

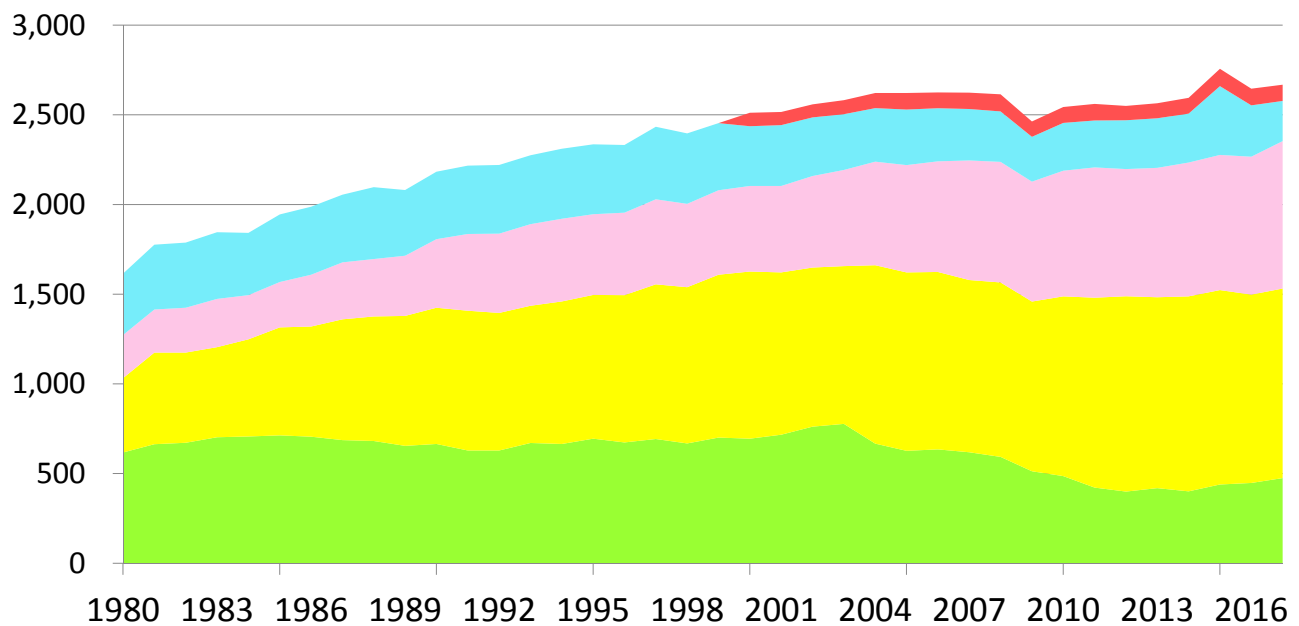
Cooking Characteristics of Rice Bran Oil in Japan

- Comparison with Soybean & Canola Oil -

TSUNO FOOD INDUSTRIAL CO., LTD
Wakayama Prefecture, Japan
24th May 2018 in Hanoi

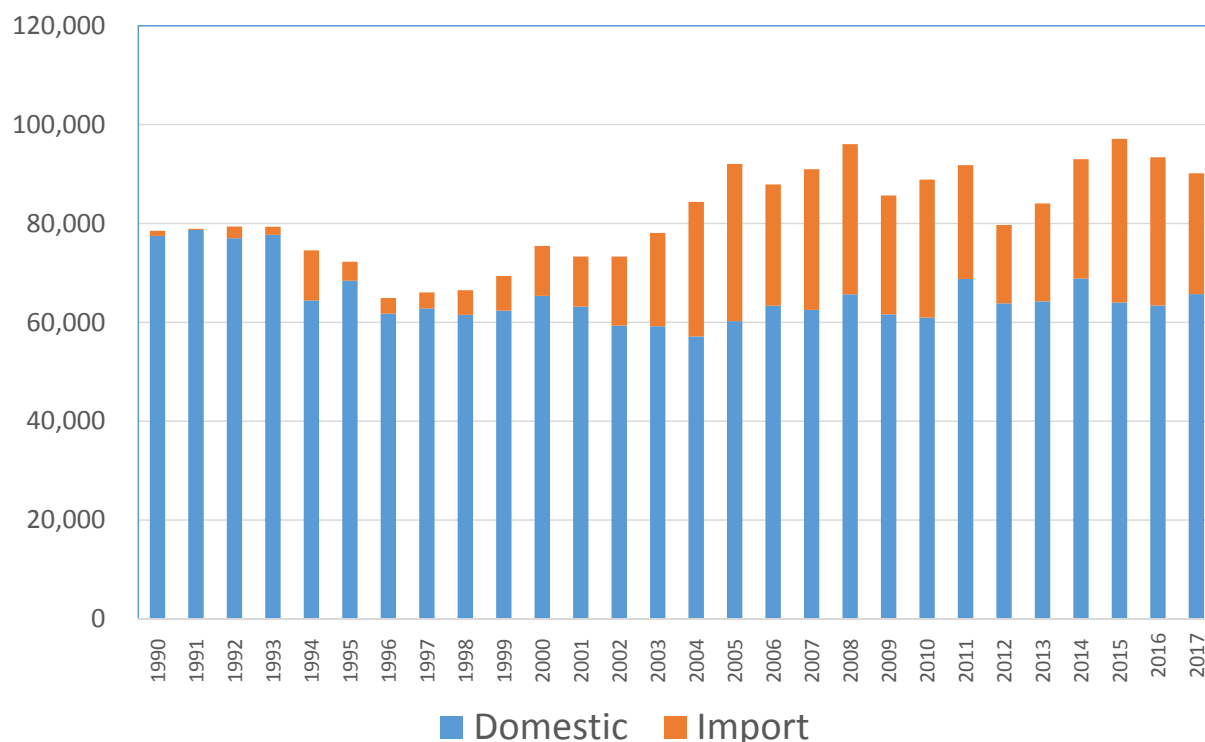


Production of Vegetable Oils in Japan (1980-2017)



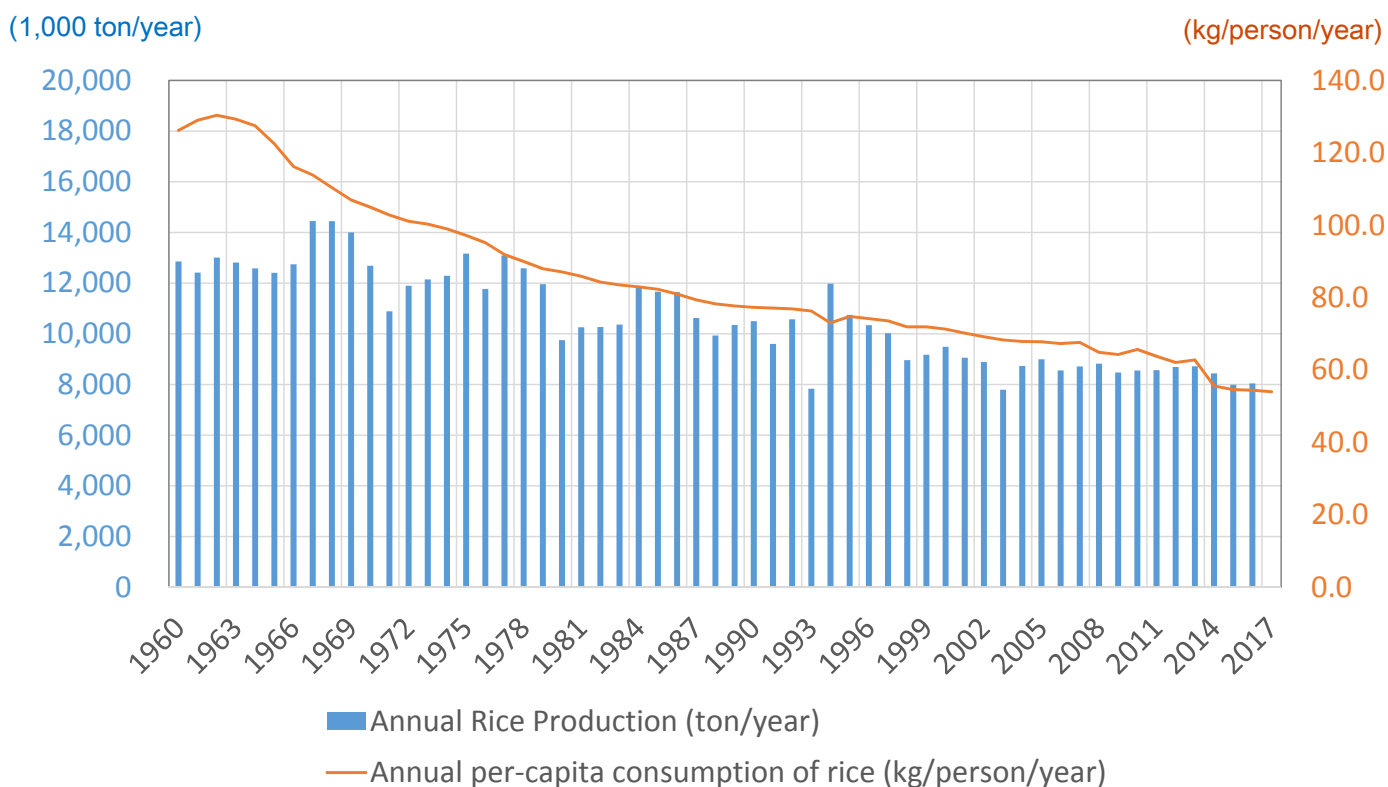
■ Soybean Oil ■ Canola Oil ■ Palm / Palm kernel / Coconuts Oil ■ Others ■ Rice Bran Oil

Production share of Rice Bran Oil in Japan (crude Oil base)



Source: Japan Industrial Cooperative Association of Rice Bran Oil, Trade Statistics of Japan

Changes in Rice Production and Consumption

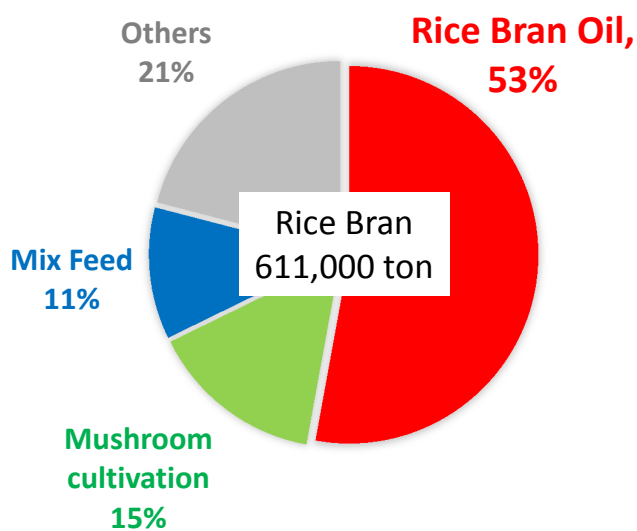
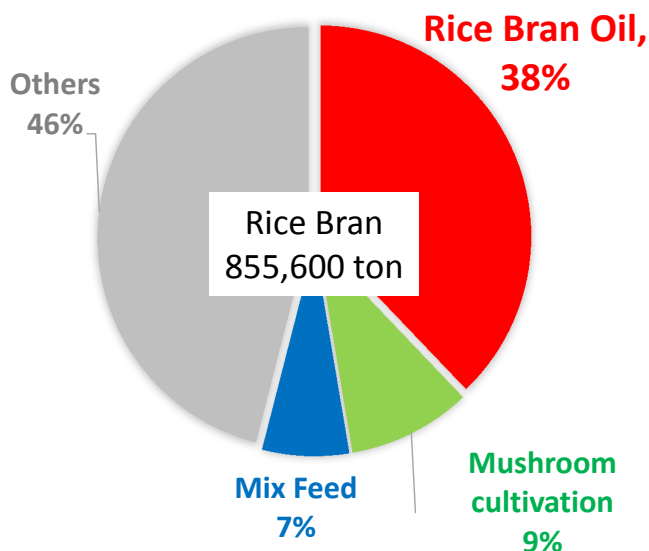


Source: Ministry of Agriculture, Forestry and Fisheries "Crop Statistics" and "Food Balance Sheet"

Domestic Use of Rice Bran in Japan

Year 2006

Year 2017



RBO Production: 63,378 ton

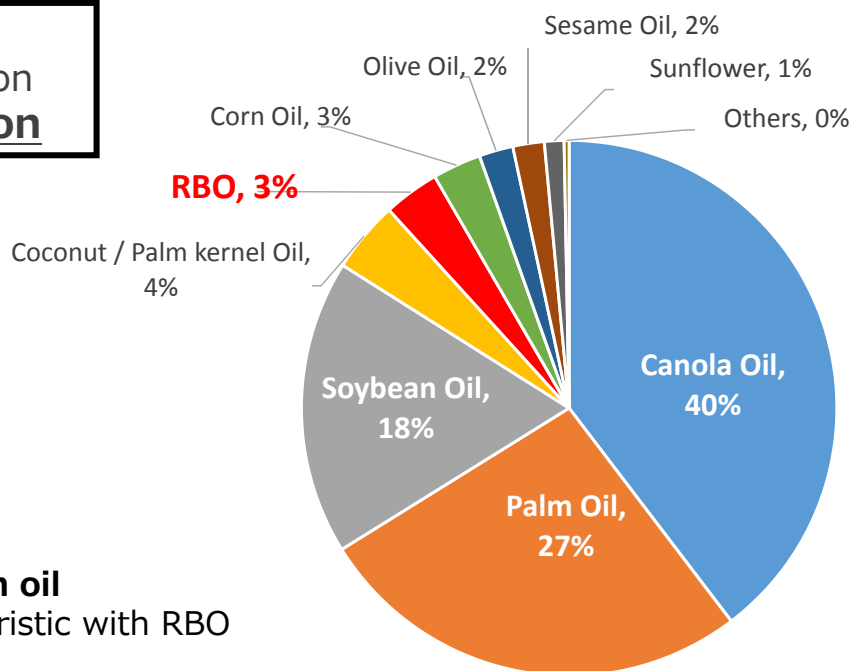
RBO Production: 65,731 ton

Increased

Source: Report by Japan Industrial Cooperative Association of Rice Bran Oil (2017)

Production share of vegetable oils in Japan

Year 2017
Total Production
2,669,000 ton



Top 3

- 1) Canola oil
- 2) Palm oil
- 3) Soybean oil

Canola & Soybean oil

⇒ Similar characteristic with RBO

Palm oil

⇒ Naturally semi-solid, raw materials in the production of solid-fat formulations such as shortenings and margarines.

Source: Ministry of Agriculture, Forestry and Fisheries "Food Balance Sheet"

Good points of Rice Bran Oil as cooking oil

Raw Material

- ① Allergen Free
- ② Low Trans Fatty Acid
- ③ High safety standard

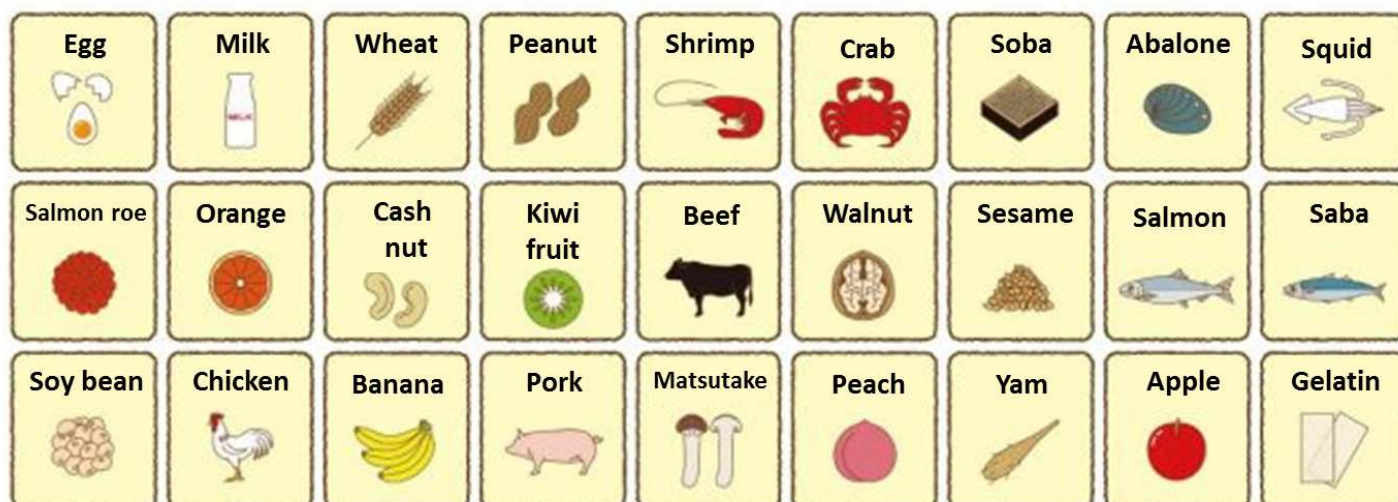
Taste & Cooking

- ④ High Stability (anti-oxidation)
- ⑤ less oily odor
- ⑥ Anti-Heating

Allergen Free

27 food allergen ingredients have been designated by Consumer Affairs Agency, Government of Japan.

Rice Bran Oil is free from all 27 allergen ingredients !



Low Trans Fatty Acid

Content of trans fatty acid of Rice Bran Oil is less than 50% compared with soybean oil and canola oils.

Global efforts to reduce the risk of heart attack

- European regulation and standard for oils and fats
⇒ Trans fatty acid content: Max 2.0%
- New York
⇒ Trans fatty acid: Fully prohibited

Cause of occurring trans fatty acid in vegetable oils

- During refining process, trans fatty acids are created from Linolenic acid.
⇒ Linolenic acid content
 - ◆ Rice Bran oil : less than 1%
 - ◆ Soybean oil and Canola oil : 7-9%

High safety standard

- Japan Inspection Institute of Fats and Oils
⇒ Japan Agricultural Standards (JAS)
- More than 40% of Japanese schools are using Rice Bran Oil for their school meals



1. 100% made in Japan
2. No-Allergen
3. No GMO



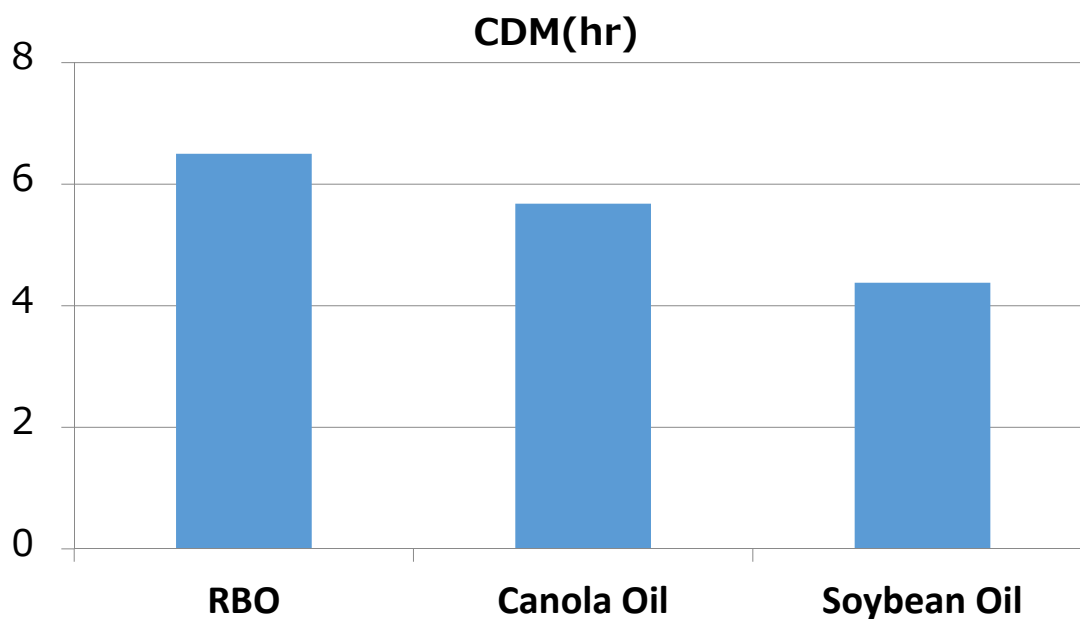
High Stability

Comparison of Unsaponifiable matter

	Vitamin E (mg/100g)		γ-Oryzanol (ppm)	Phytosterol (ppm)
	Tocopherol	Tocotryenol		
Rice Bran Oil	42	55	1,500 - 15,000	12,000 - 14,000
Canola Oil	52	0	0	6,000
Soybean Oil	78	0	0	2,000

- Values of Rice Bran Oil are cited from product label of TSUNO
- Values of other oils are the mean values analyzed by TSUNO R&D
- Content of phytosterol is not included ester.

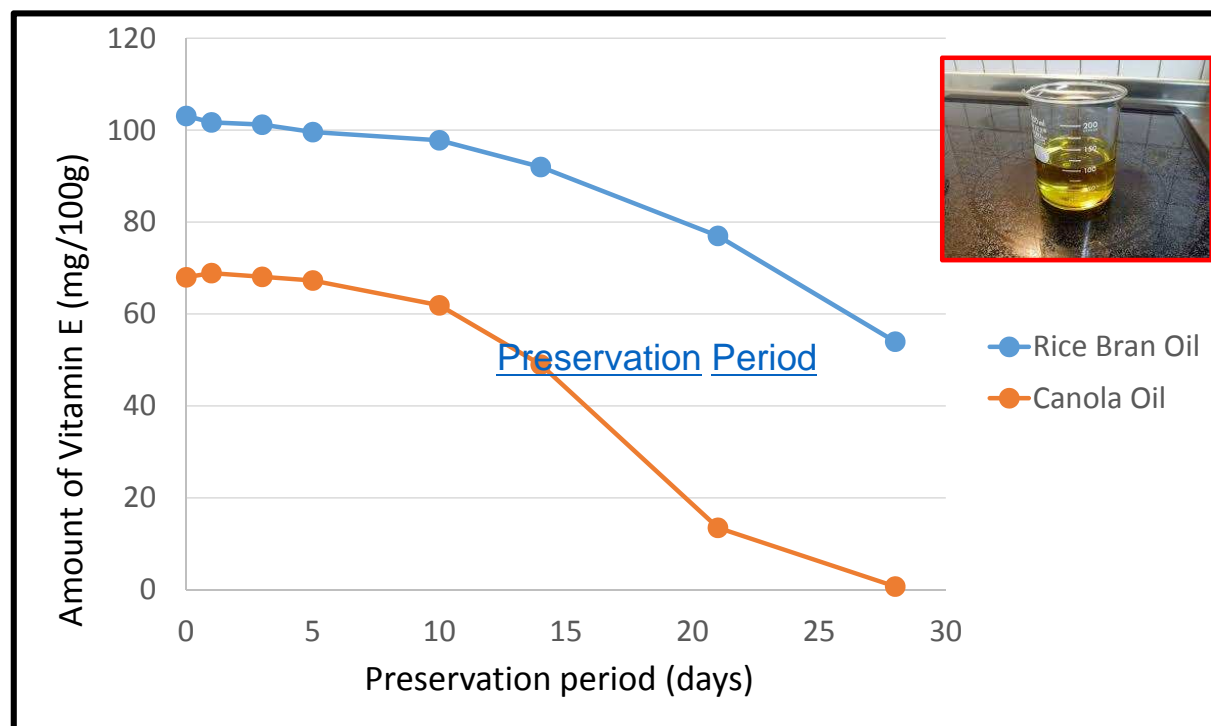
Anti-Oxidation



CDM (Conductometric Determination Method)

The method of measuring conductivity by conducting volatile decomposition products generated by oxidized fats and oils into pure water and the time of the conductivity inflection point. This method can shorten the time required to one-fifth and reduce environmental footprint because of not using solvent compared to AOM test.

Changing amount of Vitamin E during preserving at 60°C



After Vitamin E content disappeared, the deterioration of oil is accelerated.

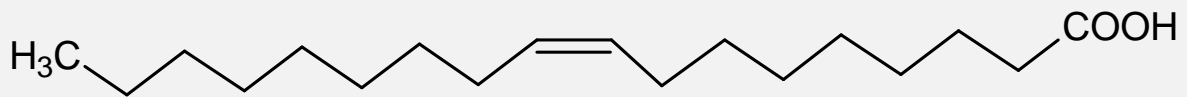
Fatty Acid Components (%)

	Saturated Fatty Acid	Unsaturated Fatty Acid			
		Oleic Acid (ω 9)	Linoleic Acid (ω 6)	Linolenic Acid (ω 3)	Others
RBO	19	43	36	1	1
Canola Oil	6	64	20	9	1
Soybean Oil	14	22	55	8	1

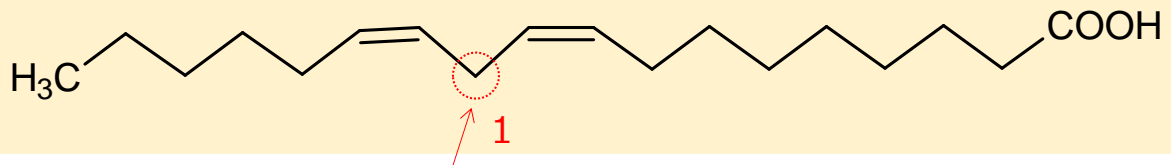
- Rice Bran Oil has a good balance of fatty acids components
- Low content of Linolenic Acid
- ⇒ High Oxidation Stability

Oxidation

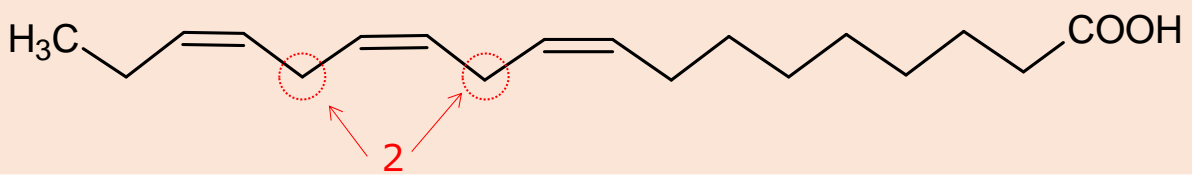
Oleic Acid



Linoleic Acid



Linolenic Acid

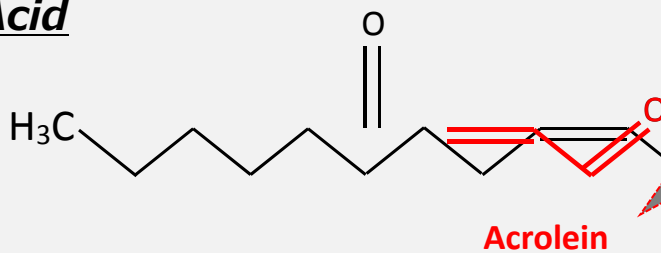


$$\text{Oleic Acid} : \text{Linoleic Acid} : \text{Linolenic Acid} = 10^0 : 10^1 : 10^2$$

$$= \underline{1 : 10 : 100}$$

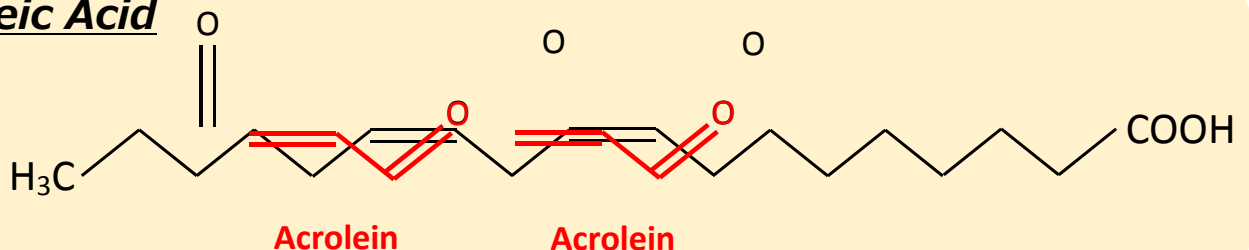
Bad Smell : Propanal & Acrolein

Oleic Acid

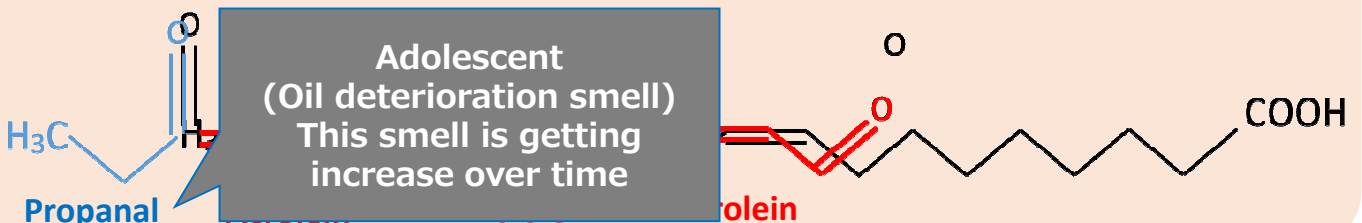


Penetrating odor
This smell is getting
decrease over time

Linoleic Acid



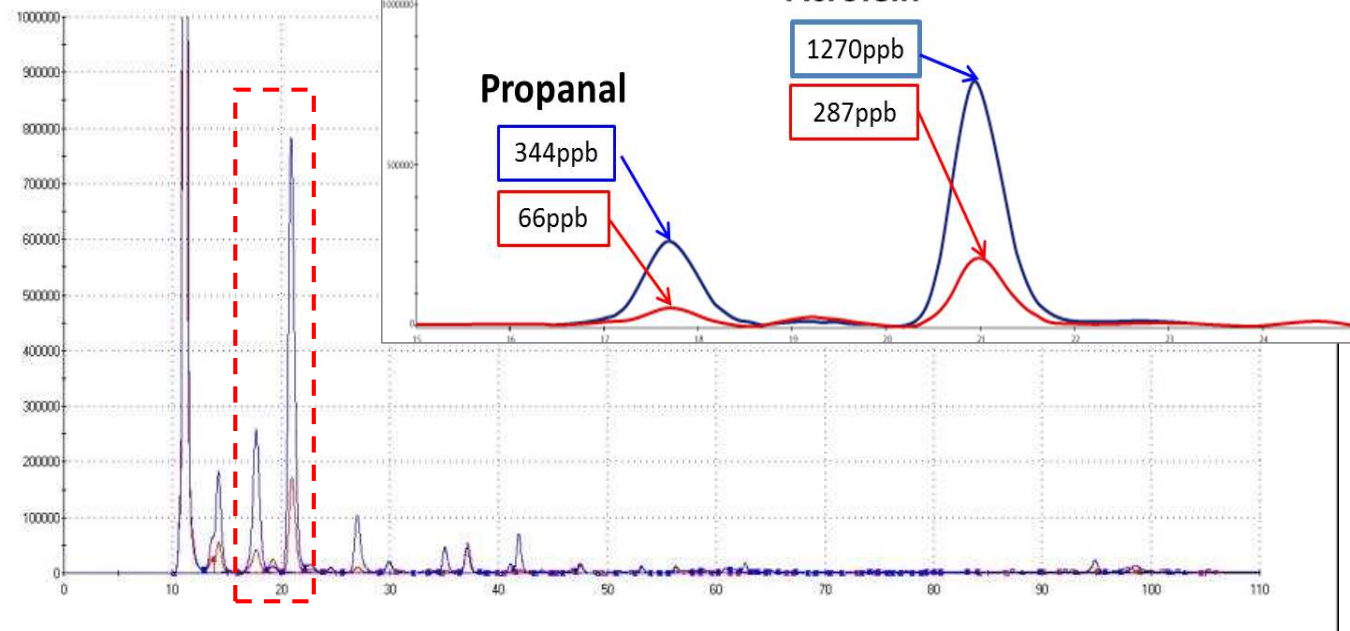
Linolenic Acid



Adolescent
(Oil deterioration smell)
This smell is getting
increase over time

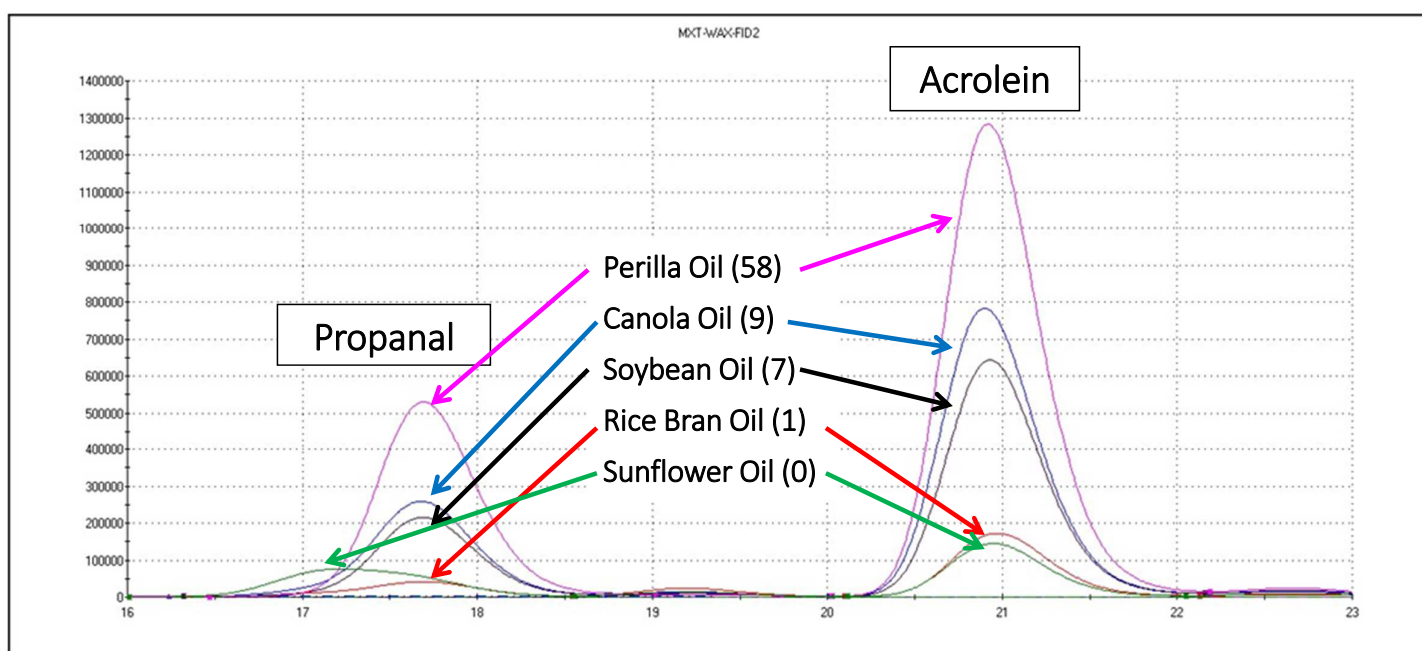
Heracles II

Less oily odor



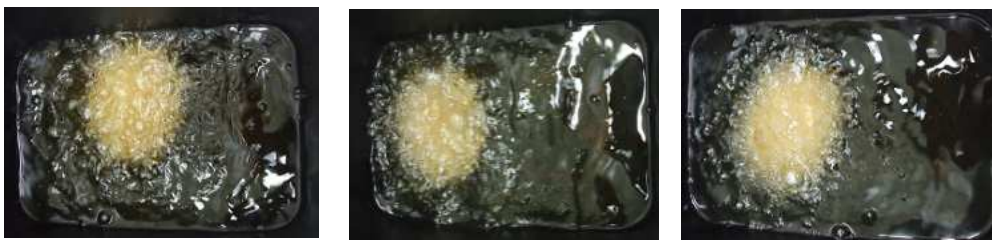
J Am Oil Chem Soc (2013) 90; 959-964

Chromatogram of vegetable oils



() : ratio of Linolenic acid content %

Anti-heating



↓ 180°C, 48 hours

Less oil bubbling



Rice Bran Oil

Canola Oil

Soybean Oil



Rice Bran Oil



Canola Oil



Rice Bran Oil



Soybean Oil

Application Example of Rice Bran Oil in Japan

To produce potato chips and rice cookies, no oily smell and maintaining good taste are required.



Rice Bran Oil + Palm Oil



Potato chips



Rice Cookie



Application Example of Rice Bran Oil in Japan

Three advantages of using Rice Bran Oil for restaurant.

1. Makes dishes taste most delicious as possible with Rice Bran Oil.
⇒ **Increase in per-customer price**
2. Dishes without having dull feeling on stomach
⇒ **Number of orders and customers increase**
3. Less stress for chef and cooking staffs
⇒ **No oily smell during cooking and easy for cleaning cooking tools**



Thank you very much for your attention !