

## 我国北方37个高产春玉米品种干物质生产及氮素利用特性

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Characteristics of dry matter production and nitrogen use efficiency of 37 spring maize hybrids with high-yielding potential in north of China

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**摘要** 选育氮高效品种是实现玉米高产高效生产的根本途径。为探明我国北方目前主推高产春玉米的物质生产及氮素利用特性, 本研究选择该区域高产品种37个, 采用盆栽试验, 依粒重和氮素子粒生产效率划分其类型, 分为高产高效(I)、高产中效(II)、中产中效(III)及低产低效(IV)4种类型。其中, 中产中效型品种最多, 为56.8%; 高产高效型品种最少, 仅为8.1%; 高产中效型和低产低效型品种分别为13.5%和21.6%。4个类型品种干物质生产及氮素利用效率开花前差异不显著, 开花后是产生差异的关键时期; 成熟期I型品种干物质和氮向子粒的分配比例较高, 而IV型品种向根和茎秆的分配比例较高。同时, I型品种的氮转移量、氮转移效率和贡献率显著高于其他3类型品种。经相关和通径分析, 氮素干物质生产效率、粒重及氮含量与氮素子粒生产效率显著相关。所以, 较高的粒重和较低的植株氮含量是高产氮高效品种的基本特征。

**关键词:** 春玉米 干物质 氮积累与分配 氮利用效率

**Abstract:** Selecting high nitrogen use efficiency (NUE) hybrid maize plays the most important role for high yield and high NUE in maize production. A pot experiment was conducted to evaluate the characteristics of dry matter (DM) production and NUE of spring maize hybrids released in the north of China currently. In this experiment, 37 maize hybrids with high-yielding potential were planted in pots and provided enough fertilizers and water in the growing season. The results indicate that 37 maize hybrids with high-yielding potential can be divided into 4 types according to the grain weight and nitrogen grain production efficiency (NGPE), the type I is high yield and high efficiency, the type II is high yield and moderate efficiency, the type III is moderate yield and moderate efficiency, and the type IV is low yield and low efficiency. The type III accounts for 56.8% of the 37 maize hybrids, while the type I is only 8.1% which is lower than that of the type II (13.5%) and IV (21.6%). For these four-type maize hybrids, the DM accumulation and NUE are not significantly different before flowering, but are remarkably different after flowering. At the maturity stage, the DM and nitrogen distributions to grains of the type I are the highest, however, the DM and nitrogen distributions to roots and stalks of the type IV are the highest. Accordingly, the nitrogen transportation amount (NTA), nitrogen transportation efficiency (NTE) and nitrogen contribution rate (NCR) of the type I are significantly higher than those of the other three types in this trial. Furthermore, the results of correlation and path analysis show that nitrogen dry matter production efficiency (NDMP), grain weight and nitrogen content are significantly correlated to NGPE. Therefore, high grain weight and low nitrogen content of single plant are the basic characteristics of high-yielding and high-efficiency hybrids.

**Keywords:** spring maize dry matter nitrogen accumulation and distribution nitrogen use efficiency

Received 2011-06-22; published 2011-12-26

Fund:

国家自然科学基金项目; 吉林省博士后科学基金项目; 国家玉米产业技术体系

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引用本文:

王晓慧 曹玉军 魏雯雯 张磊 王永军 边少锋 王立春. 我国北方37个高产春玉米品种干物质生产及氮素利用特性[J] 植物营养与肥料学报, 2012, V18(1): 60-68

WANG Xiao-hui CAO Yu-jun WEI Wen-wen ZHANG Lei WANG Yong-jun BIAN Shao-feng WANG Li-chun. Characteristics of dry matter production and nitrogen use efficiency of 37 spring maize hybrids with high-yielding potential in north of China[J] Acta Metallurgica Sinica, 2012, V18(1): 60-68

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