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CROSSBREEDING OF *GOSSYPIUM HIRSUTUM* L. WITH INTERSPECIFIC DIVERSITY AND WILD SPECIES *G.PALMERII*, GERMINATION OF BOLLS AND FULL SEEDS

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ABSTRACT
In this article, we carried out the research of crossing the tetraploid species of cotton G.hirsutum L., belonging to the suborder Karpas Rob. order Gossypium L. and with wild species G.palmerii. Good crossbreeding between G. hirsutum L. and interspecific varieties and wild species G. palmerii and their phylogenetic proximity were shown. At the same time, cultivars belonging to the intraspecific diversity of G. hirsutum L. were distinguished by a high percentage of full seed set in combinations with participation as a father.
KEY WORDS: *cotton, genetics, breeding, wild, species, polymorphic, intraspecific diversity, interspecific, cultivar, crossbreeding, gene pool, combination, box, germination of whole seeds.*

INTRODUCTION

The classification of the species and interspecific diversity of cotton belonging to the order *Gossypium* L. is still not completely clarified and the solution of controversial issues, the study of mutual phylogenetic relationships of interspecific, intraspecific varieties, the identification of prospects for introducing unused sources of biological and valuable economic traits of individual species and forms into the breeding process is one of the pressing issues.

The high and low results of germination the bolls and seeds of the bolls formed in the process of cotton breeding is one of the factors determining the mutual phylogenetic relations of species and forms used in breeding, as well as their genetic proximity or range. And this is determined by the results of crossing the genetic proximity of the studied species, i.e. the number of whole seeds tied with artificial crossbreeding. In addition, the results of crossing are confirmed by a close relationship with individual biological characters and flowering biology of species and interspecific varieties.

High and low indicators of the results of germination the bolls and seeds in the bolls formed during the crossing process are associated with the phylogenetic proximity-range of forms related to the species and interspecific diversity used in crossing [1; 2; 4; 7; 8].

The evolutionary history of the tetraploid species of the order *Gossypium* L. has always interested scientists. For example, the appearance of the wild *G.palmerii* Watt species of cotton in the classification of Todaro [10] (1877-1878) is called *G.microcarpum*, and in the works of Watt [11]) *G. palmerii* is used as an independent species [3]. To date, there is debate among scientists about the appearance of the *G.palmerii* Watt species.

In contrast to the previous classification, in the new classification P.A. Fryxell [9] included 49 species in the order *Gossypium* L. and they consist of 4 suborders, 8 divisions, and 10subdivisions. In this new classification, the form var. *palmerii* adopted as a new species.

Using classical and modern methods, as a result of many years of research A.A. Abdullaev and V.P. Klyat [1], a new natural classification of the order Gossypium L. was compiled. 58 species were introduced into it and they are divided into 4 suborders, 10 divisions, 13 subdivisions. *G.palmerii* Watt is also recognized as a new species in this new classification.

In scientific research conducted by F.U. Rafiyeva S.M. Rizayeva [5], F.U. Rafiyeva et al. [6], in combinations with high indices relative to the level of crossing, the relative affinity of subspecies was recorded, which are related to polymorphic species from the phylogenetic point of view to *G.mustelinum* Miers ex Watt.

Muminov H.A. [4] in his studies revealed the level of phylogenetic range-proximity between the ruderal ssp.pseudoarboreum f.harga species and the subspecies ssp.pseudoarboreum of the diploid *G.herbaceum* L. cotton species and proved the rise of f.harga to the level of the subspecies and revealed the phylogenetic range-proximity tropical ssp.neglectum f. Sanguineum form and ssp.neglectum subspecies *G.arboreum* L.

Sirojiddinov B.A. [7] in his studies improved the modern natural classification of the available polyploid species of the order *Gossypium* L. based on the results obtained on the new phylogenetic system of diploid species of cotton in Australia and Indochina, evaluated the biological characteristics of polyploid species and breeding potential, and also identified the rational and efficient use of genetic capabilities wild ancestors of cultivated cotton species, the nature of heredity and variability of morphobiological and valuable economic traits of introgressive hybrid forms.

In our studies, we analyzed indicators such as interspecific crossbreeding of the *G.palmerii* species with intraspecific forms of *G.hirsutum* L., germination of bolls and whole seeds**.**

MATERIALS AND METHODS

The forms of subsb.mexicanum f.yucatanense, subsp.punctatum var.gambiya were selected from the intraspecific varieties of some wild species *G.palmerii*, G.hirsutum L., as well as the cultivars Kelajak, Sulton and Porlok-1, stored in the collection "Gene pool World Cotton" laboratory of Systematics and Introduction of Cotton, Institute of Genetics and Experimental Plant Biology, Academy of Sciences of the Republic of Uzbekistan.

The following methods were used for scientific research: intraspecific and interspecific crossing, laboratory and mathematical statistics.

RESULTS

Good intraspecific and interspecific crossbreeding of *G.palmerii* species with intraspecific forms of *G.hirsutum* L. was revealed, germination of hybrid bolls was 30-90%, germination of whole seeds in hybrid bolls was 38.1-97.1% (table 1).

The studied species in hybrid combinations as a result of crossing intraspecific varieties were analyzed in two groups.

When crossing the interspecific wild *G. palmerii* species with the intraspecific *G.hirsutum* L. form, the germination of hybrid capsules was 30.0-90.0%, the germination of whole bolls was 52.4-96.3%. High rates of germination of the studied hybrid bolls and their whole seeds were observed in the combination of wild G.palmerii x Kelajak (respectively 80.4-84.4%).

Conversely, a low rate of germination of bolls (30.0%) is observed in the combination of *G.palmerii* x *G.hirsutum* L. subsb.mexicanum f.yucatanense. In hybrid boxes, the percentage of germination whole bolls was high (92.4-96.3%).

Table
Percentage of germination of bolls and whole seeds F_0 hybrids

№	Hybrid combinations	Crossing numbers	Germinated bolls, number	bolls germination percentage, %	Percentage of germination of whole seeds , %			
					$\bar{x} \pm S_{\bar{x}}$	Limit	S	V %
Interspecific crossing								
1	*G.hirsutum* L. subsb.*mexicanum* f.*yucatanense*x *G.palmeri*	10	5	50,0	96,3±1,6	89,2-100,0	5,1	5,3
2	*G.palmeri* x *G.hirsutum* L. subsb.*mexicanum* f.*yucatanense*	10	3	30,0	86,0±2,9	76,9-100,0	9,2	10,7
3	*G.palmeri* x *G.hirsutum* L. subsp.*punctatum* var.*gambiya*	10	6	60,0	85,4±6,5	75,4-100,0	23,2	26,1
4	*G.hirsutum* L. subsp.*punctatum* var.*gambiya*x*G.palmeri*	10	5	50,0	78,2±0,57	76,3-80,1	1,6	1,9
5	*G.palmeri* xSulton	10	4	40,0	92,4±1,3	93,8-100,0	4,1	4,4
6	Sulton x *G.palmeri*	10	9	90,0	52,4±3,8	38,4-64,2	12,0	23,0
7	*G.palmeri* x Kelajak	10	8	80,0	84,4±7,6	76,6-100,0	24,4	28,4
8	Kelajak x *G.palmeri*	10	8	80,0	55,1±5,8	33,3-78,1	18,4	33,5
9	Porlok-1 x *G.palmeri*	10	9	90,0	65,3±2,8	50,0-72,4	8,9	13,6
10	*G.palmeri* x Porlok-1	10	8	80,0	85,3±0,98	82,0-90,0	3,1	3,6
Intraspecific crossing								
11	Sulton x *G.hirsutum* L. subsb.*mexicanum* f.*yucatanense*	10	4	40,0	61,3±0,86	55,9-72,0	7,2	11,7
12	*G.hirsutum* L.subsb. *mexicanum* f.*yucatanense* xSulton	10	4	40,0	95,0±0,93	95,2-100,0	2,9	3,0
13	Kelajak x *G.hirsutum* L. subsp.*punctatum* var.*gambiya*	10	8	80,0	38,2±0,98	15,3-54,1	3,0	8,0
14	*G.hirsutum* L.subsp.*punctatum* var. *gambiya* x Kelajak	10	8	80,0	66,6±6,1	50,0-100,0	19,4	29,1
15	*G.hirsutum* L.subsb.*mexicanum* f.*yucatanense* x Kelajak	10	5	50,0	91,0±2,6	82,1-100,0	8,3	9,2
16	Kelajak x *G.hirsutum* L. subsb.*mexicanum* f.*yucatanense*	10	7	70,0	66,7±1,6	60,7-62,1	5,1	7,7
17	Sulton x *G.hirsutum* L. subsp.*punctatum* var.*gambiya*	10	4	40,0	65,9±1,1	60,0-70,0	3,7	5,7
18	*G.hirsutum* L. subsp.*punctatum* var.*gambiya* x Sulton	10	5	50,0	88,4±1,7	80,0-94,0	5,5	6,2
19	*G.hirsutum*L. subsb.*mexicanum* f.*yucatanense* x Porlok-1	10	8	80,0	97,1±1,5	94,1-100,0	4,9	5,0
20	*G.hirsutum*L. subsp.*punctatum* var.*gambiya* x *G.hirsutum*L. subsb.*mexicanum* f.*yucatanense*	10	3	30,0	76,2±0,49	74,1-78,2	1,5	2,0

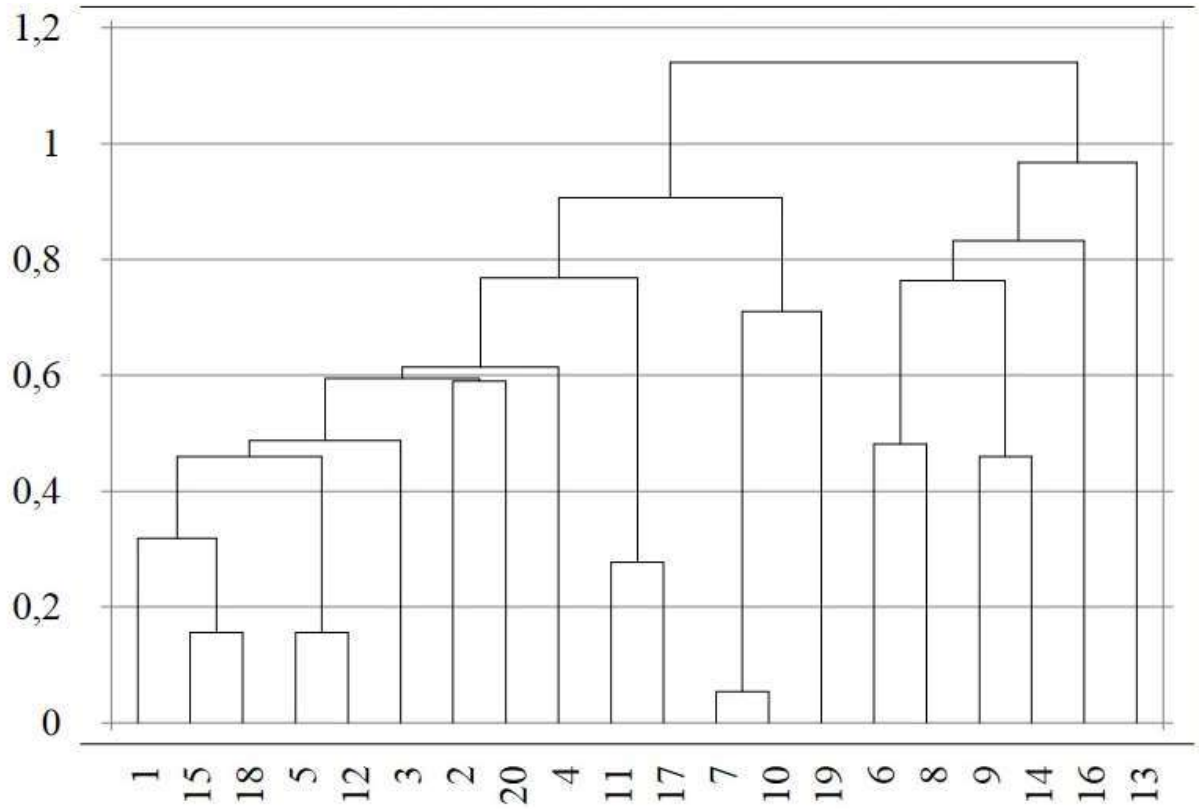

Figure. Scheme of phylogenetic relationships of *G.hirsutum* L. by intraspecific species and wild *G.palmerii* species

1.*G.hirsutum* L. subsb.*mexicanum* f.*yucatanense*x *G.palmeri*; 2.*G.palmeri* x *G.hirsutum* L. subsb.*mexicanum* f.*yucatanense*; 3.*G.palmeri* x *G.hirsutum* L. subsp.*punctatum* var.*gambiya*; 4.*G.hirsutum* L. subsp.*punctatum* var.*gambiya*x*G.palmeri*; 5.*G.palmeri* x Sulton; 6. Sulton x *G.palmeri*; 7. *G.palmeri* x Kelajak; 8. Kelajak x *G.palmeri; 9.* Porlok-1 x *G.palmeri*; 10. *G.palmeri* x Porlok-1; 11.Sulton x *G.hirsutum* L. subsb.*mexicanum* f.*yucatanense;* 12.*G.hirsutum* L.subsb. *mexicanum* f.*yucatanense* xSulton; 13. Kelajak x *G.hirsutum* L. subsp.*punctatum* var.*gambiya*; *14.G.hirsutum* L.subsp.*punctatum* var. *gambiya* x Kelajak ; 15.*G.hirsutum* L.subsb.*mexicanum* f.*yucatanense* x Kelajak; 16. Kelajak x *G.hirsutum* L. subsb.*mexicanum* f.*yucatanense;* 17.Sulton x *G.hirsutum* L. subsp.*punctatum* var.*gambiya; 18. G.hirsutum* L. subsp.*punctatum* var.*gambiya* x Sulton; 19. *G.hirsutum*L. subsb.*mexicanum* f.*yucatanense* x Porlok-1; 20. *G.hirsutum*L. subsp.*punctatum* var.*gambiya* x *G.hirsutum*L. subsb.*mexicanum* f.*yucatanense*.

When crossing with the species of cotton G.palmerii, the percentage of germination hybrid bolls (30.0-60.0) and the percentage of whole seeds in them (85.4-92.4%) was high.

Crossbreeding of intraspecific varieties, the percentage of germination of hybrid bolls and whole seeds of the studied *G.hirsutum* L. was 30.0-80.0%; 38.2-97.1%, respectively. Germination hybrid balls in a combination of *G.hirsutum* L. subsb. mexicanumf.yucatanense x Porloq-1, obtained as a result of crossbreeding was high 80.0%, germination whole seeds in a box It was also high and amounted to 97.1%. In addition, the percentage of hybrid bolls when crossing *G.hirsutum* L. subsp.*punctatum* var.*gambiya* x *G.hirsutum* L. subsb.*mexicanum* f.*yucatanense* was the lowest (30.0%) and in the combination Kelajak x *G.hirsutum* L. subsp. punctatum var.gambiya the percentage of setting whole seeds in a box was the lowest (38.2%).

CONCLUSIONS

The results of intraspecific and interspecific crossing of the studied G.hirsutum L. showed that they are well crossed by mutually intraspecific species and the wild species G.palmerii, and they are also close from the phylogenetic point of view (Fig. 1). However, in combinations where the cultivars involved as a father belong to the intraspecific varieties *G.hirsutum* L.

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