

论文

施氮水平对啤酒大麦植株氮素吸收与利用及籽粒蛋白质积累和产量的影响

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摘要:

2004—2006年连续两个生长季,以苏啤3和单2两个啤酒大麦品种为材料,探讨施纯氮0、75、150、225和300 kg hm⁻²条件下,啤酒大麦氮素积累和转运、氮素利用及籽粒产量和蛋白质积累的特性。在0~225 kg hm⁻²施氮量范围内,啤酒大麦花前植株氮素积累量和转运量均随施氮水平的提高呈上升趋势,但施氮量提高至300 kg hm⁻²后,提高幅度变小;而花前氮素转运效率及其对籽粒氮的贡献率则均随施氮水平提高呈单峰曲线变化。籽粒谷氨酰胺合成酶和谷-丙转氨酶活性也随着施氮水平的提高而上升,促进蛋白质积累,提高籽粒蛋白质含量,而当施氮量低于197 kg hm⁻²时籽粒蛋白质含量才低于12%,符合啤酒大麦酿造要求。经回归分析,在施氮量为241 kg hm⁻²时产量最高。此外,氮肥回收效率以225 kg hm⁻²施氮处理为最高,氮素生理利用效率和氮收获指数随施氮量增加而显著降低。综合考虑各项指标,建议在类似本试验条件的啤酒大麦生产区,施氮量以150~197 kg hm⁻²为宜。

关键词: 啤酒大麦 施氮水平 氮素积累 氮素利用 蛋白质含量

Effects of Nitrogen Application Rates on Nitrogen Uptake and Use,Protein Accumulation,and Grain Yield in Malting Barkey

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Abstract:

In purpose of improving application of nitrogen (N) fertilizer in malting barley (*Hordeum vulgare* L.) production, the experiments were conducted using two cultivars, Supi 3 and Dan 2, in sequential growing seasons from 2004 to 2006. Within the range of N application rate from 0 to 225 kg ha⁻¹, the N accumulation before anthesis and its translocation to grains were in positive responses to the increase of N rate, but there was a slight difference between the N rate treatments of 225 kg ha⁻¹ and 300 kg ha⁻¹. The translocation efficiency of N accumulated before anthesis, and its contribution to grains showed single-peak curve changes with the increase of N rate. The activities of glutamine synthetase and glutamic pyruvic transaminase in grains increased with the augment of N rate, indicating that more proteins were accumulated in grains at higher N rates. When N rate was lower than 197 kg ha⁻¹, the protein content in grains met the malting requirement (lower than 12%). According to the regression analysis, the highest grain yield was observed at N application level of 241 kg ha⁻¹. In addition, the N recovery efficiency was the largest in N rate treatment of 225 kg ha⁻¹, and the N physiological use efficiency and N harvest index decreased when more N fertilizer applied. The results suggest that 150–197 kg ha⁻¹ of N fertilizer should be favorable for malting barley production under environments similar to that of the present experiment.

Keywords: Malting barkey(*Hordeum vulgare* L.) Nitrogen fertilizer rate Nitrogen accumulation Nitrogen use Protein content

收稿日期 2009-04-17 修回日期 2009-07-25 网络版发布日期 2009-09-10

DOI:

基金项目:

本研究由国家自然科学基金(30671216, 30700483),江苏省自然科学基金(BK2008329),教育部新世纪优秀人才资助计划项目(06-0493),现代农业产业技术体系项目(nycytx-03)资助。

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