

Avtonomov Victor Alexandrovich

Doctor of Agricultural Sciences Sciences, Professor, Head.the laboratory

Alimova Zarina Muzaffarovna

doctoral student (Research Institute breeding, seed production and agrotechnology
cotton cultivation) **Ochildiev Nazhmiddin Narbayevich.,**

doctor Philosophy (PhD), Head.the laboratory

Chorieva Yulduz Panzhievna

M.N.S., Junior researcher (Research Institute fine-fiber cotton, Uzbekistan)

УДК 633.511.631.523.633.51:575.23:581.167

**VARIABILITY, INHERITANCE AND HERITABILITY OF THE
"LENGTH OF THE GROWING SEASON" TRAIT IN
GEOGRAPHICALLY REMOTE, LINEAR-VARIETAL HYBRID
COMBINATIONS F₁ -F₃**

The signs that determine the possibility of introducing cotton growing in Uzbekistan are precocity, which is especially important in the soil and climatic conditions of the Republic of Uzbekistan, since, as a rule, late-ripening varieties cannot realize their potential due to an insufficient amount of effective temperatures. Based on the analysis of the results of laboratory studies, the following conclusions should be drawn: - among the lines used in hybridization as maternal forms, L-175/276 and BSG-455-56/07 should be distinguished, in which, respectively, the average value of the analyzed trait is equal to 121 and 120 days; - judging by the magnitude of the dominance index (hp), the effect of complete dominance has been established in three hybrids. The heterosis effect was established in six hybrids; - the value of the heritability coefficient (h²) in F₂ hybrids ranges from 0.84 in the BSG-455-56/07 x Namangan-102 hybrid to 0.96 in the NSHE-19/06khnamangan-34 hybrid; - the value of the heritability coefficient in F₃ hybrids ranges from 0.84 in the hybrid L-588 x Namangan-102 to 0.94 in the hybrid L-2007 x Namangan-102, which indicates that the trait is inherited at a high level, which means that, starting with F₃, separate families with a low value of the analyzed value should be distinguished a feature that is important from a breeding point of view.

Key words cotton, *G.hirsutum* L., fiber harvest,, hybrid, selection, variety, line

INTRODUCTION

The main problem in the selection of cotton varieties for Uzbek breeders is still an increase in fiber yield per unit area in optimal time, and Uzbekistan is located in the north of the world cotton crop, therefore, an equally important and urgent problem is the accelerated creation and introduction into production of ultra-ripe cotton varieties combining ultra-ripe, then the rate of yield with high fiber quality and yield (Abdullaev, 2005; Abdullaev, Klyat, Rizayeva, 2005, Abzalov, 2005, Avtonomov, Umbetaev, Huseynov, 2006, Avtonomov, 2007, Ganiev, Nabiev, Hegai, 2005, Kakharov, 2005). Currently, the method of geographically distant hybridization has gained a strong place in expanding the range of variability of traits in splitting generations and selecting valuable families and lines, with the aim of further elaboration in the breeding process. The purpose of the study is to establish a number of genetic patterns of variability, inheritance and heritability in F₁-F₃ hybrids, in order to identify selectively significant ones. Based on the problem being

solved and the purpose of the research, the following tasks are defined: - study of the range of variability of the "length of the growing season" trait in F1-F3 hybrids created as a result of linear varietal, geographically distant hybridization; - determination of the value of the dominance index (hp) in linear varietal hybrids F1; - determination of the heritability coefficient (h²) of the trait in F1-F3 hybrids. From the numerous reports of scientists on wild, ruderal and cultural forms, as well as the importance in the transfer of valuable properties, research shows (Abdullaev, Klyatt, 2006, Avtonomov, 1993, Kimsanbaev O.H., 2008, Saidkarimov, 2005). In this regard, there is a need to create, study and isolate new forms and hybrids to establish the variability, inheritance and heritability of the main economically valuable traits Sh.E.Namazov (2006), E.T.Mukimov, A.I.Aliyev (2006), A.E.Kurbanov, V.A.Avtonomov (2020), A.E.Ravshanov, V.A.Avtonomov (2021).

MATERIALS AND METHODS

The research was conducted at the Uzbek Scientific Research Institute of Breeding, Seed Production and Agrotechnology of Cotton Cultivation (NISSAVH) Ministry of Agriculture of the Republic of Uzbekistan. The Institute is located three km from the city.Tashkent with coordinates of 41°20 north latitude and 69°18 east longitude. The soils are typical gray soils of the slopes and foothills of the Tien Shan on forest-like loams, not saline, with deep groundwater (more than 15 m). Thus, the revealed climatic patterns of variability were confirmed from year to year. In the conditions of one year, the parents used in hybridization and F1-F3 hybrids were studied. When conducting field experiments, the agrotechnology of cotton cultivation adopted for this zone was used. Hybridization was carried out with the participation as mothers of lines created with the participation of triploid hybrids: - L-175/276, BSG-2/06, BSG-455-56/07, L-2007, NSHE-19/06, L-588 and varieties Namangan-34 and Namangan-102. All plants of F1-F2 hybrids, as well as parent varieties, were numbered by hanging labels. For each hybrid, 20-50 plants were studied in F1, 100-150 plants in F2 and parent varieties, and 30-70 plants in F3 families. The field experience was laid out in three-fold repetition, in randomized blocks. The records were carried out in parents and F1-F2 hybrids individually by plant, and in F3 by family. On the basis of experimental data , variation series were compiled according to the studied feature. The calculation of statistical indicators was carried out according to B.A.Dospekhov (1979). The value of the dominance index (hp) of F1 hybrids was determined by the formula: (Y.M.Beil, R.E.Atkins, 1965). The degree of heterogeneity of hybrid populations F2-F3 was judged by the indicator of genotypic variability – the value of the heritability coefficient (h²), calculated by the formula A.Allard (1966).

Research results

Analyzing the results of the conducted field studies, which are presented in Table 1, it was found that the minimum average value of the analyzed trait was possessed by L-175/276 and BSG-455-56/07, in which it was equal to 121 and 120 days, respectively.

Table 1

Variability, inheritance and heritability of the "length of the growing season" trait in geographically remote, linear-variety hybrid combinations

F₁ -F₃

| Grade-standart, grade-indicator, line, grade, hybrid combination | M±m DN | σ | V% | hp | h ² F ₁ /F ₂ | h ² F ₁ /F ₃ |
|--|-------------|----------|------|-----|--|--|
| C-6524-st | 126.49±0.19 | 1.3 | 1.0 | | | |
| Bukhara-102 ind | 129.85±0.32 | 1.9 | 1.5 | | | |
| L-175/276 | 121.36±0.27 | 1.7 | 1.4 | | | |
| BSG -2/06 | 123.49±0.22 | 1.8 | 1.4 | | | |
| BSG -455-56/07 | 120.64±0.33 | 2.1 | 1.7 | | | |
| L-2007 | 127.21±0.18 | 1.2 | 0.94 | | | |
| NSHE-19/06 | 129.67±0.32 | 1.9 | 1.5 | | | |
| L-588 | 127.27±0.27 | 1.8 | 1.4 | | | |
| Namangan-34 | 116.50±0.32 | 2.0 | 1.7 | | | |
| Namangan -102 | 117.94±0.24 | 1.7 | 1.4 | | | |
| F ₁ Л-175/276x Namangan - 34 | 121.48±0.27 | 1.8 | 1.5 | 1.0 | | |
| F ₂ Л-175/276x Namangan - 34 | 122.70±0.33 | 3.99 | 3.25 | | 0.79 | |
| F ₃ Л-175/276x Namangan - 34 | 119.59±0.77 | 6.34 | 5.30 | | | 0.92 |
| F ₁ БСГ-2/06x Namangan - 34 | 126.00±0.21 | 1.8 | 1.4 | 1.7 | | |
| F ₂ БСГ-2/06x Namangan - 34 | 123.84±0.42 | 4.73 | 3.82 | | 0.85 | |
| F ₃ БСГ-2/06x Namangan - 34 | 121.13±0.65 | 5.42 | 4.47 | | | 0.88 |

| | | | | | | |
|---|-------------|------|------|-----|------|------|
| F1 БСГ-455-56/07x Namangan -34 | 124.21±0.22 | 1.6 | 1.3 | 2.7 | | |
| F ₂ БСГ-455-56/07x Namangan -34 | 121.99±0.34 | 4.09 | 3.35 | | 0.79 | |
| F ₃ БСГ-455-56/07x Namangan -34 | 121.45±0.60 | 4.95 | 4.07 | | | 0.85 |
| F1 Л-2007x Namangan -34 | 124.75±0.20 | 1.5 | 1.2 | 0.5 | | |
| F ₂ Л-2007x Namangan -34 | 120.25±0.47 | 6.02 | 5.00 | | 0.93 | |
| F ₃ Л-2007x Namangan -34 | 120.74±0.70 | 5.74 | 4.75 | | | 0.92 |
| F1 НШЭ-19/06x Namangan -34 | 127.18±0.33 | 1.9 | 1.5 | 0.6 | | |
| F ₂ НШЭ-19/06x Namangan -34 | 128.99±0.78 | 9.30 | 7.21 | | 0.96 | |
| F ₃ НШЭ-19/06x Namangan -34 | 121.18±0.62 | 5.13 | 4.24 | | | 0.85 |
| F1 Л-588x Namangan -34 | 127.54±0.25 | 1.7 | 1.3 | 1.0 | | |
| F ₂ Л-588x Namangan -34 | 123.07±0.50 | 6.07 | 4.93 | | 0.91 | |
| F ₃ Л-588x Namangan -34 | 121.00±0.63 | 5.18 | 4.28 | | | 0.87 |
| F1 Л-175/276x Namangan - 102 | 123.82±0.27 | 1.8 | 1.4 | 2.4 | | |
| F ₂ Л-175/276x Namangan - 102 | 123.25±0.26 | 3.30 | 2.68 | | 0.73 | |
| F ₃ Л-175/276x Namangan - 102 | 120.87±0.73 | 6.05 | 5.01 | | | 0.92 |
| F1 БСГ-2/06x Namangan - 102 | 127.39±0.24 | 1.9 | 1.5 | 2.4 | | |
| F ₂ БСГ-2/06x Namangan - 102 | 122.98±0.45 | 5.74 | 4.66 | | 0.90 | |
| F ₃ БСГ-2/06x Namangan - 102 | 120.09±0.72 | 6.00 | 5.00 | | | 0.91 |

| | | | | | | |
|--|-------------|------|------|-----|------|------|
| F1 БСГ-455-56/07x Namangan -102 | 124.21±0.22 | 1.6 | 1.3 | 3.7 | | |
| F ₂ БСГ-455-56/07x Namangan -102 | 121.78±0.39 | 4.55 | 3.74 | | 0.84 | |
| F ₃ БСГ-455-56/07x Namangan -102 | 120.40±0.74 | 6.22 | 5.16 | | | 0.91 |
| F1 Л-2007x Namangan -102 | 124.75±0.20 | 1.5 | 1.2 | 0.9 | | |
| F ₂ Л-2007x Namangan -102 | 121.83±0.38 | 5.06 | 4.15 | | 0.91 | |
| F ₃ Л-2007x Namangan -102 | 120.43±0.75 | 6.26 | 5.20 | | | 0.94 |
| F1 НШЭ-19/06x Namangan -102 | 129.88±0.45 | 2.1 | 1.6 | 1.0 | | |
| F ₂ НШЭ-19/06x Namangan -102 | 121.05±0.41 | 5.51 | 4.55 | | 0.87 | |
| F ₃ НШЭ-19/06x Namangan -102 | 121.65±0.59 | 4.89 | 4.02 | | | 0.84 |
| F1 Л-588x Namangan -102 | 130.33±0.21 | 1.7 | 1.3 | 1.6 | | |
| F ₂ Л-588x Namangan -102 | 126.69±0.45 | 5.84 | 4.60 | | 0.91 | |
| F ₃ Л-588x Namangan -102 | 121.09±0.64 | 5.33 | 4.40 | | | 0.89 |

Analyzing the average values of the "length of the growing season" feature in F1 hybrids, it can be seen that it ranges from 120.4 days in L-175/276hNamangan-34 to 130.3 in L-588hNamangan-102. When analyzing the values of the dominance index (hp), it was found that its value in F1 hybrids ranges from 0.5 in L-2007hNamangan-34 to 3.7 in BSG-455-56/ 07khnamangan-102. At the same time, the effect of complete dominance was established in three of them. Six have a heterosis effect. Analyzing the value of the heritability coefficient (h²) in F2 hybrids, it can be seen that the trait "length of the growing season" is inherited at a high level. At the same time, the value of the heritability coefficient in F2 hybrids ranges from 0.79 in L-175/276 x Namangan-34 hybrids to 0.96 in the NSHE-19/06khnamangan-34 hybrid. This position indicates that the trait is inherited at a high level, which means that, starting from F2, individual plants can be isolated placed in the left part of the variation series with a small value of the trait – less than 120 days, which is important from a breeding point of view. Analyzing the value of the heritability coefficient in F₃ hybrids, it can be seen that the trait "length of the growing season"

is inherited at a high level. At the same time, the value of the heritability coefficient in F₃ hybrids ranges from 0.84 in the NSHE-19/06khnamangan-102 hybrid to 0.94 in the L-2007khnamangan-102 hybrid. This situation indicates that the trait "length of the growing season" is inherited at a high level, which means that, starting from f₃, separate families with a low value of the trait should be distinguished. Based on the analysis of the results of the conducted field studies on the basis of the "length of the growing season", the following conclusions should be drawn: - among the lines used in hybridization as maternal forms, L-175/276 and BSG-455-56/07 should be distinguished, in which, respectively, the average value of the trait is 121 and 120 days; - judging by the magnitude of the dominance index (hp), the effect of complete dominance has been established in three hybrids. The heterosis effect was established in six hybrids; - the value of the heritability coefficient (h²) in F₂ hybrids ranges from 0.84 in the BSG-455-56/07 x Namangan-102 hybrid to 0.96 in the NSHE-19/06khnamangan-34 hybrid; - the value of the heritability coefficient in F₃ hybrids ranges from 0.84 in the hybrid L-588 x Namangan-102 to 0.94 in the hybrid L-2007hNamangan-102, which indicates that the trait is inherited at a high level, which means that, starting with F₃, separate families with a low value should be distinguished the analyzed trait, which is important from a breeding point of view.

REFERENCES

1. Abdullaev A.A. Historical aspects of the evolution of precocity of cotton.//Materials of the international scientific and practical conference - Tashkent: Fan, 2005. - pp. 5-9.
2. Abdullaev A.A., Klyat V.L., Rizaeva S.M. Evolutionary and historical aspects of natural and artificial selection to increase the precocity of cotton. //Materials of the international scientific and practical conference - Tashkent: Fan, 2005. - pp.9-10.
3. Abdullaev A.A., Klyat V.L., Rizaeva S.M., Ernazarova Z.A. Kuryazov Z.B., Arslanov D.M. The possibilities of using wild relatives of cotton to improve and create cultivated varieties. "The state of cotton breeding and seed production and prospects for its development", //Materials of the international scientific and practical conference - Tashkent. 2006. - pp.5-8.
4. Abzalov M.F. Evolutionary and breeding aspects of precocity and adaptability of cotton in the research of academician S.S.Sadykov. //Materials of the international scientific and practical conference - Tashkent: Fan, 2005 - pp.12-13.
5. Avtonomov V.A. Genetic aspects of breeding disease-resistant cotton varieties with increased fiber yield and quality. The author's abstract. diss... Doctor of Agricultural Sciences - Tashkent, 1993. - 64 p.
6. Avtonomov V.A., Umbstaev I.A., Huseynov I.R. Genetic analysis of signs determining the precocity of cotton species ("The state of cotton breeding and seed production and development prospects" //Materials of the international scientific and practical conference - Tashkent, 2006. - pp.34-36
7. Avtonomov, Vic.A. Intersort hybridization, in the creation of new varieties of cotton species. -Tashkent: Mehridare, 2007. - 120 p.
8. Ganiev U.M., Nabiev S.M., Hegai E.V. Study of the precocity of the September raw cotton harvest of the initial forms and their F₁ hybrids in different

conditions of water availability. //Materials of the scientific and practical international conference - Tashkent: Fan 2005,. - pp.101-103.

9. Dospekhov B.A. Methodology of field experience. M.Kolos. 1979

10. And Kahkharov.T. Correlation of precocity with economically valuable traits in intraspecific geographically distant hybrids of cotton with F2.You'll see. //Materials of the international scientific and practical conference - Tashkent: Fan 2005,. - pp.109-110.

11. Kimsanbaev O.H. Cotton breeding for early maturity, yield and fiber quality. The author's abstract. Diss... doc. agricultural sciences. -Tashkent. 2008. - 42 p.

12.Mukimov E.T., Aliev A.I. Combinational ability in the precocity of lines obtained by interspecific hybridization. "The state of cotton breeding and seed production and development prospects" //Materials of the international scientific and practical conference - Tashkent, 2006. - pp. 108-110.

13.Namazov S.E. Interspecific hybridization is an effective way to improve the productivity of cotton. "The state of cotton breeding and seed production and development prospects" //Materials of the international scientific and practical conference - Tashkent, 2006 – pp.110-111.

14. Saidkarimov A.T. Wilt tolerance of precocious introgressive lines of the genetic collection of cotton // proceedings of the International Scientific Conference "Evolutionary and breeding aspects of precocity and adaptability of cotton and other crops", dedicated to the 95th anniversary of the birth of academician S.S. Sadykov. Tashkent: Publishing house "Fan" of the Academy of Sciences of Uzbekistan, 2005. pp. 130-132.

15. Kurbonov A.E., Avtonomov V.A. Creation of cotton varieties resistant to pathogens. 2020 International Book Market Strvice Ltd, member of the OmniScriptum Publishing Group, 17 Meldrum Street, Bo Bassin, 71504.

16. Равшанов А.Э., Автономов В.А. Монография. 2021 International Book Market Strvice Ltd, member of OmniScriptum Publishing Group 17 Meldrum Street, Beau Bassin 71504. 155 с.

17. Allard R.W. Principles of Plants Breeding, John Willey, Sons. New-York-London-Sidney, 1966.

18. Beil G.M., Atkins. Inheritance of quantitive characters in grain sorgum //Jowa State Journal of Science. 1965.