

不同耐密性玉米品种的根系生长及其对种植密度的响应

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Root growth and its response to increasing planting density in different maize hybrids

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摘要 根系形态和分布对土壤中养分和水分的吸收有重要影响。增加耐密性是现代玉米 (*Zea mays* L.) 育种的主要方向, 而耐密性与根系的关系尚了解不多。本文以70年代主推的2个不耐密型品种(中单2号与丹玉13)和2个当代耐密型现代品种(先玉335和郑单958)为材料, 将田间试验和室内水培试验相结合, 在3个密度水平下, 研究了不同耐密性玉米品种的根系差异及其对种植密度的响应。结果表明, 目前推广的耐密型品种的根系要小于不耐密的老品种。不同耐密性品种之间的差异主要表现在0—40 cm。随着密度的增加, 根显著变小、变细。密度主要降低0—20 cm土层中的根系生长, 对深层根系影响较小。先玉335和中单2的根系长度对密度的反应较弱, 郑单958和丹玉13较强。这说明先玉335主要依靠其小根系适应高密度, 而郑单958既依靠较小的根系, 同时依靠较高的根系反应性适应高密度。

关键词: 玉米 密度 根长 根可塑性 基因型

Abstract: Root morphology and distribution have an important influence on the absorption of water and nutrients in soil. Increased resistance to planting density is one of the major traits in modern maize breeding, but little is known about the role of the plastic response of root system in the resistance to density in maize. In this paper, two old non-density resistant hybrids (Zhongdan2 and Danyu13) and two modern density-resistant hybrids (Xianyu335 and Zhengdan958) which had or have been widely used in different eras were adopted to investigate the root growth and its response to increasing planting density under both field condition and hydroponics. Results showed that the size of root system of the modern density-resistant cultivars is smaller than that of the old non-resistant cultivars and the difference mainly happened in 0-40 cm soil layer. Along with the increase of planting density, the root becomes smaller and thinner significantly. High planting density only reduced root length in the 0-20 cm soil layer, without significant effect on deeper roots. The response of root length to planting density was weaker in Xianyu335 and Zhongdan2, but stronger in Zhengdan958 and Danyu13. It is concluded that, to adapt to high planting density, Xianyu335 relies mainly on its small root size while Zhengdan958 depends on both small root size and high root plasticity.

Keywords: maize (*Zea mays* L.) density root length root plasticity genotype

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