



Effects of Late Nitrogen Application on Grain Yield, Quality and Nitrogen Utilization of Winter Wheat

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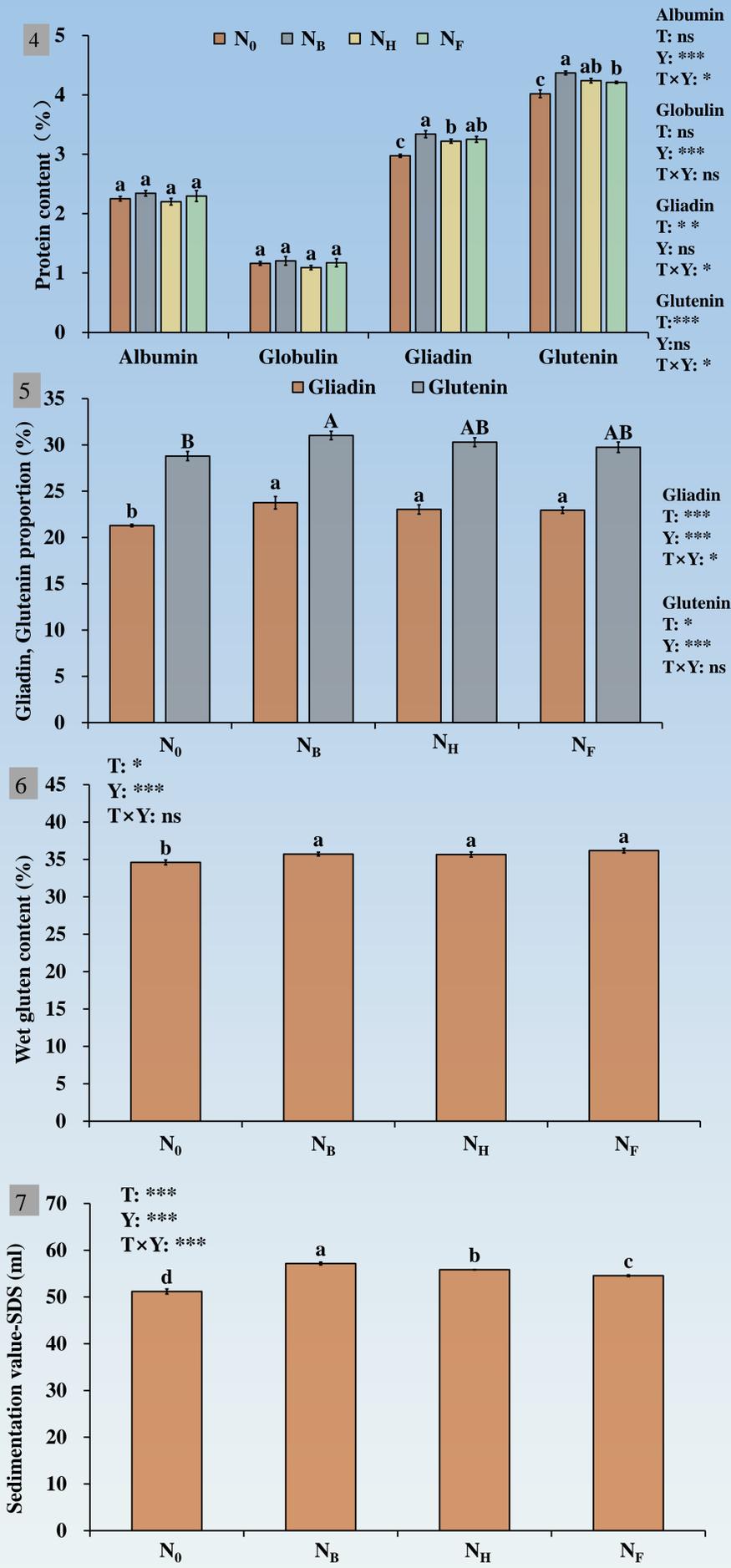
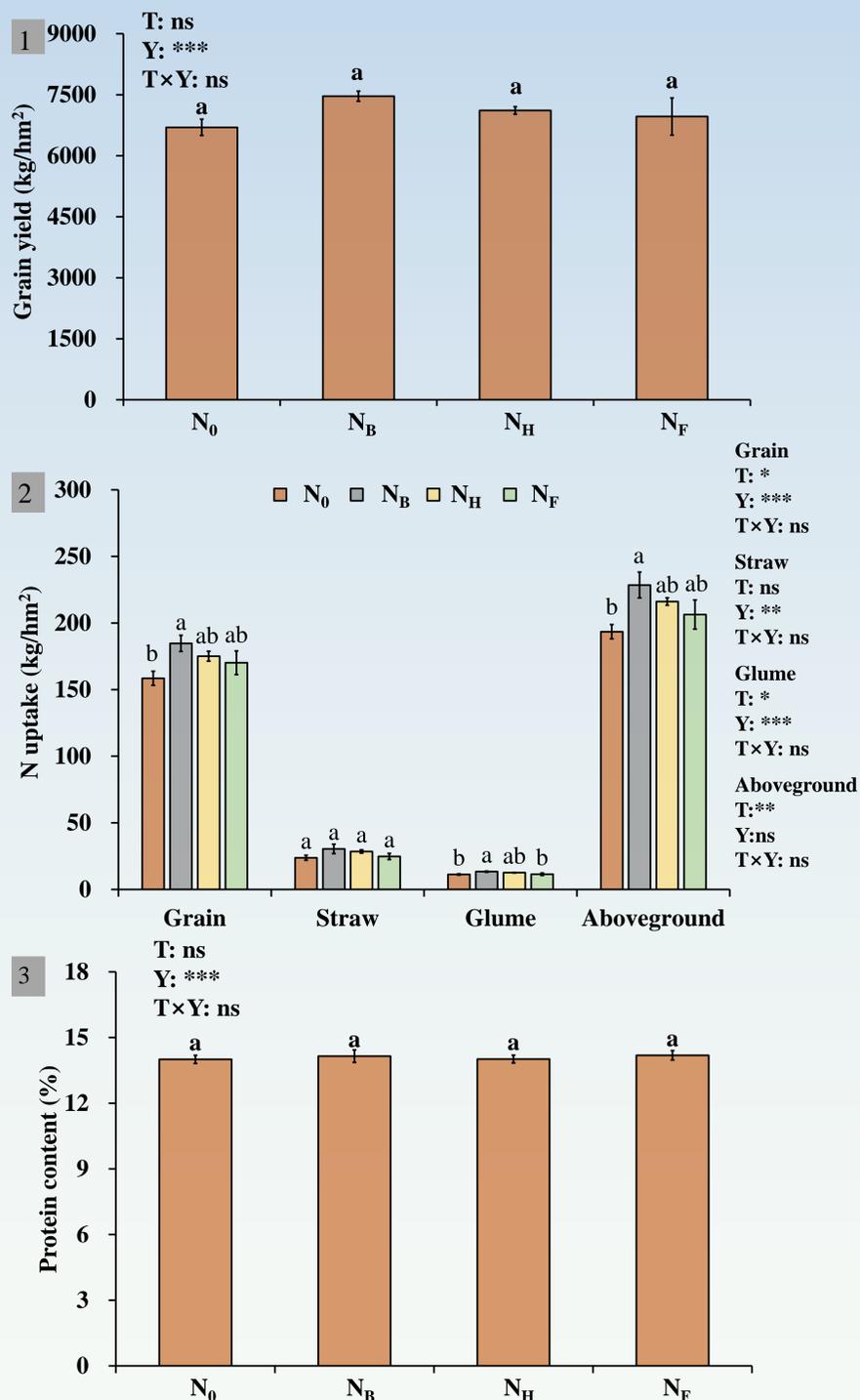
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Introduction

Late nitrogen (N) application is a method to improve wheat yield and quality. However, the results varied among studies which led to different conclusions. One of the possible explanations for these inconsistent conclusions might result from different timings of late N application. Results from previous studies indicated that there might be a critical period for late N application to improve the quality of wheat grains, while earlier or later than which might show less or no effect on grain protein and processing quality of wheat grain (Xue et al, 2016a,b; 2019). The main objective of this study was to explore the effect of late N application on wheat quality and the optimal topdressing timing on improving N uptake and wheat quality.

Materials and Methods

A field experiment was carried out from October 2017 to June 2019 using a strong-gluten winter wheat cultivar “Gaoyou 2018”. With the same dose of N application four treatment with various N application timings were conducted, i.e. N application at sowing and stem elongation (N_0), N application at sowing, stem elongation and booting stage (N_B), N application and sowing, stem elongation and heading stage (N_H), N application at sowing, stem elongation and flowering stage (N_F). Each treatment was repeated four times in a completely random block group design.



Summary

Late N application improved the quality without reducing the yield of wheat. Late N application promoted gluten synthesis and thus increased the content and ratio of gluten. Furthermore, late N application significantly improved sedimentation value-SDS and wet gluten content. **Booting stage is the key timing for late N application in improving grain quality.** Late N application at booting stage significantly increased N uptake and synthesized more gliadin and glutenin as the N distribution of grain changed. In addition, compared with others N topdressing time, N application at booting stage significantly increased wet gluten content and sedimentation value-SDS. In summary, late N application improved the quality of wheat without reducing yield, especially at booting stage.

Fig. 1 - 7: Effects of different N application timing on wheat grain yield, N uptake, grain protein content, albumin, globulin, gliadin, and glutenin content, gliadin, glutenin proportion, wet gluten content and Sedimentation value-SDS. Different letters represent significant differences ($P \leq 0.05$) of mean values. Error bars represent \pm standard errors. T, treatment; Y, years; *, **, ***, significant at the 0.05, 0.01, and 0.001 probability level, respectively; ns, not significant. (Unpublished)

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