Introduction and feasibility of tropical Sugar Beet (*Beta vulgaris* var., *saccharifera*) cultivation in Tamil Nadu
Sugar Beet Distribution

- USSR, USA, France, Germany, Italy, Poland, Turkey, Czechoslovakia, Syria, Iran, Iraq, Algeria, Israel, Pakistan and other 14 countries
Economic Importance

Sugar : 45% world total sugar production
Bio- fuel : 10% Ethanol blending
Economics : Rs.10,000 crores foreign exchange saving / year
### Comparison between sugar beet and sugarcane

<table>
<thead>
<tr>
<th>Character</th>
<th>Sugar Beet</th>
<th>Sugarcane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (months)</td>
<td>6-7</td>
<td>10-12</td>
</tr>
<tr>
<td>Brix reading</td>
<td>23-24 %</td>
<td>18-20 %</td>
</tr>
<tr>
<td>Pol %</td>
<td>20-22 %</td>
<td>13-16 %</td>
</tr>
<tr>
<td>Sugar recovery</td>
<td>15-16 %</td>
<td>11-12 %</td>
</tr>
<tr>
<td>Average sugar recovery in factory</td>
<td>10-12 %</td>
<td>8-10 %</td>
</tr>
<tr>
<td>Yield (t/ha)</td>
<td>60-80</td>
<td>100</td>
</tr>
<tr>
<td>Water requirement</td>
<td>120 cm</td>
<td>200 cm</td>
</tr>
</tbody>
</table>
Agronomy of sugar beet

1. Tropical varieties: Pasoda, Hi 0064, Doratea

2. Soil
   - Well drained, loamy to clay loam
   - pH 6.5 to 8.0 – tolerate mild salinity
   - pH <6 – can not be grown

3. Season & Climate
   - Oct – Nov to March – May (sub tropical varieties)
   - Optimum temperature regimes
     - Germination: 20 - 25°C
     - Growth and maturity: 30 - 35°C
     - Sugar accumulation: 25 - 35°C
4. Crop establishment:
- Seed rate: 3.6 kg / ha (Rs.5700/ha)
- Spacing: 50 x 20 cm
- Population: 1 to 1.2 lakhs plants / ha

5. Fertilizer: 120 : 60 : 60 kg N, P₂O₅ and K₂O / ha
   (Time & Split: Not standardized)

6. Irrigation (Quantity & Schedule: Not standardized)
   - Pre-sowing (seeds germinate in a week)
   - 1st irrigation – early establishment
   - Subsequent irrigation – need based
   - Sensitive to water stagnation
   - Stop irrigation 1 month before harvest
   - Irrigation just prior to harvest
Different stages of growth
Letter from Agricultural Production Commissioner and Secretary to Government, Agricultural Department

Development commissioner and Finance Secretary has minuted as follows:

On sugar beet cultivation in Tamil Nadu

“Agri has to establish through Tamil Nadu Agricultural University. Its suitability to Tamil Nadu Agro-climatic Zones, its yield in actual field conditions, economics and then make a general recommendation”.
Sugar Beet Evaluation in Tamil Nadu

Proposed centres

1. Bhavanisagar : Bannariamman sugars Ltd., Sattiyamangalam
2. Coimbatore : Ponni sugars Ltd., Erode
3. Periyakulam : Rajshree sugars and chemicals Ltd., Vaigai dam
4. Paiyur : Dharmapuri Dt Co-opet. Sugars Ltd., Palacode
5. Madurai : Sakthi sugars, sivaganga
6. Sirugamani : EID Parry sugars Ltd. Pugalur
Temperature regimes of proposed testing locations

<table>
<thead>
<tr>
<th>Locations</th>
<th>Sowing (Oct.) (°C)</th>
<th>Sugar accumulation (Jan.) (°C)</th>
<th>Maturity (April) (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coimbatore</td>
<td>21 – 31</td>
<td>18 – 30</td>
<td>22 – 35</td>
</tr>
<tr>
<td>Cuddalore</td>
<td>24 – 33</td>
<td>19 – 29</td>
<td>22 – 36</td>
</tr>
<tr>
<td>Sirugamani</td>
<td>23 – 34</td>
<td>21 – 31</td>
<td>25 – 38</td>
</tr>
<tr>
<td>Bhavanisagar</td>
<td>18 – 32</td>
<td>18 – 31</td>
<td>23 – 37</td>
</tr>
<tr>
<td>Madurai</td>
<td>23 – 33</td>
<td>21 – 30</td>
<td>25 – 36</td>
</tr>
<tr>
<td>Paiyur</td>
<td>22 – 31</td>
<td>17 – 30</td>
<td>20 – 36</td>
</tr>
<tr>
<td>Periyakulam</td>
<td>23 – 33</td>
<td>17 – 33</td>
<td>21 – 38</td>
</tr>
</tbody>
</table>
### Sugar beet field trials

<table>
<thead>
<tr>
<th>Location (S.V. sugars)</th>
<th>Palayasee varam</th>
<th>Sathanacherry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field duration</td>
<td>181 days</td>
<td>157 days</td>
</tr>
<tr>
<td>Variety</td>
<td>Pasoda</td>
<td>Pasoda</td>
</tr>
<tr>
<td></td>
<td>HI 0064</td>
<td>Doratea</td>
</tr>
<tr>
<td>Pol %</td>
<td>22.6</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.1</td>
</tr>
</tbody>
</table>

**Season:** *Rabi (Oct-Nov)*

SRS, Cuddalore
# Budget requirements for conducting Multi-location trails

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Annual (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I Cost of personal</strong></td>
<td></td>
</tr>
<tr>
<td>SRF – 2 Nos (Agronomy) 8800/pm x 12 x 2</td>
<td>2,11,200</td>
</tr>
<tr>
<td><strong>II Recurring Contingencies</strong></td>
<td></td>
</tr>
<tr>
<td>i) Purchase of inputs, cultivation expenses</td>
<td>3,50,000</td>
</tr>
<tr>
<td>Rs.50,000/trial for 7 trials</td>
<td></td>
</tr>
<tr>
<td>ii) Office stationeries and miscellaneous</td>
<td>20,000</td>
</tr>
<tr>
<td><strong>III Travelling allowances</strong></td>
<td>80,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>6,61,200</td>
</tr>
<tr>
<td><strong>Institutional charges @ 15%</strong></td>
<td>99,180</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>7,60,380</td>
</tr>
</tbody>
</table>
Tropical Sugar beet

G.D. Pimprikar
New Horizons
New Hopes
Tropical Sugar Beet
For the past two centuries, i.e. ever since Napoleon brought the first sugar beets to West and North Europe, beets are for “North” and cane for “South”

• The initial reactions, when in 1995, Mr. Gokhale first proposed that we tropicalise sugar beets:

• It is impossible. It will not work. You will waste your time.

• It’s been tried before and has failed
In 2004, first commercial planting of TSB at Sagar Sugar in AP

- Sagar sugar will be the first TSB factory in the world
FIRST PLANTATION OF TSB AT SAGAR SUGAR, CHITTOOR

(June 5, 2004)
Commercial planting of TSB

• Another four to five factories in India likely to come up in 2005
• Pakistan to convert 200,000 ha of cane to TSB
• Sudan, Malawi and Kenya “in waiting”
• South China very keen to move ahead

Brazil, Australia and RSA, next
Syngenta - a leading global agribusiness

- Formed by the merger of Novartis (Sandoz + Ciba) Agribusiness and Zeneca Agrochemicals
- Strong worldwide market presence - Sales US $ 6.3 Bio (Rs 30,000 Crores), in 120 countries
- No. 1 in Crop Protection
- No. 3 in high-value commercial Seeds
- Leadership in Research and Development
  - 2001 spent - US $ 723 mio (Rs 3500 Crores)
  - 25% of total employess in R&D
Syngenta Seeds
Four Brands under One Roof

NK
Corn, oilseeds and other field crops worldwide
Established in 1884/USA

HILLESHÖG
Sugar beet worldwide
Established in 1907/Sweden

S&G
Vegetables in Europe, Africa & Asia, flowers and young plants worldwide
Established in 1867/NL

ROGERS
Vegetables in the Americas
Established in 1876/USA
Syngenta and Tropical Sugar beet

- Has the biggest sugar beet brand - HILLESHOG
- More than 100 years expertise in sugarbeet breeding
- Wider Germplasm availability
- Strong leadership worldwide
- Ahead in adaptability trials
Tropical Sugar beet

- Has been made possible by
  - identification of new germplasm
  - New breeding focus
- Already in cultivation in Egypt and Sudan
- Dual purpose sugar mills already running in these countries
Starting in 1995, agronomic trials of varieties from different gene pools in India,

- Planted every month for almost 80 months, rejecting the unsuitable ones and adding new ones
- Suitability data for on almost 80 cycles in Pune
- Extended to 40 other locations in India (four year data available now)
- Trials in Pakistan, Sudan, Kenya, Malawi, Thailand

Simultaneously worked with machinery manufacturers

- Development of small sized factories (typically 2000 TPD as against 10,000 in EU)
- Process development for sugar and alcohol
- Showing trials and machinery to potential customers
INDIA

- Various sugar/industrial companies are showing interest in investing in TSB processing plant:
  - Sagar Sugar Industries Ltd: The first TSB factory in the world
  - Mr Chaware, Pune
  - Punjab: three sugar factories
  - Ugar Sugar Works, Karnataka

- Trials in various locations: Maharashtra, Karnataka, Punjab, and Andhra Pradesh
Tropical Sugarbeet

A New but Adapted crop which is

• High yielding (30-40 MT/acre)
• Tolerant to high temperature
• Less water requirement & Drought tolerant
• Improves soil conditions & Excellent in Performing on saline and alkaline soils
• Rotation with most other crops
• Water saving
• Easy for cultivation and harvesting
• An Industrial crop ready to be processed when the factory needs it. Just In Time!
High yield under **Hot** conditions
Kenana, Sudan
Beets sown under a period with a daily max. temp. of 40 degrees C
A "Greenhouse"

The good soil-cover creates a suitable climate
Dongola, Sudan

5 months old beet
A New but Adapted crop which is

• High yielding
• Tolerant to high temperature
• **Performing on saline and alkaline soils**
• Drought tolerant
• Excellent in rotation with most other crops
• Water saving
• An Industrial crop ready to be processed when the factory needs it. Just In Time!
Agricultural Research Station K.Digraj (Sangli)
Amelioration of Salt Affected Soil at Chalis Biga Farm

Principal Investigator: Dr. B.A. Chougule
Officer Incharge: Prof. H.N. Mali
Inspiration & Guidance: Dr. Subhash Puri
Director of Research: Dr. S.S. Kadam

Objectives:
- To reclaim the salt affected soil for high value crop production.
- To standardise the drainage-amendment criteria for improvement of soil.
- To demonstrate subsurface drainage technology to farmers.

Plan of Layout of Sub surface Drainage

Legend:
- Sump Well: O
- Collector Drain: MAIN DRAIN: —
- Lateral Drain: —
- Junction Box: —
- Road: —
- Drainage Outlet: (O)

Total Area: 8.81 ha

Initial Details:
- Soil type: Deep black clayey
- pH: 8.13 to 8.52

EC: 2.22 to 17.82 dS/m
ESP: 7.04 to 17.50
Hydraulic Conductivity: 0.0236 to 0.0579 m/day
Water table: 0.265 to 1.85 m from surface
Date of start of surface drainage: 7.11.2002
Date of Completion: 10.12.2002
Collector drain: 80 mm Corrugated non-perforated PVC pipe
Lateral drain: 80 mm Corrugated perforated PVC pipe
No of Infiltration openings per meter: 120
No of Infiltration openings in cross section: 3
Width of Infiltration openings in mm: 1.8
Length of Infiltration openings in mm: 15
Average depth of collector & lateral drains: 1.32 Meter
Slope of collector drain: 0.3 %
Slope of lateral drain: 0.2 %
Cost of subsurface drainage system: Rs. 22483/acre, Rs. 56,207/hectare.
80 MT/Ha direct after partial land reclamation.
Ugar
Sodic soil, not reclaimed.
<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Variety</th>
<th>Tuber Yield (Tons/Ha)</th>
<th>Sucrose Percentage</th>
<th>Percentage of leafy matters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Posada</td>
<td>72.73</td>
<td>15.50</td>
<td>9.88</td>
</tr>
<tr>
<td>2.</td>
<td>Dorotea</td>
<td>72.41</td>
<td>16.70</td>
<td>11.35</td>
</tr>
<tr>
<td>3.</td>
<td>HI 0064</td>
<td>61.89</td>
<td>15.70</td>
<td>15.31</td>
</tr>
</tbody>
</table>
TROPICAL SUGARBEET HYBRID – HI 0064
A New but Adapted crop which is

• High yielding
• Tolerant to high temperature
• Performing on saline and alkaline soils
• **Drought tolerant**
• **Excellent in rotation with most other crops**
• Water saving
• An Industrial crop ready to be processed when the factory needs it. Just In Time!
Drought tolerance due to the deep root system

Opening the way down to the moisture for following crops in the rotation

Sugar beet tap roots
A New but Adapted crop which is

• High yielding
• Tolerant to high temperature
• Performing on saline and alkaline soils
• Drought tolerant
• Excellent in rotation with most other crops
• Companion crop to extend crushing period
• An Industrial crop ready to be processed when the factory needs it.

Just In Time!
1. Sugar beet excellent supplementary or companion crop in sugarcane based industry area.

Working period of sugar industry can be extended by **110 days** due to sugar beet cultivation.

- **5th of November to 15th of April (162 days)** cane crushing.
- **1st of October to 4th of November (35 days)** sugar beet crushing
- **16th of April to 30th of June (75 days)** sugar beet crushing
Sugar Production Schedule in Monsoon Areas (in northern hemisphere)

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Fev</th>
<th>March</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy rain period</td>
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<td></td>
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<tr>
<td>Beet growing period</td>
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<tr>
<td>Beet harvesting</td>
<td></td>
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<tr>
<td>Beet drilling period</td>
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<tr>
<td>Cane harvesting period</td>
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<td></td>
</tr>
<tr>
<td>Extra operating time SB</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>90</td>
</tr>
</tbody>
</table>

- Beet growing period lasts 240 days.
- Cane harvesting period lasts 150 days.
- Extra operating time SB lasts 90 days.
TROPICAL SUGAR BEET

AN IDEAL SUPPLEMENT TO SUGARCANE
<table>
<thead>
<tr>
<th>Cost Economics of Tropical Sugar beet</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield per Acre</td>
<td>30-40 MT</td>
</tr>
<tr>
<td>Beet Price</td>
<td>Rs. 500/MT</td>
</tr>
<tr>
<td>Gross Income/Acre</td>
<td>Rs.20000/Acre</td>
</tr>
<tr>
<td>Cultivation cost</td>
<td>Rs.12000/acre</td>
</tr>
<tr>
<td>Net Income/Acre</td>
<td>Rs 8000 ( In 6 months )</td>
</tr>
</tbody>
</table>
## Advantages of Sugar beet

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Sugarcane</th>
<th>Sugarbeet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop duration</td>
<td>12-13 months</td>
<td>5-6 months</td>
</tr>
<tr>
<td>Water Requirement</td>
<td>Throughout Year</td>
<td>1/3 rd of sugarcane</td>
</tr>
<tr>
<td>Yield/acre</td>
<td>25-30 MT</td>
<td>30-40 MT</td>
</tr>
<tr>
<td>Sugar content</td>
<td>12-15 %</td>
<td>14-16 %</td>
</tr>
<tr>
<td>Sugar Yield MT/acre</td>
<td>2.5 - 4.0</td>
<td>4.5 - 6.5</td>
</tr>
<tr>
<td>Ethanol Prod.</td>
<td>1700-2700 Lt</td>
<td>2800-3500 Lt</td>
</tr>
</tbody>
</table>

*syngenta*
Tropical Sugar beet a Viable Option

- SHORT DURATION
- LESS NEED FOR WATER
- GROWS IN SALINE SOIL

A VIABLE OPTION
SUGAR BEET AS A FEEDSTOCK FOR ETHANOL: A Viable Option!
Govt. has allowed 5% blend with petrol in first phase and 10% in second phase

- Current production of ethanol is only 1.3 billion litres
Ethanol from Sugarbeet - NEW HOPE

- Can be produced directly from beet juice
- 90 ltrs / mt of beet at 15% sucrose
- 7200 ltrs / ha at 80 mt yield
## Cost comparison of various feed stocks for ethanol

<table>
<thead>
<tr>
<th>FEED STOCK</th>
<th>YIELD/MTON</th>
<th>RATE /TON</th>
<th>COST/LTR</th>
<th>CROP DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Molasses</td>
<td>240 ltrs</td>
<td>Rs. 1500-2500</td>
<td>6.25-11</td>
<td></td>
</tr>
<tr>
<td>2. S/cane juice</td>
<td>60-70 ltrs</td>
<td>700-800</td>
<td>12-14</td>
<td>12 mths</td>
</tr>
<tr>
<td>3. Corn</td>
<td>400 ltrs</td>
<td>6000</td>
<td>15</td>
<td>4-5 mths</td>
</tr>
<tr>
<td>4. Grain (waste)</td>
<td>300-400 ltrs</td>
<td>6000-8000</td>
<td>15-20</td>
<td>4-5 mths</td>
</tr>
<tr>
<td>5. Sugarbeet</td>
<td>90 ltrs</td>
<td>600-700</td>
<td>7-8</td>
<td>5-6 mths</td>
</tr>
<tr>
<td>6. Sweet sorghum</td>
<td>45 ltrs</td>
<td>300-400</td>
<td>8-10</td>
<td>3 mths</td>
</tr>
<tr>
<td>7. Tapioca</td>
<td>150 ltrs</td>
<td>1500-2500</td>
<td>10-17</td>
<td></td>
</tr>
</tbody>
</table>

- To obtain 1 Ton Molasses 250 Ton S/cane is to be crushed
- Molasses prices are unstable
- Effluent generated has high BOD / COD - 70,000ppm
Advantages of TSB over cane (FARMERS)

To Farmers and agriculture

- TSB can give the same amount of sugar as cane per land unit
  - In half the time (five to six months vs. 12 months)
  - With one third the water
- Can be grown practically for 10 months / year
- Adapts well in acidic or alkaline soils spoiled by years of cane
- Does not need any specific investment in farm machinery
- Good rotational crop for enhancing the productivity of next crop
- Farmers who have round the year water availability can take a second crop
Advantages of TSB over cane (sugar factories)

To Sugar factories

1. Improve assets utilization / reduce idle time by running factories for up to 10 months as against the current four to five months

2. Utilize land made sterile (saline) by excessive cane production

3. Interesting by-products
   1. Molasses for alcohol / ethanol
   2. Pulp (for feed or fuel),

4. TSB is the most efficient crop for production of ethanol

hilleshög

syngenta
Sugar beet - Set up in Sweden 1907

**Sugar beet an ideal complement to Sugar Cane**

- 5/6 month crop
- Less water requirement
- Can be grown in Saline/Alkaline soils with pH upto 9
- Yield 30-40 Mt per acre, with Sucrose content 14-20%
- Ideal for Sugar & Ethanol
…..and why not??

Grow beets for sugar!

You will save at least 10 000 cubic M of water/Ha.
Thank you!
Advantages of TSB over cane

To Community at large

1. Every acre under TSB will release an acre of farm land for food crops: potential 10 to 12 Mio ha.
2. Land reclaim and land conservation
3. TSB uses about one third of the water actually needed for cane
4. Beet molasses is more environment friendly than cane molasses (low effluent volume, low non sugar solid, almost no colour) and can be sprayed on land as ferti-irrigation.
5. Transformation of the existing cane factories will generate industrial activity and the development of new know-how
6. Will help meet the Increased need of bio-ethanol, efficiently
7. Export possibility
Benefits of New Crop Promotion

- Increase in the cropping intensity (i.e., One Sugar beet & two crops of Sweet sorghum in a year) thus increase the farm income to Rs.22,000 per acre per annum.

- Provides continuous and increased employment opportunities in agriculture throughout the year.

- Dependence on single source of raw material i.e. sugarcane for Sugar and Ethanol production is avoided.

- Since water requirement is less more area could be brought under irrigation. Water saving – 10,000 M3/HA
Problem of Weather abnormalities & Water Scarcity is avoided being a seasonal crop.

Forecast of sugar deficit could be offset with sugar beet due to higher sugar productivity.

Ensure continuous operation of plant (300 days) and provides opportunity for direct & indirect industrial employment continuously.
## Advantages of Sugar Beet Over Sugar Cane

<table>
<thead>
<tr>
<th>Salient Features</th>
<th>Sugar Beet</th>
<th>Sugar Cane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Duration</td>
<td>6 Month</td>
<td>12 – 13 months</td>
</tr>
<tr>
<td>Growing Season</td>
<td>Throughout the year (8 months) except rainy period</td>
<td>Only one season.</td>
</tr>
<tr>
<td>Soil Requirement</td>
<td>Grows well in Sandy loam. Also tolerates alkalinity.</td>
<td>Grows well in loamy soil</td>
</tr>
<tr>
<td>Water Requirement</td>
<td>Less water requirement. (400-500 mm)</td>
<td>Require water throughout the year (1800-2000mm)</td>
</tr>
<tr>
<td>Crop Management</td>
<td>Requires Moderate management. Low fertilizer requirement and less pest and disease complex.</td>
<td>Require good management and more fertilizers requirement.</td>
</tr>
</tbody>
</table>
## ADVANTAGES OF SUGAR BEET OVER SUGAR CANE

<table>
<thead>
<tr>
<th></th>
<th>Yield Potential</th>
<th>Sugar Content</th>
<th>Alcohol Yield Potential</th>
<th>Crop Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40-50 tons/acre</td>
<td>16% - 18%</td>
<td>2800 – 4100 L/acre</td>
<td>Gross income</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>: Rs. 24000</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Cultivation Cost : Rs. 12000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Net Income     : Rs. 12000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Av.Net income/day : Rs. 65</td>
</tr>
<tr>
<td></td>
<td>25-30 tons/acre</td>
<td>10% - 12%</td>
<td>1700-2400 L/acre</td>
<td>Gross income</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>: Rs. 25500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cultivation Cost : Rs. 18500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Net Income     : Rs. 7000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Av.Net income/day : Rs. 20</td>
</tr>
</tbody>
</table>

**Crop Economics**

- **Gross income**: Rs. 24000
- **Cultivation Cost**: Rs. 12000
- **Net Income**: Rs. 12000
- **Av.Net income/day**: Rs. 65

- **Gross income**: Rs. 25500
- **Cultivation Cost**: Rs. 18500
- **Net Income**: Rs. 7000
- **Av.Net income/day**: Rs. 20
Sugar Beet: A Case Study

S.V. Sugars, Kancheepuram
# TABLE - I

SUGAR BEET ANALYSIS - PHYSICAL

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>AGE [MONTHS]</th>
<th>AVERAGE ROOT SIZE [cm]</th>
<th>AVERAGE WEIGHT [KG]</th>
<th>MOISTURE %</th>
<th>POL %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>DIA</td>
<td>HEIGHT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HI-0064</td>
<td>5 TO 6</td>
<td>13.00</td>
<td>22.0</td>
<td>1.378</td>
<td>78.0</td>
</tr>
<tr>
<td>PASODA</td>
<td>5 TO 6</td>
<td>16.21</td>
<td>25.0</td>
<td>2.276</td>
<td>82.0</td>
</tr>
<tr>
<td>DORATEA</td>
<td>5 TO 6</td>
<td>15.00</td>
<td>27.2</td>
<td>2.290</td>
<td>82.0</td>
</tr>
</tbody>
</table>
## Alternate Raw Materials for Fuel Alcohol and Cost Analysis

<table>
<thead>
<tr>
<th>CROP</th>
<th>AVERAGE CROP YIELD (TONNES PER HECTARE PER YEAR)</th>
<th>AVERAGE ALCOHOL YIELD (LITRE PER TONNE)</th>
<th>AVERAGE YIELD (LITRE PER HECTARE PER YEAR)</th>
<th>COST PER TONNE</th>
<th>COST PER LITRE ALCOHOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUGAR CANE</td>
<td>75</td>
<td>70</td>
<td>5250</td>
<td>850</td>
<td>12.00</td>
</tr>
<tr>
<td>SUGAR BEET</td>
<td>80</td>
<td>85</td>
<td>5100</td>
<td>700</td>
<td>8.25</td>
</tr>
<tr>
<td>SWEET SORGHUM</td>
<td>50</td>
<td>50</td>
<td>2500</td>
<td>500</td>
<td>10.00</td>
</tr>
<tr>
<td>MAIZE</td>
<td>5</td>
<td>400</td>
<td>2000</td>
<td>10000</td>
<td>25.00</td>
</tr>
<tr>
<td>MOLASSES (OWN)</td>
<td>-</td>
<td>240</td>
<td>-</td>
<td>1500</td>
<td>6.25</td>
</tr>
<tr>
<td>(OTHERS)</td>
<td>-</td>
<td>240</td>
<td>-</td>
<td>2200</td>
<td>9.20</td>
</tr>
</tbody>
</table>

*Note: The above results is for the crop raised in coastal area. The western districts may get better results.*
## Sweet Sorghum Analysis Report

**S. V. Sugar Mills, Kancheepuram**

**Date of Analysis:** 11.12.2003

<table>
<thead>
<tr>
<th>Variety</th>
<th>Date of Plantation / Age</th>
<th>Juice % Sorghum (by dry crush in small mill)</th>
<th>Crushed juice analysis</th>
<th>TRS % Sorghum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>PH</td>
<td>BRIX %</td>
</tr>
<tr>
<td>Madura (Before emergence of ear head)</td>
<td>15.08.2003 / 4 months</td>
<td>51.28</td>
<td>4.89</td>
<td>16.82</td>
</tr>
<tr>
<td>Madura (After emergence of ear head)</td>
<td>15.08.2003 / 4 months</td>
<td>50.02</td>
<td>4.96</td>
<td>15.42</td>
</tr>
</tbody>
</table>