Title: Standardization of process technology for preservation of sugarcane juice (20.5.3.8**)**

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Background and justification:

Sugarcane is scientifically known as *Saccharum officinarum* from the *Poaceae* family grown in subtropical and tropical areas. The sugarcane juice is obtained by crushing and pressing the sugarcane culms. According to NCBI, sugarcane juice contains about 70–75 % of water, 10–15 % of fibre and 13–15 % of sucrose. Sugarcane juice not only quenches your thirst but also restores the lost nutrients and electrolytes in the body. The body can easily absorb the simple sugars in sugarcane juice. This will give us an instant energy boost and a rehydrated feel. It is rich in potassium, phosphorus, magnesium, calcium, iron, and vitamins such as vitamins A, B1, B2, B3, B5, B6, C and E. Preserving raw sugarcane juice is a challenging problem. Sugarcane juice turns brown soon after its extraction and gets spoiled due to fermentation within hours. The shelf life of freshly extracted sugarcane juice is limited to a few hours, and the use of hurdle technology is a strategy to ensure its safety and stability. A combination of permitted preservatives and low temperature storage could preserve raw sugarcane juice for more than a month. An ascorbic acid and citric acid act as antioxidants may prevent enzymatic browning in fresh sugarcane juice. The thermal processing and use of KMS may inhibit the microbial growth. Moreover, glass packaging may increase the storage life of juice. Thus, the present investigation entitles "Standardization of process technology for preservation of sugarcane juice" was planned with the following objectives:

Objectives:

1. To standardize pre-treatments for prevention of enzymatic browning after sugarcane juice extraction.
2. To optimize the process parameter for preservation of sugarcane juice.
3. To study quality of preserved sugarcane juice during storage

Year of Commencement: 2024-25

Specification of Juice: Sugarcane juice = 100 %
TSS = Natural

Black Salt = 0.3%

Technical Programme:

Ex. 1. Process parameter for preservation of sugarcane juice

Factor 1. Ascorbic acid level (A):
i) 500 ppm ii) 1000 ppm iii) 1500 ppm

Factor 2. Citric acid level (C):
i) 0.3% ii) 0.4% iii) 0.5%

Factor 3. KMS (K):

i) 100 ppm ii) 150 ppm iii) 200 ppm

Treatment Combinations:

$A_1C_1K_1$	$A_2C_1K_1$	$A_3C_1K_1$
$A_1C_1K_2$	$A_2C_1K_2$	$A_3C_1K_2$
$A_1C_1K_3$	$A_2C_1K_3$	$A_3C_1K_3$
$A_1C_2K_1$	$A_2C_2K_1$	$A_3C_2K_1$
$A_1C_2K_2$	$A_2C_2K_2$	$A_3C_2K_2$
$A_1C_2K_3$	$A_2C_2K_3$	$A_3C_2K_3$
$A_1C_3K_1$	$A_2C_3K_1$	$A_3C_3K_1$
$A_1C_3K_2$	$A_2C_3K_2$	$A_3C_3K_2$
$A_1C_3K_3$	$A_2C_3K_3$	$A_3C_3K_3$

Number of Treatment combinations: 27
Number of Repetitions : 3
Design : CRD with factorial concept
Sample size: 200 ml
Sample Number/treatment/repetition = 5
Packaging material: Glass bottle
Storage: at ambient temperature for one day

*Observation for Enzymatic browning (OD) shall be recorded
**Best treatment from experiment 1 shall be used in Experiment 2 along with Ginger juice = 6ml/ litre will be added as common ingredients in all treatments
Reducing sugars, total sugars and Colour of juice before and after processing shall be measured.
Maturity / Harvesting stage of sugarcane is 12-13 months

Exp. 2. Process parameter for preservation of sugarcane juice
Treatment details: Thermal processing after bottle filling*

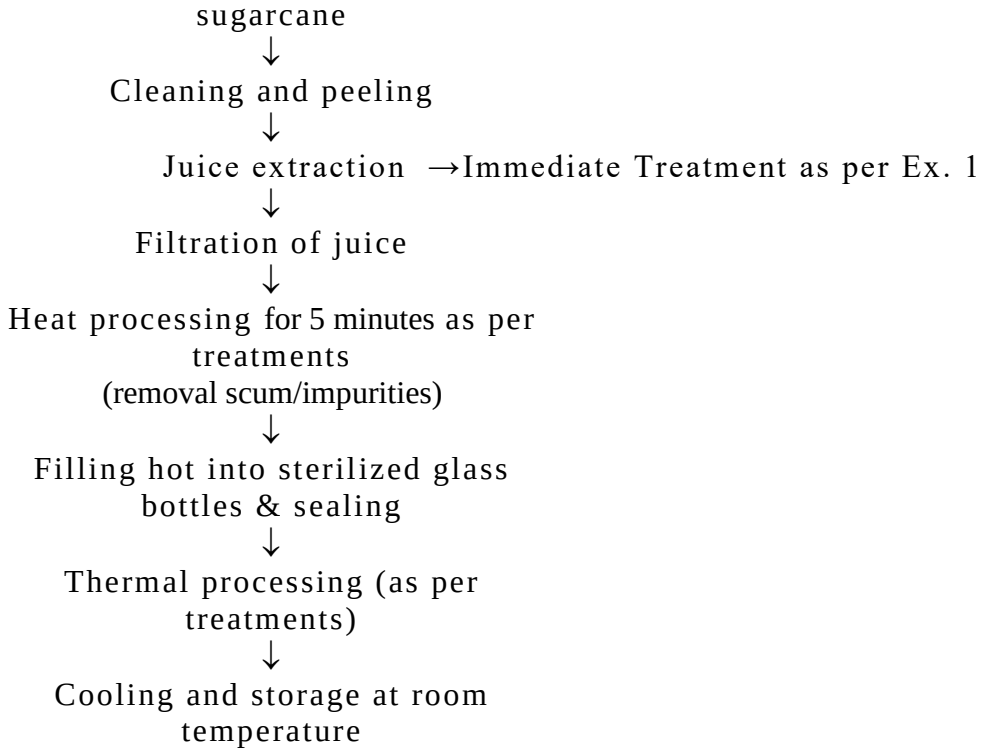
$T_{1\text{-}75^oC}$ for 5 min
$T_{2\text{-}75^oC}$ for 15 min
$T_{3\text{-}75^oC}$ for 25 min
$T_{4\text{-}80^oC}$ for 5 min
$T_{5\text{-}80^oC}$ for 15 min
$T_{6\text{-}80^oC}$ for 25 min
$T_{7\text{-}85^oC}$ for 5 min
$T_{8\text{-}85^oC}$ for 15 min
$T_{9\text{-}85^oC}$ for 25 min
$T_{10\text{-}90^oC}$ for 5 min
$T_{11\text{-}90^oC}$ for 15 min
$T_{12\text{-}90^oC}$ for 25 min

* Before filling, juice will be heated for 5 min as per specified temperature (As per treatments)

Number of Treatments: 12
Number of Repetitions: 3
Design: CRD
Sample size: 200 ml
Sample Number/treatment/repetition = 20
Packaging material: Glass bottle

Storage: at ambient temperature
Observations: Initial, 15, 30, 45 and 60 days of storage

A. Physico-chemical Parameters	**B. Sensory Parameters**
1. Total Soluble Solids (°Brix) 2. Acidity (%) 3. Total sugars (%) 4. Ascorbic acid (mg/100 ml) 5. Potassium (mg/100 ml) 6. Phenols (µg/100 ml) 7. Calcium (mg/100 ml) 8. Sodium (mg/100 ml) 9. Non-enzymatic browning (OD 440 nm) 10. Residual SO_2 (ppm)	1. Colour 2. Consistency 3. Flavour 4. Taste 5. Overall acceptability
C. Microbial Parameters	**D. Economics**
1. Total Plate Count, Coliform count, Yeast and Mould count	



Principal steps used for preparation of sugarcane juice