

大豆重组自交家系群体动态株高及其相对生长速率与产量的关系

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Relationship of Dynamic Plant Height and Its Relative Growth Rate with Yield Using Recombinant Inbred Lines of Soybean

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摘要 提高产量潜力始终是大豆育种的重要目标, 研究产量相关性状是解析产量重要途径之一。大豆株高影响产量, 但存在不确定性。本研究利用一套包含212个家系的大豆重组自交家系(RIL), 于2008—2009年连续2年测定各家系动态株高, 并计算相对生长速率, 研究与产量的关系, 以期为大豆产量改良中对株高的选择提供参考信息。试验结果表明, (1) 产量和株高变幅分别为1 000~5 000 kg hm⁻¹和38~103 cm, 说明样本有较大代表性。(2) 出苗后20 d的株高即与产量具极显著正相关, 随生长进程, 相关系数逐渐增大, 至株高生长停止达到最大。株高生长速率前期与产量呈显著正相关, 后期与产量负相关, 说明后期过快增加株高不利于产量。(3) 在试验范围内, 株高与产量呈负指数回归关系, 随株高增加, 产量逐渐增加, 当株高为80 cm时, 随株高增加, 产量的增加逐渐缓慢。发现株高的变异在70~90 cm之间时, 均能获得4 000 kg hm⁻¹产量。本文还简要讨论了重组自交家系用于表型分析的优劣, 以及在大豆产量育种中如何对株高进行选择。

关键词: 大豆 动态株高 相对生长速率 产量 相关

Abstract: Selection for increasing yield potential is consistently the main goal of soybean breeding. Plant height influences yield with uncertainty in soybean. A population of 212 recombinant inbred lines (RIL) was used to analyze the correlation of dynamic plant height and its relative growth rate with yield across two-year field experiments. The results were as followed. (1) The range of yield and plant height was 1 000 - 5 000 kg ha⁻¹, 38 - 128 cm respectively, which indicated the sample in the study had a good representativeness. Significant differences between plant height and its relative growth rate at the same developmental stages were observed among the RILs. (2) Yield was significantly and positively correlated with plant height at 20 days after emergence, and the correlation increased with the growing stages and the highest correlation occurred when plant height culminated. Yield was positively correlated with relative growth rate in plant height at earlier growth stages and negatively correlated at later stages, indicating that faster growth in plant height at later stage would not be beneficial to higher yield. (3) A negative exponential regression mode was observed in the relationship between yield and plant height. Yield increased steeply when plant height was less than 80 cm and this trend would slow down when plant height was over 80 cm. We found yields reached 4 000 kg ha⁻¹ when plant heights were 70 - 90 cm. The merits and demerits of phenotypic analysis using RIL and how to select plant height in soybean breeding were discussed.

Keywords: Soybean Dynamic plant height Relative growth rate Yield Correlation

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