

研究论文

普通玉米主要营养品质性状的遗传效应分析

兰海, 谭登峰, 高世斌, 唐祈林, 曹墨菊, 潘光堂, 荣廷昭

四川农业大学玉米研究所, 四川雅安 625014

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摘要 用13个普通玉米自交系按NC II设计(7×6)研究了普通玉米主要营养品质性状的遗传效应。结果表明,普通玉米主要营养品质性状的遗传受种子二倍体胚、三倍体胚乳、细胞质和二倍体母体植株4套遗传体系的控制;主要品质性状4套遗传体系的效应值之间无太大的差异,蛋白质、淀粉和赖氨酸含量的胚遗传效应全部体现为胚加性遗传效应,而4种品质性状的胚乳遗传效应则全部由胚乳显性遗传效应构成;母体遗传效应主要表现为母体加性效应;遗传效应预测值表明亲本9636、99S2041-1-1-1和478在普通玉米品质改良中可能有一定的应用潜力。结果还发现,不同品质性状间存在不同程度的遗传相关,因此对这些性状进行间接选择或杂种优势利用均可取得一定的效果。

关键词 [玉米](#) [营养品质性状](#) [遗传效应](#) [近红外线光谱技术](#) [遗传方差与协方差](#)

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Genetic Analysis of Main Nutrient Quality Characters in Normal Maize

LAN Hai, TAN Deng-Feng, GAO Shi-Bin, TANG Qi-Lin, CAO Mo-Ju, PAN Guang-Tang and RONG Ting-Zhao

Maize Research Institute, Sichuan Agricultural University, Ya'an 625014, Sichuan, China

Abstract Thirteen inbred lines were used in incomplete diallel crosses (7×6) to analyze genetic effect of main nutrient quality characters in normal maize. The results indicated that main nutrient quality characters were controlled by embryo, endosperm, cytoplasmic and maternal genetic effects, which did not have much more difference among each other. The embryo genetic effects were represented as embryo additive effects of protein, starch and oil content. Endosperm effects of these main nutrient quality traits were all represented as endosperm dominance effects, and maternal additive effects was more important than maternal dominance effects. Predicted genetic effects showed that inbred lines 9636, 99s2041-1-1-1 and 478 were better than other parents, their genetic effects could play the role on the improvement of main nutrient quality characters in normal maize. Correlation analysis showed that there were different degree of genetic correlations between different nutrient quality characters; these quality characters could be improved by indirect selection and utilization of heterosis. The method applied in this study revealed much more genetic information than traditional NC II analytic method. The results revealed by traditional NC II analytic method could cooperate with Zhu's method to instruct our breeding practice exactly. Because by the Zhu's method, the total genetic effects is divided into some small parts, and which are difficult to use in practice. But it could help us to realize these complex characters such as nutrient characters more deeply than ever. The traditional NC II analyze method could be easy operated in breeding practice. In this study, the experiment data were analyzed by using traditional NC II analytic method. The results indicated that these four main nutrient quality characters all were controlled by female parent's genetic effects, which were significantly different. These genetic effects, such as embryo, endosperm and maternal genetic effects have very complex relationships between each other. These three genetic effects all were controlled more or less by female parent and couldn't be distinguish clearly. In fact, there were 2/3 endosperms as same as female parent in genetic components. And characters of kernel were controlled mostly by female parent in whole growing stage. So that, these female parent genetic variance of four main nutrient quality characters all were significantly different, because the genetic variance included some other genetic components. For oil content, the genetic variance of female parent and male parent were significantly different at 0.01 and 0.05 probability levels respectively. These correspond with high oil content maize breeding and utilization in practice, for example, the selection and synthesis of high oil content maize population and the xenia effect on normal maize of high oil content. In this study, P1, P2, F1 and F2 generation were need to predicate every genetic variance, covariance, effect and so on for four main nutrient quality characters. This method could be improved by increasing other generations, such as backcross generations, and by strictly experimental control and so on.

Key words [Normal maize](#) [Nutrient quality character](#) [Genetic effect](#) [Near-infrared spectroscopy \(NIRS\)](#) [Genetic variance and covariance](#)

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