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四个栽培棉种间的杂种F1细胞遗传学与亲缘关系研究

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摘要　以棉属四个栽培棉种进行种间杂交，产生（亚洲棉×草棉）和（陆地棉×海岛棉）2个二元杂种F1及其[（亚洲棉×草棉）×（陆地棉×海岛棉）]四元杂种F1，观察和测定4个栽培棉种及其2个二元杂种F1和四元杂种F1的花粉母细胞（PMC）减数分裂的染色体行为及其花粉生活力，以研究四个栽培棉种间的亲缘关系和进化关系。结果表明，二元杂种（亚洲棉×草棉）F1 的PMC减数分裂中期I出现一个四体环，其余为二价体，染色体构型为2n=26=11Ⅱ+1Ⅳ；花粉生活力的测定表明，（亚洲棉×草棉）F1可育型花粉为50.71%，表现为典型的配子半不育特性，说明两个二倍体棉种间发生一次染色体易位。（陆地棉×海岛棉）F1以26个二价体细胞为主，但有少量的单价体、三价体以及四价体，染色体构型为2n=52=0.78I+22.24Ⅱ+0.94Ⅲ+0.98Ⅳ。花粉生活力的测定表明，（陆地棉×海岛棉）F1可育型花粉为54.84%，可见2个四倍体棉种间亲缘关系较近，二者之间仅发生了染色体的易位或倒位。而由4个栽培种合成的四元杂种F1，其减数分裂异常，染色体丢失现象普遍，部分染色体不能联会配对，以单价体的形式存在，并出现三价体、四价体、五价体等多价体，染色体构型为2n=52=5.45I+14.41II+2.44III+1.59IV+0.63V+0.15VI，其可育花粉为6.87%。研究结果表明了四种栽培棉种之间的亲缘关系相对较近，可以通过遗传重组产生综合有4个栽培棉种性状的新种质。

关键词　棉花；栽培种；种间杂种

分类号

Studies on the Cytological Characters of the Interspecific Hybrid F1 among the Cultivated Species in Gossypium and their Genetic Relationship

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Abstract

Interspescific hybridization among four cultivated species in Gossypium (herbaceum, arboreum, hirsutum and barbadense) were carried out to produce dispecific hybrids F1, (G..arboreum×G. herbaccum)F1 and (G. hirsutum×G. barbadense)F1, and quadrispecific hybrid F1, which was produced by crossed the chromosome doubled (G. arboreum×G. herbaccum)F1 with (G. hirsutum×G. barbadense)F1. In order to study the relationship and evolution among the four cultivated species in Gossypium, the characteristic of chromosome behavior during the meiosis and pollen viability in those interspecific hybrids F1 were studied in this paper. The results showed that the diploid interspecific hybrid, (G. arboreum×G. herbaccum) F1, had a four-chromosome-ring, the chromosome configuration was 2n=26=11II+1Ⅳ. And the normal pollen percent was 50.71%, which showed the character of typical gamete semi-sterility, and approved that there was a chromosome translocation between the two diploid cotton species, G. arboreum and G. herbaccum. For the allotetraploid species interspecific hybrid F1, (G.hirsutum×G.barbadense) F1, most of the chromosomes at Metaphase I could paired into bivalents, with a few number of univalents, trivalents, and quardrivalents. The chromosome configuration was 2n=52=0.78I +22.24Ⅱ+0.94Ⅲ+0.98Ⅳ, with a normal pollen rate of 54.84%. The experiment showed that there were a few chromosome translocation or chromosome inversion between the two allotetraploid cotton species, G.hirsutum and G.barbadenses. The meiosis of the quardrispecific hybrid F1 was abnormal, and the loss of chromosomes was popular. Most of the chromosomes could not synapse at Metaphase I, which led to many univalents and some multivalents. The chromosome configuration of the quardrispecific hybrid F1 was 2n=52=5.45I+14.41II+2.44III+1.59IV+0.63V+0.15VI, and the normal pollen rate was 6.87%, which showed that the relationship of four cultivated cotton species was relatively closed, and it is possible to produce a new germplasm with the good characters of four cultivated species through genetic

recombination.

Key words cotton cultivated species interspecific hybrid

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