley accessions.

Materials and methods. We investigated 75 F_1 spring barley hybrid combinations derived from crossing 25 female forms with three male ones. Twenty two cultivars and three breeding lines were taken as female components for crossing. Twenty four accessions were two-row barley; of them, 13 accessions were chaffy and belonged to the *nutans* variety (Avhur, Ahrarii, Khors, Troian, Reserv, Sviatomykhailivskyi, Talisman Myronivskyi, KWS Bambina, Datcha, Grace, Gladys, Quench, and Margret); five accessions were awnless *inerme* (Kontrast, Krechet, Modern, lines 14-561 and 15-139), one accessions was awnless *submedicum* (Vzirets); four accessions were naked *nudum* (Merlin, Gatunok, Akhiles and Yavir); and one line was naked and awnless *duplialbum* (15-1246). There was one six-row cultivar, *rikotense* variety (Amil). Line 14-561 called Herkules was submitted to the qualification examination of plant cultivars. Three cultivars (chaffy Ahrarii and Scrabble and naked NSG-1) were male components for crossing.

Plants were crossed forcibly, from spikelet to spikelet, in 2018 and 2019. F_1 seeds and parents were sown with a cassette breeding planter SKS-6A. Grain pea was the forecrop. The plot area was 0.20 m^2. The interrow distance was 0.20 m; the inter-plot tracks were of 0.50 m. Crossings were performed in two replications. Plants were harvested manually, with roots.

For structural analysis, 20 typical plants were chosen from each F_1 hybrid population, and the performance inheritance was determined by dominance degree (h_p) [26]. The obtained data were grouped and gene interaction types were determined as per G.M. Beil and R.E. Atkins's classification [27]. Using two-factor analysis of variance in STATISTICA 10, we found significant differences between the GCA and SCA variances for the performance and evaluated the combining ability effects.

Results and discussion. In the study years, the weather was various, allowing for comprehensive assessments of the experimental material. Thus, in 2019 during the growing period, barley made good use of precipitation in April and May, but in June and July there was a drought accompanied with high temperatures. The average daily temperature exceeded the multi-year average by 1.5–4.6°C, reaching the peak of 33.2–35.2°C in June. Such weather conditions were unfavorable for the development of barley plants and led to the formation of short spikes and a small number of lateral stems, while shrivelled grain was formed because summer droughts.

On the contrary, in 2020, the growing period had an excessively wet and cool spring. The temperature in April-May was lower than the multi-year average by 0.8–2.6°C, and the precipitation amount in May was 64 mm (147% of the multi-year average). Such weather conditions were favorable for the growth and development of barley, as they boosted its tillering and were boon to long spikes. Drought began and temperature elevated (0.8-1.7°C above the multi-year average) in June. Only during the second 10 days of July, there was a lot of precipitation (67 mm more than the multi-year average, or 368%), but this precipitation was torrential, often accompanied by hail, so it were ineffective. Thus, 2019 was unfavorable for the growth and development of barley, and 2020 can be considered as quite favorable.

Having analyzed F_1 plants in 2019, we defined the gene interaction type for the performance as positive overdominance (heterosis) in all hybrid combinations (the dominance degree h_p = 1.58–191.50) (Table 1). Therefore, selections of only recessive homozygotes will be effective, while selections of dominant genotypes will not be effective.

In 2020, overdominance was also seen in most F_1 hybrid combinations, in particular for parents Ahrarii, NSGJ-1 and Scrabble, the dominancedegree was 2.38–49.60, 1.11–240.00 and 2.02–48.43, respectively. In some combinations, both positive dominance (Vzirets/Scrabble [h_p = 0.79] and KWS Bambina/Scrabble [hp = 0.76]) and negative dominance (depression) (Merlin/Scrabble [h_p = -1.14] and Yavir/Scrabble (h_p = -2.28]) were determined. In 2020, intermediate inheritance in F_1 was in the hybrid combinations Ahrarii/Scrabble (h_p = 0.10), Herkules/Scrabble (h_r = - 0.24) and Merlin/Ahrarii (h_p = 0.09), where additive effects of genes were manifested, so the trait value upon selections will be similar to the genotypic one, and this trait-oriented selections will be effective.

In 2019–2020, the general (GCA) and specific (SCA) combining abilities for the plant performance of female and male components of crossings were determined.

Table 1

The dominance degree h_p in F_1 in the performance inheritance

Female component	Male component					
	Ahrarii		NSGJ-1		Scrabble	
	2019	2020	2019	2020	2019	2020
Vzirets	5.54	3.45	7.79	23.79	3.48	0.79
Amil	3.82	35.28	3.34	8.53	7.98	4.44
Avhur	9.19	7.69	16.60	7.52	10.19	2.63
Ahrarii	0	0	8.73	62.50	2.45	0.10
Khors	3.16	22.73	101.60	22.89	7.58	4.00
Troian	15.55	2.38	23.36	2.29	14.59	13.32
Rezerv	1.72	6.12	4.34	5.08	9.48	14.84
Sviatomykhailivskyi	6.44	18.50	4.66	15.89	191.50	3.14
Talisman Myronivskyi	36.69	15.20	19.79	40.00	8.18	4.14
KWS Bambina	7.10	5.59	5.79	5.36	21.42	0.76
Datcha	5.17	12.62	1.58	36.75	12.17	4.11
Gladys	8.55	3.59	9.64	5.90	6.27	2.02
Grace	73.83	4.17	64.80	8.50	2.66	2.06
Quench	81.50	32.12	39.08	11.18	6.51	3.02
Margret	4.29	28.55	6.23	17.74	10.28	4.38
Merlin	5.21	**0.09**	4.06	7.98	19.19	- 1.14
Gatunok	86.00	4.52	45.14	23.36	4.91	2.25
Akhiles	12.28	49.06	27.76	6.86	11.18	4.45
Yavir	8.05	4.25	8.06	6.93	4.82	- 2.28
Kontrast	3.52	34.56	4.20	240.00	8.15	3.07
Krechet	2.81	4.41	7.28	1.11	19.50	48.43
Modern	8.33	3.45	8.32	4.46	11.88	8.00
15-1246	3.02	3.71	7.40	8.11	124.50	28.83
Herkules	9.20	12.60	4.03	12.22	3.88	- 0.24
15-139	7.67	6.86	24.33	33.80	4.16	4.09

Two-factor analysis of variance of the F_1 experimental data demonstrated significance of the effects both of all variants (genotypes), including female and male components and F_1, and of separate F_1 and cross components (totally and individually of female and male forms), as well as of the "F_1 – cross components" and "female-male components" interactions on the trait variability.

Through this lens, we evaluated the GCA effects of the female components and testers and the SCA effects as a result of their interaction (Table 2).

As to the GCA effects, the studied accessions can be grouped as follows: with high, low or intermediate GCA. In 2019, the GCA was significantly high in female components Amil, Khors, Troian and Talisman Myronivskyi; in 2020, in Avhur, Khors, Troian, Reserv, Datcha, Margret and line 15-1246. For the two years, the GCA was high in cultivars Khors and Troian, i.e. they had much more genetic factors (or gene effects) that determine a high level of the trait. The GCA was high in male components Scrabble in 2019 and NSGJ-1 in 2020. That is, none of the parents had a consistently high GCA in the two years.

In 2019, the GCA was significantly low in female components Vzirets, Ahrarii, Kontrast, Herkules, Datcha and line 15-139; in 2020, it was low in cultivars Vzirets, Ahrarii, Herkules, KWS Bambina, Merlin, and Yavir and line 15-139. The GCA was intermediate (insignificant) in other the cultivars.

Table 2

GCA effects for the plant performance in the spring barley cultivars and lines

Cross component	Year	
	2019	2020
	Female component	
Vzirets	- 1.02*	- 1.16*
Amil	1.09*	- 0.13
Avhur	- 0.32	1.86*
Ahrarii	- 2.65*	- 0.88*
Khors	0.99*	0.70*
Troian	0.79*	0.61*
Rezerv	0.62	0.96*
Sviatomykhailivskyi	0.49	- 0.11
Talisman Myronivskyi	1.83*	0.35
KWS Bambina	- 0.03	- 0.64*
Datcha	- 1.51*	1.60*
Gladys	0.36	- 0.42
Grace	0.60	- 0.37
Quench	0.42	- 0.26
Margret	0.14	0.64*
Merlin	0.58	- 1.04*
Gatunok	0.13	- 0.53
Akhiles	0.46	- 0.50
Yavir	0.20	- 0.64*
Kontrast	- 1.52*	0.10
Krechet	0.24	0.37
Modern	0.10	- 0.11
15-1246	- 0.26	1.34*
Herkules	-0.91*	- 1.15*
15-139	- 0.83*	- 0.60*
Mean	0	0
LSD_{05}	0.62	0.58
	Male component	
Ahrarii	- 0.30*	- 0.45*
NSGJ-1	0.09	0.56*
Scrabble	0.21*	0.004
Mean	0	0
LSD_{05}	0.18	0.17

Note. * – the effects of CKD are significant at a significance level of $p = 0.05$.

Hybrids between accessions with a high GCA and accessions with a lower or intermediate GCA may be promising in breeding due appearance of positive transgressions in the offspring.

The specific combining ability (SCA) effects were assessed in 2019 (Table 3).

In 2019, the SCA effects were significantly strong in female cultivars Troian, Datcha, Gladys, Grace, Gatunok, Modern, and Herkules and in testers Ahrarii and Scrabble, some hybrid combinations with which were better or worse than the mean values of both cross components. In the combinations Troian/Scrabble, Datcha/Ahrarii, Gladys/Scrabble, Grace/NSGJ-1, Grade/NSGJ-1, Modern/Ahrarii, and Herkules/Ahrarii, the SCA values were significantly high and heterosis was manifested. Hence, it is possible to select transgressive plants in F_2 from these populations.

Table 3

SCA effects for the plant performance in the spring barley cultivars and lines, 2019

Female component, i	Male component, j					
	Ahrarii	NSGJ-1	Scrabble	$\sum S_i$	$\sum S_i^{2-}$	δS_i^{-2-}
Vzirets	0.56	0.23	- 0.79	0	0.99	0
Amil	0.60	- 0.67	0.07	0	0.81	-0.15
Avhur	- 0.13	- 0.72	0.85	0	1.26	0.09
Ahrarii	- 0.96	0.11	0.85	0	1.66	0.22
Khors	- 1.02	0.35	0.67	0	1.61	0.20
Troian	- 0.20	- 1.80	2.00	0	7.28	2.09*
Rezerv	- 1.34	0.55	0.79	0	2.72	0.57
Sviatomykhailivskyi	0.80	- 1.35	0.55	0	3.01	0.67
Talisman Myronivskyi	- 0.79	- 0.26	1.05	0	1.79	0.26
KWS Bambina	0.31	- 1.43	1.12	0	3.46	0.80
Datcha	1.61	- 1.02	- 0.59	0	3.98	0.99*
Gladys	- 1.78	- 0.15	1.93	0	6.91	1.97*
Grace	0.27	2.09	- 2.36	0	10.01	3.00*
Quench	- 0.74	0.46	0.28	0	0.84	-0.005
Margret	0.49	0.87	- 1.36	0	2.85	0.62
Merlin	1.03	- 0.88	- 0.15	0	1.86	0.29
Gatunok	- 1.99	2.36	- 0.37	0	9.67	2.89*
Akhiles	- 0.22	- 0.40	0.62	0	0.59	-0.13
Yavir	1.35	- 0.19	1.16	0	3.20	0.73
Kontrast	- 0.28	- 0.40	0.68	0	0.73	0.06
Krechet	- 0.81	1.37	-0.56	0	2.85	0.62
Modern	1.70	0.21	-1.91	0	6.58	1.86*
15-1246	- 0.71	0.77	-0.06	0	1.10	0.03
Herkules	2.41	- 1.02	-0.39	0	8.88	2.59*
15-139	- 0.17	0.94	-0.77	0	1.50	0.17
$\sum S_j$	0	0	0	0	–	20.27
$\sum S_j^{2-}$	29.33	24.33	30.40	–	–	–
δS_j^{-2-}	2.81*	2.26	2.94*	–	–	–
X	2.67	–	–	0.81		

Note. * – SCA effects are significant at p = 0.05.

Conclusions. The study found that the gene interaction types in the spring barley performance inheritance depended on cross combinations and growing conditions. In unfavorable 2019, F_1 only showed positive overdominance (heterosis), while in favorable 2020, positive overdominance, positive dominance and intermediate inheritance were observed. In 2019–2020, the high GCA was seen in female cultivars Khors and Troian, i.e. these varieties had more genetic factors (or gene effects) that positively determine the trait level. In 2019, the strong SCA effects were noticed in female components Troian, Datcha, Gladys, Grace, Gatunok, Modern, and Herkules and male forms Agrarii and Scrabble. The hybrid combinations with the maximum probability of producing transgressive segregants have been selected.

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УСПАДКУВАННЯ ПРОДУКТИВНОСТІ ТА КОМБІНАЦІЙНА ЗДАТНІСТЬ ЗРАЗКІВ ЯЧМЕНЮ ЯРОГО

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Мета і задачі дослідження. Метою дослідження було встановлення типу взаємодії генів при успадкуванні продуктивності, комбінаційної здатності та ефектів дії генів за цією ознакою у зразків ячменю ярого.

Матеріали та методи. Досліджували 75 гібридних комбінацій F_1 ячменю ярого, вихідним матеріалом були 25 материнських та три батьківських компоненти різних різновидностей (плівчасті та голозерні), схрещування проведено за типом топкросів. Сівбу насіння

першого покоління та батьківських зразків проведено касетною селекційною сівалкою СКС-6А. Попередник – горох на зерно, площа ділянки – 0,20 м^2, міжряддя – 0,20 м, міжділянкові доріжки – 0,50 м. Повторення – дворазове. Рослини збирали вручну з корінням.

Для структурного аналізу з кожної гібридної популяції F_1 відбирали по 20 типових рослин, успадкування продуктивності визначали за ступенем домінантності (h_p). Групування одержаних даних і визначення типів взаємодії генів проводили за класифікацією G.M. Beil і R.E. Atkins. За допомогою двофакторного дисперсійного аналізу по програмі STATISTICA 10 установлено достовірні відмінності між варіансами ЗКЗ і СКЗ за ознакою продуктивність та визначили ефекти комбінаційної здатності.

Обговорення результатів. У 2019–2020 рр. установлено особливості 22 сортів і трьох ліній ячменю ярого за типом взаємодії генів при успадкуванні продуктивності та комбінаційною здатністю, на основі чого визначено перспективи ефективності добору біотипів. У посушливих умовах 2019 р. у F_1 проявилося лише позитивне наддомінування, в сприятливому 2020 р. – від позитивного до негативного наддомінування. За два роки вивчення встановлено високу загальну комбінаційну здатність материнських сортів Хорс і Троян. У батьківських компонентів стабільно високої ЗКЗ за обидва роки вивчення не встановлено. Гібриди між зразками з високим рівнем ЗКЗ і зразками з більш низьким чи середнім рівнем ЗКЗ можуть бути перспективними для селекції через прояв у потомстві позитивних трансгресій. Достовірно високі ефекти специфічної комбінаційної здатності були в 2019 р. у материнських компонентів Троян, Datcha, Gladys, Grace, Ґатунок, Модерн, Геркулес та у батьківських Аграрій та Scrabble.

Висновки. В результаті дослідження встановлено, що тип взаємодії генів при успадкуванні продуктивності у ячменю ярого залежать від комбінації схрещування та умов року вирощування. В несприятливому 2019 р. у F_1 проявилось лише позитивне наддомінування (гетерозис), у сприятливому 2020 р. – позитивне наддомінування, позитивне домінування та проміжне успадкування. В 2019–2020 рр. установлено високу ЗКЗ материнських сортів Хорс і Троян, високі ефекти специфічної СКЗ материнських компонентів Троян, Datcha, Gladys, Grace, Ґатунок, Модерн, Геркулес та батьківських Аграрій і Scrabble. Виділено гібридні комбінації з найбільшою вірогідністю виділення трансгресивних сегрегантів.

Ключові слова: *ячмінь ярий, продуктивність, успадкування, ступінь домінантності, тип взаємодії генів, загальна та специфічна комбінаційна здатність (ЗКЗ та СКЗ).*

НАСЛЕДОВАНИЕ ПРОДУКТИВНОСТИ И КОМБИНАЦИОННАЯ СПОСОБНОСТЬ ОБРАЗЦОВ ЯЧМЕНЯ ЯРОВОГО

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Цель и задачи исследования. Целью исследования было установление типа взаимодействия генов при наследовании продуктивности, комбинационной способности и эффектов действия генов по этому признаку у образцов ячменя ярового.

Материалы и методы. Изучали 75 гибридных комбинаций F_1 ячменя ярового, исходным материалом были 25 материнских и три отцовских компонента разных разновидностей (пленчатые и голозерные), скрещивания проведены по типу топкроссов. Посев семян первого поколения и родительских образцов проведен кассетной селекционной сеялкой СКС-6А. Предшественник – горох на зерно, площадь делянки – 0,20 м^2, междурядие – 0,20 м, межделяночные дорожки – 0,50 м. Повторение – двухразовое. Растения собирали вручную с корнями.

Для структурного анализа с каждой гибридной популяции F_1 отбирали по 20 типичных растений, наследование продуктивности определяли по степени доминантности (h_p).

Группирование полученных данных и определение типов взаимодействия генов проводили по классификации G.M. Beil и R.E. Atkins. При помощи двухфакторного дисперсионного анализа по программе STATISTICA 10 установлены достоверные различия между вариансами ЗКЗ и СКЗ по признаку продуктивность и определены эффекты комбинационной способности.

Обсуждение результатов. У 2019–2020 гг. установлены особенности 22 сортов и трех линий ячменю ярового по типу взаимодействия генов при наследовании продуктивности и комбинационной способности, на основании чего определены перспективы эффективности отбора биотипов. У засушливых условиях 2019 г. у F_1 проявилось только положительное сверхдоминирование, в благоприятном 2020 г. – от положительного до отрицательного сверхдоминирования. За два года изучения установлена высокая общая комбинационная способность материнских сортов Хорс и Троян. У отцовских компонентов стабильно высокой ОКС за оба года изучения не установлено. Гибриды между образцами с высоким уровнем ОКС и образцами с более низким или средним уровнем ОКС могут быть перспективными для селекции посредством появлении в потомстве положительных трансгрессий. Достоверно высокие эффекты специфической комбинационной способности были в 2019 р. у материнских компонентов Троян, Datcha, Gladys, Grace, Ґатунок, Модерн, Геркулес и у отцовских Аграрій та Scrabble.

Выводы. В результате исследования установлено, что тип взаимодействия генов при наследовании продуктивности у ячменя ярового зависит от комбинации скрещивания и условий года выращивания. В неблагоприятном 2019 г. у F_1 проявилось только положительное сверхдоминирование (гетерозис), в благоприятном 2020 г. – положительное сверхдоминирование, положительное доминирование и промежуточное наследование. В 2019–2020 гг. установлена высокая ОКС материнских сортов Хорс и Троян, высокие эффекты СКС материнских компонентов Троян, Datcha, Gladys, Grace, Ґатунок, Модерн, Геркулес и отцовских Аграрій и Scrabble. Выделены гибридные комбинации с наибольшей вероятностью появления трансгрессивных сегрегантов.

Ключевые слова: *ячмень яровой, продуктивность, наследование, степень доминантности, тип взаимодествия генов, общая и специфическая комбинационная способность (ОКС и СКС).*

PERFORMANCE INHERITANCE AND COMBINING ABILITY OF SPRING BARLEY ACCESSIONS

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Purpose and objectives. To establish the gene interaction types in the performance inheritance, to evaluate the combining abilities and effects of genes for this trait in spring barley accessions.

Materials and methods. We investigated 75 F_1 spring barley hybrid combinations derived from crossing 25 female forms with three male ones (chaffy and naked). Crossing was conducted in accordance with topcross design. F_1 seeds and parents were sown with a cassette breeding planter SKS-6A. Grain pea was the forecrop. The plot area was 0.20 m^2. The interrow distance was 0.20 m; the inter-plot tracks were of 0.50 m. Crossings were performed in two replications. Plants were harvested manually, with roots.

For structural analysis, 20 typical plants were chosen from each F_1 hybrid population, and the performance inheritance was determined by dominance degree (h_p). The obtained data were grouped and gene interaction types were determined as per G.M. Beil and R.E. Atkins's classification. Using two-factor analysis of variance in STATISTICA 10, we found significant differences between the GCA and SCA variances for the performance and evaluated the combining ability effects.

Results and discussion. In 2019–2020, the features of 22 spring barley cultivars and three lines were described in terms of the gene interaction types in the performance inheritance and combining ability. On this basis, the prospects of biotype selections were evaluated. In the arid conditions of 2019, F_1 only showed positive over dominance, while in favorable 2020 the inheritance types varied from positive to negative overdominance. In the two years, the general combining ability was high in female cultivars Khors and Troian. The male components did not show consistently high GCA for the both years. Hybrids between accessions with a high GCA and accessions with a lower or intermediate GCA may be promising in breeding due appearance of positive transgressions in the offspring. In 2019, the SCA effects were significantly strong in female forms Troian, Datcha, Gladys, Grace, Gatunok, Modern, and Herkules and in male forms Ahrarii and Scrabble.

Conclusions. The study found that the gene interaction types in the spring barley performance inheritance depended on cross combinations and growing conditions. In unfavorable 2019, F_1 only showed positive overdominance (heterosis), while in favorable 2020, positive overdominance, positive dominance and intermediate inheritance were observed. In 2019–2020, the high GCA was seen in female cultivars Khors and Troian. The strong SCA effects were noticed in female components Troian, Datcha, Gladys, Grace, Gatunok, Modern, and Herkules and male forms Agrarii and Scrabble. The hybrid combinations with the maximum probability of producing transgressive segregants have been selected.

Key words: *spring barley, performance, inheritance, dominance degree, gene interaction type, general and specific combining abilities (GCA and SCA).*