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BOOK OF ABSTRACTS

EDITED BY
Hamit KÖKSEL

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Effect of Soil and Foliar Late-Season Nitrogen Application on Rheological Parameters and Gluten Content and Composition in High Protein Wheat.

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High grain protein content (GPC) is a desired trait for improve common wheat classes (Brown et al., 2005). Nitrogen (N) fertilization, and in particular the late-season application, through granular top-dressed fertilizer between booting and heading stages or through foliar fertilizer at wheat flowering, is the main factor affecting storage proteins as well as the technological quality of the derived flour (Blandino et al., 2015). The aim of this study was to compare the effect of late-season N fertilization strategies, through granular top-dressed soil or foliar applications on grain protein content and composition and the consequent rheological parameters.

Field experiment were set up over 2 growing seasons in North West Italy. In each site the effect of N fertilization (5 treatments) was evaluated on 2 common wheat cultivars, following a full factorial scheme with 4 replication. 4 late-season N (30 kg N ha⁻¹) treatment were applied: soil-applied ammonium nitrate or urea at early heading stage, and foliar sprayed at flowering (liquid urea or commercial N foliar fertilizer with mainly ureic N). All these treatments were compared to a control without N fertilization after the vegetative growth stages. Before the late-season distribution, from tillering to stem elongation stage, a total of 140 kg N ha⁻¹ was applied to all compared treatments as ammonium nitrate. The following parameters have been recorder for both crops: flag leaf greenness (NDVI vegetative index), flag leaf burn severity, grain yield, test weight (TW), thousand kernel weight (TKW), GPC, gluten content, alveographic and Mixolab parameters. Moreover an analysis of reserve protein fractions has been performed on flour samples trough sequential extraction in alcohol and reducing agents and spectrophotometric detection (Bradford method).

In all the experiments, the grain yield, TW and TKW were not affect by late-season N fertilization, although the foliar fertilizer application resulted in leaf burn severity of 11.6% (foliar urea) and 10.4% (commercial foliar fertilizer). The use of top-dressed soil ammonium nitrate or the foliar application at flowering resulted in a significant increase of GPC (+0.97%) and flour strength W, (+22%) compared to the untreated control, while the qualitative enhancement obtained through soil application of granular urea was significantly lower (GPC + 0.56%; W + 12%).

In gel-separation and quantification by densitometry analysis of gliadins and low (LMW-GS) and high (HMW-GS) molecular weight glutenins showed that ammonium nitrate fertilization increases in abundance the gliadin fraction (by inducing in particular the 31.5 kDa gliadin subunit) and the LMW-GS fraction (by inducing subunits with MW lower than 32.5 kDa). Foliar N application led to a significantly general increase of both HMW and LMW-GS, while the use of granular urea led to a lower increase of all gluten protein fractions.

As was expected, the application of a N foliar fertilizer at anthesis increase GPC, nevertheless the different fertilization strategies resulted in a different improvement of the rheological parameters. These differences could be correlated to a different effect on the occurrence of protein fractions related to the effectiveness and the timings of nutrient provision.

Keywords: *Triticum aestivum*, high protein wheat, gluten, nitrogen fertilization, alveograph, Mixolab.