Starch pasting properties by MixoLab of wheat trials differing in Falling Numbers

L. Cato and J. NC
Australian Export Grains Innovation Centre (AEGIC), 3 Baron-Hay Court, South Perth, WA 6151, Australia
Correspondence: larisa.cato@aegic.org.au

1. INTRODUCTION

The falling number (Fn) determination is commonly used to estimate the degree of field sprouting and enzyme activity (namely α-amyloses and proteases) in wheat meal and flour. The economic consequences of high α-amylose activities can be very significant. Both bread and noodle making quality can be adversely impacted by high levels of α-amylose as a result of field sprouting. Sprout damage occurs when the wheat is quite mature and cannot be harvested because of a long periods of rain. The presence of α-amylose and protease enzymes are an indicator of changes in the grain. α-Amylose breaks down starch molecules into smaller sugar molecules, while the protease breaks down protein in the grain. Therefore, grain with high levels of these two enzymes contain starch and proteins that are damaged, making them unsuitable for bread, noodle or pasta products.

Noodle appearance is the first critical judgment made by the consumer when evaluating noodle quality. Noodle appearance evaluation is based on noodle colour, brightness, appearance of specific protein peaks and gluten stability (discolouration). Another important aspect of noodle quality is eating quality of noodles or noodle texture. Both starch and proteins play an important role in defining eating quality of noodles.

The objective of this study was to investigate starch and gluten properties of wheat varieties differing in Fn.

2. MATERIALS AND METHODS

Wheat trials
Ten (10) Australian wheat varieties were grown at three locations in southern Western Australia (Salmon Gums, Corack and Neridup) in 2015-16 growing season. Two of the three sites produced sound grain (high Fn) while the third site received significant amount of rain prior to harvest resulting in significantly lower Fn.

Noodle preparation
White salted noodles (WSN) were prepared using flour, water (34%) and salt (4%) only. A mixture of trials (Salmon Gums, Corack and Neridup) incorporated the ingredients for 5 min before the crumbs were sheeted on a laboratory scale noodle machine (Ohtake, Tokyo, Japan) with an initial block temperature of 30°C. Two passes were made at this setting with the noodle sheet being folded between passes to ensure homogeneity. Before two step reduction process noodle sheet was rested for 60 min at 25°C and 85% RH. Final noodle thickness was 2.50mm ± 0.02mm. A noodle sheet piece was cut off for Minolta measurements and the remainder of the sheet was cut into noodle strands using cutter #12. Noodles were cut into 10cm strands for texture measurements.

Noodle colour and texture measurement
Noodle sheet colour was measured with a Minolta Chroma Meter (CR-310) and L* (brightness), b* (yellowness) and a* (redness) value were recorded at time zero and Fig. 2 a and b). Trial grown in Neridup had on average higher grain protein content but lowest dough strength (Rmax) (Fig. 1c) and lowest gluten functionality, as indicated by lower Gluten Performance Index (Solvent Retention Capacity) values (Fig. 1d). Changed starch and gluten properties adversely impacted the textual properties of noodles, resulting in softer noodles (Fig. 3c). Low Fn also had adverse impact on noodle brightness (Minolta L*) (Fig. 3a), while noodle yellowness (Minolta b*) was largely impacted by location grown (Fig. 3b).

3. RESULTS AND DISCUSSION

4. CONCLUSIONS

Acknowledgements
* South East Premium Wheat Growers Association (SPPWA) for provision of samples.

aegic.org.au