



Effect of rosehip powder addition on dough development and ability of gas formation and retention during fermentation

Nicoleta PIRCU VARTOLOMEI & Maria TURTOI*

Dunarea de Jos University of Galati, Cross-border Faculty, 47 Domneasca St., 800008 Galati, Romania

Abstract: This study aims to investigate the influence of rosehip powder addition on dough development and its ability of gas production and retention during fermentation. The dough was prepared in a Rheofermentometer F3 Chopin from white wheat flour 550 type with the addition of 1.0, 2.5 and 5.0 % rosehip powder. The parameters of the dough development and of gaseous release were determined and discussed. The discussion of the results reveals that rosehip powder addition improves the dough rheology similar to synthetic ascorbic acid. Further studies to establish the optimal dose of rosehip powder addition and to study the influence on bread quality are necessary.

Introduction

In the process of dough development, the gluten network is formed in the bread dough. This network has an essential role in the retention of the gas generated by the yeast during the dough fermentation and proofing. The ability of gas retention could be improved by the addition of small quantities of different ingredients into the wheat flour (e.g., enzymes, emulsifiers, antioxidants, etc.).

Ascorbic acid (AA) is an improver used to accelerate flour maturation, process weak flours and for fast and intense kneading of dough. Its role in breadmaking is to mediate the oxidative reactions which stabilize the dough and help in keeping the elastic and viscous properties needed for gas retention.

AA is mainly obtained through chemical synthesis. Current trends of using natural bioactive compounds leads to the idea of AA replacement with natural materials rich in vitamin C such as acerola cherry, rosehip, Kakadu plum or cranberries.

Aim: to study the effect of rosehip powder on the development of dough and its ability of gas production and retention.

Materials and methods

Materials

Wheat flour: moisture 14.15 ± 0.06 %, ash 0.550 ± 0.01 %, proteins 14.75 ± 0.01 %, wet gluten 34.10 ± 0.07 %, water absorption 59.60 ± 0.14 %, granulosity $180 \mu\text{m}$.

Rosehip powder (Rp): moisture 13.40 ± 0.15 %, ash 6.50 ± 0.07 %, proteins 4.89 ± 0.11 %, lipids 0.76 ± 0.01 %, carbohydrates 73.66 ± 0.19 %, vitamin C 200 ± 24 mg/100 g, granulosity $180 \mu\text{m}$.

Rheometer: Chopin F3 rheofermentometer

Methods

Fermentographic test consists in the automatic and continuous determination of gas amount formed during the dough fermentation, in an environment with constant temperature (30°C) for a determined duration of 3 hours (180 min).

Calculation: Excel from 2010 Microsoft Office

Statistical analysis: ANOVA one way,



Fig. 1. Chopin Rheofermentometer

Results and discussion

The fermentographic test provides important information about the dough development parameters such as the maximum height of the dough, H_m (Fig. 2) the time in which H_m is obtained, the height of the dough, h , at the end of the test (Fig. 2), and the production of gases during the dough fermentation at 30°C for 3 hrs such as the time T_x where the CO_2 loose from the dough begins, total gas production volume, lost CO_2 volume and retained CO_2 volume (Fig. 3).

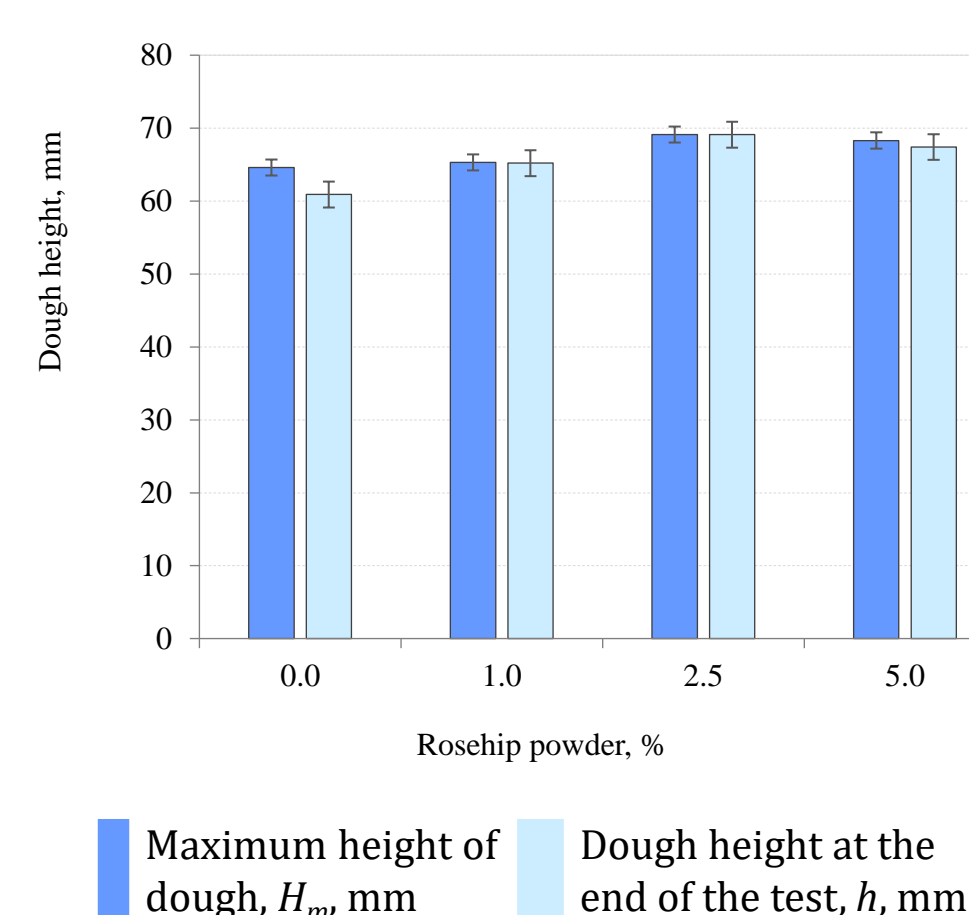


Fig. 2. Dough height as a function of rosehip powder addition

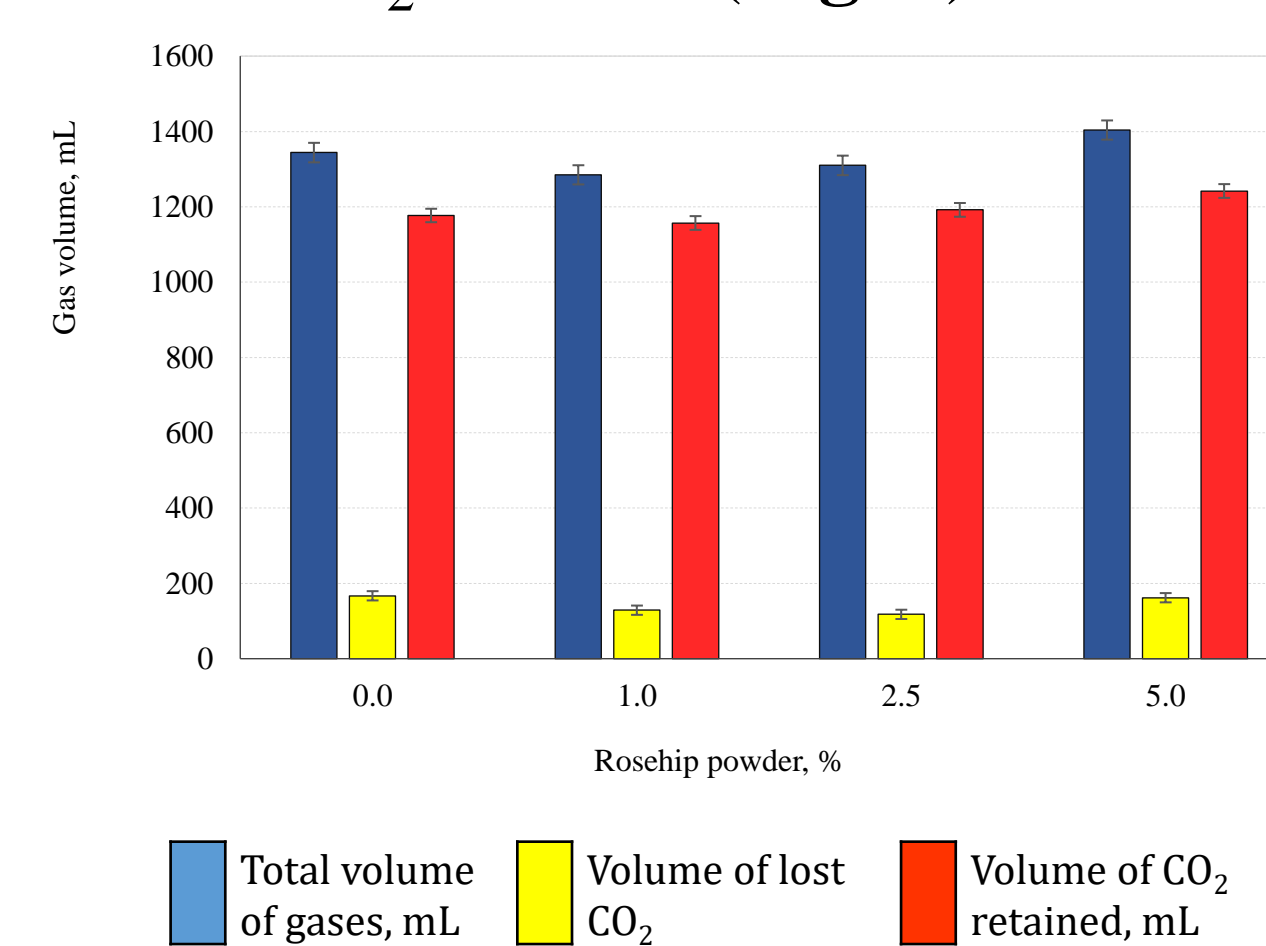


Fig. 3. Gas volume as a function of rosehip powder addition

Findings and comments:

- The maximum height and the final height of the dough increase significantly ($p < 0.05$) with the Pm addition up to 2.5 % Pm after which a decrease is observed;
- The Rp addition stabilizes the dough (the relative stabilization time is zero);
- The percentage of dough falling is maximum for control, minimum for 1.0 % Rp and zero for 2.5 % Rp;
- The time T_1 in which the maximum dough height is obtained increases to 180 min (no dough fall) for 2.5 % Rp and decreases with 5 min for 5.0 % Rp;
- The time at which the loss of gas from the dough begins is 30 % lower for 5.0 % Rp compared to control;
- The volume of gases retained in the dough increases with the Pm addition.

Conclusions

Rosehip powder addition has a positive influence on rheological parameters whose evolution indicate that the addition of rosehip powder should be under 2.5 %.

Acknowledgement

This study was performed with the material support of S.C Dizing SRL Brusturi, Neamt.