

codex alimentarius commission



FOOD AND AGRICULTURE
ORGANIZATION
OF THE UNITED NATIONS

WORLD
HEALTH
ORGANIZATION



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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FATS AND OILS

EIGHTEENTH SESSION
LONDON, U.K. 3-7TH FEBRUARY, 2003

INDIA'S PAPER:

THE NEED FOR INCLUSION OF RICE BRAN OIL IN THE STANDARDS FOR NAMED VEGETABLE OILS.

Background

In the 16th Session of the Codex Committee on Fats & Oils held at London, U.K. on 8-12th March, 1999, the delegation of India proposed to include the development of provisions of rice bran oil in view of its important production in several Asian countries and its specific nutritional qualities. It was decided that the delegation would submit the relevant information to determine the need for inclusion of rice bran oil in the Standards for Named Vegetable Oils.

Potential, Production and level of Trade: International scenario

2. Among the food grains, which form the largest portion of food materials used in the world, the production of paddy is the highest next only to wheat. In Asian countries, rice is the principal cereal produced and consumed by the population. The current world production of paddy is 597.3 MMTs. (2001)

(Source: FAO). The production of rice estimated at 2/3rd of paddy is 398.2 MMTs. The worldwide estimated potential of rice bran which refers to the thin coating removed from the brown rice during the process of milling is 29.87 MMTs. The rice bran is an important source of oil, the oil content varying between 12-20% depending upon the quality of bran/type of milling method used. On an average, rice bran contains 15% oil. On the basis of this, the total potential of rice bran oil in the world works out to 4.48 MMTs. The Asian countries alone contribute about 98.4% to the total potential, amounting to 4.41 MMTs of rice bran oil. The production of paddy and an estimated potential of rice bran and rice bran oil in major areas of the world are shown in Table-I.

3. In so far as India is concerned, of the non-conventional oils, rice bran oil is the most important in terms of its potential to augment the availability of oils. Full realization of the potential will help in reducing the gap between demand and availability of indigenous edible oils in the country to a significant extent. On the basis of rice production of around 91 MMTs in 2001-02, the production potential of rice bran at 7.5% of rice works out to 6.83 MMTs corresponding to 1.03 MMTs of rice bran oil. The rice production vis-à-vis rice bran potential and availability of rice bran oil during 1993-94 to 2001-02 (October-November) are shown in Table-II.

4. Precise information about the level of international trade is not available. But, it can be safely stated that the quantities produced are traded and are used for human consumption.

5. **Toxonomic Information**

Family

Graminaceas

Genus Oryza

Species

Oryza Sativa

Eco-geographic

Races

Oryza indica

Oryza japonica

Oryza javanica

In Africa

Oryza glaberrima

Scope – Justification for inclusion within the standard and evidence is fit for human consumption.

6. Rice bran oil is used as a premium edible oil in **Japan, China, Thailand, Korea** and other oil producing countries. In Japan, rice bran oil is more popularly known as ‘heart oil’ as it keeps the cholesterol level in serum relatively low. Government of India has gone in details into the question of edibility of rice bran oil. Based on the results of studies carried out including nutritional and toxicological studies, Government has declared rice bran oil as an edible oil. Standards of Quality have been laid down in the Prevention of Food Adulteration (PFA) Act, 1955, Solvent Extracted Oils, De-oiled Meal & Edible Flour (SEO) Control Order, 1967 and Vegetable Oil Products (VOP) (Regulation) Order, 1998. The standards of quality laid down under PFA Act and SEO (Control) Orders are shown in Table-III and Table-IV respectively.

7. The special features of rice bran oil which contribute to its unique properties beneficial for maintaining good health are:

- It contains oryzanol which increases HDL (good) cholesterol and lowers LDL (bad) cholesterol and triglycerides.
- The ratio of saturated, monounsaturated and polyunsaturated fatty acids is the closest to World Health Organization (WHO) recommendation, from the nutritional point of view.
- It is good for skin. It contains squalene which improves skin tone and delays wrinkle formation.
- It has natural antioxidants which afford protection against diseases, as also contribute to stability.
- It has 4 hydroxy 3 methoxy cinnamic acid which stimulates hormonal secretion and rejuvenates health.
- It has tocopherol (Vit. E) which helps in maintaining balance of nervous system.
- It has tocotrienol which has anti-thrombotic and anti-cancer properties.
- Food fried in refined rice bran oil absorbs 15% less oil and lower calorie intake.

- According to the recommendations of the National Research Council, Washington DC, the PUFA/MUFA content should be nearly 1.0. The ratio of PUFA/MUFA is near to this value in rice bran oil.

8. The hypocholesterolemic activity of rice bran oil vis-à-vis other vegetable oils is recorded below:

HYPOCHOLESTEROLEMIC ACTIVITY OF VARIOUS EDIBLE OILS

Edible Oil	Linoleic Acid %	Cholesterol level
Safflower	77.1	-16
Sunflower	61.4	-12
Cottonseed	58.0	0
Soyabean	50.2	+3
Sesame	45.9	+2
Corn	43.0	-15
Rice Bran	36.0	-17
Groundnut	35.0	+5

It may be observed that the rice bran oil has remarkable cholesterol lowering property in comparison to other edible oils and is thus the 'Heart Friendly' cooking oil.

Essential Nutritional Properties of Rice bran Oil.

9. Among the factors contributing to the exceptional nutritional properties of rice bran oil may be the following:

(a) Fatty Acid Composition

- Rice bran Oil contains more than 75% unsaturated fatty acid of which essential fatty acid in the form of linoleic acid (PUFA) constitutes about 35% (Table—V-A).
- Chemically the composition of rice bran oil is very close to groundnut oil containing 34-36% linoleic acid and 2% linolenic acid, the essential fatty acids (Table—V-B).

- (iii) The stearic acid content of rice bran oil is 3% compared to about 4% of palm oil. Oleic acid content is almost comparable to palm oil/Palmolein while linolenic acid content is higher (2.2%) as compared to 0.06% in palm oil.
- (iv) According to the recommendations of the National Research Council, Washington DC, the PUFA/MUFA content should be nearly 1.0. The ratio of PUFA/MUFA is nearly this value in rice bran oil while it is of the order of 0.27-0.37 in Palmolein/palm oil. The PUFA/MUFA ratio is considered to be the most important factor in controlling atherosclerosis problem.

(b) Unsaponifiable Matter (UM) in Rice bran oil:

Rice bran oil is characterized by relatively high content of UM (about 6%). As per PFA specification, the UM in refined rice bran oil is not to be more than 3.5%. Japanese Agriculture Standards however, specify it to be less than 5%.

(c) The micronutrient profile of rice bran oil:

- The rice bran oil is characterized by certain micro-nutrients which contribute to its exceptional nutritional qualities as summarized below:

Micro-nutrient	Amount %	Advantage
Tocopherol	0.02-0.08	Antioxidant, free radical scavenger, reduces risk of cardiovascular diseases, arthritis, cancer, cataract, antitumour.
Tocotrienol	0.025-0.17	Cholesterol reduction, antithrombotic, anticancer, and anti-ageing properties, tumour suppression, antioxidant.
Oryzanol	1.2-1.7 (physically refined RBO)	Increases good (HDL) cholesterol, decreases bad (LDL) cholesterol, treats nerve imbalance and menopause disorder, retards aging effects, antidandruff and anti-itching agent. Effective in treating a broad range of gastrointestinal disorders including stress-induced gastric and duodenal ulcers.
Squalene	0.3-0.4	Antioxidant, improves skin tone, and anti-wrinkle properties.

10. To sum up, the rice bran oil is the only oil which, besides having almost balanced fatty acid composition and linoleic to linolenic (Omega6/Omega3) ratio closest to the recommendation of the nutritionists contains three categories of natural anti-oxidants namely, tocopherols, tocotrienols and oryzanol as against only one category, i.e. tocopherols found in all other conventional oils. In fact rice bran oil is gaining acceptance as the 'health oil' by virtue of the desirable fatty acid composition with higher oxidative stability alongwith better cholesterol reducing power than all other edible oils. It contains certain unique micro-nutrients which are important for promotion and maintenance of good health.

Essential Composition and Quality Factors for Refined Ricebran Oil.

Identity characteristics

Moisture and volatile Matter	Not more than 0.1 per cent by weight
Refractive Index at 40°C	1.4600 to 1.4700
Butyro-refractometer reading at 40°C	51.0 to 66.4
Saponification value	180-195
Iodine Value (wijs)	90-105
Acid value	Not more than 0.5
Unsaponifiable Matter	Not more than 3.5 per cent
Flash Point (Penski Marten closed Method)	Not less than 250°C

GLC Ranges of Fatty Acid Composition (%)

c 14:0	<0.6
c 16:0	15 – 21.5
c 18:0	1.7 – 2.9
c 18:1	38.4 – 43.0
c 18:2	34.4 – 37.4
c 18: 3	1.5 – 2.2
c 20:0	<0.06

Quality characteristics

Colour : Characteristic of the designated product

Odour and Taste: Characteristic of the designated product and free from Foreign and rancid odour and taste and free from non-edible oils

FORMAT NO. I

Document No. & Date : CX/FO 03 JANUARY 2003

Subject: THE NEED FOR INCLUSION OF RICE BRAN OIL IN THE STANDARDS FOR NAMED VEGETABLE OILS.

A gist of issues requiring consideration:

Essential composition and quality factors for Refined Ricebran Oil

- Identity characteristics
- Quality characteristics

Existing national position as outlined in the policy or legislation

Rice Bran Oil has been declared as an edible oil. Standards of quality have been laid down in the Prevention of Food Adulteration Act, 1955, Solvent Extracted Oils, De-oiled Meal and Edible Flour Order, 1967 and Vegetable Oils Products (Regulation) Order, 1998.

Stand taken by India in the past, if any.

In the 16th Session of the Codex Committee on Fats & Oils held at London, U.K. on 8-12th March, 1999, the delegation of India proposed to include the development of provisions of rice bran oil in view of its significant production in several Asian countries and its specific nutritional qualities. It was decided that the delegation would submit the relevant information to determine the need for inclusion of rice bran oil in the Standards for Named Vegetable Oils.

**The last date for sending comments : ---
on the documents to the Secretariat
or the host country**

**The date by which comments from the : ---
Members/stakeholders should reach
the NCCP(1)**

FORMAT NO. II

Name of the Codex Committee/ Commission : JOINT FAO/WHO FAO FOOD STANDARDS PROGRAMME CODEX COMMITTEE ON FATS AND OILS

Agenda document No. and Relevant paragraphs No. : CX/FO 03 JANUARY 2003

Issues in Brief:

- Edible quality of rice bran oil: Special features
- Exceptional Nutritional Properties of rice bran oil
- Essential composition and quality factors

National Position based on legislation and policy of the Government:

Rice Bran Oil has been declared as an edible oil. Standards of quality have been laid down in the Prevention of Food Adulteration Act, 1955, Solvent Extracted Oils, De-oiled Meal and Edible Flour Order, 1967 and Vegetable Oils Products (Regulation) Order, 1998.

Impact of the proposed agenda on:

a) Domestic Trade:

Production of edible grade rice bran oil has gone up from 2.40 lakh MTs in 1993-94 to 4.30 lakh MTs in 2001-02. In the year 2002-03 the production is likely to go up further to around 5.00 lakh MTs. In other words, this reflects the growth of rice bran oil during the period 1993-94 to 2002-03.

b) International market:

Precise information about the level of international trade is not available. But, it is reasonable to assume that the quantities produced are traded and are used for human consumption.

c) Consumers interest:

The very production of edible grade rice bran oil which has almost doubled during the period 1993-04 to 2001-02 is a broad measure of the increased consumer interest in the oil.

Technical/commercial or other relevant information/data in support of the proposal or against:-

The special features of rice bran oil which contribute to its unique properties beneficial for maintaining good health are:

- It contains oryzanol which increases HDL (good) cholesterol and lowers LDL (bad) cholesterol and triglycerides.
- The ratio of saturated, monounsaturated and polyunsaturated fatty acids is the closest to World Health Organization (WHO) recommendation, from the nutritional point of view.
- It is good for skin. It contains squalene which improves skin tone and delays wrinkle formation.
- It has natural antioxidants which afford protection against diseases, as also contribute to stability.
- It has 4 hydroxy 3 methoxy cinnamic acid which stimulates hormonal secretion and rejuvenates health.
- It has tocopherol (Vit. E) which helps in maintaining balance of nervous system.
- It has tocotrienol which has anti-thrombotic and anti-cancer properties.
- Food fried in refined rice bran oil absorbs 15% less oil and lower calorie intake.
- According to the recommendations of the National Research Council, Washington DC, the PUFA/MUFA content should be nearly 1.0. The ratio of PUFA/MUFA is near to this value in rice bran oil.
- The rice bran oil is characterized by certain micro-nutrients which contribute to its exceptional nutritional qualities as summarized below:

Micro-nutrient	Amount %	Advantage
Tocopherol	0.02-0.08	Antioxidant, free radical scavenger, reduces risk of cardiovascular diseases, arthritis, cancer, cataract, antitumour.

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Squalene	0.3-0.4	Antioxidant, improves skin tone, and anti-wrinkle properties.

Past history and earlier stand, if any:

In view of the significant production of rice bran oil in several Asian countries and its specific nutritional qualities as summarized above, India proposed in the 16th Session of the Codex Committee on Fats and Oils held at London, U.K. on 8-12th March, 1999 to include the development of provisions of rice bran oils in the standards for Named Vegetable Oils. This was accepted in principle by the Codex Committee.

Other considerations like names of countries likely to support or against based on past participation:-

As per available information Japan and Thailand particularly are likely to support the proposal.

Summary of overall comments:-

What should be the participation level in this work:- (Please tick mark the option suggested with a brief justification)

Chairperson of the Codex Committee on Fats and Oils,
An expert Industry representatives

FORMAT NO. III

Name of the Codex Committee/ Commission : JOINT FAO/WHO FAO FOOD STANDARDS PROGRAMME
CODEX COMMITTEE ON FATS AND OILS

Agenda document No. and Relevant paragraphs No. : CX/FO 03 JANUARY 2003

India's Position:-

{Detailed justification if required, be appended in a separate sheet}

Rice Bran Oil has been declared as an edible oil. Standards of quality have been laid down in the Prevention of Food Adulteration Act, 1955, Solvent Extracted Oils, De-oiled Meal and Edible Flour Order, 1967 and Vegetable Oils Products (Regulation) Order, 1998.

Detailed justification is given in the background paper.

Background justification quoting past history, if possible:

In view of the significant production of rice bran oil in several Asian countries and its specific nutritional qualities as summarized above, India proposed in the 16th Session of the Codex Committee on Fats and Oils held at London, U.K. on 8-12th March, 1999 to include the development of provisions of rice bran oils in the standards for Named Vegetable Oils. This was accepted in principle by the Codex Committee.

FORMAT – IV

- (a) Subject of the Meeting : Need for formulating Codex Standard for Ricebran Oil
- (b)&(c) Place /dates of the meeting: Interactions mostly in the form of Seminars etc. at national level were held with the concerned Government Departments, Academic/R&D Organisations and Trade & Industry, as indicated below:
- | <u>Place</u> | <u>Date</u> |
|--------------|-------------|
| Hyderabad | 25.4.1998 |
| New Delhi | 8.5.1999 |
| Goa | 3.6.2000 |
| Kolkata | 7.7.2001 |
| Chandigarh | 30.6.2002 |
- (d) Names and designation of the leader and other members of the delegation : The national seminars were organised by the Solvent Extractors Association of India (SEAI) and supported/ sponsored by among others the Ministry of Consumer Affairs, Food & Public Distribution, Ministry of Health & Family Welfare, Ministry of Agriculture & Cooperation, Ministry of Food Processing, Council of Scientific and Industrial Research (CSIR), National Institute of Nutrition, etc., in addition to Trade & Industry.
- (e) List of additional documents : Proceedings of these national seminars as tabled in the meeting as indicated above are enclosed. along with a copy of each document
- (f) A copy of the draft report : as adopted in the meeting : As above
- (g) A summary of salient recommendations/decisions made having on India : The recommendations are included in the proceedings of the national seminars enclosed.

One of the major recommendations has been regarding the need for formulating standards for edible rice bran oil.

(h) A gist of deliberation on each of the items of the agenda concerning India :

Covered in the proceedings of the Seminars enclosed.

TABLE – I

Estimated potential of Rice Bran Oil in selected areas of World

(Figures in Million MT)

<u>AREA</u>	<u>PADDY</u>	<u>RICE</u>	<u>RICE BRAN</u>	<u>RICE BRAN OIL</u>
WORLD	573.263	372.621	29.81	4.48
ASIA	523.887	340.527	27.24	4.41
INDIA	123.012	79.960	6.40	0.96
CHINA	198.471	129.006	10.32	1.55
JAPAN	12.531	8.145	0.65	0.10
PAKISTAN	6.546	4.255	0.34	0.05

[Source : FAO' 1997]

TABLE – II**RICE BRAN OIL POTENTIAL AND ACTUAL EXPLOITATION
(1993-94 TO 2001-02)**

	<u>2001-02</u>	<u>2000-01</u>	<u>1999-00</u>	<u>1998-99</u>	<u>1997-98</u>	<u>1996-97</u>	<u>1995-96</u>	<u>1994-95</u>	<u>1993-94</u>
Paddy Production Million MT	136.50	127.40	135.10	118.60	122.30	120.80	119.40	121.70	120.50
Rice Production Million MT	91.00	84.90	89.70	86.10	82.50	81.70	79.60	81.80	80.30
Total Rice Bran Potential, Million MT (7.5% of Rice)	6.83	6.37	6.73	6.46	6.19	6.13	6.00	6.10	6.00
Rice Bran Oil Potential, Lakh MT (15% Recovery)	10.20	9.60	10.10	9.70	9.30	9.20	9.00	9.10	9.00
Actual Rice Bran Processing, Lakh MT	36.00	33.00	33.10	32.00	33.00	32.00	32.00	31.07	30.30
RBO Production									
Edible : Lakh MT	4.30	3.80	3.70	3.50	3.50	3.10	3.10	2.70	2.40
Non-Edible : Lakh MT	1.20	1.20	1.30	1.30	1.50	1.70	1.70	1.80	2.00
Total : Lakh MT	5.50	5.00	5.00	4.80	5.00	4.80	4.80	4.50	4.40
Untapped Potential Rice Bran Oil, Lakh MT	4.70	4.80	4.20	4.20	4.30	4.30	4.20	4.50	4.60
Percentage of Exploitation	54%	52%	54%	50%	53%	52%	53%	52%	51%

Source : SEA Data Bank]

PRODUCTION OF REFINED RICE BRAN OIL - (1995-96 TO 2001-02)*(QTY. IN M.T.)*

YEAR	2001-02 (E)	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
Production	1,75,000	1,50,000	1,35,000	1,23,921	1,13,591	97,558	84,269

TABLE – III

PFA SPECIFICATIONS OF RICE BRAN OIL

i)	Moisture and (Volatile matter)	Not more than 0.1 percent by weight
ii)	Refractive Index at 40°C B.R. Reading at 40° C	1.4600 to 1.4700 51.1 to 66.4
iii)	Saponification Value	180 to 195
iv)	Iodine Value (Wijs' method)	90 to 105
v)	Acid Value	Not more than 0.5
vi)	Unsaponifiable matter	Not more than 3.5 per cent
vii)	Flash Point (Penskei marten closed method)	Not less than 250°C

TABLE – IV

SPECIFICATION OF RICE BRAN OIL AS LAID DOWN UNDER SEO CONTROL ORDER

<u>Sl.No.</u>		<u>Raw Grade. I</u>	<u>Refined Grade</u>
1.	Moisture and Insoluble impurities percent by weight Max.	0.50	0.10
2.	Size of Cell (Inch)		1
3.	Colour on levibond scale (i) Expressed as (ii) No. of Units (Max.)	-	Y + 5R 20
4.	Refractive Index at 40°C	1.4600 to 1.4700	1.4600 to 1.4700
5.	Specific Gravity at 30°C / 30°C	0.910 to 0.920	0.910 to 0.920
6.	Saponification Value	175-195	180-195
7.	Iodine Value (WIJS)	85-105	90-105
8.	Acid Value (Max.)	40	0.5
9.	Unsaponifiable matter percent by weight (Max.)	6.0	3.0
10.	Flash Point Panskey Martens (Closed)°C Min.	100	250

TABLE – V.A

COMPOSITION OF COMMON VEGETABLE OILS

	Fatty Acids % Weight			Essential Fatty Acids	<u>Antioxidants*</u>
	<u>SFA</u>	<u>MUFA</u>	<u>PUFA</u>	<u>Omega6 / Omega3</u>	
Mustard Oil / Rapeseed Oil	6	67	27	2	Tocopherols
Sunflower Oil	12	21	67	57	Tocopherols
Safflower Oil	10	15	75	69	Tocopherols
Soyabean Oil	16	24	60	10	Tocopherols
Groundnut Oil	20	50	30	32	Tocopherols
Rice Bran Oil	20	45	35	15	Tocopherols Tocotrienols & Oryzanol
Recommended	Below 33%	Above 33%	About 33%	5-10	Maximum Possible

TABLE – V.B

FATTY ACID COMPOSITION (av.) OF RICE BRAN OIL, PALM OIL AND GROUNDNUT OIL

	RICE BRAN	PALM OIL	PALMOLEIN	GROUNDNUT OIL
MYRISTIC	0.60	0-15.00	1.00	-
PALMITIC	21.50	41-46.80	39.80	14.40
STEARIC	2.90	4-05.10	4.40	3.10
OLEIC	38.40	37-40.80	42.50	42.60
LINOLEIC	34.40	9-11.00	11.20	35.90
LINOLENIC	2.20	0-0.60	0.40	-
PUFA : MUFA*	0.95	0.37	0.27	0.84