

- 01. Experiment number and title (As per CJA)** : **21.5.3.40**
Development and storage of sweet sorghum based *halwa* premix
- 02. Budget Head** : 12940
- 03. Collaborative department, if any** : Main Sorghum Research Station, Surat
Food Quality Testing Laboratory, Navsari

04. Background information:

Millets in general and sorghum particular is also known as nutria-cereals and are a source of food, feed and fodder. Modern acquired lifestyles have paved the way for micronutrient deficiencies along with diabetes, cardiovascular diseases and hypertension. Thus, millets have revived as a plausible alternative for living a healthy lifestyle. In 2019, the global millet production was 27.8 million tons. India ranks 1st in millet production, accounting for 41.0 per cent of the global market share. To create domestic and global demand, the Indian Government has got declared the year 2023 as International Year of Millets from FAO. South Gujarat is one of the pocket for the sorghum and minor millets. *Hallway* is a traditional dessert which is popular not only in the Indian cuisine but also in Asian and Middle Eastern cuisines. Traditionally it is prepared using semolina, ghee, seeds and nuts during festivities and occasions. It is also called as *sheer* or *kesari* in some regions. The ready to cook (RTC) and ready to Reconstitute (RTR) food demand is increasing. The ingredients used in Indian traditional foods have tremendous health advantages. There is a lack of research on development and mechanization of convenience type traditional food products using sorghum. Considering the great importance of sorghum, fruits and milk in a balanced diet and the potential for RTC/RTR food products in market, a study was carried out to develop sorghum based RTR *halwa* pre mix with following objectives.

05. Objectives:

1. Standardization of recipe and process for sweet sorghum based *halwa* premix.
2. Evaluation of quality parameters and storage stability of sweet sorghum based *halwa* premix.

- 06. Principal investigator and associates** : PI- Er. P. S. Pandit
Co PI- Dr B. Davara, and Dr. T. Vyas

- 07. Location and Agro-climatic sub-region** : PHTC, NAU, Navsari, FQTL, NAU, Navsari, MSRS, NAU, Surat

- 08. Year and Season** : Year of commencement: 2025
Year of completion: 2026

- 09. Crop and Variety** : Pre mix for sweet sorghum based halwa

10. Experimental details :

- (a) Treatments for performance** : Based on runs of RSM

(b) Experimental Design:

Study Type	Response Surface	Subtype	Randomized
Design Type	I-optimal, Coordinate Exchange	Runs	20
Design Model	Quadratic	Lack of Fit 4	Blocks 1

- (c) Replications/Repetitions** : Based on Runs of RSM

(d) Independent Variables:

Particle Size: 80, 120, 160, 200 mesh

Ingredient ratios: Sugar (15-35) g, Milk Powder (5-10) ml, Ghee (5-15) g.

Roasting parameters: Temperature, Time, and Layer Thickness.

Packing materials: Multi Layer Pouch, PET Bottle, Glass Bottle.

Treatment	Factor 1	Factor 2	Factor 3	Factor 4
Run	A:Particle Size	B:Milk Powder	C:Sugar	D:Ghee
Unit	Mesh	g	g	g
1	80	6.95	22.7	9.45
2	120	5	29.7	5
3	160	6.95	35	9.9
4	120	5	15	14.5
5	200	10	35	15
6	200	5	15	7.4
7	200	5	28.5	15
8	80	5	35	15
9	120	10	34.8	10.55
10	200	8.38668	15	14.8
11	120	8.1	27.498	5.25
12	80	10	15	15
13	120	5.125	15.5	5
14	120	8.725	15	5
15	160	10	23.0853	9.9
16	160	6.625	21.7693	11
17	80	10	35	5
18	200	8.675	29.7121	5
19	120	8.3	28.4	15
20	80	6.95	22.7	9.45

11. Observations To Be Recorded:

Moisture Content, Size, Proportion of Various Ingredients, Desired Quality Parameters of Ingredients, Calorific Value, Rancidity, Organoleptic Parameters, Microbial Parameters, Packing Material Specifications, Rehydration Ratio, pH, Acidity, Rancidity.

12. Methodology (if necessary):

Standard Process of Premix of Halwa Making:

- 100 g of Sorghum flour – roasting at low flame
- Grinding of dried *halwa* pre-mix (80 – 200 mesh size)
- 5 - 10% flour weight mix milk powder.
- Thin layer moisture adjusting.
- Addition of icing sugar 15 - 35% weight of dried *halwa mix*
- Addition of cardamom powder 0.025 - 0.100 % of the total weight of dry blended *halwa mix*.
- Addition of ghee 5-15 % of the total weight of dry blended *halwa mix*.

Preparation method of RTR halwa:

- ✓ Adding hot boiling water to the mix in the ratio of 1 : 1.
- ✓ Pre mix was uniformly stirred and kept covered for 3 minutes.
- ✓ Evaluation of ingredient as per method described by

13. Experiment Flow Chart :

