

Reuse of almond by-products: Scale-up production of functional almond skin added semolina sourdough breads

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Almond by-products are rich in polyphenols. A previous work carried out at laboratory-scale level demonstrated the functionalization of traditional semolina sourdough bread with almond skin, but also evidenced some hygienic issues related to the storage condition of this almond by-product. The present work reports the application of powdered almond skin (PAS) for sourdough bread production at industrial level.

To this purpose, almond factory generating wet almond peel modified the producing line to ameliorate the hygienic characteristics of the skin to be reused. Plant modifications reduced the presence of spore-forming aerobic bacteria, members of Enterobacteriaceae family and total coliforms below the detection limits.

Starting from three recipes without (control, CTR) or with PAS (at 5 or 10 % (w/w) on the weight of semolina, 5-PAS and 10-PAS, respectively), seven different sourdough breads were realized: ciambellina, galletto, sfilatino, lunette, pagnottella, mafalda, and chiocciolina. Sourdough inoculum (pH 3.77) was characterized by a fermentation quotient of 2.68. The initial pH of control trial was 5.16, while higher values were registered for PAS added doughs. The higher titratable acidity registered in PAS added doughs was mainly imputable to the acid content of almond by-products. After fermentation, LAB slightly increased for all doughs, while the increase of yeasts was more pronounced due to the addition of baker's yeast. After baking, PAS addition determined a lower weight loss, an increase of firmness and a diminution of specific volume. A preference test indicated that mafalda and sfilatino shapes were those more appreciated by consumers and further investigated. Mafalda breads formulated with 10 % PAS, after 6-day storage, exhibited the highest IC₅₀ value of 90.77 mg/mL against DPPH radical, while a moderate ABTS radical scavenging activity was observed among investigated samples. Sensory evaluation is ongoing.