Development of mustard oil blends for quality improvement

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 Indian mustard is most commonly used as a source of cooking oil.
 Keeping in the availability and importance of mustard oil, it was blended with different oils



 Collaborative study in USA, AIIMS and St. Johns Medical College, Bangalore has proved that use of mustard oil as cooking medium reduces the risk of Coronary Heart Disease (CHD) by almost 70% in comparison to sunflower oil

AN OVERVIEW

INDIA CONSTITUTES: ABOUT

- ✓ 7.4 % OF WORLD OILSEEDS PRODUCTION
- ✓ 6.1 % OF WORLD OILMEAL PRODUCTION
- ✓ 3.9 % OF WORLD OILMEAL EXPORTS
- ✓ 5.8 % OF WORLD VEGETABLE OIL PRODUCTION
- ✓ 11.2 % OF VEGETABLE OIL IMPORTS
- ✓ 9.3 % OF WORLD'S EDIBLE OIL CONSUMPTION

Domestic Oil Production, imports and total Edible Oil Consumption in India



Domestic Production MMT
Imports MMT
Total Consumption MMT

Data Source: DAC, GOI

IMPORT OF DIFFERENT VEGETABLE OILS IN INDIA (MEAN OF 2003-04 TO 2007-08) OIL YEAR WISE (NOV-OCT)



MEAN NET DOMESTIC AVAILABILITY OF EDIBLE OILS FROM OILSEEDS (1995-96 TO 2006-07)



PROPORTION OF FATTY ACIDS IN OILSEED CROPS

	Fatty Acid %			EFA	
OIL	SFA	MUFA	PUFA	Omega6/ omega3	SFA:MUFA:PUFA
MUSTARD	06	67	27	02	1 : 11 : 4. 5
RAPESEED	06	67	27	02	1 : 11 : 4. 5
CANOLA	08	59	33	02	1 : 7: 4.0
SUNFLOWER	12	21	67	57	1 : 1.7 : 5.5
SAFFLOWER	10	→15	75	69	1 : 1.5 : 7.5
GROUNDNUT	20	50	30	32	1 : 2.5 :1.5
SOYBEAN	16	24	60	10	1 : 1.5 : 3.8
OLIVE	16	→75	09	-	1 : 4.7 : 0.56
COTTONSEED	29	20	51	100	1 : 0.68 : 1.75
RICE BRAN	22	43	35	15	1 : 2.0 : 1.6
CORN	16	37	47	46	1 : 2.3 : 2.9
WHO- Rec	28.6	42.8	28.6		1: 1.5 :1
1. Saarc oils & fat 2005 2. Grundy (1995)	<33% 25%	>33% 25-75	33% 25%	5-10	1: 1-3 : 1

Fatty acid composition (%) of different vegetable oils.

Oils	Palmitic (C _{16:0})	Stearic (C _{18:0})	Oleic (C _{18:1})	Linoleic (C _{18:2})	Linolenic (C _{18:3})	Eicosenoic (C _{20:1})	Erucic (C _{22:1})
Rice bran	19.19	0.22	39.35	41.23	-	-	-
Soybean	11.23	-	22.82	57.13	8.79	-	-
Sesame	12.92	-	39.63	47.39	-	-	-
Safflower	5.96	-	13.17	80.85	-	-	-
Groundnut	12.05	-	46.36	41.58	-	-	-
Olive	10.7	-	89.2	0.09	-	-	-
Sunflower	5.69	-	39.71	54.59	-	-	-
Mustard	1.75	-	13.4	18.23	10.66	5.4	50.54
Palm	44.06	43.36	11.9	-	-	-	

Fatty acid ratio of different vegetable oils

Oils		Essential fatty acids ω -6:ω -3		
	SFA	MUFA	PUFA	
Mustard	1	39.6	16.50	1.71
Rice bran	1	2.02	2.12	41.23
Soybean	1	2.03	5.86	6.49
Sesame	1	3.06	3.66	47.39
Safflower	1	2.20	13.56	80.85
Groundnut	1	3.84	3.45	41.58
Olive	1	8.33	0.09	0.09
Sunflower	1	6.97	9.59	54.59
Palm	1	0.98	0.27	-

Why to go for blending of oil

- Oils and fats are recognized as essential nutrients as they perform many functions and are also rich source of energy
- This is not even a single edible oil which perfectly matches the latest recommendation as sole cooking medium.

Details of Blend prepared with their ratio

Blend	Oils	Ratio
BLEND-1	Mustard : Rice Bran : Palm	(30:25:45)
BLEND-2	Mustard : Sesame: Palm	(30:20:50)
BLEND-3	Mustard: Rice bran: Palm : Sesame : Olive	(15:35:30:10:10)

Three parameters to judge an oil as "Healthiest oil"

- Ratio of SFA: MUFA: PUFA
- > Ratio of essential fatty acids (ω -6: ω -3)
- Presence of natural antioxidants

Fatty acid composition of mustard oil blends

Oils	Palmitic (C _{16:0})	Stearic (C18:0)	Oleic (C _{18:1})	Linoleic (C _{18:2})	Linolenic (C _{18:3)}	Eicosenoic (C _{20:1})	Erucic (C _{22:1})	ω -6: ω-3
BLEND-1 MO:RBO:PO (30:25:45)	25.73	-	31.69	21.92	4.27	2.12	13.84	5.2
BLEND-2 MO:SO:PO (30:20:50)	24.73	-	34.54	19.86	3.39	1.77	15.23	5.85
BLEND-3 MO:RBO:PO:SO: OLIVE (15:35:30:10:10)	26.35	-	32.72	23.51	5.55	-	11.46	4.23

Proportion of fatty acids in mustard oil blends

Pland	Potio of oilo	Ratio			
Diena	Dienu Ratio of olis		MUFA	PUFA	
	MO:RBO:PO (MRP) 30 : 25 :45	1.0	1.8	1.0	
I	MO:SO:PO (MSP) 30 : 20 :50	1.06	2.2	1.0	
III	MO: RBO: PO: SO: Olive (MRPSO) 15 : 35 :30 : 10 : 10	1.0	1.7	1.1	

MO = Mustard oil,	RBO = Rice bran oil,
PO = Palm oil,	SO = Sesame oil

Fatty acid profile of mustard oil blends.



Conclusion

- These designed oil blends were nutritionally superior over individual oils.
- The major oil in these blends is mustard oil which has anti-carcinogenic properties and has appreciable amount of omega-3 fatty acids.
- Therefore, these blends after performing clinical trials proposed to be used for patients suffering from cancer and coronary heart diseases.

