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Cytogenetical characteristic of the introgressive common wheat lines including and lacking the 4S^I chromosome

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The synthetic genome-substituted wheat line Aurosis (AABBS^I S^I) differs from genome of common wheat cultivar Aurora (AABBDD) in presence of S^I subgenome instead of D one. When hybrids between mentioned genotypes were obtained and self-pollinated, a number of 42-chromosome lines were developed that demonstrated some alien characters, including resistance to powdery mildew.

The description of these lines concerning the number and homeological relationship of S^I chromosomes that substituted ones of D genome was carried out through studying the chromosome associations in meiosis M1 of PMC in hybrids between introgressive line and cultivar Aurora, and molecular genetic marking of these lines using biochemical and microsatellite markers specific for chromosomes D and S^I. Among total introgressive lines studied (67) 16 possessed the gametocidal chromosome 4S^I, which is known for its severe gametocidal activity in the hemizygotic condition. Among 17 lines resistant to powdery mildew 11 ones included this chromosome. According to results of molecular marking, the lines studied demonstrated the presence of alien chromatin from all homeological groups, except for 2, in different combinations. Different lines had from one to three introgressions. The meiotic chromosome configurations in the hybrids between lines and between lines and cultivar Aurora were studied. On the basis of this, it could be followed out that alien genetic material in introgressive lines' genomes is presented by one (35 lines), two (16), or three substituted chromosomes (2 lines), and also one (28) or two (7 lines) translocations. The resistance of lines is related to substitution or translocation of 3S^I chromosome in the genome, and is controlled by a single dominant gene. According to our data, not all the lines possess the gametocidal chromosome 4S^I. Nevertheless, lines that do and do not possess it do not differ in such important characters as percentage of grain formation in spike, germination ability, and the number of aneuploids among progenies of introgressive lines after their self-pollination, and show the decreased values of all mentioned characters. This demonstrates that action of gametocidal chromosome in hybrid AABBS^I, the progenitor of the lines developed, would influence on the progenies, even in the absence of 4S^I chromosome, and would complicate the transfer of the useful resistance genes (to powdery mildew in our case) on the common wheat genetic background.