INDIAN RICE BRAN OIL INDUSTRY
What is Rice bran & Rice bran Oil

Ricebran is an Oily Layer in Between The Paddy Husk and the White Rice

A unique cooking oil produced from Rice Bran is Rice Bran Oil
India’s Paddy Production

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-09</td>
<td>145</td>
</tr>
<tr>
<td>2009-10</td>
<td>130</td>
</tr>
<tr>
<td>2010-11</td>
<td>140</td>
</tr>
<tr>
<td>2011-12</td>
<td>150</td>
</tr>
<tr>
<td>2012-13</td>
<td>160</td>
</tr>
</tbody>
</table>
Andhra Pradesh Paddy Production


Production: 14, 10, 14, 14, 14
## India – Rice Bran Oil Potential & Production

### 2012-2013

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy Production</td>
<td>155MT</td>
</tr>
<tr>
<td>Rice Production</td>
<td>103MT</td>
</tr>
<tr>
<td>Rice bran Potential</td>
<td>8.86MT</td>
</tr>
<tr>
<td>Rice bran Oil Potential</td>
<td>1.46MT</td>
</tr>
<tr>
<td>Rice bran Processing</td>
<td>4.8MT</td>
</tr>
<tr>
<td>Rice bran Production</td>
<td>0.9MT</td>
</tr>
<tr>
<td>Untapped Potential for RBO</td>
<td>0.56MT</td>
</tr>
</tbody>
</table>
Benefits of RICE BRAN OIL

* Cholesterol busting power
* Cancer protection
* Better cardiovascular health
* Improved skin health
* Immunity boost
* Endocrine power
Usage of De Oiled Ricebran

* DOB Widely Used in Manufacture of Cattle Feed, Poultry Feed, Fish Feed, as Fuel for Boilers,
Rice bran Oil Extracting Process

1. Rice Bran
2. Cleaning
3. Clean Bran
4. Steam Cooking
5. Stabilized Bran
6. Pelletising
7. Bran Pellets

Steam from Steam Boiler
TECHNOCHEMENGINEERS .P.LTD

DESIGNERS, MANUFACTURERS, AND TURNKEY PROJECT SUPPLIERS
OF
SOLVENT EXTRACTION PLANTS
VEGETABLE OIL REFINARIES & OIL DERIVATIVE PLANTS

G3, RAJANIGANDHA APARTMENTS
CHAITANYAPURI, HYDERABAD-60
ANDHRAPRADESH, INDIA.
COMPANY PROFILE

TECHNOCHEM IS INNOVATIVE BUT DON’T JUST FABRICATE EQUIPMENT

TECHNOCHEM IS ESTABLISHED IN 1995 AND BECOME ONE OF LEADING MANUFACTURERS, DESIGNERS AND SUPPLIERS OF SOLVENT EXTRACTION PLANTS, OIL REFINERIES, OIL MILLING, OIL DERIVATIVE PLANTS.

TECHNOCHEM IS SUPPLYING PLANT AND MACHINERY IN MALAYSIA WITH EXTRACTION TECHNOLOGY SDN BHD AND IN THAILAND WITH ENVITRADE ENGINEERING CO. & EXTRACTION TECHNOLOGY SDN BHD. AS JOINT VENTURES

TECHNOCHEM SUPPLIED MORE THAN 150 SMALL AND LARGE SCALE PLANTS OF DIFFERENT CAPACITIES ON DIFFERENT RAW MATERIALS.
TECHNOCHEM REDILY OFFERS THE CUSTOMER FULL SUPPORT DURING THE IMPLEMENTATION OF PROJECT THROUGH ALL THE STAGES, RIGHT FROM THE PRELIMINARY STAGE TO ASSES THE TECHNO ECONOMIC VIABILITY, SITE SELECTION, PREPARATION OF LAYOUTS, SUPPLY OF EQUIPMENT, OFFERING SKILLED TECHNICIANS DURING INSTALLATION AND START UP, TRAINING FOR THE CUSTOMERS STAFF, AFTER SALES SERVICE, ASSISTING THE CUSTOMER AND CONTINUOUSLY UPDATING THE TECHNOLOGY, TO REDUCE THE COST OF PRODUCTION.
Continuous Bran Oil Extraction Process

- Any Oil Bearing material can be Extracted by Continuous Solvent Extraction Plant with Proper Preparation of raw material before feeding to the Extraction process.

Rice bran generally available in Different Qualities in India as follows.

- Raw Rice bran having oil content 16 – 18%;
- Boiled Rice bran having Oil Content 20-26%;
- Rough bran having Oil Content 10-12% with high Sand & Silica content;
All the above grades are available at different regions and Proper mixing will be done as per the Market’s demand and those having refineries will mix proportionately as per there finished Product of Refined oil quality.

Continuous Solvent Extraction Process is to extract oil from bearing materials with the help of Solvent/chemical called normal-Hexane. This process is having the following stages in which the material is prepared suitable for extraction, recovery of oil with Efficient recovery of normal-Hexane.
1. Preparation of Raw Material-cleaning, cooking, palletizing.

2. Extraction- Oil extraction with the help of normal-Hexane.

3. Distillation Process.-Separation of crude Oil and normal-Hexane.


5. Recuperation section.-Recovery of normal-Hexane vapors from out going vapors.

Preparation of Raw Materials

A). Cleaning of Bran -- The Rice bran is Separated from all foreign materials like, stones, Jute. Iron particles, etc by screening the raw material.

B). Cooking of Bran----- The cleaned Bran is cooking by giving direct live steam to de-activate The LIPASE enzyme present in the Bran. The LIPASE enzyme present in the Bran will Detoriate the oil quality present in the Bran on Storage. Hence it is recommended to Deactivate lipase enzyme before the bran is storing long time, to prevent the damage of oil Present in the Bran. The Lipase enzyme will be converted to cellulose during cooking (deactivation) process, that will act as a binder during pelletization.
C). Pelletization ------ The Bran after cooking is having 13-14% moisture is palletized in Pellet mill, The powder form Bran Will be converted into high porosity pellet form in this Process Which helps the bran oil extraction with normal -Hexane from Bran pellets, because of Easy penetration of hexane through pellets and The oil present in the Bran completely Dissolved In normal-Hexane.

D). Cooling of pellets----- The pellets coming out of pellet mill are having 11-12% moisture and 70 degree centigrade in temperature. These pellets needs to be cooled to 50 degree centigrade Before going to Extraction process. The cooling of pellets takes place in a pellet cooler. These pellets will be passed to main plant by a drag conveyor where the extraction of oil takes place.
Extraction: (Dissolving oil present in Bran in normal-Hexane)

- The Bran pellets enters into the extractor and pure normal-Hexane is pumped in to extractor from intermediate tank called Water & normal-Hexane separator. The normal-Hexane is circulated by spray pumps in counter current direction to Bran pellets materials moving direction. The Bran pellets are travels on a chain fitted with perforated sheets covered with S.S wire mesh. The extraction time for dissolving the oil present in the Bran pellets is 1Hr 30Min. The normal-Hexane comes in the counter current contact in the extractor from the top of the Bran pellets bed which is 1 mtr to 1.2 mtr height. The oil present in the material dissolved in normal-Hexane while it is percolating through the bran pellets. The S.S.wire mesh on which the Bran pellets are moving allow the OIL+NOMAL-HEXANE mixture called MISCELLA to collector hoppers fixed in the bottom of extractor.
The miscella collected in hoppers circulated again by pumps connected to hoppers. The final miscella will be collected in miscella tank. As the material reaches to extractor discharge point the oil will be extracted complete and the oil left in de oiled bran at discharge point will be 0.5 to 0.7% and normal – Hexane present is 30 to 40% that is absorbed by Bran pellets during extraction process.

- Then - Hexane present in the extracted meal coming out of the extractor will be recovered in desolventising stage.
Distillation Process: (Separation of oil + normal-Hexane)

- The oil and normal-Hexane mixture so called “Miscella” collected in the miscella tank is subjected to distillation in Four stages to separate oil and normal-Hexane. The normal-Hexane can not be Separated complete in single step from oil.

**STAGE-1—(Heat exchanging)**

- The First stage consisting of Economizer connected with flash vapor separator.

- The miscella initially enters to economizer from bottom and passes through S.S. Pipes. The hot normal - Hexane vapors coming out of the de-oiled bran during --
the desolventising process comes into the contact in economizer with miscella. The hot vapors are around 85 degree centigrade raise the temperature of miscella. The normal-Hexane vapors out side the S.S.pipes. During in this stage, normal-Hexane vapors loose the heat and condensed by raising the temperature of the Miscella to 70 degree centigrade. Some of the steam is saved in the heat exchanging. The miscella with n-Hexane vapors enter into flash vapor separator, where the n-hexane vapors are separated and pass to condenser Condenser where the normal-Hexane vapors cooled with cooling tower water that is at 32 degree centigrade. The vapors and water come into contact in indirect and counter current. The water after cooling the vapors go back to cooling tower where the cooling takes again to 32 degree centigrade.
STAGE-2 — (Heating concentrated Miscella with Steam)

- The Second stage is consisting of Raising film evaporator connected with flash vapour separator.

- The miscella entered into raising film evaporator from the bottom and passes through S.S.pipes. The In direct steam is given to evaporator that will heat the miscella from the outside of S.S.Pipes. The boiling point of normal-Hexane is 65 degree centigrade. The miscella in the first stage is heated up to 85 degree centigrade and the normal-Hexane present in the oil gets evaporate and separated in flash separator and pass in to the Condenser where the normal-Hexane vapours cooled with cooling tower water that is at 32 degree centigrade. The vapours and water come into contact in indirect and counter current. The water after cooling the vapours go back to cooling tower where the cooling takes again to 32 degree centigrade.
STAGE-3 – (Heating concentrated Miscella with Steam)

- The Third stage is consisting of Raising film evaporator connected with flash vapor separator.

- The miscella entered into raising film evaporator from the bottom and passes through S.S.pipes. The In direct steam is given to evaporator that will heat the miscella from the outside of S.S.Pipes. The boiling point of normal Hexane is 65 degree centigrade. The miscella in the first stage is heated up to 95 degree centigrade and the normal-Hexane present in the oil gets evaporate and separated in flash separator and pass in to the Condenser where the normal-Hexane vapors cooled with cooling tower water that is at 32 degree centigrade. The vapors and water come into contact in indirect and counter current. The water after cooling the vapors go back to cooling tower where the cooling takes again to 32 degree centigrade.

- At the end of 2nd heater outlet the oil remains rich in concentration and n - Hexane left will be 3-5%.
STAGE – 4 (Stripping of final traces of normal-Hexane)

- The Fourth stage of distillation is to strip off the final traces of normal-Hexane in Stripping Column with the help of direct live steam. The final oil temperature will be around 95-100°C. The final crude oil will be collected in intermediate tank in the plant. After the quality checking the oil will be taken to bulk storage tanks.

- The whole distillation process will takes under vacuum of 700 –720 mm Hg to protect the Crude oil quality and to recover normal-Hexane vapors efficiently, and help to minimize the Normal-Hexane losses.
Desolventising Process: (Separation of normal-hexane from de-oiled bran)

The Bran after oil extraction called deoiled bran will be having 30-40% n-Hexane when coming out of extractor. The de oiled bran is conveyed through a vapor tight drag conveyor to desolventising Toaster. The Deoiled bran is heated with indirect steam to raise the temperature up to 105 degree centigrade during this process. The live steam also given to strip the final traces of the n-Hexane present in the material. As soon as the material reaches to discharge point of Desolventising toaster, the temperature of the material is 105 degree centigrade. As the normal-hexane boiling point is 65 degree centigrade. Hence the n-hexane present in the deoiled bran will be evaporated at the temperature of 105 degree centigrade, and pass through the Economizer.
Recuperation Section: (RECOVERY OF NORMAL-HEXANE VAPOURS FROM VENT VAPOURS)

- The function of recuperation section is to recover the n-Hexane vapors going out of the whole system which is under vacuum and air tight.

- In this section, the mineral oil (Servo spin-12) is used to absorb the final uncondensed vapors going out of system along with some air enters into system during the process. The condensed vapors. Cooled by spraying cold water directly on to vapor in contact cooler open type before entering in to the recuperation. The cold mineral oil absorbs the n-Hexane vapors and again this cold oil is heated to 90°C to strip off n-Hexane present in oil. Again the hot oil is cooled by cooling water to get 40°C Temperature. This is a continuous cycle and the vapors stripped off in this process again condensed in condenser.
6. De oiled Bran Bagging Section: (De oiled Bran packing)

- The de oiled Bran coming from the extraction process is given water in hydrator in which the material mixed with water uniform to maintain the Moisture 12-13% prior to bagging in poly propylene bags.
### Project Cost for 150TPD Solvent Extraction Plant on Ricebran (Approx)

1. **Plant & Machinery Includes**
   - (Main Plant, Preparatory, Conditioning Sections, Structural's, Erection & Commissioning, Cooling Tower Hexane Storage Tanks, Painting & Insulation)
   - Rs 2,95,00,000/-

2. **Godown for Stocks (25000 Sq.Ft )**
   - Rs 1,00,00,000/-

3. **Civil Works Includes**
   - (Plant & Machinery Foundations, RCC Construction, Underground Storage tanks, Cooling Ponds, Pump House Lab, Stores, Administration Buildings, Boiler Sheds, weigh Bridge, RCC Chimmy, Oil Storage tanks)
   - Rs 1,00,00,000/-

4. **Electricals Includes**
   - (Transformer, DP Structure, LTDB Panel, Generator, Main Cables, Lighting, Godown Lighting Etc)
   - Rs 50,00,000/-
# Project Cost for 150TPD Solvent Extraction Plant on Ricebran (Approx)

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5. Boiler &amp; Accessories Includes</strong></td>
<td><strong>Rs 40,00,000/-</strong></td>
</tr>
<tr>
<td>(Boiler 3MT/Hr, Main Steam &amp; Condensate Line, Softener 2MT/Hr, Pipes lines, Structure Etc)</td>
<td></td>
</tr>
<tr>
<td><strong>6. Miscellaneous</strong></td>
<td><strong>Rs 50,00,000/-</strong></td>
</tr>
<tr>
<td>(Lab Equipments, Weigh Bridge, Office, Safety Equipments, Preoperative Expenses Etc)</td>
<td></td>
</tr>
<tr>
<td><strong>7. Oil Storage Tanks -150MT x2Nos</strong></td>
<td><strong>Rs 20,00,000/-</strong></td>
</tr>
<tr>
<td><strong>8. Land &amp; Development 3 – 4 Acres</strong></td>
<td><strong>Rs 1,00,00,000/-</strong></td>
</tr>
<tr>
<td><strong>Total Cost for the Above</strong></td>
<td><strong>Rs 7,55,00,000/-</strong></td>
</tr>
</tbody>
</table>
### Profit & Loss Calculation Based on 1MT Bran on Feed Basis (INR)

#### A. INPUT Cost (Taxes, Transportation Included)

<table>
<thead>
<tr>
<th>S.N</th>
<th>Particulars</th>
<th>% Oil</th>
<th>Price/MT</th>
<th>Mixing Qualities in KGs</th>
<th>Total Oil in KGs</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Raw Bran</td>
<td>16</td>
<td>18000</td>
<td>800</td>
<td>128</td>
<td>14400</td>
</tr>
<tr>
<td>2</td>
<td>Boiled Bran</td>
<td>19</td>
<td>19000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Rough Bran</td>
<td>6</td>
<td>9500</td>
<td>200</td>
<td>12</td>
<td>1900</td>
</tr>
<tr>
<td>4</td>
<td>Production Cost/1MT Materials processed</td>
<td>6</td>
<td>9500</td>
<td>200</td>
<td>12</td>
<td>1230</td>
</tr>
<tr>
<td></td>
<td><strong>Total INPUT Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1000</strong></td>
</tr>
</tbody>
</table>
### Profit & Loss Calculation Based on 1MT Bran on Feed Basis (INR)

#### B. By Sales

<table>
<thead>
<tr>
<th>S.N</th>
<th>Particulars</th>
<th>Price MT</th>
<th>Yielding</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>De Oiled Bran</td>
<td>13500</td>
<td>870.5</td>
<td>11751.75</td>
</tr>
<tr>
<td>2</td>
<td>Crude Rice bran Oil - 10% FFA</td>
<td>46500</td>
<td>135.0</td>
<td>6277.50</td>
</tr>
</tbody>
</table>

**Total Realization Cost**

|                | 1005.5 | 18029.25 |

A. Total Realization Cost: Rs. 18,029.25  
B. Total Input Cost: Rs. 17,530.00  
**Profit**: Rs. 499.25
Solvent Extraction Plant
RICEBRAN PREPARATORY SECTION
RICEBRAN PREPARATORY SECTION
DISTILLATION SECTION
TEPL CERTIFICATIONS

CERTIFICATE OF REGISTRATION

This is to certify that the Quality Management System of
TECHNOCHEM ENGINEERS PVT. LTD.
Address: G-3, Rajanigandha Apartments, Chaitanyapuri, Hyderabad - 500060 (A.P.) India.
has been assessed and found compliance with the requirements of
ISO 9001:2008

Concerning the Following activities:

Certificate No.: CQ - 1511
1st Surveillance Date Due On: 18/10/2014 Date of Initial Registration: 18/10/2011
2nd Surveillance Date Due On: 18/10/2013 Date of Certificate Expiry: 17/10/2016
Subject to the Company Maintaining its system to the required standard.

PSA Quality Certification Pvt. Ltd.
2nd Floor, Phool Singh Complex, Atta Sector-27 Noida-201301 (U.P.) India
info@psacertification.com, www.psacertification.com
Accredited By American International Accreditation Organization
201 Los Gatos Saratoga Road, Suite 144, Los Gatos, CA 95030, USA
www.aiiao-bar.org

CERTIFICATE REGISTRATION

Annexure to Certificate
Certificate No.: PSA/IN/CE/138
issued for this company

TECHNOCHEM ENGINEERS PVT.LTD.
Address: G-3, Rajanigandha Apartments, Chaitanyapuri, Hyderabad - 500060 (A.P.) India.
This certificate refer as above covered the following products group.

1. Conveyors.
2. Elevators.
4. Rotary Air Locks.
5. Extractors.
6. Toasters.
7. De-Solventizers.
8. Separators.
13. Recovery Sections.
15. Flash Separators.
17. Coolers.
18. Condensers.
20. Cracking Machines.
22. Flaking machines.
25. Catchalls.
27. Separators & cyclones.
28. Reactors.
29. Bleachers.
30. Distillation Columns.
32. Pre-distillators.
33. Filter Presses.
34. Polish Filters.
35. Scrubbers.
36. Barometric Condensers.
37. Mixers.
38. Autoclaves.
39. Screw presses.
40. Extruders.
41. Expanders.

Certificate No.: PSA/IN/CE/138
1st Surveillance Date Due On: 29/11/2014 Date of Initial Registration: 29/11/2013
Validity of this certificate can be verified at www.pscertification.com.

PSA Quality Certification Pvt. Ltd.
2nd Floor, Phool Singh Complex, Atta Sector-27 Noida-201301 (U.P.) India
info@psacertification.com, www.psacertification.com

Director
Director
TECHNOCHEM INNOVATIONS

- ZERO VENT SYSTEM: -
  TO REDUCE HEXANE LOSS

- ZERO WATER DISCHARGE: -
  TO REDUCE WATER CONSUMPTION.

- CRUDE OIL VACCUM COOLING: -
  TO INCREASE THE BLEACHIBILITY OF OIL

- LOW TEMPERATURE DISTILLATION: -
  TO INCREASE THE QUALITY OF CRUDE OIL

- PHE CONDENSERS & HEATERS: -
  TO REDUCE HEXANE, STEAM.

- VERTICAL MEAL COOLER: -
  FOR COOLING DOM UPTO AMBIENT TEMP.
EXTRACTOR :-
DESIGNED FOR BETTER DE OILING.

TOASTER :-
DESIGNED FOR LOW STEAM CONSUMPTION.

PREPARTORY SECTION :-
DESIGNED FOR LOW POWER CONSUMPTION.
ADVANTAGES OF TC PLANT

- LOW POWER CONSUMPTION.
- LOW HEXANE CONSUMPTION.
- LOW MAINTENANCE COST.
- BETTER DE OILING (BELOW 0.7%).
- LESS MANPOWER.
- BETTER BLEACHIBILITY OF CRUDE OIL.
- HIGH VACCUM.
- LOW STEAM CONSUMPTION.
- LESS WATER CONSUMPTION.
- EASY TO OPERATE.
THANK YOU