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 INHERITANCE OF MORPHOLOGICAL TRAITS IN F₁-PLANTS
OF SPECIES AFRO-ASIAN COTTON
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 НАСЛЕДОВАНИЕ МОРФОЛОГИЧЕСКИХ ПРИЗНАКОВ F₁-РАСТЕНИЙ ВИДОВ
АФРОАЗИАТСКОГО ХЛОПЧАТНИКА
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ABSTRACT

In this article was given that it was found that the inheritance of such morphological traits as: «height of the first fruit branch (hs)», «number of sympodial branches», «height of the main stem» in F₁ plants in combinations (subsp. *africanum* x subsp. *frutescens*, subsp. *pseudoarboreum* x subsp. *frutescens*, subsp. *pseudoarboreum* f. *harga* x subsp. *frutescens*, subsp. *euherbaceum* («A-338») x subsp. *frutescens*), proceeded on the basis of a general hereditary pattern. It was observed that the trait prevailed in most combinations, that is, in the youngest species and forms that participated as a mother plant. Combinations with high indicators for the trait can be used in further studies, having a positive effect on the yield of cotton.

ABSTRACT

В данной статье было указано, что установлено наследование таких морфологических признаков, как: «высота первой плодовой ветви (hs)», «количество симподиальных ветвей», «высота главного стебля» у растений F₁ в комбинациях (subsp. *africanum* x subsp. *frutescens*, subsp. *pseudoarboreum* x subsp. *frutescens*, subsp. *pseudoarboreum* f. *harga* x subsp. *frutescens*, subsp. *euherbaceum* («A-338») x subsp. *frutescens*), протекал на основе общего наследственный образец.

Было замечено, что признак преобладал в большинстве комбинаций, то есть у самых молодых видов и форм, которые участвовали в качестве материнского растения.

Комбинации с высокими показателями по признаку могут быть использованы в дальнейших исследованиях, что положительно скажется на урожайности хлопчатника.

Keywords: cotton plant, species, intraspecific, subspecies, wild, ruderal, tropical, cultivated, morphology.

Ключові слова: хлопчатник, вид, внутривидовой, подвид, дикий, рудеральный, тропический, культурный, морфология.

Introduction

Height of the first fruit branch (hs): In cotton, the height of the first fruit branch (hs) is one of the main impact that determine the yield of plants. This trait supports that the low location in the stem of the height of the first fruit branch (hs) ensures high early maturity of the plant.

From the buds formed in the axils of the leaves of the main stem, branches of cotton develop. At the first time, stems are not formed in the axils of the first 2-3 leaves, since they remain during the break. Only in some cases such buds germinate, several underdeveloped stems with small leaves may be forming. In rare cases, stems grow from the seed-leaf armrest.

Such branches are formed before or after the appearance of the first true leaves when the growth tips of the buds of the main stem are damaged. Usually, two types of branching are formed in cotton: a growth branch, monopodial branches or monopodia and fruit branches, sympodial branches or sympodia. The growing branch grows from the lower part, and the fruit branch usually develops from the upper of branch grows, from the following axils of the leaves of the main stem [7].

Sources and research methods

As a source of research, the existing in the gene pool of the laboratory "Experimental polyploidy and phylogeny of cotton" of the Institute of Genetics and Experimental Biology of Plants of the Academy of Sciences Republic of Uzbekistan, listed in his published monograph by FM Mauer [1, 4] forms of *G. herbaceum* L.: wild - subsp. *africanum* (Watt) Mauer, ruderal - subsp. *pseudoarboreum* Mauer, subsp. *pseudoarboreum* f. *harga*, tropical - subsp. *frutescens*, cultural - subsp. *euherbaceum* Mauer («A-338»).

Research methods: comparative morphology, intraspecific hybridization, genetic and statistical analysis [2, 3, 9].

Results of the study

Proceeding from this, to study the trait «Height of the first fruit branch (hs)» as a source of research, we used the intraspecific varieties of *G. herbaceum* L., where their value averaged 6,0-14,4 [6]. Among the parental forms, the highest rate is observed in the subspecies subsp. *africanum* is located on average at 14,4 nodes (Fig. 1, 2).

Figure 1. «The height of the first fruit branch (hs)» in varieties of the species *G. herbaceum* L.

Figure 2. «Height of the first fruit branch (hs)» in parental forms and intraspecific F₁-plants obtained with their participation

A low index for this trait was observed in the subspecies *subsp. euherbaceum* («A-338») located on the middle - 6,0 node.

On the basis of the interbreeding of varieties of the species *G. herbaceum* L., it was found that in F₁ plants the trait «Height of the first fruit branch (hs)», on average, falls on 6,4-8,8 nodes.

F₁ plant obtained by crossing wild and tropical subspecies in a combination of *subsp. africanum* x *subsp. frutescens* was distinguished by a high score for the «Height of the first fruit branch (hs)». It was noted that her «Height of the first fruit branch (hs)» accounted for an average of -8,8 nodes.

The dominant coefficient of this combination is $hp = 0,87$, with incomplete dominance, intermediate inheritance manifested itself. Dominance was noted on the basis of the subspecies, which participated as the paternal parental form. A low indicator with an average location of 6,4 nodes is highlighted in the subspecies, obtained on the basis of crossing of cultivated and tropical subspecies *subsp. euherbaceum* («A-338») x *subsp. frutescens*. The dominant coefficient of this combination is $hp = 0,67$, intermediate inheritance of incomplete dominance was observed. It was noted that in the analysis of this combination for the trait «Height of the first fruit branch (hs)» was superior to the subspecies that took part as a mother plant.

In conclusion, we can say that the trait «Height of the first fruit branch (hs)» in F₁ plants obtained in a combination of cultivated and tropical forms of *G. herbaceum* L. has the most positive indicators and can be used as a starting material in subsequent studies.

Number of sympodial branches

The sympodial branch in cotton is one of the main morphological traits, the number of which can have a positive and negative effect on the productivity of the

plant. Usually, in extremely early maturing cotton species, branches of the secondary order grow only in the form of a fruit branch. From the point of view of the nature of formation and morphological structure, the fruit branch differs sharply from the growth branch. Unlike the main stem, the fruit branch forms a wider angle, this angle is often right. The interval of the first node of the fruit branch grows from the bud of the leaf sinus of the main stem, and stops growing after the emergence of the flower bud at the top of the branch. At the end of the first node, a leaf grows between the flower bud and the node. After the formation of one bud in the leaf sinus, a second internode is formed, being a continuation of the previous internode, it ends with a flower bud from which the leaf also protrudes and continues in this order. Thus, when a formed branch appears from several buds that have appeared in a row, it means that each intermediate node of the formed fruit branch is considered a product of the development of some buds. The fruit branch is called "sympodial" due to this nature of development. Sympodial is a Greek word meaning multi-stage [8].

Proceeding from this, we used as a source of research the intraspecific varieties of *G. herbaceum* L. according to the trait «located node of the first sympodial fruit branch (hs)», where the average value was 15,4-30,6 [6]. The highest score among parent forms is *subsp. pseudoarboreum* f. *harga*, belonging to the ruderal subspecies, averaging -30,6 pcs. (fig. 3).

A low index in the wild subspecies *subsp. africanum* - «the number of sympodial branches» averaged -15,4.

Among F₁ plants, the highest index for the trait «number of sympodial branches» was observed for the combination of *subsp. euherbaceum* («A-338») x *subsp. frutescens*, obtained by crossing the cultivated and tropical subspecies.

Figure 3. «Number of sympodial branches» in intraspecific varieties of the species *G. herbaceum* L.

It was noted that with such a combination, the «number of sympodial branches» averages 28,6 pieces (units). Its dominance coefficient is $h_p = 0,83$, there is an intermediate inheritance of incomplete dominance.

The superiority of the subspecies (subsp. *frutescens*), which participated according to the paternal form according to the trait, was observed (Fig. 4).

Figure 4. «Number of sympodial branches» in parental forms and in F_1 -plants obtained with their participation

The combination of subsp. *pseudoarboreum* x subsp. *frutescens*, obtained by crossing ruderal and tropical subspecies, is found to be low and located on average at 16.4 knots. His dominance coefficient was $h_p = -0,85$, his intermediate heritability of incomplete dominance was observed. When analyzing the trait «number of sympodial branches» of this combination, the dominance of the subspecies (subsp. *frutescens*), which participated as the paternal form, was noted.

As a result of the studies, it was found that high indicators of the trait «number of sympodial branches» have a positive effect on the yield of cotton, which can be used as a useful trait for further research.

Height of the main stem

The main stem of cotton consists of two parts: 1. The lower part is the intermediate elbow (hypocotylus), which is located between the root neck and the seed-leaf (the first true leaves); 2. The upper part - the upper part of the stem above the part where the seed leaves are located - is called the upper part of the seed plants (epicotyl). The first true leaves and stems are not formed under the seed-bearing elbow. Above the seed of the leaves are the first true leaves, from the axil of which a branch grows. Depending on the growth conditions, type, variety of cotton, the height varies from 70-80 to 120-140 cm, and in fine-fiber cotton it can reach up to 120-150 cm, rarely up to 200 cm [7].

The intraspecific varieties of the species *G. herbaceum* L., used as the sources of the study, on the basis of «the height of the main stem» averaged 82,6-143,6 [5]. The highest indicator among the parental forms is that of subsp. *pseudoarboreum* f. *harga* belonging to the ruderal subspecies, where the value averaged -143,6 cm (Fig. 5).

Also, low indicators of the trait «height of the main stem» were noted in the tropical subspecies subsp. *frutescens* - 82,6 cm.

It was revealed that the «height of the main stem» in F_1 plants averages 99,0-162,2 cm. A high indicator for this trait is observed when crossing ruderal and tropical subspecies subsp. *pseudoarboreum* x subsp. *frutescens*. The «height of the main stem» of these plants averages 162,2 cm.

Figure 5. «Height of the main stem» in intraspecific varieties of the species *G. herbaceum* L.

The dominance coefficient was $h_p = 14,9$, which indicated his heredity in an extremely dominant, positive state of heterosis (Fig. 6). Intraspecific F_1 plants

according to the trait, the dominance of the subspecies (subsp. *pseudoarboreum*) was observed, participating as the maternal form.

Figure 6. «Height of the main stem» of parental forms and their F_1 - plants

Combination of subsp. *africanum* x subsp. *frutescens* obtained by crossing wild and tropical subspecies has the lowest rate and the «main stem height» averaged 99,0 cm. The dominance coefficient of this combination was $h_p = -0,38$ which was observed as heritability in an incomplete dominant, intermediate state. Analysis of this combination on the basis of the

«height of the main stem» confirms the superiority of the mother form (subsp. *africanum*) over the other subspecies participating in this study.

Conclusion

As a result of the research, it was found that the inheritance of such morphological traits as: «height of the first fruit branch (hs)», «number of sympodial branches», «height of the main stem» in F₁ plants in combinations (subsp. *africanum* x subsp. *frutescens*, subsp. *pseudoarboreum* x subsp. *frutescens*, subsp.

pseudoarboreum f. *harga* x subsp. *frutescens*, subsp. *euherbaceum* («A-338») x subsp. *frutescens*), proceeded on the basis of a general hereditary pattern. It was observed that the trait prevailed in most combinations, that is, in the youngest species and forms that participated as a mother plant. Combinations with high indicators for the trait can be used in further studies, having a positive effect on the yield of cotton.

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