

研究论文

燕麦种间杂种F1的形态学与细胞遗传学研究

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摘要 通过远缘杂交, 结合杂种幼胚培养, 获得了普通栽培燕麦(0001, *Avena sativa*, 2n=42, AACCCDD)与野生大燕麦(0034, *A. magna*, 2n=28, AACC), 东方燕麦(0025, *A. orientalis*, 2n=42, AACCCDD)与野生大燕麦(0027, *A. magna*, 2n=28, AACC)的杂种F1, 其杂交结实率分别为8.00%和8.11%。对杂种F1花粉母细胞(PMC)减数分裂中期 I (M I)染色体行为观察发现, “0001×0034”杂种F1平均每PMC有10.95个单价体, 24.05条染色体发生联会形成二价体, 平均每PMC染色体构型为2n=35=10.95 I +12.03 II (6.75 rod+ 5.28 ring) (Xta=17.35)。“0025×0027”杂种F1平均每PMC有8.43个单价体, 26.60条染色体发生联会形成二价体和少数三价体, 平均每PMC染色体构型为2n=35=8.43 I +13.22 II (8.00 II rod+5.22 II ring)+0.054 III(Xta=18.73), 表明六倍体燕麦的A、C染色体组与四倍体燕麦的A、C染色体组不完全同源, 可能发生了一些结构性变异。

关键词 燕麦 远缘杂交 形态学 减数分裂

分类号 S512

Morphologic and Cytogenetic Characterization of F1 from Interspecies Crosses in Oat

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Abstract Oat belongs to genus *Avena* L. in Gramineae. Cultivated oat is a cereal crop available for human nutrition and health and animal feed. Basic researches of oat are weaker than other crops in genetics, physiology and biochemistry. The evolution of the tetraploid and hexaploid species is vague, and the origins of B, C and D genomes have not been identified. Germplasm of oat breeding in China is poor. The tetraploid oat is the important germplasm for oat breeding. At present, the researches on the cross between tetraploid and hexaploid species are very few. The objectives of this study were to expand the genetic resources by analyzing the morphologic, cytogenetic characteristics and backcrosses seed setting rate of hybrids involving *Avena sativa* with *A. magna* and *A. orientalis* with *A. magna*. Hybrids of *A. sativa* (0001) × *A. magna* (0034) and *A. orientalis* (0025) × *A. magna* (0027) were successfully obtained by hybridization and immature embryo culture in vitro. Their seed setting rates were 8.00% and 8.11%, respectively (Table 2). Morphologic characteristics of these hybrids F1 were intermediate between the parents or resembled either of parents (Table 3). Pollen fertility of these hybrids F1 were 1.00% and 0.80%, respectively (Table 4). Seed setting rates of hybrids in backcrosses were 1.97% and 1.75%, respectively (Table 5), indicating it can be feasible to transfer the beneficial genes from tetraploid species into hexaploid *A. sativa*. At the same time, chromosomes pairing behaviors of the hybrids F1 at meiosis were investigated. There were 10.95 univalents in the pollen mother cell (PMC) in hybrid F1 of combination ‘0001 × 0034’ and 24.05 associated chromosomes formed bivalents on the average, their meiotic configuration was 2n=35=10.95 I +12.03 II (6.75 rod+5.28 ring)(Xta=17.35)(Table 6, Plate 1 3–5). For the F1 of combination ‘0025 × 0027’, 8.43 univalents were observed in each PMC, 26.60 associated chromosomes formed bivalents and few trivalents, the meiotic configuration was 2n=35=8.43 I +13.22 II (8.00 II rod+5.22 II ring)+0.054 III(Xta=18.73) (Table 6, Plate 1 9–11), indicating the A, C genomes of the hexaploid and tetraploid were incompletely homologous.

Key words [Avena](#); [Interspecies cross](#); [Morphology](#); [Meiosis](#)

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