

不同氮肥管理措施在华北平原冬小麦上的应用效果

赵士诚,沙之敏,何萍*

农业部作物营养与施肥重点实验室, 中国农业科学院农业资源与农业区划研究所, 北京 100081

Response of winter wheat to different nitrogen managements in North Central China

ZHAO Shi-cheng, SHA Zhi-min, HE Ping**

Ministry of Agriculture Key Laboratory of Crop Nutrition and Fertilization/Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, Beijing 100081, China

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摘要 在河北省衡水和辛集试验点, 采用田间试验研究了氮肥不同用量和不同基追比对冬小麦生长、产量和土壤氮素变化的影响。结果表明, 衡水试验点的土壤本底供氮量能满足小麦返青前的正常生长, 施氮肥对小麦增产无效, 但与施基肥处理相比, 不施基肥、仅在拔节和孕穗期2:1分次追肥显著提高了氮肥利用率。在辛集, 不施基肥显著影响小麦返青前的生长, 施N 60 kg/hm²能满足小麦拔节前的正常生长, 不施基肥、仅在拔节后追肥不能消除前期氮缺乏对小麦生长和高产的影响; N 240 kg/hm²以基追比1:3施用能获得较高的产量和氮肥利用率。冬小麦生育期田间氮肥表现损失主要来源于基肥, 但中后期追肥比例过大也增加了收获后土壤的无机氮残留。由于土壤肥力和质地不同, 相同氮肥管理方法下两试验点小麦的生长、产量和氮肥利用率的差异较大, 因此, 为达到作物高产和氮肥高效, 对氮肥的同步调控应结合作物养分阶段需求、土壤养分供应特征和土壤肥力、质地的区域分异特征分区进行。

关键词: 冬小麦 氮肥管理 基肥 追肥

Abstract: The field experiments were conducted to investigate the effects of different nitrogen (N) fertilizer rates and the ratio of basal N and topdressing N on winter wheat growth, grain yield and the change of soil N content in Hengshui and Xinji, Hebei province, respectively. The results show that indigenous N supply could meet the demand of N for winter wheat normal growth before the revival stage, and the applied N fertilizer do not significantly increase wheat grain yield in Hengshui site, while compared with the treatments of applying basal N and topdressing N, the applications of topdressing N only at shooting and booting stages at the ratio of 2:1 increase N use efficiency significantly. In Xinji site, 60 kg N/ha could meet the demand of N for wheat growth before the shooting stage, all N are applied as topdressing at the shooting stage do not eliminate the effect of N deficient at the early growth stage on wheat growth and high grain yield, and the application of 240 kg N/ha at the ratio of 1:3 (basal N and topdressing N) at the shooting stage could achieve higher grain yield and N use efficiency compared with other treatments. The apparent N loss during winter wheat growth season mainly comes from the basal N, while high topdressing N rates at mid-later stages also increase soil N residual after the harvest. Because of the variations of soil fertility and texture, the effects of the same N management method on winter wheat growth, yield and N use efficiency in two sites are different, so for higher crop yield and higher N use efficiency, the synchronizing regulation of N fertilizer should combine crop nutrient demand, nutrient supply from soil and regional variation characters of soil fertility and texture.

Keywords: winter wheat nitrogen fertilizer management basal nitrogen topdressing nitrogen

Received 2010-07-23; published 2011-03-31

Fund:

国家级项目

Corresponding Authors: 赵士诚 Email: sczhao@caas.ac.cn

引用本文:

赵士诚 沙之敏 何萍.不同氮肥管理措施在华北平原冬小麦上的应用效果[J] 植物营养与肥料学报, 2011,V17(3): 517-524

ZHAO Shi-cheng SHA Zhi-min HE Ping. Response of winter wheat to different nitrogen managements in North Central China[J] Acta Metallurgica Sinica, 2011,V17(3): 517-524

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