



VARIABILITY AND HERITAGE OF MORPHOPHYSIOLOGICAL SYMPTOMS IN BIOLOGICAL PLANTS IN THE PROCESS OF SELECTION OF SUNBULL PLANTS

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ANNOTATION

The total water content, dominance and flexibility coefficients in the leaves of F₁- F₂- F₃ plants of hybrid combinations obtained from simple and complex hybridization to create a water-resistant selection material of sunflower from oilseeds were studied. This study showed that this trait is inherited differently in simple and complex F₁, F₂ and F₃ hybrids under different water regime conditions, with F₂ hybrid combinations varying depending on the dominance coefficients and water supply conditions in hp as well as the composition of the parent forms of hybrids. The plants showed that the total amount of water in the leaves depends not only on the conditions of water supply but also on the genotypic composition

KEYWORDS: Sunflower, morphophysiological, heredity, hybrid, drought tolerance, yield, seed core, ripening, cohesion, variability, hybridological analysis.

INTRODUCTION

The role of oilseeds in the national economy is very significant. The oils extracted from them are the most important food product necessary for the daily life of our people. In addition, these oils play an important role in maintaining human health. In particular, the introduction of new varieties of accelerated type in production, increasing the yield of oilseeds, is one of the important resources for improving product quality. The success of the creation of such varieties depends largely on the source material. High yield success depends in many ways on how the raw materials are used. Selection of agricultural crops, including sunflower, uses simple and complex methods of achieving wide variability in valuable traits for the farm and new forms. Regardless of how the hybridization process is carried out, new plastic genotypes will emerge that can adapt and change to new living conditions as a result of genetic modification. Hybridization and selection is one of the main artificial methods of creating a new

varieties, and its success will largely depend on the genotype of the selected mixing methods and starting materials. Due to limited water resources in Uzbekistan and the shortage of water in the region in recent years, the creation of drought-resistant varieties of sunflower is one of the main directions of genetics and selection of sunflower

According to D.T.Abdukarimov, T.E.Ostanakulov and M.K. Lukov [1], the yield of sunflower depends on the productivity of individual baskets and the number of plants per hectare. The productivity of a separate basket is determined by the number of seeds (pistachios) in it and the mass and weight of each seed. Here the amount of output of the seed core is of great importance. This figure depends on the output of the seed coat from the total mass. A 10% increase in the seed kernel (core) - leads to an increase in the amount of fat by 6-7%.

According to M.Amanov, A.Rustamov [2], in the flowering phase of sunflower, after the fertilization process, a number of physiological and



biochemical processes take place until the seed is fully mature. The period of complete formation of the seed consists of two stages, the first of which is the period of seed growth lasting 14-16 days. During this period, the nucleus of the seed is formed. Then in the second stage the accumulation of carbohydrates, proteins and fats of the main organic compounds from the seeds takes place in 20-25 days. The physiological maturation of the seed is characterized by the accumulation of dry matter in it and a decrease in moisture to 35%.

According to R.Yu. Aliqulov, Sh.M. Khaldarov [3], one of the most important indicators of plant water balance is the total amount of water in the leaves.

Drought tolerance of varieties is the ability to withstand a lack of moisture in the soil, without drastically reducing their productivity and crop quality. At the same time, it is currently theoretically and practically important to study the specific genotypic susceptibility of new varieties of sunflower to different water regimes, including water scarcity conditions, and to increase the resilience potential of newly created varieties in their adaptive selection.

Taking into account the above, we study the basic physiological parameters to withstand water shortages in the natural soil-climatic conditions of Karakalpakstan through simple and complex hybridization methods in different irrigation schemes. we aimed to recommend their work.

RESEARCH METHODS

The research was conducted in the laboratory "Breeding and seed production of oilseeds" in the experimental farm of the Karakalpak Agricultural Research Institute.

The experiments began in 2019 and compared the variability, heredity, and scale of variability of some valuable farm traits in the generation of biological seedlings of simple and complex hybrids in the context of alternative water supply and water scarcity with hybridological analysis of parental forms. 50 plants from each of the varieties F_1 - F_2 - F_3 , hybrid combinations were studied. In field experiments, important physiological parameters of plant water metabolism were determined by the method of total water content in the leaves:

The dominance coefficient in G_1 hybrids is given in G.M.Veil and R.E.Atkins work, calculated according to the formula S.Wright [5].

$$hp = \frac{F_1 - MR}{R - MR}$$

hp - dominance coefficient;
 F_1 - the arithmetic mean of the hybrid sign;
 MR - the arithmetic mean of both parental form symbols;

R - the arithmetic mean of the best parent form sign.

The results obtained from the experiments show that B.A. Dospekhov [4] carried out statistical processing. In this case, the indicators obtained for each character were analyzed by variance, ie the reliability of differences between varieties and hybrids was determined by the Fisher criterion (F_1), the total error of the experiment S_x , the error of mean differences S_d and the smallest difference (EKF) 95%.

Water scarcity of sunflower varieties, ridges or hybrids, i.e. the degree of susceptibility to a model drought on a given character, the coefficient of resilience (Kmos.) Is as follows S. A. Ebarhart is evaluated by definition according to the W.A. Russell formula:

$$Kmos\% = \frac{(X_1 \cdot 100)}{X_2} - 100\%$$

here the x_1 is the water shortage indicator of the sign, the X_2 is the water supply indicator of the sign. During the ripening of sunflowers baskets were selected and individual selections for each hybrid combination

RESEARCH RESULTS AND THEIR ANALYSIS

In our experiments, the total amount of water in the leaves of sunflower varieties and their hybrids in the conditions of optimal water supply (optimal background) in the flowering-harvesting phase was 70-72% of soil moisture compared to ultimate field moisture capacity (UFMC), and 48-50% in the background of modeled drought. the total amount of water in the leaves of sunflower plants was studied simultaneously in the plants. In the group of sunflower varieties identified under optimal water conditions, the highest total amount of water in the leaves was recorded in the foreign Jant lower variety (79.1%). This variety and Luchaferul and S-NS-N-2011g varieties did not differ significantly from each other in terms of character, and the lowest water content in the leaves was detected in Tels (76.3%) cultivars, and this variety differed reliably from all other varieties in Table 1.



Table 1
Total water content, dominance (hr) and flexibility (Kmos.) Coefficients in the leaves of sunflower varieties and F₁- F₂- F₃ plants

T/ p	Varieties and hybrid combinations	First generation F ₁					Second generation F ₂			Third generation F ₃		
		Optimal background (%) (soil humidity UFMC relatively 70-72%)	hp	Modeled background (%) (Soil humidity UFMC relatively 48-50%)	hp	Kmos, %	Optimal background (%) (soil humidity UFMC relatively 70-72%)	Modeled background (%) (Soil humidity UFMC relatively 48-50%)	Kmos, %	Optimal background (%) (soil humidity UFMC relatively 70-72%)	Modeled background (%) (Soil humidity UFMC relatively 48-50%)	Kmos, %
1.	KK-1	72,4±0,3	-	70,5±0,3	-	-2,62	73,0±0,3	72,3±0,4	-0,95	75,2±0,1	73,4±-0,1	-2,39
2.	KK-60	74,4±0,3	-	73,2±0,2	-	-1,61	74,6±0,7	73,9±0,2	-0,93	74,3±0,2	73,9±0,2	-0,54
3.	Luchaferul	78,2±0,2	-	75,6±0,3	-	-3,32	78,5±0,5	75,3±0,3	-4,07	77,5±0,3	75,9±0,5	-2,06
4.	Tels	69,8±0,3	-	68,6±0,4	-	-1,72	70,4±0,3	68,8±0,3	-2,27	73,6±0,3	72,9±3,0	-0,95
5.	S-Alstor	73,6±0,3	-	72,2±0,4	-	-1,90	72,3±0,2	71,8±0,5	-0,69	75,5±0,3	72,3±0,3	-4,49
6.	Jant lower	79,1±0,3	-	75,2±2,1	-	-5,17	75,6±0,04	72,3±0,1	-4,36	78,8±0,3	75,3±0,1	-4,44
7.	C-HS-H-2011г	78,8±0,4	-	73,3±0,5	-	-6,34	81,2±0,2	76,9±0,4	-5,29	78,4±0,3	77,0±0,3	-1,78
8.	Luchaferul x KK-1	76,6±0,3	1,8	72,9±0,4	0,6	-4,83	77,4±0,4	75,6±0,3	-2,32	77,2±0,3	75,3±0,1	-2,46
9.	Tels x KK-1	75,7±0,1	-0,1	74,6±0,7	0,1	-1,45	77,1±0,3	74,6±0,7	-3,24	76,8±0,2	75,2±5,8	-2,08
10.	S-Alstor x KK-1	79,0±0,2	0,3	75,2±0,5	0,9	-4,81	79,0±0,1	75,7±0,6	-4,18	77,5±0,3	76,6±0,3	-1,16
11.	C-HS-H-2011г x KK-1	76,4±0,3	1,2	74,9±0,7	1,4	-1,96	80,0±0,1	76,6±0,5	-4,25	75,7±0,2	73,9±0,5	-2,37
12.	Jant lower x KK-1	76,8±0,4	-3,0	73,4±0,3	-2,6	-4,42	78,0±0,3	76,5±0,1	-1,92	77,4±1,6	75,7±0,3	-2,19
13.	Сор Голлипс x KK-1	75,4±0,3	-0,9	73,2±0,2	-1,0	-1,88	76,6±0,4	73,6±0,2	-3,91	74,3±0,2	72,3±0,2	-2,69
14.	Ак-12/95 x KK-1	74,6±0,3	0,6	72,2±0,4	0,04	-3,21	72,3±0,2	71,0±0,5	-1,79	75,5±0,3	73,3±0,3	-2,91
15.	F ₁ (Jant lower x KK-1) x F ₁ (Ак-12/95 x KK-1)	78,9±0,2	1,9	77,4±0,2	2,6	-1,90	77,2±-7,0	76,1±0,3	-1,42	76,7±0,3	75,3±0,1	-1,82
16.	F ₁ (C-HS-H-2011г. x KK-1) x F ₁ (S-Alstor x KK-1)	79,9±0,4	1,3	76,9±0,5	-1,0	-3,75	77,7±11,0	77,1±0,1	-0,77	78,0±0,1	76,9±0,4	-1,41
17.	F ₁ (Сор Голлипс x KK-1) x F ₁ (Tels x KK-1)	77,6±0,5	0,4	76,5±0,3	1,8	-1,42	78,0±1,5	76,4±0,2	-2,05	80,0±0,1	78,9±0,3	-1,37



In normal F_1 hybrids of varieties, the highest performance on this trait was in the combination of S-Alstor x KK-1 (79.0%), Luchaferul x KK-1 (76.6%) and Jant lower x KK-1 (46.8%), with a relatively low performance. and S-NS-H-2011g x KK-1 and Tels x KK-1 hybrid combinations (76.4% and 75.7%, respectively). In the combination of F_1 (S-Alstor x KK-1) of the Jant lower and Tels varieties, which have the highest and lowest values of the total amount of water in the leaves, the marking index was 79.0%, and the dominance process (hp) was 0.3. showed an incomplete predominance of the high-yielding variety in the hybrid character trait. F_1 (Jant lower x KK-1) of KK-60, KK-1 and S-Alstor sunflower varieties (total water content in leaves 72.4%, 73.6% and 72.4%, respectively) with close relative to each other in the hybrid combination was 76.8%, and the predominance was $hr = -3.0$, i.e., in this combination, the sign of total water content in the leaves was inherited in a state of negative heterosis.

Inheritance of characters in the case of positive heterosis with predominance was found to be in combinations of F_1 (Luchaferul x KK-1) and F_1 (S-NS-H-2011g x KK-1) (hp 1,8 and 1,2, respectively). In the second generation, these F_2 (Luchaferul x KK-1) and F_3 (S-NS-H-2011g x KK-1) hybrid combinations accounted for 77.4% and 80.0%, while in the third generation, 75.3% and 73, respectively, was equal to 9%.

In the first generation of complex hybrids, the highest values for the total amount of water in the leaves are F_1 (Jant lower x KK-1) x (F_1 (Ak-12/95 x KK-1) and F_1 (S-NS-H-2011g. X KK-1) x F_1 (S-Alstor x KK-1) (79.9% in each, 78.9% in each). -1) in the hybrid combination (77.6%, respectively). In the combination of these complex hybrids F_1 (Jant lower x KK-1) x (F_1 (Ak-12/95 x KK-1), the total water content in the leaves was 79.9% and the dominance coefficient (hp) was 1.9., the inheritance of the character took place in a state of extreme dominance, as in the parental forms- simple F_1 hybrids. Another combination of complex hybrids in F_1 (Sor Gollips x KK-1) x (F_1 (Tels x KK-1) had a dominance coefficient of 0.4, ie in this hybrid the inheritance of a trait is recorded in its hybrids of its parental forms F_1 . passed in the state of incomplete dominance (hp = 0.4) of the high-performance hybrid, but not in the state of extreme dominance given. Complex hybrids ranged from the lowest in the F_2 generation to 77.2% -78.0%, respectively, and in the F_3 generation from the highest and lowest in total leaves (76.7% -80.0%). was recorded.

In all the genotypes studied in the modeled drought conditions, it was found that the total amount of water in the leaves of sunflower plants decreased to a different extent compared to the conditions of optimal water supply. In the case of water scarcity, Luchaferul (75.6%) and Jant lower (75.2%) varieties had the highest total water content in the leaves, while the Tels

variety (68.6%) had the lowest water content. In ordinary F_1 hybrids of varieties, the highest indicator of total water content in the leaves was in the combination of S-Alstor x KK-1, S-NS-H-2011g x KK-1 and Tels x KK-1 (75.2%, 74.9, respectively). % and 74.6%), while the lowest was found in the combination of Luchaferul x KK-1 (72.9%). In the combination of F_1 Luchaferul x KK-1 of Luchaferul and KK-1 varieties (75.6% and 70.5%, respectively), which differ reliably from each other in terms of total water content in the leaves of the plant, the sign index is 75.6%, while the dominance coefficient hr was 0.6, and the inheritance was intermediate. Other hybrid components close to each other in terms of sign performance in hybrids of Jant lower and KK-1 varieties (75.2% and 70.5%, respectively), ie in combination with F_1 (Jant lower x KK-1), the sign index is 73.4% hp while -2.6, i.e., in this case the inherited plants were completely dominated by the KK-1 variety, which had less water content in the leaves. In complex F_1 hybrids in conditions of water scarcity in the soil, the highest values of the total water content of the leaves in the combinations F_1 (Jant lower x KK-1) x (F_1 (Ak-12/95 x KK-1) are 77.4%, respectively, and the lowest values are 77.4%. F_1 (S-NS-H-2011g. X KK-1) x F_1 (S-Alstor x KK-1) and F_1 (Sor Gollips x KK-1) x F_1 (Tels x KK-1) in combinations (76 respectively), 9% and 76.5%, respectively. Combinations of simple F_1 hybrids inherited in a state of over-predominance of the total water content mark on plant leaves are complex F_1 (In the hybrid of rim lower x KK-1) x F_1 (Ak-12/95 x KK-1), the sign index was 77.4%, and the dominance coefficient hp was 2.6. The rim showed that the lower x KK-1 simple hybrid did not prevail. While the simple hybrids F_1 are $hr = -1.0$ in Sor Gollips x KK-1 and $hp = 0.1$ in Tels x KK-1, the complex F_1 (Sor Gollips x KK-1) x F_1 (Tels) of these two hybrids x KK-1 in the combination was $hp = 1.8$, ie the trait under study was inherited in a state of positive predominance, in contrast to the parent forms - ordinary F_1 hybrids. In the F_1 generation of ordinary hybrids to the lowest index (71.0% -76.6%, respectively) and in the F_3 generation to the highest and lowest values of total water content in the leaves (72.3% -76.6%) was found to be in the range.

CONCLUSION

In general, the total amount of water in the leaves of plants in conditions of water scarcity in the soil relative to the water regime decreased by 1.6-6.3% in varieties, 1.4-4.8% in simple hybrids F_1 and 1.4-3.7% in complex hybrids F_1 . In the second-generation cultivars studied, it decreased by 0.9-5.3%, in simple F_1 hybrids by 1.8-4.2%, and in complex F_2 hybrids by 0.8-2.0%. In the third-generation cultivars studied, it decreased by 0.9-4.5%, in simple F_3 hybrids by 1.2-2.5%, and in complex F_2 hybrids by 1.4-1.8%. This indicates that the total amount of water in the leaves of



plants depends not only on the conditions of water supply, but also on the genotypic composition. The results showed that this trait is inherited differently in simple and complex F₁, F₂ and F₃ hybrids under different water regime conditions, with F₁ hybrid combinations changing depending on the dominance coefficients and water supply conditions in hp as well as the composition of the parent forms of hybrids.

LIST OF USED LITERATURE

1. *Abdukarimov D.T., Ostanakulov T.E., Lukov M.K. Breeding and Seed Workshop. // Zarafshan Publishing House. Samarkand, 1993. 150 p.*
2. *Amanova M., Rustamov A. Capital varieties of sunflower. // Journal of Agriculture of Uzbekistan. № 5. 2004. 24 p.*
3. *Alikulov R. Yu., Xaldarov Sh.M., Samiev X.S. Utochnenie formula vodopotrebleniya xlopchatnika. //Tez.dokl. I-syezda fiziologov rast. Uzbekistan. - Tashkent, 1991. -S. 98.*
4. *Dospexov B.A. Methodology of field opyta. M.: "Agropromizdat", 1985. p. 251.*
5. *Abdul Djalil Hassan Muhammad Al Harani. Effektivnost parnoy i slozhnoy gibridizatsii v uluchshenii selektsionno - tsennyx priznakov xlopchatnika: Avtoref. dis. kand. s / x. nauk. - Tashkent, 1995. - 19 p.*