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## ► To cite this version:

Marianne Joubert, Valerie Lullien-Pellerin, Marie Helene Morel. Impact of durum wheat grain composition on semolina yield and pasta quality. 15. European Young Cereal Scientists and Technologists Workshop (EYCSTW), Apr 2016, Milan/Bergamo, Italy. hal-01604729

**HAL Id: hal-01604729**

**<https://hal.science/hal-01604729>**

Submitted on 3 Jun 2020

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## Impact of durum wheat grain composition on semolina yield and pasta quality

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- Durum wheat, semolina yield and pasta quality
- Protein and ash content
- Starchy endosperm particle size distribution

In Italy, France and Greece, traditional dried pasta are manufactured exclusively from durum wheat semolina and water. Thus, spaghetti quality is directly linked with the durum wheat grain quality. This talk demonstrates how the durum wheat grain composition and physical attributes affect semolina yield and composition and finally the pasta quality.

Five durum wheat grain samples, grown in 2014 under different nitrogen doses, were characterized in terms of mass, texture and mechanical properties and biochemical composition and transformed on a milling pilot plant (scale 150kg) delivering 18 different fractions. Yield in the different flour and semolina fractions, as well as their biochemical composition (content in protein, ash, phytic acid, damaged starch, total starch) and physical attributes (particle size distribution) were determined and related to the grain characteristics. In particular semolina yield was found related to grain vitreousness and grain protein content. The different milling fractions were combined in order to compose eighteen different semolina blends, representing six levels of protein content (9.2 to 13.5%) , four levels of ash content (0.65 to 1.16%) and three particle size distributions (D50 from 230 to 600  $\mu$ m). Each variable (protein, ash, D50) was tested at different levels, values of the other two being fixed. In this a way, an experimental design was constituted. The semolina blends were transformed into pasta on an experimental press (scale 10 kg) and dried using standard low and high temperature diagrams. Color and defaults (speck, spots and cracks) of the dried spaghetti quality were assessed. Cooking quality of pasta was evaluated by measuring pasta viscoelasticity after optimal cooking time +6min.

The study confirms that a high ash content decreases significantly the yellowness and the brightness index of pasta. Semolina particle size distribution impacts also the pasta color, coarser semolina leading to brighter pasta. A significant positive effect of semolina protein content was shown on the viscoelastic index of pasta. This approach allows a non-distorted estimate of how each variable impacts the pasta quality.

*Marianne Joubert is a second year PhD Student at French National Institute for Agricultural Research in Montpellier (France) within the Joint Research Unit on Agropolymer Engineering and Emerging Technologies. Her PhD topic is focused on the adaptation of the durum wheat grain processes, milling and pasta making, to grain variabilities. Her work is part of a French National Research Agency project about agronomic, technologic, and organizational innovations to improve the sustainability of the durum wheat chain. This study is also supported by a French pasta-manufacturing company.*