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甘蓝型油菜含油量的主基因＋多基因遗传效应分析

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摘要

应用多世代联合分析数量性状主基因和多基因混合遗传的统计方法, 分析了甘蓝型油菜两个组合的5个世代——亲本P1、P2、F1、F2和F2:3家系材料含油量的遗传效应。结果表明，分离世代F2及F2:3家系含油量次数分布均呈混合的正态分布，符合主基因＋多基因的遗传特征。D-2模型是该项研究两个甘蓝型油菜杂交组合含油量的最适遗传模型，含油量的遗传是由一对加性主基因和加-显性多基因共同控制的。组合1（1141B × 版C1-1）主基因加性效应值为－1.74，表明亲本1141B中主基因位点上的等位基因降低含油量，而亲本版C1-1中的等位基因增加含油量。多基因加性效应值和显性效应值分别为－1.99 和0.93。F2的主基因遗传力和多基因遗传力分别为60.20%和28.10%。F2:3的主基因遗传力和多基因遗传力为81.00%和14.90%。两组合在F2:3家系世代含油量的主基因遗传力均较F2 高，因此认为高含油量育种中在F2:3家系进行选择效率较高。

关键词

甘蓝型油菜；含油量；主基因和多基因混合遗传模型；遗传力

分类号

Genetic Analysis of Oil Content in Brassica napus L. Using Mixed Model of Major Gene and Polygene

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Abstract

<P>The joint segregation analysis of a mixed genetic model of major gene plus poly-gene was conducted to study the inheritance of oil content in Brassica napus L.. Five populations, i.e the populations of 2 parents(P1 and P2), F1, F2 and F2:3 (derived from F2) family, from each of the two crosses (1141B × Ken C1-1, 32B × Ken C1-2) were investigated.The frequency distributions of oil content in F2 and F2:3 family populations show characteristics of a mixed normal distribution, which indicated that the inheritance of oil content followed a major gene plus poly-gene model. Twenty-one genetic models were established, which could be classified into five types: one and two major genes, polygenes, one and two major genes plus polygenes. The most suitable genetic model could be selected using Akaike's Information Criterion and the fitness of the selected one could be examined by a set of tests. Results show that genetic model D-2 is the most fitting genetic model for the trait. In other words, oil content in oilseed rape is controlled by one additive major gene plus additive and dominance polygenes. For cross 1 (1141B × Ken C1-1) the heritabilities of major gene and poly-genes in F2 are 68.21% and 27.17%, respectively, and in F2:3 are 81.70% and 16.80% , respectively. The additive effect of major gene is –1.74, which indicates that the locus of the allele in parent 1141B may decrease the oil content, but that in parent Ken C1-1 may increase it. The additive and dominance effects of the polygenes are 1.20 and –1.93, respectively. For cross 2 (32B × Ken C1-2) the heritabilities of major gene and polygenes in F2 are 66.20% and 28.10%, respectively, and in F2:3 were 81.00% and 14.90%, respectively . The additive effect of major gene was –3.74, which also indicates that the locus of the allele in parent 32B may decrease the oil content, but that in parent Ken C1-2 may increase it. The additive and dominance effects are –1.99 and 0.93, respectively. The heritability of the major gene in F2:3 is higher than that in F2 in both crosses, so it would be more efficent to conduct selection in F2:3 families for high oil content in breeding.</P>

Key words

Brassica napus L.;　oil content;　mixed major gene and poly-gene genetic model;　heritability

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