



MORPHOBIOLOGICAL CHARACTERISTICS OF INTROGRESSIVE HYBRIDS OF COTTON

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ABSTRACT

*In the article was presented the results of estimation on morphologic, biologic and an economic value of hybrids F_1 obtained on the basis of interspecific crossings of cultivated (*G.hirsutum* L.) and wild (*G.arboreum*, *G.australe*, *G.nelsonii*) cotton species with use of the polyploidy method. Obtained on the basis of intergenomic crosses the new synthetic complex hybrid forms have in their karyoplasm potential of yield and resistance to biotic and abiotic environmental factors that have an special importance for the practical breeding as an initial material in the development of new cotton cultivars of intensive type.*

KEYWORDS: *cotton, cultivar, interspecific hybridization, experimental polyploidy, hexaploid, colchicine.*

DISCUSSION

Today, there are great opportunities to improve the efficiency of genetic and breeding research based on the search for sources with economically valuable traits and properties and the creation of rare hybrid forms with new genotypes of the cotton genus by applying methods of intraspecific and interspecific hybridization.

It is known that with the participation of representatives of tetraploid and diploid species of the genus *Gossypium* L., using methods of interspecific hybridization and experimental polyploidy, a number of scientists were able to obtain economically important agricultural diseases (*gommosis*, *fusariosis*) and sources against pests (*spider mites*, *aphids*) [1, 4-5].

S.M.Rizayeva [2-3] obtained a set of amphidiploid and hexaploid rare forms with high economically valuable characteristics on the basis of mutual hybridization of distant intergenomic species.

We conducted experimental studies on remote hybridization involving wild diploid species of the Australian continent with *G.arboreum* L. and *G.hirsutum* L.

Knotting of the box in hybrid combinations of *G.hirsutum* ssp. *euhiirsutum* (Kelajak) x (*G.arboreum* ssp. *nanking* (with white fiber) x *G.nelsonii*), (*G.arboreum* ssp. *nanking* (with white fiber) x *G.nelsonii*) x *G.hirsutum* ssp. *euhiirsutum* (Kelajak) reciprocals obtained by crossing varieties of *G.hirsutum* ssp. *euhiirsutum* with hybrids (F_1) created on the basis of interspecific hybridization of Australian and Indo-Chinese cotton species is 3,3-8,0%, the binding rate of full-fledged seeds in the box is 33,3-38,5%. And hybrid combinations of *G.hirsutum* ssp. *euhiirsutum* (Namangan 77) x (*G.arboreum* ssp. *obtusifolium* var. *indicum* x *G.australe*), *G.arboreum* ssp. *obtusifolium* var. *indicum* x *G.australe*) x *G.hirsutum* ssp. *euhiirsutum* (Namangan 77) reciprocals knotting of the box is 5,9-9,1%, knotting of full-fledged seeds in the box is 16,7-55,8% (table 1).



Table 1.
Knotting of the box and full-fledged seeds in the box during interspecific hybridization of different genomic species

Hybrid combinations	Number of crosses, pieces	Number of hybrid boxes, pieces	The percentage of the set of hybrid boxes, %	The number of seeds tied, pieces		The percentage of the set full of seeds, %
				Full	empty	
<i>G.hirsutum</i> ssp. <i>euhiirsutum</i> (Namangan 77) x (<i>G.arboreum</i> ssp. <i>obtusifolium</i> var. <i>indicum</i> x <i>G.australe</i>)	22	2	9,1	48	38	55,8
(<i>G.arboreum</i> ssp. <i>obtusifolium</i> var. <i>indicum</i> x <i>G.australe</i>) x <i>G.hirsutum</i> ssp. <i>euhiirsutum</i> (Namangan 77)	17	1	5,9	2	10	16,7
<i>G.hirsutum</i> ssp. <i>euhiirsutum</i> (Kelajak) x (<i>G.arboreum</i> ssp. <i>nanking</i> (with white fiber) x <i>G.nelsonii</i>)	30	1	3,3	9	18	33,3
(<i>G.arboreum</i> ssp. <i>nanking</i> (with white fiber) x <i>G.nelsonii</i>) x <i>G.hirsutum</i> ssp. <i>euhiirsutum</i> (Kelajak)	25	2	8,0	15	24	38,5

It should be noted that the appearance of enlargement and thickening of leaves in hexaploid hybrids, an increase in internodes and deformity of pods indicate mutational variability. On grounds of form and colour of petals, shape of bracts, parent, columns, color of anthers and pollen, the color of the fiber is dominated by the female parent. In F₁C hexaploid hybrids, as in varieties of *G.hirsutum* ssp. *euhiirsutum*, the inheritance of an anthocyanin spot at the base of the petal is noted. The intermediate nature of inheritance by morphobiological (shape and color of boxes, seed size) and many other quantitative characteristics was revealed.

Morphobiological characteristics of F₁C hexaploid hybrids (2n = 78)

F₁C *G.hirsutum* ssp. *euhiirsutum* (Namangan 77) x (*G.arboreum* ssp. *obtusifolium* var. *indicum* x *G.australe*) hexaploid hybrids (2n = 78) – erect compact form, leaves are located in medium density (figure 1).

The height of the main shoot is 85,0 cm, with weak pubescence and strong anthocyanin redness. The total number of internodes is 22. The branch is sympodial, the first sympodial branch (hs) is located on the 7-internode, monopodial branches (m) are absent, the sympodium (s) is 16 PCs. Leaves are large (11,5 x 12,3 cm), green, 3-5 palmate, toothed (thick and long teeth). The omission is weak. Nectary – 3, ovoid, colorless. The leaf petiole has a strong anthocyanin redness 14,2 cm long. Flowers are medium-sized, bell-shaped, open in an average width. The volume of the petals is 5,6 x 4,4 cm, wavy shape, bright yellow, anthocyanin spot at the base is not present. Peduncle length 1,4-1,6 cm.

Bracts-3, heart-shaped with 9-11 teeth, the length of the teeth is 0,5-2,1 cm. the Sepals are wavy, bright green, gossypal glands are located in an average density. Anthers on the stamen thread are located in an average density. The stamens and anthers are yellow. The mother column is located 0,3 cm above the stamen columns. Boxes 4-5 nest, egg-shaped, green, medium-sized. The weight of cotton in one open box is 3,9-5,8 g, the white fibers are 33,0-37,0 mm long. Seeds of medium size, weight of 1000 seeds-72,4-103,6 g. Valuable features-do not require a short day, productive, branching type 1.

F₁C *G.hirsutum* ssp. *euhiirsutum* (Kelajak) x (*G.arboreum* ssp. *nanking* (with white fiber) x *G.nelsonii*) hexaploid hybrids (2n = 78) – erect, compact form, leaves are located in medium density. The height of the main shoot is 75,0 cm, average omission, strong anthocyanin redness. The total number of internodes – 18 PCs. Branching-sympodial, the first sympodial branch (hs) is located on 5-6 internodes, monopodial branches (m) 1-2 PCs, Sympodium (s) - 12 PCs. The leaves are large (12,5 x 14,0 cm), green, 3-5 palmate, toothed (the denticles are thick and long). The omission is weak. Nectary – 3, ovoid, colorless. The leaf petiole has a strong anthocyanin redness 15,8 cm long. Flowers are medium-sized, bell-shaped, open in an average width. The volume of the petals is 4,8 x 4,7 cm, wavy, bright yellow, there is no anthocyanin spot at the base. Peduncle length 0,8-1,0 cm. Bracts-3, heart-shaped with 8-10 denticles, denticles length 0,5-1,8 cm.

The sepals are undulating, bright green in color, and the gossypole glands are located in an



average density. Anthers on the stamen thread are located in an average density. The stamens and anthers are yellow. The mother column is located 0,2 cm higher. Boxes 4-5 nest, egg-shaped, green, medium-sized. The weight of cotton in one open box

is 4,8-7,5 g, the white fibers are 33,0-36,0 mm long. Seeds of medium size, weight of 1000 seeds-120,6-131,0 g. Valuable signs - not demanding for a short day, productive, resistant to gnawing and sucking pests (figure 2).



Figure 1. F₁C *G.hirsutum* ssp. *euhirsutum* "Namangan 77" x (*G.arboreum* ssp. *obtusifolium* var. *indicum* x *G.australe*)



Figure 2. F₁C *G.hirsutum* ssp. *euhirsutum* "Kelajak" x (*G.arboreum* ssp. *nanking* (with white fiber) x *G.nelsonii*)

Thus, the studies revealed that hybrids (F₁) derived from crossing Indochina (A₂ genome) and Australian (gene) of wild diploid species of cotton plant with cultivars (AD₁ genome) of *G.hirsutum* L. interbreed very difficult or do not interbreed. The knotting rate of hybrid boxes is very low, 3,3-9,1, which shows. And the percentage of binding of full-fledged seeds in the box showed relatively high results (16,7-55,8%).

Difficult crossing of wild diploid cotton species with cultural (tetraploid) varieties, especially absolute non-crossing with participation as a mother, that is, the phenomenon of proteandria (maturation of the maternal column and stamens at different times) is probably due to their belonging to different geographical ecotypes. It should be noted that such cases between crossed species form certain genetic obstacles. The main morphobiological features of F₁C hybrids (shape and color of petals, bracts, parent columns, color of stamens and anthers, fiber color) are dominated by the maternal forms. Along with this, at the base of the petal of all studied hybrids, as in the variety *G.hirsutum* L., there are no anthocyanin spots.

New artificial complex hybrid forms obtained on the basis of intergenomic hybridization have a complex in their karyoplasm of productivity potential

and resistance to biotic and abiotic environmental factors, which will serve as a rare source material for practical selection in the creation of new varieties of intensive type of cotton.

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