Establishing a 50 tons per day pretreatment and Solvent extraction plant and a 10 tons per day Refining plant.

Estimated Cost of Production Equipment

Process	Capacity	Price (USD)
Pretreatment	50 tons per day	68,178
Solvent Extraction	50 tons per day	140,514
Refinery	10 tons per day	143,958
Dewaxing Plant		68,323
Bottling plant	800 bottles/ hour	19,000
Total		**439,973**

Production Ability– Projection

Material	Quanti-ty	Rate	Unit Cost USD	Expense (USD)
Avg. bran available / month	400 Mt	-	$85/ mt	34,000
Solvent	2.4 Mt	6kg/ton	2500/ ton	6000
Crude Oil yield	80 Mt	5ton bran/1 ton crude	-	-
Phosphoric Acid	4 Mt	50kg/ton	$900/ ton	3600
Bleaching Earth	5.6 Mt	70kg/ton	$320/ ton	1792
Refined Oil	60 Mt	6.6ton bran/1ton Refine oil	-	-
Power	Aprox. 38,400	Approx. 200 KW	GYD 58/ KW	GYD2,227,200 USD 11,136
Water	5,760Mt	30Ton/hr	GYD $112/ m^3	GYD$645,120 USD$3,225
Time Labour	192 hr (8days)	45 worker/ day GYD $5000/ worker	GYD $225,000/ day	GYD $1,800,000 USD$9,000
Total Expense				**USD $68,753**
Income (60 x $1426/mt)				**$85,560**
Profit				**$ 16,807**

GUYANA RICE DEVELOPMENT BOARD

POSTHARVEST DEPARTMENT

Conclusion

Rice bran oil has the potential to be a serious valued added product for Guyana since it is obtained from a byproduct of rice processing and it's by product can still be utilized for the same purposes bran has traditionally been used for in the past. The initial investment cost for the processing is significant, however the attributes of rice bran oil; especially its health benefits has resulted in it becoming increasingly popular on the world market

Rice Bran Oil--

A Possible Value Added Product for Guyana

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Rice Bran Oil

Introduction

Rice bran is a byproduct of rice generated when brown rice is polished to make white rice. It is composed of fractions from the pericarp, the aleurone, the sub-aleurone layers, and the seed coat, the nucellus along with the germ, or embryo, and a small portion of endosperm.

It usually has a moisture content of ranging from 10 to 15% and consists of a mixture of substances such as protein, fat, ash and crude fiber. Rice bran is also contains 10-23% bran oil, small amounts of anti oxidants and provides an excellent source of Vitamin B and E.

Fatty Acid Composition of Rice Bran Oil

Fatty acid	Percentage
C14:0 Myristic acid	0.6%
C16:0 Palmitic acid	21.5%
C18:0 Stearic acid	2.9%
C18:1 Oleic acid	38.4%
C18:2 Linoleic acid	34.4%
C18:3 α-Linolenic acid	2.2%

Rice bran oil is extracted from the germ of the inner husk of rice and contains a range of fats, of which with 47% monounsaturated, 33 polyunsaturated, and 20% saturated fatty acids.

Rice Bran Oil is the most balanced and versatile oil on the market that is closest to the AHA recommendations.

Features of Rice Bran Oil

- *Rice bran oil is rich in vitamin E, γ-oryzanol (an anti-oxidant that may help prevent heart attacks*
- Rice bran oil is a superior salad, cooking, and frying oil which leaves no lingering after taste.
- The high smoke point prevents fatty acid breakdown at high temperatures
- Its light viscosity, allows less oil to be absorbed in cooking, reducing overall calories.

Extraction of Rice Bran Oil

.Rice bran oil is extracted by Solvent Extraction. This method that separates compounds based on their relative solubilities in two different immiscible liquids, usually water and an organic solvent .The basic steps involved in extracting oil from rice bran are as follows :

- *Preparation*- impurities are separated and rice bran is converted into pellet
- *Extraction* - The pellets are subjected to extraction. A high enough solvent ratio and a sufficient number of effective stages of wash until the final pure solvent wash. The residual is known as “Miscella”.
- *Distillation* - The miscella is distilled in vacuum distillation process to obtain the Hexane- free rice bran .
- *De-Solventization* - The extraction process leaves de-oiled rice bran enriched with hexane solvent. This is again heated & steamed to get hexane free De-Oiled rice bran.

Refining

At the end of solvent extraction the product is crude oil, to obtain maximum value from this has to be refined into edible oil. The refining process consist of the following

- *Degumming*: passing hot water through the oil to precipitate out gums and proteins that are soluble in oil but not in water.
- *Bleaching*: removes "off-colored" components by treatment with fuller's earth, , or activated carbon followed by heating, filtering, & then drying to recoup the oil.
- *Deacidification*: treats the oil with sodium hydroxide or sodium carbonate to pull out free fatty acids, phospholipids, pigments, and waxes
- *Deodorizing*: treating with high-heat pressurized steam to evaporate less stable compounds that might cause "unusual" odors or tastes.
- *Dewaxing*, or winterizing, improves clarity of oils intended for refrigeration by dropping them to low temperatures and removing any solids that form.

Byproducts of Rice Bran oil Processing

Two major byproducts of the rice oil processing are de -oiled bran and soap stock both of which is used in the animal feed industry.

Markets

Rice Bran Oil is the healthiest edible oil, containing vitamins, antioxidants, nutrients and Trans fat free. Rice Bran Oil is extensively used in Japan, Korea, China, Taiwan and Thailand as a premium edible oil. It is estimated that actual current annual world rice bran oil production is less than 800,000 mt or about 1 % of all vegetable oils used for human consumption.