Microstructural changes in cooked apricots related to the loss of texture

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INTRODUCTION

The quality of the apricot products is largely defined by their texture, which is significantly lost upon processing. The pectin properties of apricots may play an important role in this loss of texture, even more than the initial firmness, but this is not yet well understood [1]. This study aims to identify a varietal differentiation in the texture-loss properties and to link them with microstructural changes, with a final goal of understanding the mechanisms that influence the texture loss in apricot.

METHODOLOGY

Fruits were selected from four varieties at similar ripening stages, which were determined by their firmness using a compression test [1]. The apricot halves were cooked at 85 °C in sugar syrup and their texture was measured by the maximum force in the penetrometry test [1]. Microstructure changes were revealed by ruthenium red staining (pectin) and LM19 immunolabelling (unmethylated and low-methylated pectin) [2].

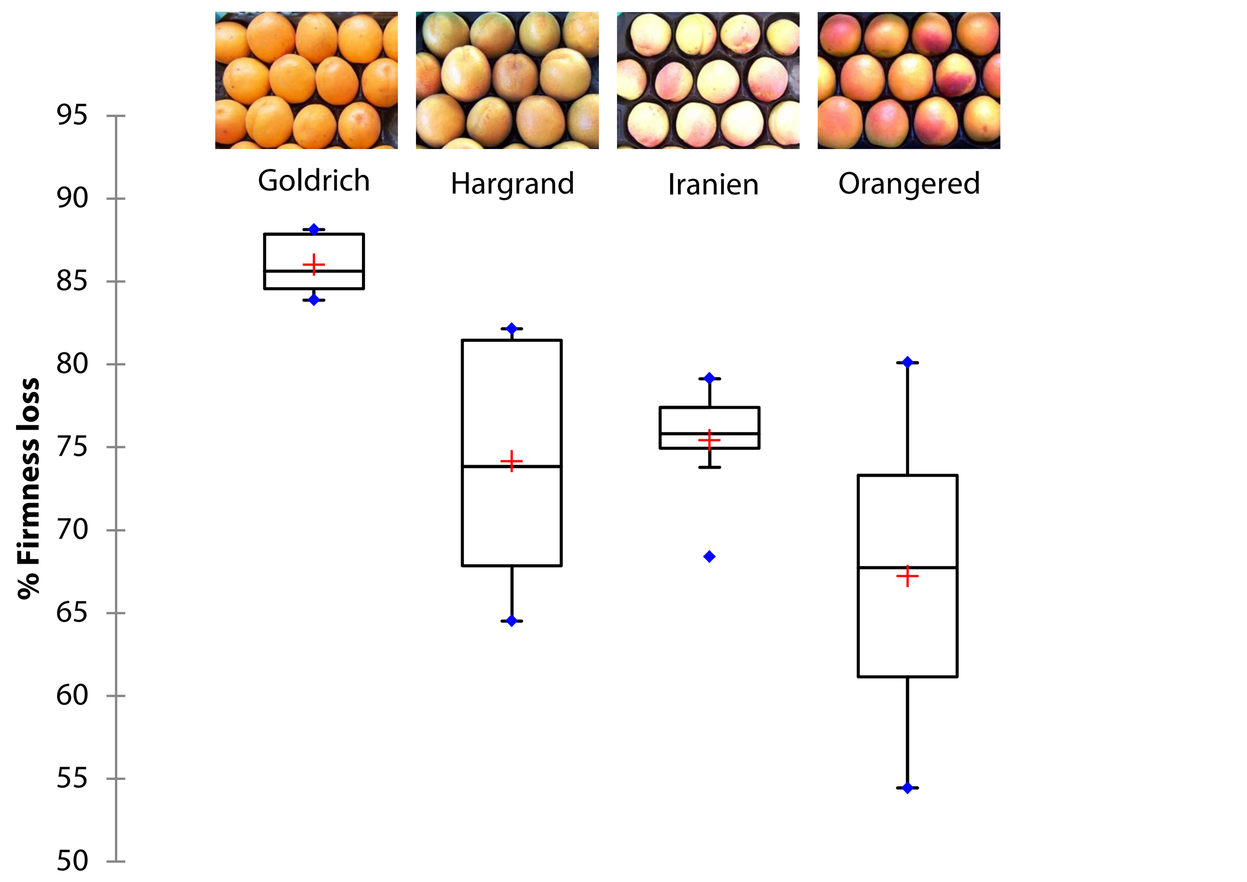


Fig. 1. Loss of texture after thermal treatment as expressed by the percentage loss of the initial firmness (Fmax, penetrometry test). The boxplots indicate means (red crosses), medians (central horizontal bars), first and third quartiles (lower and upper limits respectively), and minimum and maximum values (blue points).

RESULTS & DISCUSSION

Variety largely influenced the loss of texture (**Fig. 1**). Orangered was the variety with higher resistance to the texture loss (67% of the initial firmness), followed by Hargrand (74%), Iranien (75%) and Goldrich (86%). The tissues did not show severe damaging after cooking, however, some microstructural changes could be observed. The cells lost turgor as demonstrated by the higher sinuosity of the cell walls. Some intercellular spaces swelled, creating round-shaped microstructures filled with unmethylated pectin, as showed by LM19 (**Fig. 2**). Their presence across the varieties showed to be in line with their resistance to the loss of texture (**Fig. 3**). Varietal differences in the biochemical properties must have prompted the ease of pectin to be leached from the tissue or to be retained within the intercellular spaces.

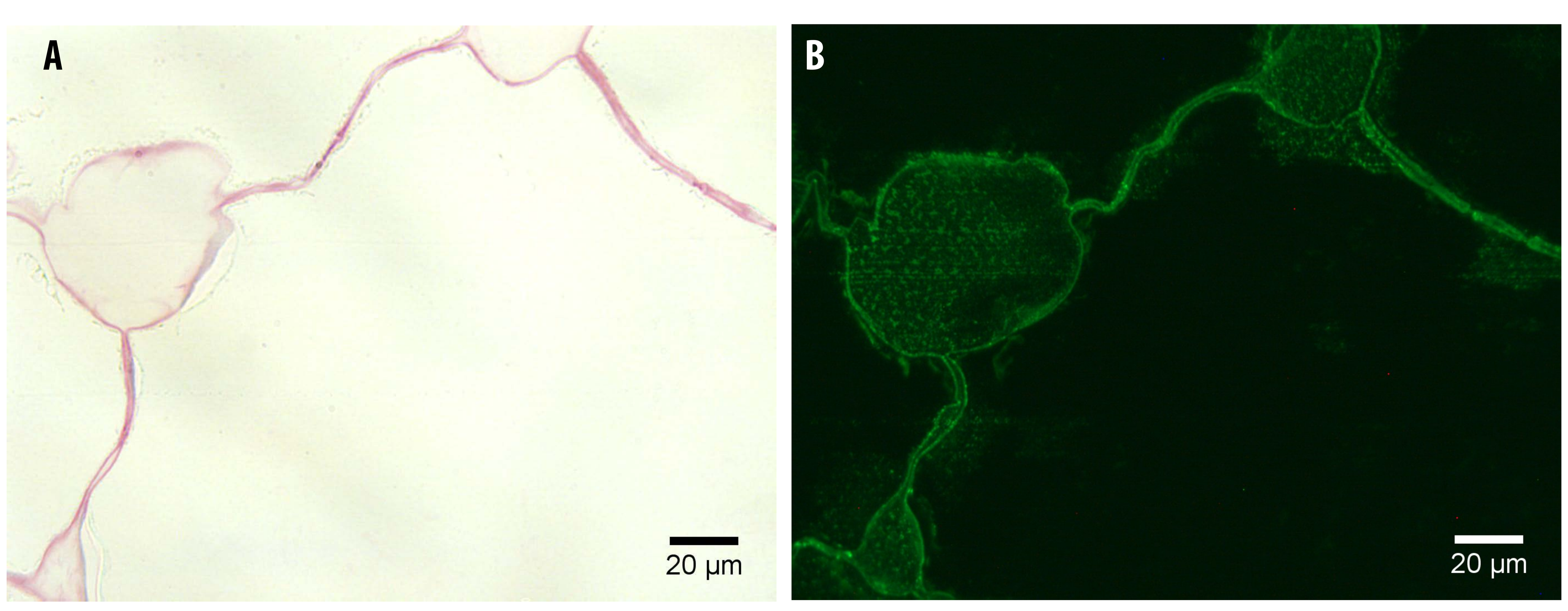
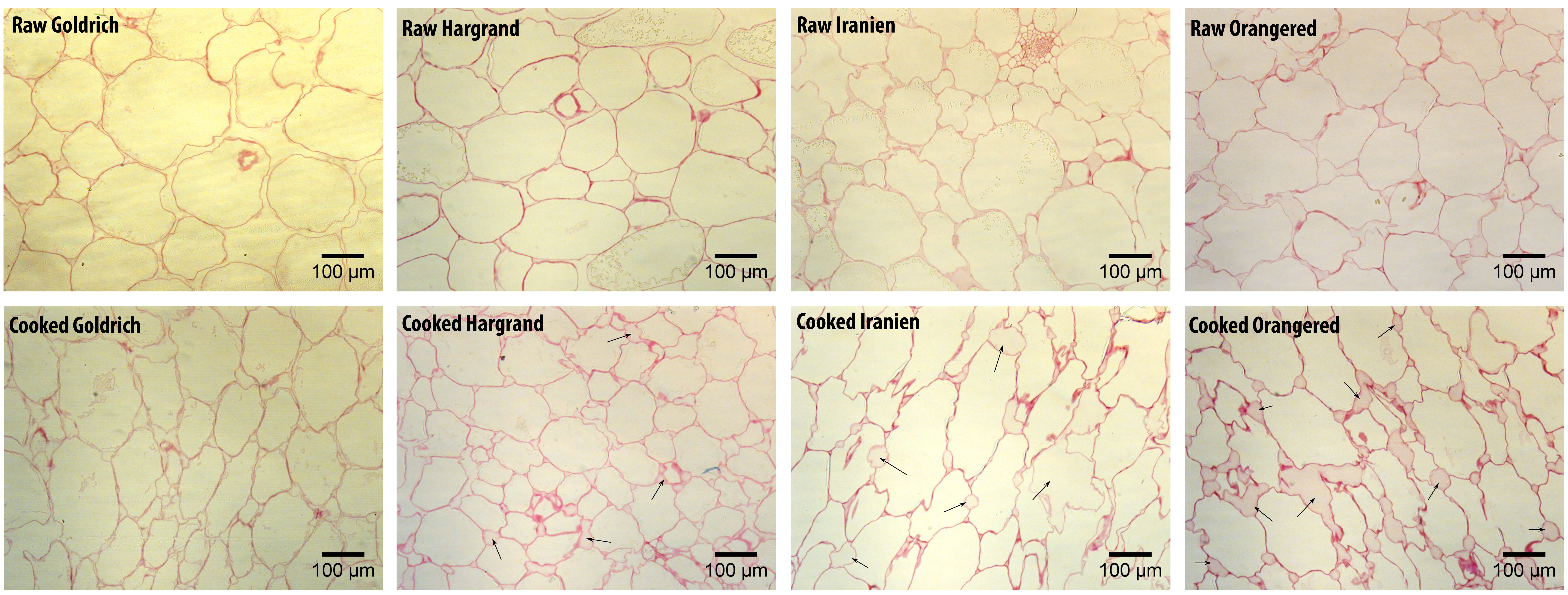


Fig. 2. Detail of the round intercellular spaces filled with unmethylated pectin in a thermally treated sample (Iranien). A, ruthenium red staining; B, LM19 immunolabelling.

CONCLUSIONS

We identified a link between the creation of intercellular microstructures and the loss of texture. This study opens the possibility of understanding the creation of these microstructures and the biochemical properties that are implied, which is in the interest of the food industry for the elaboration of higher quality apricot products.

Fig. 3. Effect of cooking on the apricot microstructure, with the apparition of round-shaped intercellular microstructures filled with unmethylated and low-methylated pectin (some examples are marked with arrows).



REFERENCES

[1] C.E. Missang, J.F. Maingonnat, C.M.G.C. Renard & J.-M. Audergon. *Food Res. Int.*, **44** (2011) 46-53.
[2] A. Ribas-Agustí, S. Van Buggenhout, P. Palmero, M. Hendrickx & A. Van Loey. *Innov. Food Sci. Emerg.Technol.*, **24** (2004) 113-120.

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