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小麦氮素利用效率的基因型差异

张锡洲,阳显斌,李廷轩,余海英

四川农业大学资源环境学院, 四川雅安 625014

Genotype difference in nitrogen utilization efficiency of wheat.

ZHANG Xi-zhou, YANG Xian-bin, LI Ting-xuan, YU Hai-ying

College of Resources and Environment, Sichuan Agricultural University, Ya'an 625014, Sichuan, China

摘要

通过土培盆栽试验，研究了130份小麦材料在相同氮素水平下生物量、氮素积累量、氮素生产效率的基因型差异，旨在筛选具有高效利用氮素能力的小麦基因型，为氮高效小麦育种提供种质资源.结果表明：拔节期、抽穗期和成熟期供试小麦单株生物量变幅分别为1.06～3.08 g、1.88～9.05 g和2.64～13.75 g，单株籽粒产量变幅为1.38～9.90 g .拔节期、抽穗期氮素干物质生产效率变幅分别为25.62～65.41 g·g^{-1} N（F= 5.099**）和35.79～88.70 g·g^{-1} N（F=5.325**），成熟期氮素籽粒生产效率变幅为19.06～38.54 g·g^{-1} N（F=4.669**）.不同氮素生产效率小麦基因型拔节期氮素干物质生产效率（F=637.941**）、抽穗期氮素干物质生产效率（F=201.173**）及成熟期氮素籽粒生产效率（F=443.450**）存在极显著差异.不同氮素生产效率小麦基因型拔节期、抽穗期及成熟期生物量差异显著，有效分蘖数与穗数差异不显著.氮素生产效率高的基因型具有无效分蘖少、抽穗期前氮素利用能力强、抽穗期-成熟期氮素吸收与再利用能力强等特点.典型氮高效基因型小麦省CXK027-4和良麦4号的籽粒产量是低效基因型694的3.44倍和2.86倍，籽粒氮素积累量是694的3.06倍和2.81倍.

关键词： 小麦 氮素利用效率 动态聚类 籽粒产量

Abstract:

A pot experiment with 130 wheat cultivars was conducted to study their genotype difference in biomass per plant, nitrogen accumulation, and nitrogen production efficiency under the same level of nitrogen supply, aimed to screen the high efficiency nitrogen-utilizing wheat genotypes. The results showed that the biomass per plant of the cultivars at jointing, heading, and maturing stages was within the ranges of 1.06-3.08 g, 1.88-9.05 g, and 2.64-13.75 g, respectively, and the yield per plant was 1.38-9.90 g. The nitrogen dry matter production efficiency was 25.62-65.41 g·g^{-1} N (F= 5.099**) at jointing stage and 35 79-88 70 g·g^{-1} N (F=5.325**) at heading stage, and the nitrogen production efficiency of grain yield was 19 06-38 54 g ·g^{-1} N (F=4.669**) at maturing stage. There were significant differences in nitrogen dry matter production efficiency (jointing stage, F=637.941**; heading stage, F=201.173**) and nitrogen grain yield production efficiency (maturing stage, F=443.450**), and also, in biomass accumulation among the cultivars, but no significant differences in tiller number and effective tiller number. The wheat genotypes with high nitrogen utilization efficiency had the characteristics of less ineffective tiller, high nitrogen utilization before heading stage, and high effective nitrogen absorption and reuse capability at heading and maturing stage. The grain yields of high nitrogen efficiency genotypes Sheng CXK027-4 and Liangmai 4 were 2.44 times and 1.86 times higher than those of low nitrogen use efficiency genotype 6 94, and the nitrogen accumulation in grain yields was 2.06 times and 1.81 times higher than that of low nitrogen use efficiency genotype 694, respectively.

Key words: wheat nitrogen utilization efficiency dynamic cluster grain yield

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