



ALTERNATIVE FEEDSTOCKS FOR ETHANOL PRODUCTION

A glimpse of state-of-the-art Grain Distillery in Maharashtra
Viraj Alcohols Limited, Shirala, Kolhapur, M.S.

Viraj Alcohols Limited

- Capacity: 33,000 litres per day of grain spirit.
- Feedstock: Corn, broken rice, sorghum, or any other grains for production of Export Quality Extra Neutral Alcohol. One feedstock at a time.
- Multipressure Distillation with integrated evaporation system (for concentration of thin slops)
- PLC based SCADA system
- Residue converted into Distillers Wet Grain Solubles (DWGS), sold as cattle feed (an additional revenue stream)
- Self sustaining unit for power



Grain Policy by Govt. of Maharashtra

1. Worldover, grain alcohol is preferred for producing potable brands.
2. In order to mitigate the difference in cost of production of grain based alcohol over molasses based alcohol, there is a need to provide encouragement to such units, which will in turn promote investment growth in this field. Due to lack of irrigation facilities and rain dependency in the backward regions of Maharashtra like Marathwada and Vidarbha, farmers in these regions mainly produce crops like jawar, bajara, maize, etc. Many times, due the irregular rain fall, these grains become spoiled and are not good for human consumption. These grains do not fetch good price in the market and hence the farmers are in loss. In order to increase the alcohol production from grains and to avoid losses of farmers, it has become very much essential to promote and encourage distillery units which produce alcohol from grains.

Decisions :

1. This scheme will be know as "Financial Assistance to Grain Based Distillery & Integrated Units – 2007".
2. All the new grain based distillery / integrated (distillery + bottling) units which will be erected and operational by the end of 2009, will be eligible for financial assistance.
3. This financial assistance will be provided to those grain based distillery units which will be using the grain produced in the State only.
4. In order to get relief on the investments made by units under this scheme, the units can claim a rebate of Rs. 10/- per litre on the excise levied on the product supplied to units producing alcohol beverages/medicines and cosmetics.
5. With a view to promote investments in the backward regions of Marathwada and Vidarbha classified as "D" Zone as per declaration of the Industry's Department of the Government of Maharashtra, the maximum required investment limit is 150% of the total investment or 37.50 crore in "D" zone and 200% or Rs. 50 crores for "D+" zone, whichever is less. The investment

limits for other regions except Vidharba & Marathwada will be 100% of the total investment or Rs. 25 crores, whichever is less for "D & D+" zones.

6. This scheme is applicable upto the completion of the capital expenditure or 2013, whichever is earlier. Under no circumstances the benefit will be extended beyond 2013.
7. It is expected that the beneficiaries shall commence commercial production within 2 years from the date issue of Letter of Intent. As per the progress of the project and wherever it is found essential, the decision for extension under this scheme can be considered.
8. Those units who have already received a Letter of Intent can transfer their location and set up their project in "D" and "D+" zones, as notified by the Government.
9. The new units who set up their project in the industrially backward zones i.e. "D" and "D+" as declared by the Government decide to set up their unit in other zones will not be eligible to get benefit, under this scheme.
10. The alcohol produced from grains if used as potable alcohol and for cosmetics purposes (M & T.P.), those units will be given financial assistance of Rs. 10/- per liter if proper record is maintained and certified by the State Excise Department.
11. In order to provide quick financial assistance, Finance Department of the State Govt. is expected to formulate a procedure.

By order & in the name of Chancellor, Govt. of Maharashtra.

S/d-

(G.S. Rasal)

Dy. Secretary,

Govt. of Maharashtra,

Housing Dept.



Sugarcane Streams for Ethanol Production

While evaluating different sugar streams (apart from C molasses) as feedstock for alcohol production, PRAJ addressed the following factors in order to arrive at the most optimum option:

1. Optimize distillery capacity with relation to sugar production.
2. Wastewater management
3. Energy optimization
4. Economics of diverting sugar streams to distillery for alcohol manufacture Management of feed-stocks, wastewater and energy in the distillery.
5. Perishable or storable nature of the feedstock: Molasses & concentrated syrup (above 70 Brix) streams can be stored over several months whereas juice streams are perishable.

Smart Distillery Options:

The Smart Distillery integrates the distillery operation with sugar processing. The options are based on length of cane crushing season.



Secondary Juice or Filtrate Juice in addition to B or C molasses

Option for sugar mills with half-year or shorter cane crushing season.

1. Option for sugar mills with half-year or shorter cane crushing season.
2. Incorporates pretreatment section comprising of separation, clarification and partial evaporation. Partially evaporated juice sent on to the HIFERM continuous fermentation system for alcohol production.
3. Water is recycled and reused, minimizing fresh-water needs to almost zero levels.
4. Wastewater/vinasse quantity is reduced to 1.5 to 2 litres.

Mixed juice Syrup as feedstock.

Smart Distillery can process mixed juice syrup from specific effect of evaporation as feedstock. This option helps to reduce wastewater volume considerably.

B molasses

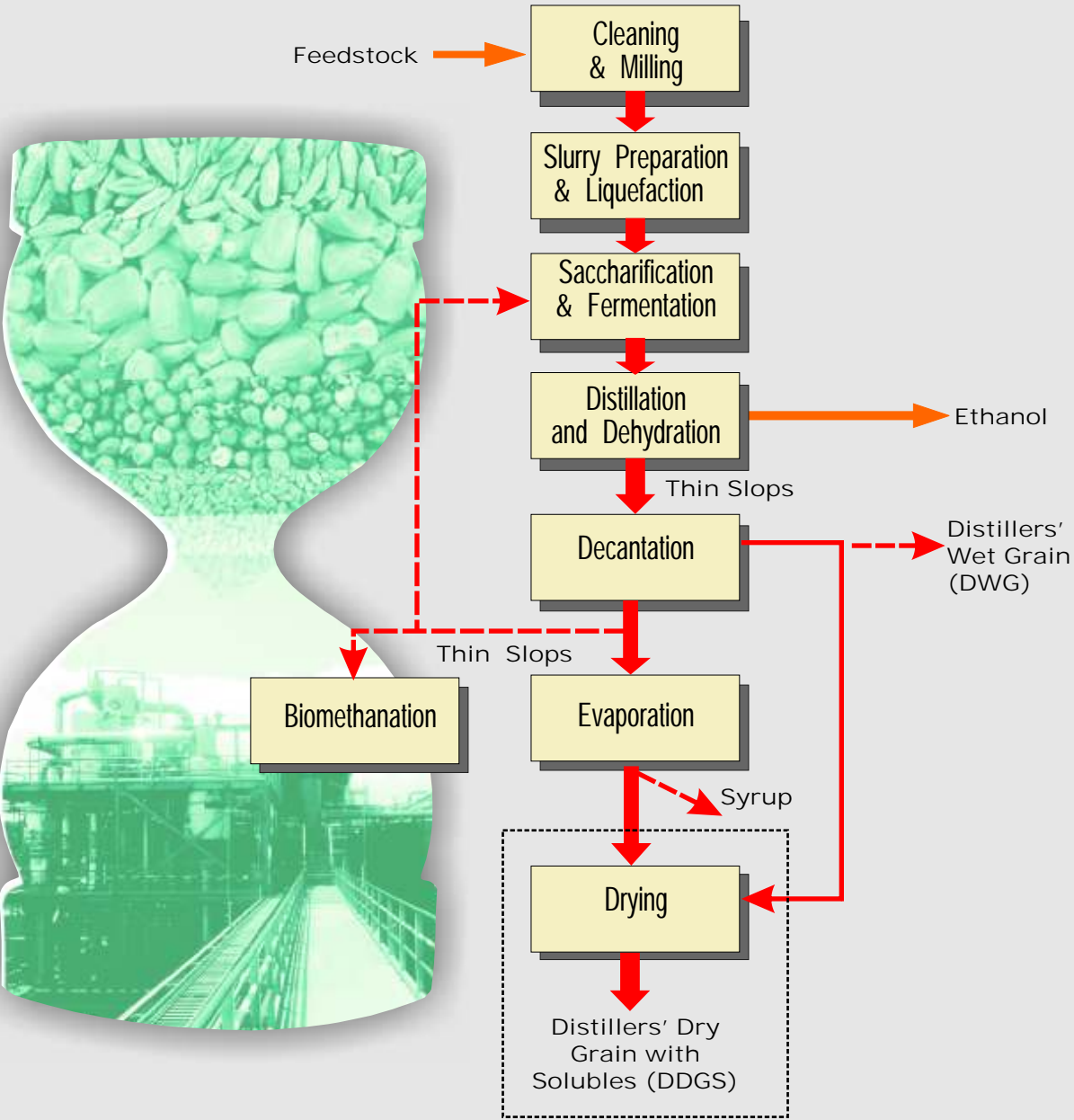
Smart Distillery is also designed to operate exclusively with B-molasses throughout the year. If the sugar separation is stopped at B-molasses, the quantity of molasses and sugar diverted is higher than that of C-molasses. This facilitates operation of distillery for 9 to 10 months continuously. For low crushing seasons, B-molasses can be stored for a period of 3 to 4 months.

Smart Distillery – The Praj Advantage

PRAJ undertakes design, engineering, construction and start-up services for Smart Distillery Technology based plants including

1. Audit of the Sugar Mill streams
2. Optimization of distillery capacity
3. Optimization of the combinations of various feedstocks
4. Integration engineering of Smart Distillery with sugar mill.

Grain processing block diagram



Sweet Sorghum to Ethanol Technology by Praj



Sweet Sorghum – an emerging energy crop

Sweet sorghum, or “Sorgo” is closely related to other sorghum crops. It differs from grain sorghum mainly because the stalks are taller and juicier and have high sugar content, just like sugarcane. Conventionally, some sweet sorghum varieties are grown for syrup production, while others are grown for forage.

Merits of Sweet Sorghum as feedstock for alcohol production:

1. The juice from contained in the stem of sweet sorghum is rich in fermentable sugar and is useful for alcohol production, After extensive research on sweet sorghum, Praj has established following advantages of using sweet sorghum for alcohol manufacturing.
2. Can be grown in tropical as well as Mediterranean climatic zones.
3. Harvesting & cultivation practices are very simple & identical to sugar cane.
4. Sweet sorghum requires less water and fertilizers, compared to sugarcane crops and can survive in low water zones.
5. Due to short cycle of 3.5 to 4 months, usually up to two cycles are also possible from the same land annually, in certain irrigated regions.

6. Sweet Sorghum gives bagasse as a co-product, which is the main source of energy (Steam & Electricity), for distillery operation. This practically makes alcohol production free of operating cost and gives possibility of operations in rural areas.
7. In addition to bagasse, Sweet sorghum also gives high quantity of green foliage, which is useful as cattle-feed.
8. Almost negligible wastewater volume.

Praj has conducted several on-farm trials in different seasons in various regions of India and abroad to establish the viability of Sweet Sorghum as an emerging energy crop. Tata Chemicals will be the first dedicated ethanol production plant based on Sweet Sorghum.





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