EFFECTS OF CONTROLLED SPROUTING ON NUTRITIONAL AND VISCOSITY PROFILE OF WHOLE WHEAT FLOUR

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ABSTRACT

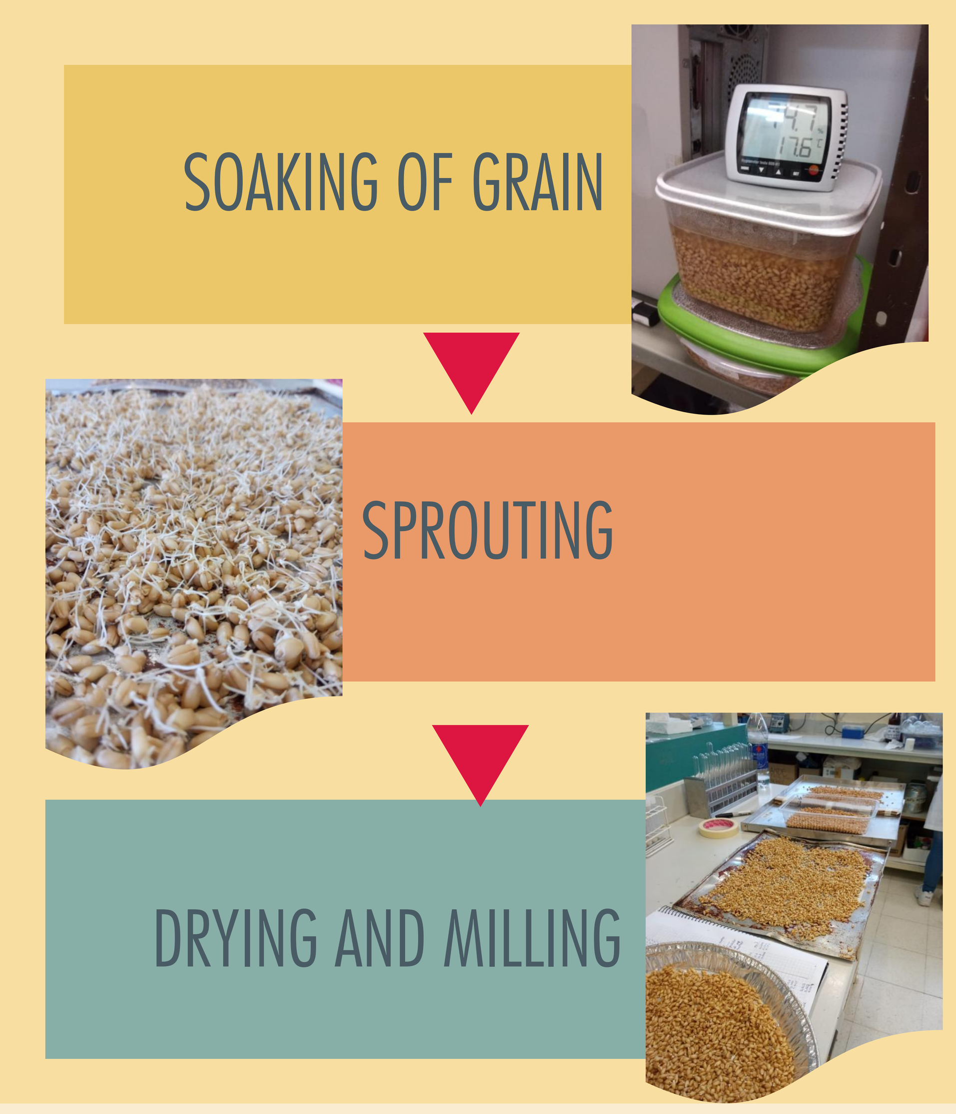
Sprouting may be regarded as a natural bioreactor and could be used to improve the nutritional profile of bread and enhance its technological properties such as bread volume and texture.

The purpose was to examine the effect of temperature and time on the sprouting process to obtain sprouted whole wheat flour (SWWF) with an improved nutritional and technological profile for its use as a functional ingredient.

Keyword: sprouted whole wheat flour, enzyme activity, functional ingredient

METHODS

Klein Valor (KV) and INTA 815 (IN) wheat varieties were incubated for 18, 24, and 48 h at different temperature conditions (15, 20, and 25 °C) and dried up at 50 °C. The dried samples were milled by using a cyclonic mill (1 mm) and the resulting SWWF was analysed. Degree of sprouting, residual α-amylase activity (Amyla-zyme-method, Megazyme), degree of protein hydrolysis (1), reducing sugar (3) and water-soluble arabinoxylans (4) content were determined . In addition, the viscosity profile of SWWF suspensions and partial replacements of whole wheat flour with SWWF were carried out (5). Ungerminated whole wheat flour (UWWF) was used as a control. ANOVA analysis was carried out (6).



RESULTS AND DISCUSSION

The germination rate was temperature-dependent. However, the degree of sprouting varied among wheat varieties. IN grains sprouted faster than KV grains (Fig 1). Overall, wheat sprouted at 15 and 20 °C for 48 h equated to the α-amylase activity, free amino acid, and water-soluble arabinoxylans content of those grains sprouted at 25 °C (Fig 2). The values reached at these conditions were between 15-25 times, 5-9 times, and 2 times higher than UWWF, respectively. Moreover, the sprouting process led to a decrease in the peak viscosity of SWWF suspensions (Fig. 3). The lower viscosity indicates that part of the starch was hydrolysed, generating reducing sugars that could favour yeasts fermentation and also improve the crust colour and flavor of bread.

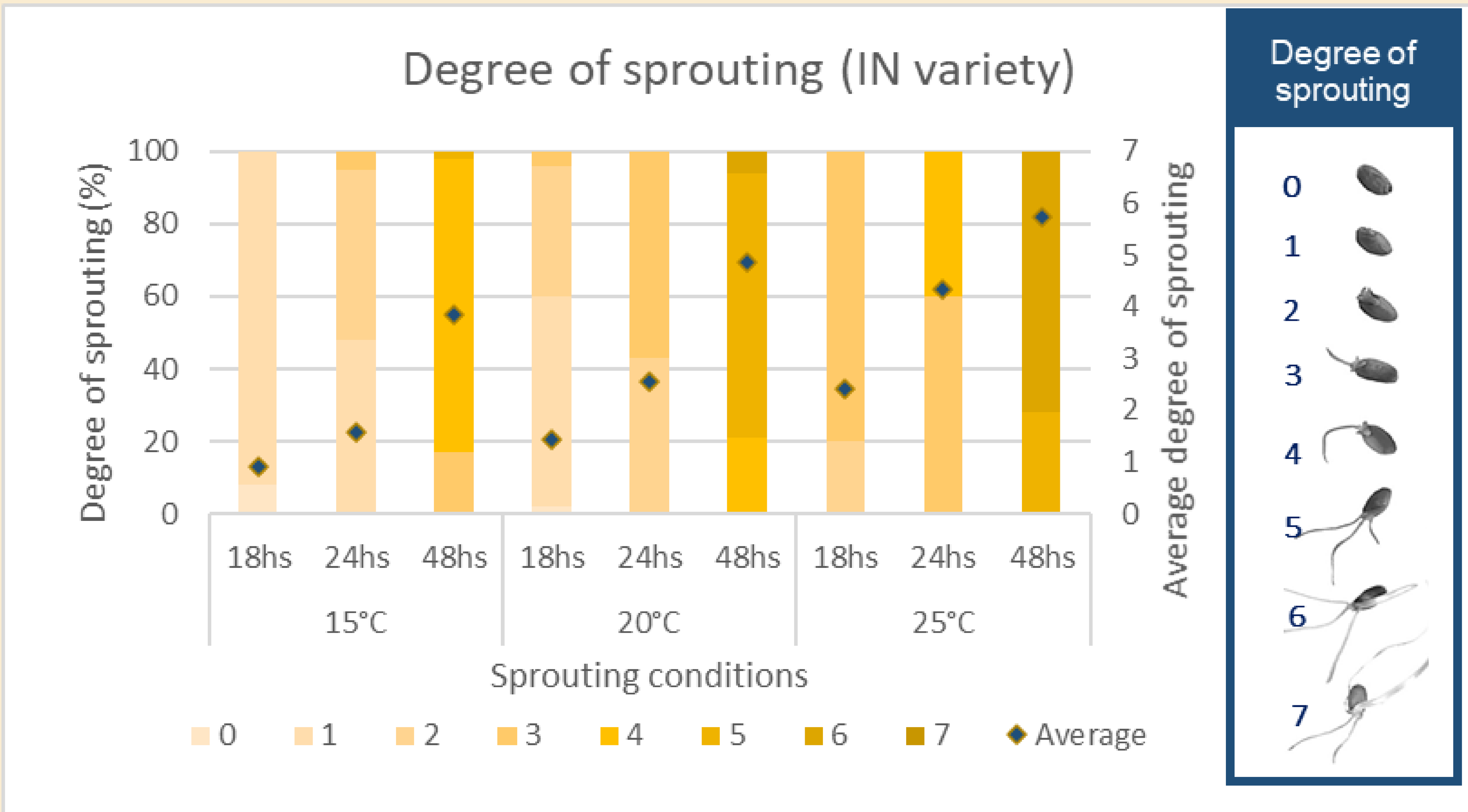


Fig. 1 Effect of the temperature on the degree of sprouting after 18, 24, and 48 h.

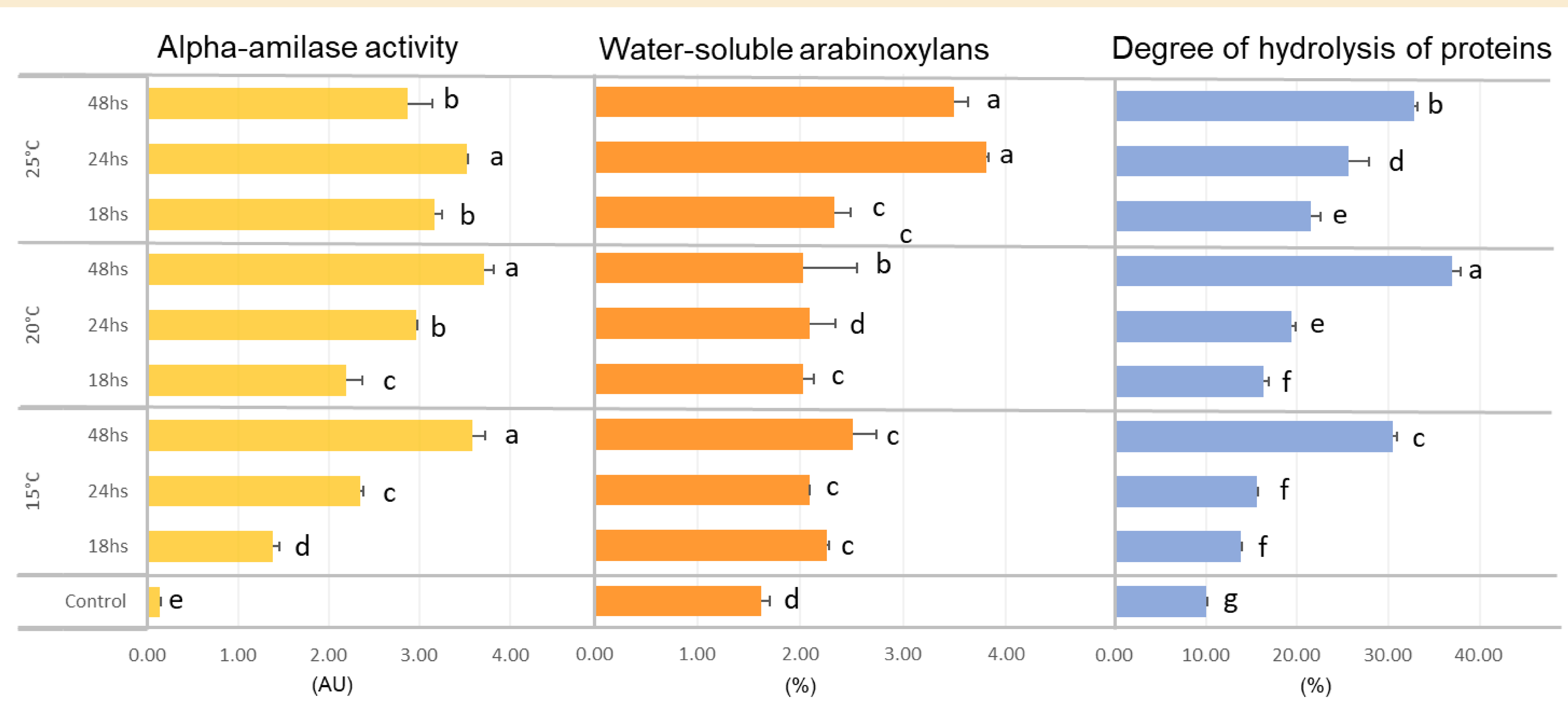


Fig. 2 Effect of sprouting condition in α-amylase activity, free amino acid, and water-soluble arabinoxylans content of IN variety. Different letters in the same column indicate significant differences ($p<0.05$).

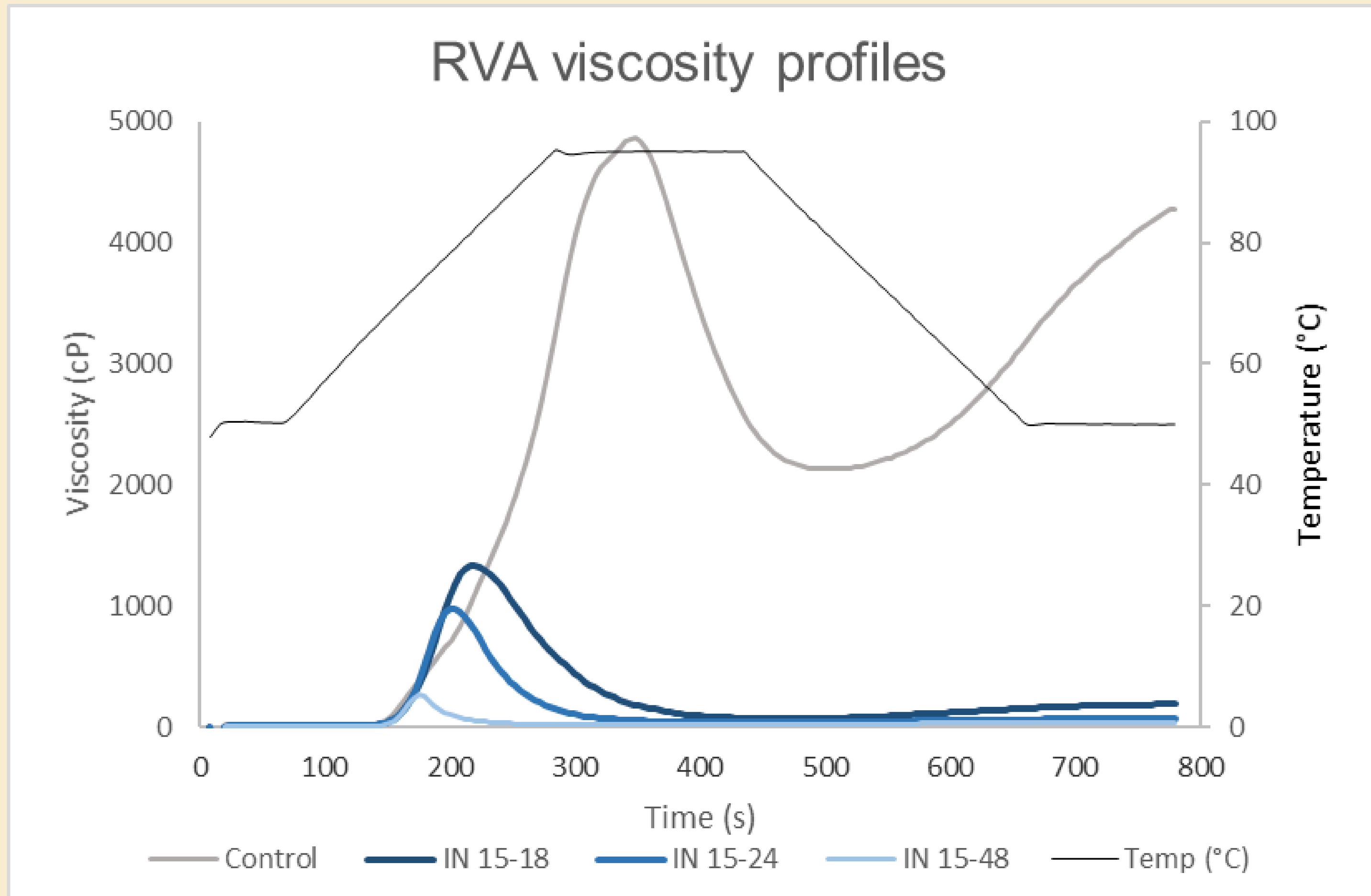


Fig. 3 RVA profiles of SWWF suspensions (IN variety).

CONCLUSION

In this way, sprouting in controlled conditions represents a promising strategy to obtain SWWF with a balance between nutritional improvement and enzymatic activity. That could be used as a functional ingredient to partially replace commercial additives on whole wheat bread formulation.

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