Comparative study on the physicochemical properties of extruded fortified rice kernels produced from different rice varieties with their corresponding rice varieties

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Introduction

Fortified Rice Kernels

Fortified rice kernels (FRK) are extruded rice-shaped kernels manufactured by blending rice flour with micronutrient premix

Rice / Rice Broken
Rice Flour
Fortified Rice Kernels (FRK)

Extrusion + Drying

Unique Selling Points

Fortification of staple: Address nutrition insecurity
Value addition to broken rice: By-product utilization
Uses extrusion technology: Cost-effective option

Challenges

- FRK should match the physio-chemical and cooking characteristics of normal rice
- Different rice varieties with different starch composition in rice broken collected from mills
- Extrusion process condition and FRK quality affected by feed composition

Objectives

In this study four parboiled and three raw rice varieties were collected and processed to produce FRK. The FRK’s apparent amylose content (AAC), color, density, functional properties, and cooking time were compared with that of the corresponding native rice variety (NR).}

Methodologies

Quality parameters

- Apparent amylose content – using UV spectrophotometer
- Colour
- Functional Properties – WAI & WSI
- Bulk density
- Cooking time

Results & Discussions

Apparent Amylose Content (AAC) %

<table>
<thead>
<tr>
<th>Variety</th>
<th>AAC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badshah bhog</td>
<td>19.35</td>
</tr>
<tr>
<td>Tajmahal rice</td>
<td>20.09</td>
</tr>
<tr>
<td>CC rice</td>
<td>20.29</td>
</tr>
<tr>
<td>Shankar rice</td>
<td>21.02</td>
</tr>
<tr>
<td>Maashakti bhog</td>
<td>22.32</td>
</tr>
<tr>
<td>IR 36</td>
<td>22.53</td>
</tr>
<tr>
<td>Pragti gold</td>
<td>22.32</td>
</tr>
</tbody>
</table>

All rice varieties belonged to intermediate amylose varieties. AAC of FRK were lower than that of corresponding NR.

Physical Properties

- Lightness values of FRK reduced compared to NR except for parboiled varieties. Redness and yellowness of FRK were higher than NR which is reflected in Del E
- Bulk density of FRK was lesser than NR

Functional Properties

- The WAI and WSI of FRK were significantly different between each rice varieties
- WAI and WSI of FRK were higher than that of the NR due to starch modification

Cooking Time

- Properties of FRK were significantly influenced by the native rice variety
- Differences were observed between FRK properties and its corresponding native rice properties
- Furthers studies on optimization of the processing conditions for rice varieties based on amylose: amylopectin ratio is required to produce FRK that matches the properties of native rice.