Изследвания върху полските култури, 2005, Том II - 1
Field Crops Studies, 2005, Vol. II - 1

DEVELOPING OF NEW DONORS OF THE COTTON ON THE BASE OF INTERSPECIFIC HYBRIDIZATION

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Abstract

Namazov S., A.Muratov, A.Aliev, S.Boboev, 2005. Developing of new donors of the cotton on the base of interspecific hybridization

The further development of selection on improvement of cultivars should be based on improving commercial cultivars and developing of new methods of creation of forms with participation of wild species of cotton - sources of useful traits where the leading part should belong to interspecific hybridization [1-3]. In this connection, studying of genetics of interspecific hybrids of cotton directed to synthesizing of valuable recombinants with agronomic-valuable traits and using them in practical selection is actual problem. The results received during research can have essential value at developing of cultivars with wide genetic potential. However, many aspects of this important problem, in particular technique of research works with valuable recombinants, received in selection process by composite hybridization, when undesirable properties of wild species segregate during long generation are insufficiently investigated [4].

Key words: Interspecific and composite hybridization, Commercial cultivars, Diploid, tetraploid hybrids, Weight of 1 boll, Weight 1000 piece of seeds, Length of a fibre, Gin turnout, Biological nursery, Selection nursery

MATERIAL AND METHODS

Researches on interspecific hybridization, in developing of new genetic forms with useful traits and properties to selection, were begun by employees of laboratory of “Genetics and cytology of cotton” of the Uzbek scientific research institute of cotton breeding and seed production more than 30 years ago. Here were received diploid, triploid, tetraploid and hexaploid hybrids with restored fertility. On the basis backcrosses those with commercial cultivars of cotton with various expressions of agronomic valuable properties which are used as hybrids of donors are received. Lines and families distinguished on a complex positive agronomic valuable attributes, representing the certain value for their use in practical selection are allocated also.

In the research investigations as initial materials were used such as the interspecific hybrid F_{13} K-58 (G. Thurberi x G. Raimondii), the composite interspecific hybrid: F_{17}{F_3 [F_2 (G. Thurberi x G. Raimondii) x C-6037] x C-6037} and standard variety Namangan-77. All of materials were investigated in field conditions.

RESULTS AND DISCUSSIONS

The purpose of the present researches was: developing of interspecific hybrids of

cotton and synthesizing recombinants with the given traits and properties suitable for use in practical selection by crossing of wild and cultivated species of a cotton; studying of character of inheritance of useful traits in the senior generations and allocation of the best families and linear materials, on a complex of positive attributes, for attraction in selection process and for crossing as donors.

Interspecific hybrids and their various generations, crossed with cultivated cultivars of middle staple and long staple cotton, separating families and samples served as object of researches. Populations, planted in field conditions were numerous, 25-50 plants in each row, the scheme of planting 60 x 25 x 1. During vegetation period and growth phases of plants, carried out the appropriate accounts and supervision by the standard technique. Researches carried out in two nurseries (biological and selection).

In biological nursery were carried out an estimation more than ten hybrid combinations having a composite interspecific origin. From the investigated combinations the most interesting to selection process allocated a combination representing hybrids of F_{13}G.thrurberi x G.raimondii. This combination is characterized by a wide range of variability agronomic and morphological attribute. However, it up to the present generation (F_{13} for intraspecific hybrids it is considered already a line), has the undesirable traits inhered from wild species of a cotton, such as: small bolls and low weight of seeds, short fibre etc. At the same time, combine also distinctive agronomic and morphologic traits representing the certain value in cotton breeding (resistance to wilt, quantity of bolls, the form of leaf etc.)

The analysis of traits showed, that the weight of one boll of families №74, 85, 94 has made 5,7-6.2 g. The standard variety (Namangan-77) had this parameter at a level of 4.9 g. Have conceded to the standard on boll size next families: №34, 97, 103, 110, 121, 123 with values of an analyzed attribute from 4.1 till 4.8 g. (table 1). On a parameter of weight of 1000 seeds, families had various values, as, exceeding considerably the standard, and making a concession from smaller weight of seeds. Considerably exceeded the standard on this traits family №74, 85, 89 and 107 with weight of 1000 seeds 117-128 g. Comparatively light weight of seeds at families №34, 103, 121 (83-91 g).

The investigated and allocated families represent the greatest value on length of a fibre. So, the best length of a fibre characterized families № 74, 89, 97, 107, 110 32,9-34.4 mm which have made value, at 30.8 mm at the standard. Only one family № 94 has conceded to the standard on length of a fibre at which it was equaled 30,6 mm. Other families were characterized by length of a fibre from 31.0 mm up to 31.8 mm which are also satisfactory parameters.

On an output of a fibre, except for three families, the allocated samples have more increased output of a fibre in comparison with the standard of having 39.9 %. Families № 89, 107, 110 had rather low output of a fibre of 34.1-35.3 %. The high output of a fibre distinguished families №34, 85, 103 and 121 other families insignificantly exceeded or, up to standard of a standard variety.

Distinctive features of the investigated samples are: for family №74 - the large boll (5.7 g.), a high gin turnout (40,7 %), long fibres (33,4 mm) with emerald fuzzy, has foliage inherent from species G.arboreum, i.e. small leaves. The similar characteristic of families № 97 and 107 differs, however the family № 97 has a boll of smaller size (4.5) and family №107, the lowered gin turnout of a fibre (34,8 %). It is necessary to note, that families № 121 and 123 which in field conditions has proved as early, prolific and fruitful, at the same time, it was small boll and light seed weight. At the appropriate purposeful selection on size of a boll and weight of seeds, there is an opportunity to allocate valuable selection initial a material, as will be will be carried out the next years.

Thus, studying of samples in biological nursery testifies, that there are potential sources of an initial material for practical selection of cotton.

In selection nursery studying the best families allocated of bio left for the further studying proceeded. In this nursery the special attention was given the samples having

characteristic morphological attributes, combined with agronomic-valuable parameters. The purpose was studying stabilization morphological-economic traits and allocation of best of them for studying in control nursery.

Table 1. Components of productivity, gin turnout and fibre lengths of hybrids in biological and selection nurseries

№ Families	Weight of 1 boll, g	Weight 1000 piece of seeds, g	Length of a fibre, mm	Gin turnout, %
Biological nursery the Interspecific hybrid: F_{13} K - 58 (G. Thurberi x G. Raimondii)				
34	4,4	83,0	31,8	43,0
74	5,7	118	33,4	40,7
85	6,2	128	31,3	41,8
87	5,1	115	31,3	40,9
89	5,3	121	34,4	35,3
94	5,7	100	30,6	39,5
97	4,5	112	33,2	40,8
103	4,6	91,0	32,0	42,8
107	5,1	117	33,0	34,8
110	4,5	112	32,9	34,1
121	4,1	84,0	31,8	41,7
123	4,8	99,0	31,6	40,5
166	5,3	100	31,0	41,0
Selection nursery the Composite interspecific hybrid: F_{17}{F_3 [F_2 (G. Thurberi x G. Raimondii) x C-6037] x C-6037}				
44	4,8	105	31,0	41,4
60	4,8	103	32,9	41,9
80	5,6	116	32,1	38,3
88	6,3	120	31,9	36,3
98	4,5	96	30,6	40,9
110	5,0	100	34,1	39,6
113	4,3	97	29,8	40,8
147	5,0	103	31,0	41,7
150	5,0	114	30,0	39,9
St. variety: Namangan-77	4,9	109	30,8	39,9

From the table it is visible, that on mean boll weight of a standard variety Namangan-77 has weight 4.9 g. The largest size of one boll distinguished families № 80, 88, 110, 147, 150 where it was from 5.0 till 6.3 g. The previous years were allocated a number of lines described with earliness and large boll size. At the same time, there are combinations, where size of boll was from 4.3 till 4.8 g. This size of boll was basically characterized families № 44, 60, 98, 113 etc. with values mainly from 4.3 till 5.0 g.

The weight of 1000 seeds at overwhelming majority of families was higher, than at a standard variety which was equaled 109. Thus, the smaller size of seeds allocated families № 44, 60, 98, 147 where they have made from 97 up to 105 г. The highest weight of seeds had № 80 and 88 families accordingly 116 and 120 g.

The length of a fibre at investigated families basically appeared up to the standard - equal 30.08 mm. However, it is possible to allocate among them families № 60, 110 which considerably surpass the standard and which have accordingly shown length of 32.9 mm and 34,1 mm. Shorter than the standard length of a fibre was in family № 113, with value of 29.8 mm. The great bulk of families was characterized by length of a fibre 30.0-31.6 mm. I.e. it is a little conceding or exceeding a standard variety Namangan-77.

On an gin turnout overwhelming majority of families exceeded a standard variety

Namangan-77 at which it was equaled 39,8 %. The highest gin turnout was characteristic to families № 44, 60, 98, 110, 113, 147 having parameters from 38.3 % up to 41.9 %, thus especially it is necessary to note at these families and high weight of 1000 seeds, made from 114 till 120, except for families № 44 and 60 (weight of seeds which makes 103 and 105). Considerably conceded to a standard variety lower gin turnout of family № 88 at which has made 36,3 %.

Conclusions

On the base of conducted investigation have been done the following conclusions:

Studying and an estimation of composite hybrids of expressiveness of traits and their selection value has shown, that synthesizing new enough and valuable materials representing the selection importance, as sources of new genetic forms of donors of a cotton.

On the basis of composite interspecific hybridization it is proved that exist an opportunity of developing of a selection material combining high productivity, early maturity, resistance to wilt, high gin turnout and fibre length.

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