EFFECTS OF PREGELATINIZATION ON PHYSICO-CHEMICAL AND FUNCTIONAL PROPERTIES OF GERMINATED BROWN RICE FLOUR CV. KDML 105

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Introduction
Germinated brown rice

Brown rice soaked in water to induce slight germination, which was shown by 1-2 mm. of grown root.

Table 1. Nutrients in white, brown and germinated brown rice

<table>
<thead>
<tr>
<th></th>
<th>White rice</th>
<th>Brown rice</th>
<th>Germinated brown rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>6.00 g</td>
<td>7.40 g</td>
<td>10.00 g</td>
</tr>
<tr>
<td>Fat</td>
<td>0.80 g</td>
<td>2.40 g</td>
<td>4.50 g</td>
</tr>
<tr>
<td>Dietary fiber</td>
<td>0.60 g</td>
<td>2.80 g</td>
<td>4.50 g</td>
</tr>
<tr>
<td>Vitamin B1</td>
<td>0.07 mg</td>
<td>0.26 mg</td>
<td>0.31 mg</td>
</tr>
<tr>
<td>Vitamin B2</td>
<td>0.02 mg</td>
<td>0.04 mg</td>
<td>0.11 mg</td>
</tr>
<tr>
<td>Vitamin B3</td>
<td>1.80 mg</td>
<td>5.50 mg</td>
<td>8.25 mg</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>0.46 mg</td>
<td>1.40 mg</td>
<td>2.00 mg</td>
</tr>
<tr>
<td>GABA</td>
<td>1.2 mg</td>
<td>7.00 mg</td>
<td>12.00 mg</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>93.20 g</td>
<td>77.70 g</td>
<td>70.10 g</td>
</tr>
</tbody>
</table>
Many studies showed germinated brown rice cv. KDML 105 contained high nutrients such as protein, GABA, vitamin B1.
**Pregelatinization**

Pregelatinization is a process which suspensions of flour or starch and water were cooked and dried to give products that disperse readily in cold water and form moderately stable suspensions.
Spray dryer

• Flour suspension is fed to an atomizer and the droplets are mixed with a hot gas.

• The solution of the flour must be very watery.
Drum dryer

• Flour suspension is fed to the machine. The heat will cause gelatinization and dry the flour suspension at the same time.
• Cooked flavor, off-color and nutrients loss.

Extrusion

• Raw materials are transported, mixed, kneaded, sheared, and cooked.

• Flour will be deformed due to shearing.

• Heat from friction and cooking caused gelatinization.
Objectives

To evaluate the physico-chemical properties of pregelatinized germinated brown rice cv. KDML 105 flour produced from single screw extruder.

Materials and methods
Khaw Dok Mali 105 (KDML 105) brown rice

Germinated (Khampang et al., 2009)

Soaked in water and washed every 12 hrs until the root of rice is long for 0.5-1 mm

Dried & milled

Sieved through 300 micron screen

Single screw extruder

Flour:water ratio
3:1, 2:1, 1:1

Temperature
60, 80, 100 °C

Pregelatinized flour

3X3 Factorial CRD

• ANOVA
• Duncan’s multiple range test
• SAS program

Chemical analysis
• GABA (Kitaoka and Nakano, 1969)
• Vitamin B1 (Liu et al., 2002)

Physical properties
• Pasting properties (Sloth et al., 2009)
• Swelling and Solubility Properties (Schoch et al., 1964)

Results & Discussion
Fig. 1 GABA contents of germinated brown rice and pregelatinized flour (mg/100 g sample dry weight basis).

Fig. 2 Vitamin B1 contents of germinated brown rice and pregelatinized flour (mg/100 g sample dry weight basis).
Fig. 3 RVA viscogram
Fig. 4 Pasting profile of germinated brown rice and pregelatinized flour produced at 60°C.

Fig. 5 Pasting profile of germinated brown rice and pregelatinized flour produced at 80°C.
Fig. 6 Pasting profile of germinated brown rice and pregelatinized flour at 100 ºC.

Fig. 7 Swelling power of germinated brown rice and pregelatinized flour.
Conclusion

• Pregelatinization had no effect on GABA content.

• Vitamin B1 content was decreased with the increasing of temperature.

• Pregelatinization caused decrease pasting temperature and viscosity and increase swelling power and solubility.
Acknowledgements

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