





## 8. JAGGERY PROCESS


i.	<b>a. Type of Technology</b>	:	Product
	<b>b. Technology developed</b>	:	Bottling of Sugarcane Juice
ii.	<b>Application/ Use</b>	:	To preserve the sugarcane juice in bottles
iii.	<p><b>Description of Technology :</b>  A technology has been developed for preserving the sugarcane juice in bottles for a period up to six months. The process of preserving the sugarcane juice involves peeling, crushing, filtration, pasteurization and bottling. Sodium Benzoate @ 125 ppm is added as preservative. The bottled juice can be stored without any loss in the quality and flavour for six months at room temperature. The cost involved for the production of one bottle (200 ml) of juice is Rs.3.00. Consumer acceptability of the preserved juice was evaluated and found to be 98 per cent.</p>		
			
iv.	<b>Input/raw material</b>	:	Sugar cane
	a) Overall dimension	:	
	b) Plant & Machinery	:	Sugar cane crusher, Filtration unit, Double wall steam kettle, bottle washer, Auto clave, Bottle closer
	c) Weight	:	-
	d) Prime mover	:	-
	e) Power	:	Depending on the production capacity
	f) Man power	:	Depending on the production capacity
	g) Land	:	Nil
	f) Investment	:	Minimum Rs.5, 00,000 depending on the capacity
v.	<b>Output capacity</b>	:	Depending on the production capacity
vi.	<b>Unit cost (per machine)</b>	:	Minimum 2 lakhs investment
vii.	Suitability for crops/commodity	:	Sugarcane
viii.	Efficiency	:	-
ix.	Unit cost of operation	:	Rs. 3 per bottle of 200 ml. (excluding bottle)
x.	<b>Patent obtained/applied</b>	:	No
xi.	<b>Commercialization status</b>	:	Commercialized
	(a) No. of Licensees to whom the technology has been transferred	:	3
	(b) Selected Addresses of Licensee / Manufacturer	:	<ol style="list-style-type: none"> <li>1. Mr. J. Sethupathy, G-3 unit Industrial Estate, S. Vellalapatty, Karur- 639004, Tamil Nadu.</li> <li>2. Mr. Rasi Ramalingam (Rasi Masala), 22, 1st street, Ghere Pukasham Nagar, Pondicherry-605008</li> <li>3. Mr. Upendra K. Shah, Khode Pratishthan, Vishwasakhanatur Health Cure Centre, Khargone- 451001 (M.P.).</li> </ol>
xii.	Contact Address	:	Professor and Head, Agricultural Machinery Research Centre, Tamil Nadu Agricultural University, Coimbatore - 641 003. Phone: 0422- 6611272; FAX: 0422-6611455; e-mail: processing@tnau.ac.in

<b>i.</b>	<b>Name of the Technology</b>	:	Okra Plant Stalk Powder for Clarification
<b>ii.</b>	<b>Application/ Use</b>	:	Okra plant stalk powder is ready to use form of vegetative clarificant which can be used for efficient clarification during jaggery processing. This RTU form of clarificant is useful in areas of non availability of fresh okra plant or in off season of okra plant.
<b>iii.</b>	<b>Description of Technology :</b>		<p>The wild species of okra ( <i>Abelmoschus esculentus</i>) plants of 75 to 90 days crop age re used for preparation of powder. The okra plant stalks are chopped into small pieces of about 2 cm length then dried it in shed for the period of 15-20 days. Dried pieces are grinded to get the fine powder. This powder is sieved through 1 mm sieve and stored in air tight plastic containers. During jaggery processing this powder is applied @ 1.6 Kg/ 1000 liters of sugarcane juice. It has same clarification efficiency as that of fresh okra plant.</p> 
<b>iv.</b>	<b>Input/raw material</b>	:	Fresh Okra plant stalk
	a) Overall dimension	:	NA
	b) Weight	:	NA
	c) Prime mover/ Plant & Machinery	:	Chopper machine, Grinding machine, 1 mm sieves, plastic containers
	d) Man power	:	02 / day
	e) Power	:	4.0 hp
	f) Land	:	NA
	g) Investment	:	Rs. 25,000/-
<b>v.</b>	<b>Output capacity</b>	:	50 kg /day
<b>vi.</b>	<b>Unit cost (per machine)</b>	:	Rs. 30 / kg
<b>vii.</b>	<b>Suitability for crops/commodity</b>	:	Okra stalk
<b>viii.</b>	<b>Efficiency</b>	:	NA
<b>ix.</b>	<b>Unit cost of operation</b>	:	NA
<b>x.</b>	<b>Patent obtained/applied</b>	:	Nil
<b>xi.</b>	<b>Commercialization status</b>	:	Ready for commercialization
	(a) No. of Licensees to whom the technology has been transferred	:	Nil
	(b) Selected Addresses of Licensee/Manufacturer and Contact addresses	:	Nil
<b>Xii</b>	<b>Contact address</b>		PI, AICRP on PHT, Regional Sugarcane & Jaggery Research Station, Opp. Market yard, ( Mahatma Phule Krishi Vidhyapeeth , Rahuri Kolhapur-416005 ( MS)




<b>i.</b>	<b>Name of the Technology</b>	:	Value-added Jaggery
<b>ii.</b>	<b>Application/ Use</b>	:	Promotion of Nutritionally Rich Jaggery
<b>iii.</b>	<b>Description of Technology:</b>		
	<p><i>Aonla</i> as a natural source of vitamin C has been added in jaggery in suitable form and quantity and at a proper stage of jaggery preparation. Value-added jaggery cubes and bars have been prepared. Such kind of jaggery if included in the menu of mid-day meal being given to rural school going children will help in fighting malnutrition.</p>		
<b>iv.</b>	<b>Input/raw material</b>	:	Aonla and sugarcane juice
	a) Overall dimension	:	50x25x25 mm
	b) Weight	:	25 g
	c) Prime mover/ Plant & Machinery	:	NA
	d) Man power	:	02
	e) Power	:	Manual
	f) Land	:	NA
	g) Investment	:	Rs. 6000
<b>v.</b>	<b>Output capacity</b>	:	7 kg/batch
<b>vi.</b>	<b>Unit cost (per machine)</b>	:	Rs 6000
<b>vii.</b>	<b>Suitability for crops/commodity</b>	:	juice
<b>viii.</b>	<b>Efficiency</b>	:	90%
<b>ix.</b>	<b>Unit cost of operation</b>	:	2 Rs/kg
<b>x.</b>	<b>Patent obtained/applied</b>	:	-
<b>xi.</b>	<b>Commercialization status</b>	:	Ready for commercialization
	(a) No. of Licensees to whom the technology has been transferred	:	-
	(b) Selected Addresses of Licensee/Manufacturer and Contact addresses	:	-
<b>xii.</b>	Contact addresses	:	Director or Research Engineer Indian Institute of Sugarcane Research, Lucknow (UP). Phone: 0522-2480726 Fax: 0522-2480748 email:iisrko@sancharnet.in


i.	a. Type of Technology	:	Product
	b. Technology developed	:	Rectangular Shaped Jaggery
ii.	Application/ Use	:	Production of rectangular shaped jaggery
iii.	<b>Description of Technology:</b>		
	<p>The boiling and concentration of sugarcane juice is done in the open pan on two / three pan furnace up to the striking point. Thus concentrating juice is transferred from boiling pan to a wooden cooling pan. It is allowed for cooling for about 10 minutes which is followed by manual puddling for about 10 minutes and is left for cooling in continuation for about 08-10 minutes. Then the concentrating juice starts solidifying in the form of slurry which is, then pored into the rectangular moulding frame for rectangular shaped jaggery. It is then left for setting/ solidification. After about 25 minutes, the rectangular frames are dismantled and rectangular shaped jaggery weighing about 10-12gm each piece is taken out and is put for shade or solar drying prior to packaging.</p>		
iv.	<b>Input/raw material</b>	:	Sugar cane juice
	a) Overall dimension		12x25x25 mm
	b) Weight		10-12 g/cube
	c) Prime mover/ Plant & Machinery	:	manual
	d) Man power		01 No.
	e) Land	:	NA
	f) Investment		Rs 4000
v.	<b>Output capacity</b>		3.5 kg/batch
vi.	<b>Unit cost (per kg)</b>		Rs. 35 /kg
vii.	<b>Suitability for crops/commodity</b>	:	Sugarcane
viii.	<b>Efficiency</b>		95%
ix.	<b>Unit cost of operation</b>		Rs 2.0/kg
x.	<b>Patent obtained/applied</b>	:	Not applied
xi.	<b>Commercialization status</b>	:	Ready for commercialization
	(a) No. of Licensees to whom the technology has been transferred	:	--
	(b) Selected Addresses of Licensee/Manufacturer	:	Nil
xii.	Contact addresses	:	Director or Research Engineer Indian Institute of Sugarcane Research, Lucknow (UP). Phone: 0522-2480726 Fax: 0522-2480748 email:iisrko@sancharnet.in


<b>i</b>	<b>Name of the Technology</b>	:	Cube-shaped Jaggery
<b>ii</b>	<b>Application/ Use</b>	:	Increased income to the farmers
<b>iii</b>	<b>Description of Technology :</b>		<p>Sugarcane juice clarified with vegetative clarificant is boiled and concentrated upto the striking point. At striking point, it is taken out from the boiling pan to a wooden cooling pan. It is kept for 5-10 minutes for cooling. Then, it is puddled for 5-10 minutes and left for further cooling. At this stage, the concentrated juice starts solidifying. It is then pored in moulding frames and left for solidification. After 20-30 minutes, the moulding frames are dismantled and one-inch cubes of jaggery (22-25g) are taken out. It is then dried and packed.</p> 
<b>iv</b>	<b>Input/raw material</b>	:	Jaggery
	a. Overall dimension (L x B x H mm)	:	-
	b. Weight	:	-
	c. Prime mover	:	-
	d. Power (hp)	:	-
	e. Man power	:	-
	f. Land	:	-
	g. Investment	:	-
<b>v</b>	<b>Output capacity</b>	:	7 kg per batch
<b>vi</b>	<b>Unit cost (per machine)</b>	:	Rs. 48/kg
<b>vii</b>	<b>Suitability for crop/ commodity</b>	:	Jaggery
<b>viii</b>	<b>Efficiency</b>	:	-
<b>ix</b>	<b>Unit cost of operation</b>	:	-
<b>x</b>	<b>Patent obtained/applied</b>	:	-
<b>xi</b>	<b>Commercialization status</b>	:	Commercialized
	a) No. of Licensees	:	3
	b) Addresses of Licensees or Manufacturer	:	1. M/S Vindhya wasini Traders, Patna (Bihar) 2. M/S Amit Agro, Rampur (U.P.) 3. Mr Gurpreet Singh Khanna, Gurdaspur (Punjab) Mr Anand Singh, Gonda (U.P.)
<b>xii</b>	<b>Contact Address</b>	:	Director, Indian Institute of Sugarcane Research, Raebareli Road, Lucknow Phone:0522-2480726,Fax:0522-2480748 Email: iisrko@sancharnet.in

i	<b>Name of the Technology</b>	:	Process Technology for Production of Value-added Jaggery Cubes and Bars
ii	<b>Application/ Use</b>	:	Fights malnutrition, increased income to the farmers and improved socio-economic status of the farmers
iii	<b>Description of Technology :</b>		<p>A process technology for production of value-added jaggery using <i>aonla</i> as a natural source of vitamin C has been developed. Using this technology nutritionally rich jaggery having vitamin C can be prepared in cubes and bars. Dried <i>aonla</i> shreds @ 75g/kg of jaggery is added in cooling pan in the process of jaggery making. Value-added jaggery produced using <i>aonla</i> as a natural source of vitamin C has a good palatability besides being rich in vitamin C.</p> <pre> graph TD     Sugarcane[Sugarcane] --&gt; Juice[ Juice extraction ]     Juice --&gt; Settling[ Settling and filtration ]     Settling --&gt; Heating[ Heating and scum removal ]     Heating --&gt; Boiling[ Boiling and concentration ]     Boiling --&gt; Cooling[ Cooling ]          Aonla[Aonla] --&gt; Washing[ Washing and cleaning ]     Washing --&gt; Grating[ Grating/Shredding ]     Grating --&gt; Drying[ Drying ]          Cooling --&gt; Mixing[ Mixing of dried Aonla with concentrated slurry ]     Drying --&gt; Mixing          Mixing --&gt; Moulding[ Moulding ] </pre>
iv	<b>Input/raw material</b>	:	Jaggery
	a. Overall dimension (L x B x H mm)	:	-
	b. Weight	:	-
	c. Prime mover	:	-
	d. Power (hp)	:	-
	e. Man power	:	-
	f. Land	:	-
	g. Investment	:	-
v	<b>Output capacity</b>	:	30 kg of value-added jaggery per batch
vi	<b>Unit cost (per machine)</b>	:	Rs. 70 per kg
vii	<b>Suitability for crop/ commodity</b>	:	Jaggery
viii	<b>Efficiency</b>	:	-
ix	<b>Unit cost of operation</b>	:	-
x	<b>Patent obtained/applied</b>	:	-
xi	<b>Commercialization status</b>	:	Ready for commercialization
	a) No. of Licensees	:	-
	b) Addresses of Licensees or Manufacturer	:	-
xii	<b>Contact Address</b>	:	Director, Indian Institute of Sugarcane Research, Raebareli Road, Lucknow Phone:0522-2480726,Fax:0522-2480748 Email: iisrko@sancharnet.in

<b>i</b>	<b>Name of the Technology</b>	:	Liquid Jaggery
<b>ii</b>	<b>Application/ Use</b>	:	Storability is better. It can be used as a substitute for honey and can give better profitability
<b>iii</b>	<b>Description of Technology :</b>		<p>Sugarcane juice is extracted, filtered and heated over jaggery furnace. On heating, lime (100g lime in 5 l water/100 kg juice) is added to raise the pH from 5.2-5.4 to 6.5-7.0 for coagulation of impurities. After removal of impurities, mucilaginous extract of vegetative clarificant is added for further clarification. Now juice is made acidic by adding phosphoric acid and is vigorously boiled. As soon as the temperature reaches 105-106°C, it is removed from pan, cooled and packed in glass or PET bottles. Addition of citric acid @ 0.04% and 0.1% potassium metabisulphite or 0.5% benzoic acid help in preventing crystallization and increasing shelf life respectively.</p>
			
<b>iv</b>	<b>Input/raw material</b>	:	Sugarcane
	a. Overall dimension (L x B x H mm)	:	-
	b. Weight	:	-
	c. Prime mover	:	-
	d. Power (hp)	:	-
	e. Man power	:	-
	f. Land	:	-
	g. Investment	:	-
<b>v</b>	<b>Output capacity</b>	:	
<b>vi</b>	<b>Unit cost</b>	:	Rs. 20/300 ml
<b>vii</b>	<b>Suitability for crop/ commodity</b>	:	Jaggery
<b>viii</b>	<b>Efficiency</b>	:	-
<b>ix</b>	<b>Unit cost of operation</b>	:	-
<b>x</b>	<b>Patent obtained/applied</b>	:	-
<b>xi</b>	<b>Commercialization status</b>	:	Commercialized
	a) No. of Licensees	:	1
	b) Addresses of Licensees or Manufacturer	:	M/s Gurpreet Singh Khanna, Gurdaspur (Punjab)
<b>xii</b>	<b>Contact Address</b>	:	Director, Indian Institute of Sugarcane Research, Raebareli Road, Lucknow Phone:0522-2480726,Fax:0522-2480748 Email: iisrko@sancharnet.in



<b>i</b>	<b>Name of the Technology</b>	:	Powder/Granular Jaggery
<b>ii</b>	<b>Application/ Use</b>	:	It can easily be packed and stored.
<b>iii</b>	<b>Description of Technology :</b> Sugarcane juice is extracted, filtered and heated over jaggery furnace. On heating, mucilaginous extract of vegetative clarificant is added and the scum is removed. Now the juice is vigorously boiled till the temperature reaches to 120-122°C. Then it is transferred to wooden tray and cooled by continuous puddling. When it starts solidifying, it is rubbed using ladle and between palms/wooden plates and made into powder/granular form. It is then dried under sun, sieved/graded and packed in polythene packets.		
<b>iv</b>	<b>Input/raw material</b>	:	Sugarcane
	a. Overall dimension (L x B x H mm)	:	-
	b. Weight	:	-
	c. Prime mover	:	-
	d. Power (hp)	:	-
	e. Man power	:	-
	f. Land	:	-
	g. Investment	:	-
<b>v</b>	<b>Output capacity</b>	:	-
<b>vi</b>	<b>Unit cost (per machine)</b>	:	70/kg
<b>vii</b>	<b>Suitability for crop/ commodity</b>	:	Jaggery
<b>viii</b>	<b>Efficiency</b>	:	-
<b>ix</b>	<b>Unit cost of operation</b>	:	-
<b>x</b>	<b>Patent obtained/applied</b>	:	-
<b>xi</b>	<b>Commercialization status</b>	:	Commercialized
	a) No. of Licensees	:	1
	b) Addresses of Licensees or Manufacturer	:	M/s Gurpreet Singh Khanna, Gurdaspur (Punjab)
<b>xii</b>	<b>Contact Address</b>	:	Director, Indian Institute of Sugarcane Research, Raebareli Road, Lucknow Phone:0522-2480726,Fax:0522-2480748 Email: iisrlko@sancharnet.in

i.	<b>Name of the Technology</b>	:	Jaggery Chocolate
ii.	<b>Application/ Use</b>	:	A novel confectionary product
iii.	<b>Description of Technology :</b> The nature of jaggery in terms of its color, texture and sweetness, would make it very suitable for a chocolate like product. Therefore, jaggery would be a healthier alternative due to its low fat and higher mineral content. It is much commonly used by rural people as a rich source of energy and minerals and has been a part of their traditional affairs as 'Desi Sweet'.		
iv.	<b>Input/raw material</b>	:	
	a) Overall dimension	:	3"x2"
	b) Weight	:	50g
	c) Prime mover	:	Not applicable
	d) Power	:	4-5 unit/h
	e) Man power	:	Skilled workers (2)
	f) Land	:	20'x40'
	f) Investment	:	Rs.500000/-
v.	<b>Output capacity</b>	:	Information not available
vi.	Unit cost of operation	:	Rs. 14.00
vii.	Suitability for crops/commodity	:	Jaggery/ Sugarcane
viii.	Efficiency	:	Good
ix.	<b>Unit cost (per machine)</b>	:	Rs. 14/- per piece (50g)s
x.	<b>Patent obtained/applied</b>	:	applied
xi.	<b>Commercialization status</b>	:	
	(a) No. of Licensees to whom the technology has been transferred	:	Nil
	(b) Selected Addresses of Licensee /Manufacturer	:	Nil
	Contact Address	:	Head, Department of Process and Food Engg, College of Tech., G. B. Pant University of Agriculture & Tech., PANTNAGAR - 263 145 (Uttaranchal)