

研究论文

大豆脂肪酸组分的胚、细胞质和母体遗传效应分析

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摘要 利用5个大豆品种配制20个杂交组合, 采用广义种子遗传模型分析了大豆脂肪酸组分的胚、细胞质和母体植株等3套遗传体系的基因主效应和基因型×环境效应。棕榈酸含量、硬脂酸含量和亚油酸含量是以基因型×环境互作效应为主。亚麻酸和油酸的遗传主效应和基因型×环境互作效应相近。在脂肪酸组分的遗传主效应中, 棕榈酸、硬脂酸和亚油酸含量是以胚主效应为主。油酸含量和亚麻酸含量以细胞质主效应为主。在基因型×环境互作方差中, 脂肪酸组分以极显著的胚互作方差为主。亚麻酸含量是以基因的加性效应和加性×环境互作效应为主, 棕榈酸含量、硬脂酸含量、油酸含量和亚油酸含量以基因的显性和显性×环境互作效应为主。棕榈酸含量和油酸含量是以普通狭义遗传率为主。硬脂酸、亚油酸含量和亚麻酸含量以互作狭义遗传率为主。在普通狭义遗传率中, 棕榈酸含量、油酸含量和亚麻酸含量以细胞质普通遗传率和母体普通遗传率为主。在互作狭义遗传率中, 油酸含量和亚麻酸含量以胚互作狭义遗传率为主, 亚油酸含量以母体植株互作遗传率为主。棕榈酸含量、硬脂酸含量、油酸含量和亚油酸含量以细胞质及母体选择响应和互作选择响应为主, 亚麻酸含量的胚普通选择响应和互作选择响应为主。

关键词 [大豆](#) [脂肪酸组分](#) [胚遗传效应](#) [细胞质遗传效应](#) [母体遗传效应](#) [遗传率](#)

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Analysis of Embryo, Cytoplasmic and Maternal Effects on Fatty Acid Components in Soybean (*G. max* Merrill)

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Abstract Quality of oil determined by the constituents and proportion of fatty acid components, and the understanding of heredity of fatty acid components is of importance to breeding for good quality soybean varieties. Embryo, cytoplasmic and maternal effects and genotype×environment interaction effects for quality traits of soybean (*G. max* Merrill) seeds were analyzed using a general genetic model for quantitative traits of seeds with parents, F₁ and F₂ of 20 crosses from a diallel mating design of 5 parents planted in the field in 2003 and 2004 in Harbin, China. The interaction effects of palmitic, stearic and linoleic acids contents were larger than genetic main effects, while genetic main effects were equal to interaction effects for linolenic and oleic acids content. Among all kinds of genetic main effects, the embryo effects were the largest for palmitic, stearic and linoleic acids, and cytoplasm effects were the largest for oleic and linolenic acids. Among all kinds of interaction effects, the embryo interaction effects were the largest for fatty acids. The sum of additive and additive×environment effects were larger than that of dominance and dominance×environment effects for linolenic acids content, but not for other quality traits. The general heritabilities were the main parts of heritabilities for palmitic acids content and oleic acids content, but the interaction were more important for stearic, linoleic and linolenic acids contents. For the general heritability, maternal and cytoplasm heritabilities were the main components for palmitic, oleic and linolenic acids content. It was shown for the interaction heritabilities that embryo interaction heritabilities were more important for oleic and linolenic acids contents, while maternal interaction heritabilities were more important for linoleic acids content. Among selection response components, maternal and cytoplasm general responses and/or interaction responses were more important for palmitic, stearic, oleic and linoleic acids contents. The main selection response components were from embryo general response and/or interaction response for linolenic acid content. It suggested that the selection of palmitic, stearic, oleic and linoleic acids contents in offspring should be in maternal plants, while linolenic acids content should be improved screening the single seed or selected in higher generations.

Key words [Soybean](#) [Fatty acids](#) [Embryo effects](#) [Cytoplasmic effects](#) [Maternal effects](#) [Heritability](#)

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