Abstract
Quality of product after rehydration is important to consumer acceptability. To obtain a good quality of cooked rice, this work was to study the effects of pre-treatments and cooking methods on quality of cooked jasmine rice and drying kinetics. Two cooking methods, boiling and cooking by rice cooker, were used to prepare the cooked rice. The cooked rice obtained from rice cooker was dipped into cool water at 4°C for 30 s before drying. The cooked rice prepared from the boiling method was frozen at -20°C for 24 h and cooled at 4°C for 24 h. The cooked rice was then dried at 80°C using a laboratory tray dryer. The final moisture content required at 10% d.b. (dry basis). The cooking methods and pre-treatments were insignificantly affected on the drying time. The textural property in terms of hardness, stickiness, cohesiveness and adhesiveness were similar for the freshly cooked rice samples obtained from the rice cooker and boiling method. For the dried samples, the dried cooked rice was rehydrated with hot water for 10 min before testing textural property, and the experimental results showed that the pretreatment methods affected the final product quality. The cooked rice frozen at -20°C provided the textural property nearly closed to the freshly cooked rice whilst the cooked rice cooled at 4°C had a higher value of hardness as compared to the fresh sample. The pre-treatment methods and drying could not reduce the glycemic index of cooked rice.

Keywords: cooked rice, glycemic index, textural property
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การระดับชื้นของข้าวที่ผ่านการต้มก่อน (Inventory starch hydrolysis) ปรากฏถาวรที่

**Figure 1** Drying kinetics of cooked rice without pretreatment, with pretreatment by freezing at -20°C for 24 h, cooling at 4°C for 24 h and dipping in 4°C water for 30 s.

จาก**Figure 1**: พบว่าไม่มีความแตกต่างอย่างมีนัยสัญญาณ สำหรับเวลาที่ใช้ในการระดับชื้นข้าว ทุกๆปัจจัยการต้มข้าวผัดเดียว วิธีการต้ม และข้าวสุกที่ไม่ผ่านการต้มข้าว ใช้เวลาในการระดับชื้นประมาณ 100 นาที เพื่อให้ได้ข้าวที่แห้งสำเร็จที่มีความชื้นสูงที่ 10 % d.b.

ผลการทดสอบการแข็งแรงข้าว (In vitro starch hydrolysis)

**Figure 2** แสดงการเปลี่ยนแปลงสูงของ total starch hydrolysis จากการรับประทานข้าว พบว่าการต้มข้าวที่มีผลโดยตรงต่อการยอมรับของเสียงข้าว โดยเฉพาะข้าวสุกที่ไม่ผ่านการต้มข้าว ตัวอย่างที่มีผลต่อการยอมรับได้รับการยอมรับข้าวที่มี缎เครื่องที่มีความสุกชื้นสูง ซึ่งมีนัยสูงสุดด้วยเครื่อง Texture analyzer และน้ำมันทดสอบอยู่ภายในวันที่ Goni et al. (1997)
Table 1  The value of Equilibrium concentration (C∞), kinetic constant (k), hydrolysis index (HI) and glycemic index (GI) of freshly cooked rice, dried cooked rice without pre-treatment, dried cooked rice with pretreatments by freezing at -20°C for 24 h, cooling at 4°C for 24 h and dipping in 4°C water for 30 s.

<table>
<thead>
<tr>
<th>Pretreatment conditions</th>
<th>C∞ (g/g) ± SD</th>
<th>k (min⁻¹) ± SD</th>
<th>HI ± SD</th>
<th>GI ± SD</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshly cooked rice by boiling</td>
<td>44.68 ± 3.79a</td>
<td>0.69 ± 0.06a</td>
<td>79.78 ± 6.82a</td>
<td>83.51 ± 3.75a</td>
<td>0.99</td>
</tr>
<tr>
<td>Dried rice without pretreatment</td>
<td>50.56 ± 1.99bc</td>
<td>0.76 ± 0.03a</td>
<td>90.33 ± 3.55bc</td>
<td>89.30 ± 1.95bc</td>
<td>0.99</td>
</tr>
<tr>
<td>Dried rice with pretreatment by dipping in 4°C water (30s)</td>
<td>49.21 ± 2.09b</td>
<td>0.76 ± 0.04a</td>
<td>87.92 ± 3.78b</td>
<td>87.98 ± 2.07b</td>
<td>0.99</td>
</tr>
<tr>
<td>Dried rice with pretreatment by freezing at -20°C (24h)</td>
<td>46.94 ± 1.34ab</td>
<td>0.73 ± 0.04a</td>
<td>83.84 ± 2.42ab</td>
<td>85.74 ± 1.33ab</td>
<td>0.98</td>
</tr>
<tr>
<td>Dried rice with pretreatment by cooling at 4°C (24h)</td>
<td>53.95 ± 2.40c</td>
<td>0.72 ± 0.05a</td>
<td>96.35 ± 4.26c</td>
<td>92.61 ± 2.34c</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Figure 2  Enzymatic digestions of freshly cooked rice, dried cooked rice without pre-treatment, dried cooked rice with pretreatments by freezing at -20°C for 24 h, cooling at 4°C for 24 h and dipping in 4°C water for 30 s.

Table 2  (Cont.)
Table 2 The textural properties of freshly cooked rice from rice cooker, freshly cooked rice from boiling, after rehydration of dried cooked rice without pretreatment, dried cooked rice with pretreatments by freezing at -20°C for 24 h, cooling at 4°C for 24 h and dipping in 4°C water for 30 s.

<table>
<thead>
<tr>
<th>Pretreatment conditions</th>
<th>Hardness (N)</th>
<th>Cohesiveness (Dimensionless)</th>
<th>Stickiness (N)</th>
<th>Adhesiveness (N.sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshly cooked rice from rice cooker</td>
<td>103.71 ± 8.44</td>
<td>0.56 ± 0.03</td>
<td>8.47 ± 2.62</td>
<td>7.09 ± 1.20</td>
</tr>
<tr>
<td>Freshly cooked rice by boiling</td>
<td>116.44 ± 3.49</td>
<td>0.57 ± 0.02</td>
<td>10.82 ± 1.13</td>
<td>9.61 ± 1.66</td>
</tr>
<tr>
<td>Dried rice without pretreatment</td>
<td>115.55 ± 4.90</td>
<td>0.56 ± 0.02</td>
<td>5.45 ± 1.50</td>
<td>3.52 ± 1.57</td>
</tr>
<tr>
<td>Dried rice with pretreatment by dipping in 4°C water (30s)</td>
<td>118.82 ± 10.36</td>
<td>0.59 ± 0.05</td>
<td>3.24 ± 1.55</td>
<td>2.30 ± 1.26</td>
</tr>
<tr>
<td>Dried rice with pretreatment by cooling at 4°C (24h)</td>
<td>128.07 ± 5.74</td>
<td>0.56 ± 0.03</td>
<td>5.36 ± 0.56</td>
<td>3.16 ± 0.54</td>
</tr>
<tr>
<td>Dried rice with pretreatment by freezing at -20°C (24h)</td>
<td>119.79 ± 7.64</td>
<td>0.56 ± 0.02</td>
<td>9.13 ± 1.32</td>
<td>6.57 ± 1.48</td>
</tr>
</tbody>
</table>

