RBO CURRENT STATUS & FUTURE PROSPECTS in JAPAN

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Big three cereals of the world

Rice  Wheat  Corn

World annual production:
- each about 500 million metric tons (MMT)

Half of the population of the world eat rice as the staple food.
### World Vegetable Oil Consumption 2011*

<table>
<thead>
<tr>
<th>Oils</th>
<th>MMT (million metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palm</td>
<td>49.6</td>
</tr>
<tr>
<td>Soybean</td>
<td>42.6</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>23.2</td>
</tr>
<tr>
<td>Sunflower seed</td>
<td>12.9</td>
</tr>
<tr>
<td>Cotton seed</td>
<td>5.2</td>
</tr>
<tr>
<td>Peanut</td>
<td>5.2</td>
</tr>
<tr>
<td>Palm kernel</td>
<td>5.1</td>
</tr>
<tr>
<td>Coconut</td>
<td>3.9</td>
</tr>
<tr>
<td>Olive</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Rice Bran</strong></td>
<td><strong>1.4</strong></td>
</tr>
</tbody>
</table>

RBO is rich in Vitamin E and suitable for high-temperature cooking such as deep frying and a popular cooking oil in Asia.

*USDA

*RBO is expected to expand the production to help ease shortages of edible oil supplies in Asia*
Annual production of rice and rice bran oil

● Annual production of rice in the world: 500 million metric tons (MMT)

  Asia 480 MMT
  Japan 10 MMT (2%)

● 10% of brown rice is rice bran (Polishing)
20% of rice bran is rice bran oil (RBO)

  World annual production of RBO: 1.4 MMT*
  Asian annual production of RBO: 1.3 MMT
  Japan annual production of RBO: 0.06 MMT

RBO is 3% of annual consumption of vegetable oils in Japan
## Production of rice and rice bran oil in Asia 2012* (MMT)

<table>
<thead>
<tr>
<th>Country</th>
<th>Rice, actual</th>
<th>Rice Bran, potential</th>
<th>RBO (MMT)</th>
<th>Actual</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>&gt;131.2</td>
<td>9.2</td>
<td>0.1</td>
<td>0.1 (6%)**</td>
<td>1.8</td>
</tr>
<tr>
<td>India</td>
<td>89.2</td>
<td>6.2</td>
<td>0.8</td>
<td>0.8 (61%)**</td>
<td>1.3</td>
</tr>
<tr>
<td>Indonesia</td>
<td>43.0</td>
<td>3.0</td>
<td>-</td>
<td>-</td>
<td>0.6</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>31.8</td>
<td>2.2</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
</tr>
<tr>
<td>Vietnam</td>
<td>26.0</td>
<td>1.8</td>
<td>0.01</td>
<td>0.01 (3%)**</td>
<td>0.4</td>
</tr>
<tr>
<td>Thailand</td>
<td>21.4</td>
<td>1.5</td>
<td>0.05</td>
<td>0.05 (16%)**</td>
<td>0.3</td>
</tr>
<tr>
<td>Philippines</td>
<td>10.8</td>
<td>0.8</td>
<td>-</td>
<td>-</td>
<td>0.2</td>
</tr>
<tr>
<td>Japan</td>
<td>10.0</td>
<td>0.8</td>
<td>0.08</td>
<td>0.08 (40%)**</td>
<td>0.2</td>
</tr>
</tbody>
</table>


** Percent of potential

China realizes 6% of its potential for RBO, India produces 61% of its potential. China, Vietnam and Thailand have big potential for future RBO production.
The rice bran yield is estimated by the amount of rice harvested (as a staple food) x 0.08. from Ministry of Agriculture, Forestry and Fisheries “Crop Statistics” in Japan.

Imported crude RBO is from Vietnam (9318 ton), Thailand (970 ton) and Brazil (1779 ton) in 2014.
Production and import of crude RBO in Japan

From the data of Ministry of Agriculture, Forestry and Fisheries, and Ministry of Finance in Japan.
RBO market is expanding in Japan for household use & restaurant due to high stability of RBO.
In Japan, about 40% kindergarten, nursery, elementary and middle school use RBO for cooking during lunch and dinner meals.

RBO is considered as a healthy and good cooking oil for food such as tempura and tonkatsu.

For confectionary companies, RBO is used for making snack food such as potato chips, rice cracker, and so on, due to its good taste and color.
Rice Bran Price < Rice Bran Meal Price

Historically until now, RBO market has been limited only in Japan. From now, it may expand more globally.

To utilize the rice bran meal, basic research has been extensively curried out and the market has been significantly developed in Japan.

The rice bran meal (defatted rice bran) is used for livestock feed, and for veterinary medicine.

The price of rice bran meal is comparatively higher than the price of rice bran oil.
The price of RBO is rather higher than other cooking oils due to the time-consuming manufacturing processes.

- 120-150% of soybean oil and rapeseed oil price.
- 150-200% of palm oil price.

Due to the healthy oil trend in recent years, RBO comes into the spotlight as a new premium and healthy oil.
(1) For Cooking

1. No tired! (Heta-ra-nai)
2. No bad smell! (nio-wa-nai)
3. No bad taste! (kuse-ga-nai)

Used for a wide variety of products including snack food such as potato chips, and karinto (fried dough cookies), fried rice crackers, and instant noodles, and even professional chefs prefer and use it.

RBO is approximately 1.5 times stable against oxidation than rapeseed oil and soybean oil and lasts longer... So it is greatly effective for small scale shops and restaurants.
(2) For Nutrition

- **Anti-oxidative**
  - Vitamin E (VE) → Toc + Toc-3
  - Super Vitamin E = TOCOTRIENOL
  - Anti-oxidation
  - Cholesterolemia reduction and prevention
  - Arteriosclerosis prevention
  - Anti-tumor

- **Cholesterol-lowering**
  - Menopausal symptom improving
  - Hyperlipidemia improving
  - ... 300 mg/day (minimum required)
  - Anti-oxidation
  - Anti-oxidation
  - Cholesterol-lowering

- **γ-ORYZANOL**

- **Plant Sterol**

Foods for Specified Health Uses (FOSHU)
Reasons Why RBO is Popular in Japan

Introduced on TV

RBO the oil which prevents arteriosclerosis
Super Vitamin E

Grad school, Tohoku University
Professor Teruo Miyazawa

On TV Tokyo program “Shujii ga mitsukaru shinryôjo
(Clinic For Finding a Doctor)”
RBO future prospects in Japan

Current issues
- Reliably securing raw materials for RBO and maintaining the quality.
- Effective utilization of RBO by-products.
- Foreign crude RBO with a suitable quality and price.
- Improvement of added value of defatted rice bran from overseas.

Future prospects
- The great nutritional properties of RBO are taken into account, more consumers will be attracted to and purchase the RBO product.

RBO is “A TASTY AND HEALTHY OIL” for promoting our longevity.