DETAIL PROJECT REPORT

On

ESTABLISHMENT OF MODERN JAGGERY PROCESSING UNIT FOR THE PRODUCTION OF VALUE ADDED JAGGERY

SUGARCANE RESEARCH INSTITUTE
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Contents

1. The Project at a Glance

1.	**Title of Project**	Establishment of modern jaggery processing unit for production of value added jaggery
2.	**Theme Area**	Processing of Sugarcane for value addition
3.	**Name of the entrepreneur/FPO/SHG**	----------
4.	**Place where work to be undertaken**	----------
5.	**Duration**	2 years
6.	**Total Budget Requirement**	Rs. 12 Lakh
7.	**Proposed project capacity**	5-20 T.C.D.
8.	**Nodal Officer**	**Director** Sugarcane Research Institute, RPCAU, Pusa, Samastipur, Bihar – 848 125 Email- director.sri@rpcau.ac.in
9.	**Principal Investigator**	**Anupam Amitabh** Assistant Professor-cum-Scientist (Processing and Food Engineering) SRI, RPCAU, Pusa, Samastipur, Bihar – 848 125 Email- anupam@rpcau.ac.in Mobile – 8340540286, 9204541395
10.	**Expected Outcome**	Income and employment generation through sugarcane processing

2. General Overview of Sugarcane production, processing and value addition

2.1 Introduction

In present scenario the Bihar Agriculture as a whole is undergoing several transformative changes. Growing population, changing lifestyles, expanding urbanization and accelerating climate changes are creating new challenges for Bihar agricultural research and development. Sugarcane occupies an important position in agrarian economy of Bihar. Bihar is an agriculture dominating state and its economy mainly depends on agriculture. About 77% of the population primarily engaged in Agriculture which contributes about 35% to the state domestic product. The area under sugarcane during 2019-20 is soared up to 3.15 lakh hectares and during 2018-19 state produced 182.85 lakh tonnes of cane with an average productivity of 60.15 tonnes/hectare (Deptt. of Cane development Govt. of Bihar) as indicated in fig. 1. During current crop season more than 8.40 lakh tonnes of sugar was produced by sugar mills of the state. The sugar production in Bihar likely to be increased to a record of 8.55 lakh tonnes in 2019-20 from 3.85 lakh tonnes in the year 2010-11 (Bihar Govt. Statistics).

Despite rapid urbanization and growth in industrial and service sectors, progress of the rural economy remains central for overall socio-economic development owing to its forward and backward linkages. The liberalizing economy has brought about enhanced market and technological opportunities, thereby pushing for greater interface between the sub- economic sectors. A reallocation of factors of production from agriculture to more productive non-farm sectors would bring about the required transformation in rural-based economies. In this regard, jaggery sector assumes importance for providing the "agriculture-industry" linkage by not only absorbing surplus labor from agriculture, but also spiraling economic activity to boost rural incomes. The provisioning of subsidy, other incentives and training to farmers towards adoption of improved variety of seeds have facilitated the increase in production.

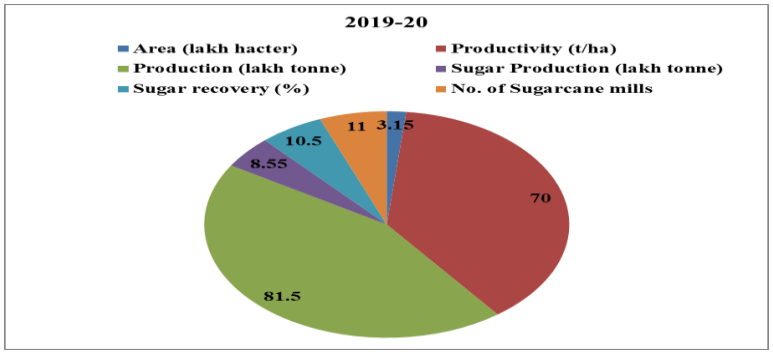


Fig. 1 : Production and productivity (estimated) of sugarcane in Bihar (2019-20)

2.2 Rationale

About 60-70% of sugarcane produced is supplied to sugar factories for preparation of sugar while around 10-15% is used for preparation of jaggery. The cane map of Bihar is shown in fig. 2 indicates the situation of sugar mills in Bihar. The estimates by the National Commission of Agriculture (1976) show that per capita requirement of sweeteners would increase to 40 kg per head per annum by 2030 A.D. in India. The rising demand for sweeteners has brought focus on jaggery, an important cottage industry in economies such as Bihar for their implications on employment and income. As a traditional non-centrifugal sugar, jaggery is produced in small units using local machinery in rural areas. In Bihar, like in most parts of India, jaggery is produced conventionally through the process of heating purified cane juice by employing about 10 semi-skilled workers. In past, Bihar had 33 sugar factories located at almost every corners of Bihar and was contributing 20-25% sugar production of the country. At present, its contribution has declined to 2-2.5%.

Status of sugarcane in west and East champaran:

District	Area (ha) coverage under sugarcane	Production of sugarcane (Tonnes)	Productivity (t/ha)
East Champaran	52685.0	5575677.30	105.83
West Champaran	148504.91	9698429.66	65.31

Source: Sugarcane Industries Deptt., Govt. of Bihar

On the other hand, Sugarcane is grown in an area of 12,450 ha in 13 non-mill districts of Bihar *viz. Madhubani, Saharsha, Madhepura, Banka, Dharbhanga, Jamui, Purnea, Begusarai, Bhagalpur, Vaishali, Nawada, Lakhisarai and Munger.* The canes produced in these areas are not utilized for manufacturing of sugar but largely for the manufacture of jaggery. Traditional methods of jaggery making have become non profitable business due to the production of low quality jaggery which fetches low prices. More so, this cottage industry remained neglected due to cane crushing inefficiency, juice clarification, inefficiencies in heating and open pan boiling system, meager financial and policy support to jaggery units, lack of technological intervention in juice extraction, open pan furnace inefficiency, jaggery moulding and packaging, quality control and hygiene issues, lack of skill , non-adoption of R&D interventions due to paucity of infrastructure, development fund, improper jaggery market and extension support.

Hence, jaggery as a cottage industry in Bihar now needs to be given more emphasis to meet the local and global quality parameters. With the introduction of FSSAI (Food Safety and Standards Authority of India) and ISO standards which includes the food

safety and HACCP (Hazard Analysis and Critical Control Points), have put the food and feed products under stringent quality assurance checks. Every unit operation, right from harvesting to packaging and storage of jaggery production system, therefore, needs modernization. This will not only uplift this cottage industry but also act as a step ahead in the direction of making self-reliant, generating employment for migrants' village youths and ensuring the economic and nutritional security of farmers in particular and nation as whole. Therefore, by establishing the modern jaggery processing unit will be a great initiative towards providing employment to migrant laborers of Bihar.

For continuous production with profitable jaggery recovery, the cane growers should grow the early and midlate sugarcane varieties in 40:60 ratio. In the early November, the ratoon of early grouped varieties should be crushed first to get maximum jaggery recovery. Then the canes of plant crop with early maturing variety should be crushed which should be followed by ratoons of midlate and plant crops of midlate varieties. For proper solidification of jaggery cane should have at least 16% sucrose and 85% purity.

Fig. 2. Cane map of Bihar

Source: Cane Industry Deptt. Govt. of Bihar

2.3 About SRI Pusa

The Sugarcane Research Institute, Pusa has been working towards the enhancement of the sugarcane in Bihar since its establishment in 1932 with a view to

increase the sugar production in the state. Several elite varieties of sugarcane has been developed from Sugarcane Research Institute, Pusa with a potential of producing cane yield of about 90-100 t ha^{-1}. The technologies emanated from this Institute have played a substantial role in improving the cane yield and sugar recovery. It now envisages marching ahead with renewed vigour to face complex challenges and to harness domestic and global opportunities for the welfare of the cane growers in Bihar. The institute is primarily focusing on varietal development, development of agro techniques, value addition on jaggery, integrated nutrient management, integrated pest management, crop diversification for sustained productivity of sugarcane and sugarcane mechanization. The Institute bred 275 varieties, out of which 56 varieties were developed and released for commercial cultivation. The institute developed varieties in the name of B.O. and CoP. The Institute is working with collaboration with National Hybridization Garden, SBI, Coimbatore for development of elite varieties for sugarcane. The institute has developed various elite varieties namely BO 14, BO 17, BO 32, BO 43, BO 47, BO 55, BO 70, BO 91, BO 99, BO 102, BO 109, BO 110, BO 120, BO 128 and BO 130. In commercial cultivation varieties are BO 91, BO 153, BO 154, CoP 9301, CoP 2061, CoP 112 and Rajendra Ganna -1 (CoP 16437).

Sugarcane Processing- In view of changing market scenario, consumers' preferences and global competitions, new income-generating opportunities need to be created through crop and product diversification in sugarcane **'Produce to Product Chain'.** In this regards, SRI, Pusa has established a modern jaggery processing unit with modern technology of jaggery processing in hygienic condition. Different types of value added jaggery products, liquid jaggery, sugarcane juice vinegar etc are being produced at this unit. ***RTU (Ready –To-Use)*** **vegetative clarificants**- Institute is continuously working in field of providing a best technology for good quality organically processed jaggery. Keeping this in view, institute has developed a RTU clarificant powder for improving the quality of jaggery.

The sustainable sugarcane farming intended to meet society's sweeteners, food, energy and bio-fuel needs in the present without compromising the ability of future generations to meet their own needs. SRI is committed to bring about a demand driven and technology-led enhanced growth in sugarcane agriculture in the country, for improving the livelihood of farmers and for ensuring sustainable cane agriculture with efficient, remunerative, highly competitive sugarcane cultivation with value added crop, product and by-product diversifications.

2.4 Jaggery status in Bihar

The districts of Madhepura, Bhagalpur, Banka, Gopalganj, Darbhanga, West Champaran, and Madhubani are the major jaggery producing parts in Bihar. Estimated figures of jaggery production in Bihar for the period 2010-11 to 2016-17 are presented in table 2.

Table 2. Status of Jaggery production in Bihar

Year	Sugarcane production	Weight of sugarcane utilized for jaggery production	Jaggery Production
2010-11	13.41	1.61	0.13
2011-12	17.75	2.13	0.17
2012-13	22.22	2.67	0.21
2013-14	17.94	2.15	0.17
2014-15	21.12	2.53	0.20
2015-16	18.18	2.18	0.17
2016-17	18.24	2.19	0.18

Note: Assumed that 12 per cent of sugarcane is utilized for jaggery production; Recovery percentage for jaggery as 8 per cent

Source: Indian Sugar, 2019

2.5 Nutritive value of organically processed jaggery and sugar

The analysis of organic jaggery (Table-3) indicated that it is a bank of vitamins and minerals. It is rich in calcium, phosphorus and iron. The jaggery made by using natural clarificant is delicious golden in colour and prominent source of energy. Because having high vitamin C, vitamin A and other minerals, it can act as a vehicle to fight iron and vitamin deficiency. In contrast, the composition of sugar clearly indicated that sugar is only source of energy (398.0 Kcal) with sucrose content of 99.5%, without any additional contribution of vitamins and minerals. The above data clearly indicated that nutritive value of sugar is negligible and so it is inferior for healthy life. The nutritive and medicinal value of Jaggery has been also reported by Tiwari *et. al.* (2014). It provides glucose to the body, which is started as glycogen & burned by the muscles when they require energy. It helps to hydrate the body quickly and speed up the recovery process after jaundice. Jaggery has some antioxidant which helps in purifying the blood & curing problems. People suffer from cough, constipation and water retention problems can also overcome these problems. The jaggery made by plant clarificant becomes more nutritionally rich. The daily use of jaggery increase human life span and its regular consumption reduces the incidence of diabetes (Kumar, 1999; Singh, 1998).

Table 3. Constituents of jaggery and sugar in 100 g

Sl. No.	Particular	Jaggery	Sugar

1.	Sucrose (%)	75.5	99.5
2.	Water (gm)	3.80	-
3.	Protein (gm)	0.40	-
4.	Fat (gm)	0.10	-
5.	Carbohydrate (gm)	95.0	-
6.	Total mineral (gm)	0.60	-
7.	Calcium (mg)	80.20	-
8.	Phosphorus (mg)	40.20	-
9.	Iron (mg)	11.40	-
10.	Thymine (mg)	0.02	-
11.	Riboflavin (mg)	0.05	-
12.	Vitamin C (mg)	0.50	-
13.	Carotene (Vitamin A) (µgm)	168.0	-
14.	Energy (Kcal)	383.0	398.0

Source : Sinha *et al.* (2015).

In Bihar most of the sugar factories are located in north western part only while other part of the state is lacking sugar industries and thus Jaggery Production is the only option for strengthening rural economy through cane cultivation and Jaggery production.

Jaggery is marketed in different shapes, colour and texture. There are three forms viz. solid, liquid and granular form of jaggery. Most of the jaggery (80%) is prepared in solid form and the remaining (20%) is prepared in liquid or granular form. Jaggery may be light golden, golden, dark golden, light brown or brown in colour. In India, the production of jaggery ranges between five million tonnes to seven million tonnes creating employment opportunities to the millions of people in rural areas. It is estimated that two third of the sweetener requirement in rural areas is met by jaggery. The jaggery industry in the country has thus, been continued to be an industry of great importance and relevance.

However in Bihar, farmers are not aware of ;

a. Modern jaggery production technique developed by SRI, Pusa for nutritionally rich profitable jaggery products.
b. Use of natural clarificants during juice purification process for obtaining higher market value of the produce. Generally, farmers use toxic chemicals i.e. sodium carbonate, sodium bicarbonate and alum during juice purification for obtaining artificial colour for jaggery for higher market value of produce causing health related problems.
c. Use of three pan modern system can save fuel, time and money for jaggery production.

d. Varietal importance and varietal scheduling of jaggery production.
e. The value added organically processed jaggery such as :-
   (i) Value added Jaggery (ii) Chunks (iii) Chocolate (toffee)
   (iv) Bricks shaped Jaggery (v) Jaggery powder
f. Proper packaging and storage for long lasting quality preservation.
g. Marketing of jaggery for maximum profit.

Keeping in view, the above facts the project is proposed with the following objectives:

i. Establishment of jaggery processing unit for quality jaggery production.
ii. Dissemination and popularization of quality jaggery production technology for sugarcane grower.
iii.

3. Jaggery as a small cottage industry

3.1 Jaggery production technology at SRI

For jaggery production matured cane with high sucrose content and low colloidal impurities is selected. Softness, low mineral content and light colored varieties are other parameters for consideration. Efforts should be made to crush the cane within 24 hours after harvest to prevent inversion of sucrose. De-trashed cane variety suitable for jaggery making is crushed in horizontal or vertical crushers. Horizontal crushers yield higher juice recovery in comparison to vertical crushers. Crushed juice is allowed to settle before passing through multistage filtration. Heavy impurities get settled at the tank bottom due to gravity. Thus obtained decanted juice free from dispersed foreign matter is heated on bagasse fired open pans. Three pan furnaces utilize the waste heat of flue gases for preheating of raw cane juice. It is more suitable for continuous production of jaggery. Boiling and concentration of juice takes place in the pans. In order to remove colloidal impurities use of clarificants from vegetable sources, deola, okra, phalsa, caster, groundnut, soybean etc., are recommended to maintain food value and keeping quality of jaggery. Deola is most commonly used for jaggery making. The juice is concentrated in pan till it reaches the striking temperature of 114-118^{0}C. At this point, molten jaggery is transferred to cooling wooden pan before final transfer of moulds. Moulds can be of different shapes and sizes. Conditioning is done to attain jaggery moisture within range of 5-7% for storage purpose. For ease of handling and packaging, and increased market value, cubical moulding frames for 10 or 20 g jaggery are preferred. Moisture content in

jaggery should not exceed above 6% and should be kept at a relative humidity of 43-61% for good keeping quality of jaggery (Chockalingam, 1985).

The operations involved in jaggery manufacturing process from sugarcane as follows:

(i) Sugarcane Planting →Maturity→Harvesting

(ii) Crushing→Settling→Filtering

(iii) Concentration (Boiling)→Cooling →Moulding

(iv) Packaging→Storage→Marketing

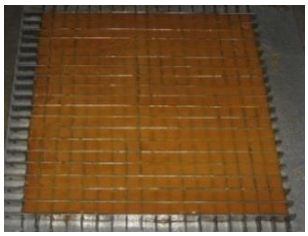
3.2 Process Flow Diagram for jaggery :

Cane Production

Harvesting and Detrashing

Crushing and Filtration

Concentration in open pan using vegetative clarificants



Transfer to cooling pan for mixing and cooling Cubical moulding of jaggery

3.3 VALUE ADDITION OF ORGANICALLY PROCESSED JAGGERY

Techniques developed for qualitative jaggery in different ready to use form

(i) Quality Jaggery cubes (ii) Chunks (iii) Chocolate (toffee)

(iv) Bricks shaped jaggery (v) Jaggery powder

Requirement of materials for value addition of organically processed jaggery production

Giloy (*Tinispora cordifolia*), ajwain (*Trachyspermum ammi*), Fennel (*Foeniculum vulgare*), Linseed (*Linum usitatissimum*), fenugreek (*Trigonella foenum-graecum*), ginger (*Zingiber officinale*), tulsi (*Ocimum tenuiflorum*), moringa oleifera, Cashew nut (Kaju) etc. in powder form to be used in jaggery cubes.

(i) **Jaggery cubes –** Quality jaggery cube of 20 g weight is very attractive in shape as well as in size.

(ii) **Jaggery powder** – Jaggery in the form of glucose in a packet of 250 -1000gm. Seal proof packing is done. It could be preserved for longer period.

(iii) **Chunks** – Chunks not a new things but a traditional product from remote past and it contains low moisture in comparison to jaggery. It may be in the shape of laddu, peda, burfey etc. involving no cost, which will increase demand, portability and self life.

(iv) **Chocolate** – Chocolate may be made from jaggery like other existing chocolate. It could be made by adding cocoa beans, milk product like cream or powder milk, wrapped with plastic coated paper which will attract the customer, who likes chocolate. It will be safely preserved for whole season.

(v) **Brick shaped jaggery** –A one kg brick, chemical free jaggery containing fennel seed, fenugreek, ginger, dry ginger, leaf and root of tulsi juice low moisture wrapped in water proof paper developed by Sugarcane Research Institute, Dr. Rajendra Prasad Central Agricultural University, Pusa which will be continued to be produced under this project.

3.4 Dissemination of developed technologies through training and other extension activities

The improved technologies developed with this project will be transferred to the jaggery producing farmers through organizing the training programmes. The farmers of these non sugar factories district depend only on jaggery production. The technology will also be disseminated among the beneficiaries through doordarshan, booklet, folders, radio programme, extension articles in newspaper and journals.

3.5 Technical Details

Project controlling site	:	SRI, RPCAU, Pusa and Sugarcane Industries Department, Govt. of Bihar
Theme Area	:	Income & Employment Generation for through quality jaggery production.
Jaggery unit establishment	:	One model jaggery processing unit

i) Project activity

- Site selection and Procurement of materials/equipments/inputs.
- Establishment of modern jaggery unit at selected site.
- Farmer's awareness training programme for technology dissemination and popularization of quality jaggery production technology.

Specification of single Jaggery Processing Unit

S.N	Particulars	
1.	Area required for establishment	2200 sq.ft.
2.	Average Capacity of unit	5-20 TCD (tonnes of cane crushing per day)
3.	Cost of machinery and equipments for jaggery processing (Annexure-I)	Rs. 12 Lakh
	Total cost of one Unit	**Rs. 12 Lakh**

3.6 Employment generation (For single processing unit)

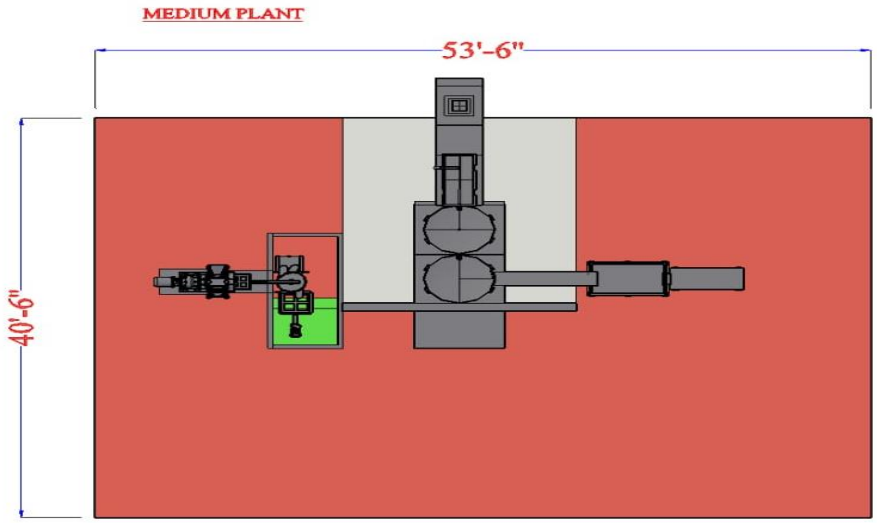
Manpower Requirements:

1.	Crushing period of plant	210 days per year
2.	Unit capacity	5.0 -10 tonnes crushing per day
3.	Cane required during the season (let 3.0 tonnes per day)	210 x 3.0 = 630.00 tonnes
4.	Sugarcane Cultivation Area requirement for processing of jaggery in a season	6.0 hectare (@ 100 t/h)
5.	Mandays requirement for above work 1. Direct labourers (for jaggery processing plant)= 15 mandays x 210 = 3150 mandays 2. Indirect labourers (for cultivating 6 hectare land) = 600 mandays **Total mandays in a season = 3750 mandays**	

3.7 Year wise Breakup of work

S.No	Activity	1st year	2nd year
1	Site selection		
2	Construction of jaggery shed for selected site		
3	Procurement of jaggery processing equipments		
4	Establishment of modern jaggery processing unit		
5	Dissemination and popularization of quality jaggery production technology for sugarcane grower through hands on training.		

3.8 Plant Layout



All dimensions are in feet

3.9 Budgetary provision

3.9.A. Land and Building

The size of land needed will be around 2200 sq.ft. A jaggery shed of 100 sq.m with pillar and cantilever arrangement with asbestos sheet/ local available material for roofing needs to be constructed for manufacturing quality jaggery.

3.9.B Cost analysis for establishment of Jaggery plant:

An approximate cost analysis of jaggery plant for 500 kg jaggery per day capacity is discussed as under.

Assumptions:

1.	Plant Capacity	500 kg/day
2.	Working days	210 day/year
3.	Working hours	12 h
4.	Juice recovery	60%
5.	Jaggery production	12% of cane weight
6.	Cane Requirement	50 Q/day
7.	Cane price	Rs 300/Q
8.	Interest rate	12% per annum
9.	Repair maintenance	1.5%
10.	Insurance	1%

Cost analysis for establishment of jaggery plant per annum:

1.	Cost of machine and structure	Rs 27,00,000
2.	Raw material	Rs 31,50,000
3.	Wages	Rs 4,50,000
4.	Utilities	Rs 8,00,000
5.	Miscellaneous	Rs 1,00,000
6.	Working capital	Rs 45,00,000
7.	Interest and Insurance	Rs 2,05,200
8.	Total variable cost	Rs 45,50,000
9.	Total capital (Fixed + working)	Rs 74,55,200
10.	Cost of production per year	Rs 45,50,000
11.	Cost of production per kg	Rs 43.33
12.	Turnover (@sale price Rs. 80/kg)	Rs 84,00,000
13.	Net profit	Rs 38,50,000

14.	Net profit ratio	45.83%

3.9.C. List of equipment and other items for one unit

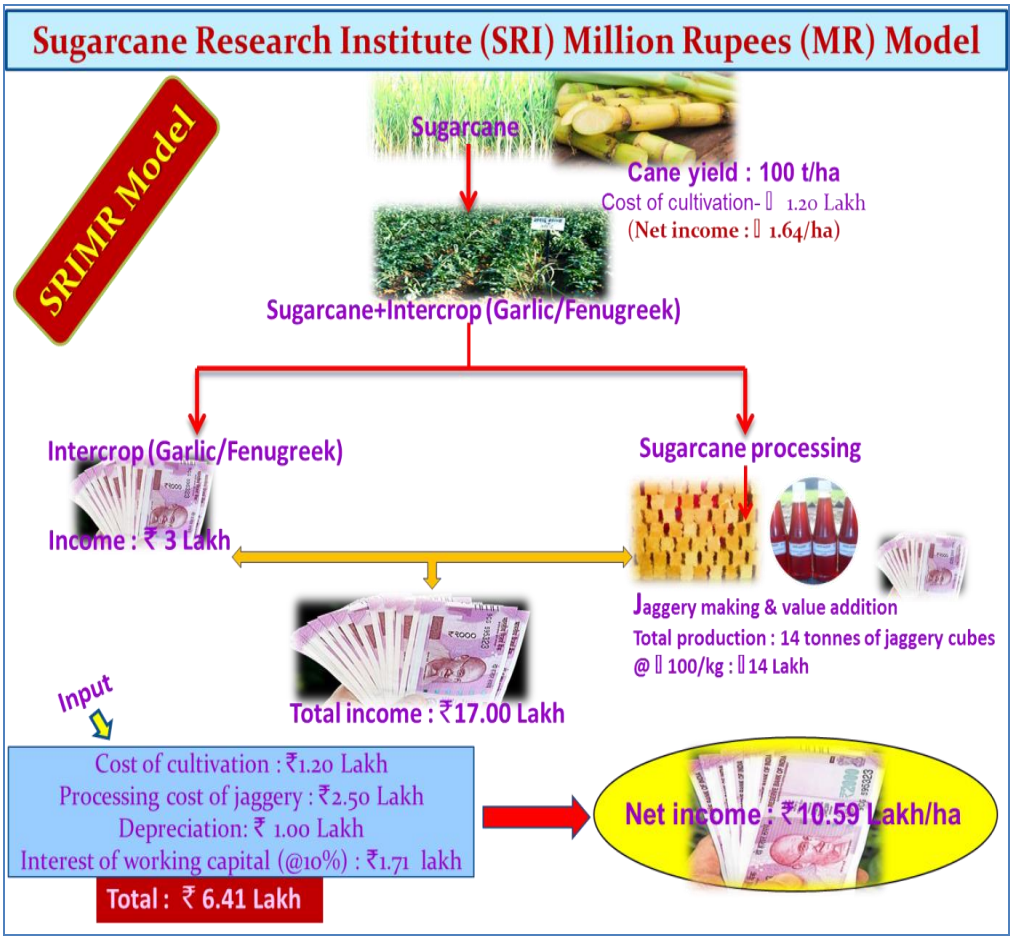
Particular	specification	Quantity
Crushing unit	Sugarcane Crusher with Helical Gear Box - size- 9.5" x 9.5". - 12.5 hp – 1 Nos. M.S. Safety Cover – 1 Nos. Oil & Grease – 1 Set Foundation Bolts – 10 Nos. Electric Motor – 1 Nos. Pulley & V-Belt – 1 Set Motor Foundation - 1 Nos. Electric Panel Board(With Wiring) for Sugarcane crusher,	01
BOILING UNIT & JAGGERY TOOLS	3 Open Pan Round of 6 feet Dia. & 1 Open Pan Rectangle of 5 Feet Length – 1 Set. Fire Bar with Angles & Fire Window – 1 Set S.S. Tank for Bhindi Juice 1.5' x 1.5'– 1 Nos. S.S. Tank for Juice Mud 1.5' x 1.5' with Nipple & Gate Valve – 1 Nos., S.S. Scoop Small with M.S. Handle– 2 Nos. M.S. Scoop Big with M.S. Handle – 2 Nos. S.S. Scum Remover with M.S. Handle – 2 Nos. Mug Big – 1 Nos., Mug Small – 1 Nos. Wooden Laddle with M.S. Handle – 1 Nos. S.S. Khurpa Small with M.S. Handle – 2 Nos. S.S. Khurpa Big with M.S. Handle – 2 Nos. S.S. Supdi with M.S. Handle – 1 Nos. S.S. Jaggery Transfer Plate – 1 Nos.	01 set
COOLING, MOULDING & PACKAGING UNIT	Stainless Steel CoolingPan size - 60" x 36" x 9"-**1 Nos**. S.S. Jaggery Moulding frame with Platform Size – 1"x1"x1" – 4 Sets Jaggery pouch sealing machine – 1 Nos Jaggery Mould Table – 1 Nos.	01set
SPARES	A,B Roll Scraper – 1+1 = 2 Nos C-Roll Scraper – 1 Nos Coupling – 1 Nos. Master Gear Pinion – 1 Nos. Fast Pulley Pinion - 1 Nos.	01set
Laboratory equipments	Portable PH Meter – 1 Nos. Portable Brix Meter (1-25' Brix) – 1 Nos. Infra-Red Temperature Recorder – 1 Nos. Portable Moisture Meter (1-25%) – 1 Nos	01set
TOTAL COST OF EQUIPMENT'S INCLUDING TRNSPORTATION, INSTALLATION, TESTING & IGST 18% = **Rs. 12 Lakh (approx.)**		

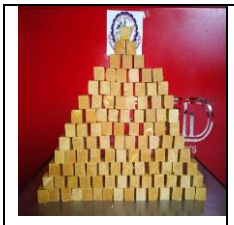
4. Project outcome

4.1 Outcomes of jaggery processing

The quality jaggery produced will be sold out at higher price in wholesale market. Hence, by adopting the technology, the farmer can enhance their income by selling the value jaggery at Rs.100-120/kg instead of Rs.60/kg (price of traditionally made jaggery). The socio-economic impact of jaggery cottage may be ruled out because of its contribution in rural development. It is a cottage industry managed by semi-skilled workers and its modern techniques will definitely provide benefits to farmers for quantum jump in their income significantly. It will improve the product quality, hygiene, and market access to reap economic benefits of premium jaggery product in market. Possibilities for diversification of jaggery with other value added products processing such as pelted and wafer cattle feeds making with molasses can be explored.

4.2 Expected outcome: <u>SRIMR (Sugarcane Research Institute Million Rupees) Model for production and processing of sugarcane:</u>



					
Quality jaggery cubes	Value added jaggery cubes	Brick shaped jaggery	Jaggery granules	Liquid jaggery	Sugarcane vinegar

Value added products:

SRI in Media

खुला अत्याधुनिक गन्ना प्रोसेसिंग प्लांट

अब कृषि विवि में लोगा गुणवत्तायुक्त गन्ने के रस, गुड़ व अन्य का उत्पादन, लोग ले सकेंगे मजा

उत्पादन लक्ष्य पर काम करें वैज्ञानिक

दिवंगत कर्मी के परिजन को मिल प्रबंधन ने दी राशि

शोध डॉ. राजेंद्र प्रसाद केंद्रीय कृषि विश्वविद्यालय के विज्ञानियों ने बीमारी से लड़ने को तैयार किए तीन देसी उत्पाद

अब कोरोना संक्रमण को धकियाएंगे देसी उत्पाद

जागरण विशेष

मगरूब दिताएंगे बीमारियों से छुटकारा

सलाह | रोपाई का समय, विधि, पोषण प्रबंधन, सिंचाई, खरपतवार प्रबंधन, निकाई-गोराई, मिट्टी चढ़ाना, बंधाई, कटाई का प्रबंधन महत्वपूर्ण

गन्ने का करें समसामयिक प्रबंधन, आमदनी बढ़ा सकता उत्पाद

पूसा (समस्तीपुर), सत्र : गन्ना उत्पादन और उत्पादकता को वर्तमान स्तर से बढ़ाने के लिए वैज्ञानिक दृष्टिकोण अपनाना बेहद जरूरी है। उन्नत प्रभेद रोप का समय, विधि, पोषण प्रबंधन, सिंचाई, खरपतवार प्रबंधन, निकाई, गोराई, मिट्टी चढ़ाना, बंधाई, समय से कटाई समेत अन्य महत्वपूर्ण क्रियाओं का अनुपालन समय से आवश्यक है। यह सुझाव डॉ. राजेंद्र प्रसाद केंद्रीय कृषि विश्वविद्यालय, पूसा के ईख अनुसंधान संस्थान के निदेशक डॉ. एके सिंह ने दिए। वे दैनिक जागरण के खेतीबाड़ी कार्यक्रम में महत्वपूर्ण टिप्स दे रहे थे। उनका कहना है कि अप्रैल व मई में गन्ने के कल्ले निकलते हैं। इस अवस्था में गन्ने की फसल को खरपतवार से मुक्त रखना चाहिए। वैसे तो कल्ले की संख्या प्रभेद करता है, परंतु स्वस्थ एवं प्रभावी कल्ले के लिए मिट्टी में नमी, पर्याप्त पोषक तत्वों का होना आवश्यक है। मई में जमीन की नमी को देखते हुए 15 से 20 दिनों के अंतराल पर सिंचाई जरूरी है। अभी खेत में सिंचाई करने से पायरिला और जड़ बेधक कीटों की आक्रमकता भी कम होती है। वैसे, हाल में सूबे के लगभग सभी जिलों में बारिश हुई है। अतः कृषक बंधु भूमि में नमी का आकलन करने के बाद ही सिंचाई करें।

प्रत्येक सिंचाई के बाद निकाई गोराई जरूरी ... बसंतकालीन मुख्य फसल में यदि पंक्तियों में खाली स्थान दिखाई दे तो दो से तीन आंख की गेंडे या बड चीप या पॉलीथीन विधि द्वारा विकसित पौधों से रिक्त स्थानों की भरपाई कर दें। आवश्यकतानुसार सिंचाई करें तथा प्रत्येक सिंचाई के बाद निकाई-गोराई अवश्य करें। अप्रैल के अंतिम सप्ताह या मई में पायरिला दिखाई देते हैं। बचाव के लिए निचली पत्तियों के सामने वाले भाग में यदि सफेद रंग का अंड समूह दिखाई दे तो ग्रसित पत्तियों को काटकर नष्ट कर दें।

इस माह में सभी रोग के लक्षण प्रकट होने लगते हैं, अतः नियमित रूप से निरीक्षण करें और आक्रांत पौधे को खेत से निकाल कर नष्ट कर दें। फसल की जड़ के पास 375 मिलीलीटर कोराजन, 1000 लीटर पानी में घोल बनाकर प्रति हेक्टेयर की दर से ड्रेंचिंग करें। इस समय स्प्रे मशीन के नोजल का बाहरी हिस्सा खोल दें और 24 घंटे के अंदर सिंचाई करें।

डॉ. एके सिंह, निदेशक, गन्ना अनुसंधान केंद्र • जागरण

खरपतवार प्रबंधन का रखें ख्याल

खरपतवार नियंत्रण के लिए 2-4 डी 1.25 लीटर प्रति हेक्टेयर दवा का 700 से 800 लीटर पानी में घोलकर छिड़काव करें। इस समय सीराउर विधि में 88 किलोग्राम यूरिया प्रति हेक्टेयर और ट्रेंच एवं जोड़ी पंक्ति विधि में 100 किलोग्राम यूरिया प्रति हेक्टेयर के दर से ऊपरी निवेश करें। मास्क एवं दस्ताना लगाकर भौतिक दूरी का ध्यान रखते हुए सरकार के दिशा निर्देशों का पालन करते हुए कृषि कार्य करें।

रोग प्रतिरोधक क्षमता बढ़ाने वाला गुड़ तैयार कर है केंद्रीय कृषि विवि

पूसा | निज संवाददाता

डॉ.राजेन्द्र प्रसाद केन्द्रीय कृषि विवि से जुड़े ईख अनुसंधान संस्थान के निदेशक डॉ.अनिल कुमार सिंह व उनकी टीम वीसी डॉ.आरसी श्रीवास्तव के निर्देशन में गुड़ के प्रसंस्करण का कार्य कर रही है। टीम में डॉ.संतोष कुमार ठाकुर, डॉ.डीएन कामत शामिल हैं। वैज्ञानिकों की मानें तो ईख राज्य का एक मात्र सबसे बड़ा औद्योगिक फसल है।

बिहार में पहले 33 चीनी मिल थी। अब 11 चीनी मिलें चल रही है। वह भी महज पांच जिलों तक सिमटी है। ऐसे में जिलों की पंचायतों में सरकारी या सहकारी स्तर पर गुड़ प्रसंस्करण इकाई लगाकर प्रवासियों को रोजगार व बेहतर आमदनी दिलाई जा सकती है।

विवि के गुड़ प्रसंस्करण ईकाई के वैज्ञानिक ईअनुपम अमिताभ ने बताया कि कोरोना वायरस के संक्रमण से बचाव के लिए रोग प्रतिरोधक क्षमता बढ़ाने की जरूरत है।

इसके लिए विवि ने गुड़ के साथ गिलोई, सहजन, तुलसी, अदरक आदि का प्रसंस्करण कर मूल्य वर्धित गुड़ बना व बेच रही है। यह बर्फी स्वरूप में उत्कृष्ट पैकिंग के साथ उपलब्ध है। यह आम लोगों के लिए काफी लाभदायक साबित होगा। टीम में अनिमेष शील व रामकुमार राय शामिल हैं।

कम लागत में अधिक उपज देने वाले प्रभेद कोरोना संकट से जूझ रहे किसानों को दिलाएगा अधिक लाभ, अच्छी मिलेगी कीमत

कृषि विवि ने तैयार किया मुनाफा देने वाला गन्ना का प्रभेद

पूसा | अभय कुमार

कोरोना से जूझ रहे राज्य के किसानों के लिए अच्छी खबर है। डॉ.राजेन्द्र प्रसाद केन्द्रीय कृषि विवि से जुड़े ईख अनुसंधान संस्थान के वैज्ञानिकों ने एक साथ गन्ना के पांच नये प्रभेद विकसित किए हैं। इसमें तीन अगात व दो मध्य पछात प्रभेद शामिल हैं। इसकी अच्छी उपज के साथ रस में चीनी की मात्रा अन्य की तुलना में एक से डेढ़ प्रतिशत अधिक है। कुलपति डॉ.आरसी श्रीवास्तव व निदेशक डॉ. अनिल कुमार सिंह की देखरेख में संचालित शोध के प्रतिफल से गन्ना किसान सशक्त हो सकेंगे। वैज्ञानिक की मानें तो उक्त प्रभेदों की ब्रीडिंग वर्ष 2010-11 में कोयम्बटूर स्थित गन्ना प्रजनन संस्थान में (वैज्ञानिक डॉ.डीएन कामत व डॉ.बलवंत कुमार ने) की गई थी। बीते 10 वर्षों के सफल चयन व प्रत्यक्षण के आधार पर इसे चिन्हित व नामित किया गया है। इन प्रभेदों से राज्य में गन्ने की औसत उपज व चीनी की परता दोनों में वृद्धि होगी। वैज्ञानिक के अनुसार इसकी रोपनी अक्टूबर-नवम्बर व फरवरी-मार्च में होती है।

गन्ना वैज्ञानिक व प्रजनक डॉ.डीएन कामत ने बताया कि प्रभेदों की औसत उपज सौ टन प्रति हेक्टेयर है। जबकि रस में चीनी की मात्रा अगात प्रभेद में आठ महीनें पर 18.18 से 1840 प्रतिशत एवं 10 महीनें पर 1883 से 1979 प्रतिशत है। जबकि मध्य पछात प्रभेद में 10 महीनें पर 1661 से 1690 एवं 12 महीनें पर 1698 से 1807 प्रतिशत होता है। वैज्ञानिक के अनुसार वर्तमान समय में इस प्रभेद की उपलब्धता कम है। इसे गुणन करने की दिशा में कार्य किये जा रहे हैं।

वैज्ञानिक टीम में है शामिल

वैज्ञानिक टीम में डॉ.डीएन कामत व डॉ.बलवन्त कुमार प्रजनक के रूप में शामिल हैं। जबकि अन्य सहयोगी वैज्ञानिकों में डॉ.नवनीत कुमार, डॉ. एसके ठाकुर आदि शामिल हैं।

तीन अगात प्रभेद

- ईख अनुसंधान केंद्र के वैज्ञानिकों ने तैयार किया प्रभेद
- इसमें तीन अगात व दो मध्य पछात प्रभेद हैं शामिल

कौन-कौन से हैं नये प्रभेद

अगात प्रभेद - को.पू.-20436, को.पू.-20437, को.पू.-20438।

मध्य पछात प्रभेद- को.पू.-20439, को.पू.-20440