Sprouting: A sustainable tool for enhancing prebiotic properties of durum wheat seeds (*Triticum durum*)

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INTRODUCTION

• Consumers’ awareness
• Functional foods
• Claims??

In vitro digestion: an understanding of food components behaviour during digestion to prove the suggested physiological effects.
INTRODUCTION

• Sprouting is an old green tool used to improve cereals and pulses nutritional properties

• Prebiotics are non-digestible food ingredient that beneficially stimulates growth or/and activity of one or a limited number of beneficial bacteria in the colon

The aim of this study was to evaluate the role of sprouting bioprocess in enhancing durum wheat (Triticum durum) prebiotic properties, through the use of an in vitro digestion model.
Materials and Methods

- Triticum durum (2 cultivars « Karim »: high yielding and « Chili » landrace)
- 48h, 25°C

Sprouting

In vitro digestion
- FSRI model

Plate counting after incubation

Prebiotic index
4.5g Sample

Oral Phase

6ml saliva

Gastric phase

12 ml gastric juice

Intestinal Phase

12 ml duodenal juice + 6ml bile + 2 ml NaHCO₃

Freezing the rest in the liquid N₂

Colon Phase

Inoculation of 5ml juice with 10⁶ CFU/bacterial strain

Freezing the rest in the liquid N₂

Plate counting on selective media

Time: 5min
Temperature 37°C
pH: 6.8

Time: 2h
Temperature 37°C
pH: 2.25

Time: 2h
Temperature 37°C
pH: 6.75

Time: 2h
Temperature 37°C
pH: 6.75

Temperature 37°C
Materials and Methods

Prebiotic Index calculation (PI):

$$PI = Bif + Lac - Eco - Clos$$  (1)

$$Bif = \frac{\log Bif_{Tx}}{\log Bif_{T0}} / \frac{\log Tot_{Tx}}{\log Tot_{T0}}$$  (2).

Equation (2) was applied for all terms of Equation (1).

Where: Bif - number of *Bifidobacterium* CFUs, Lac - number of *Lactobacillus* CFUs, Eco - number of *Escherichia* CFUs, Clos - number of *Clostridium* CFUs; Tx – at sample time; T0 – at inoculation time.
Results and discussion

**Table 1. Evolution of prebiotic index (PI) after wheat sprouting**

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Treatment</th>
<th>PI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karim</td>
<td>Raw</td>
<td>0.29±0.02^A</td>
</tr>
<tr>
<td></td>
<td>Sprouted</td>
<td>0.47±0.07^B</td>
</tr>
<tr>
<td>Chili</td>
<td>Raw</td>
<td>0.52±0.04^B</td>
</tr>
<tr>
<td></td>
<td>Sprouted</td>
<td>0.57±0.01^B</td>
</tr>
</tbody>
</table>

^A,B Means in same column that do not share same letters are significantly different, according to Fisher’s test. (p<0.05).
Results and discussion

• Positive values of PI confirming wheat prebiotic properties whether for raw or sprouted seeds

• Effect of genetic background on sprouts prebiotic properties evolution.
Conclusions

Our *in vitro* results have shown that the prebiotic effects in the human colon could be induced by whole mill flour obtained from raw durum wheat seeds (*Triticum durum*) or from sprouted seeds.

Interestingly, sprouting could significantly enhance this positive effect.

Genetic background plays a key role in prebiotic index evolution after sprouting.
Thank You

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