Durum Wheat quality prediction for breeding purposes with NIRS

M. Paolini1\*, A. Di Gianfelippo2

1 R&D – Società Produttori Sementi S.p.A. – Via Macero, 1 40050 Argelato (BO) Italia, marilena.paolini@syngenta.com

2 Alma Mater Studiorum Università di Bologna, viale Fanin, 40, 40127 (BO) Italia, ant.dg94@gmail.com
\*Corresponding author

Durum wheat quality for pasta making is strongly dependent on genetic traits of the varieties used and enhanced by good agricultural practices. It is strategic for this crop that the breeding process is assisted by the evaluation of qualitative performance. The direct measurement of quality is carried out with time and resource consuming techniques; in addition, sometimes these techniques are not compatible with the grain quantity generated during the breeding cycles. Therefore, predictive methods are adopted whenever possible, together with the statistical analysis of results obtained from replicates, locations, years. At the R&D laboratory of Società Produttori Sementi (PSB) we apply high throughput techniques and tools, in order to perform predictive analysis of durum wheat quality during the breeding process, which is aimed to obtain new varieties with a high and stable quality for the pasta industry. Among the techniques used, NIRS analysis plays a key role. It is performed through a monochromator NIR + VIS and a FT-NIR instrument, on whole or ground grains. In-house calibrations are developed based on samples from experimental plots, quite heterogeneous as to origin, cultivation method and selection generation. In addition to the consolidated and regularly updated predictive models (protein content, vitreousness, yellow index, test weight), in this paper new calibrations have been investigated regarding other qualitative traits of grain (average grain weight, black point, fusarium damage) or semolina (colour indexes, gluten quality), and some promising results were obtained (correlation coefficient between 0,7 for black point rate and 0,9 for average grain weight). The availability of NIRS predictions with enough accuracy and robustness adds to the speed and simplicity of analysis a high degree of flexibility in the sampling, evaluation and selection process for durum wheat: the constant match of qualitative analysis to the agronomic and yield evaluation can become feasible and sustainable.

**Keywords:** durum, wheat, quality, pasta, NIRS

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