

FORM-C: NEW TECHNICAL PROGRAMME

1.	Title (21.6.3.16)	Development of fermented tea beverage: Kombucha					
2.	Budget Head	12935					
3.	Collaborative Department	PHT, ACH, PMBB, NMCA and FPU, CoF					
4.	Background information	Kombucha tea is beverage prepared by fermentation of tea with the Symbiotic Culture of Bacteria and Yeast (SCOBY). It is a lightly effervescent, sweetened fermented tea drink commonly consumed for health benefits. It helps in digestion, removal of toxins from body, to boost the immune system, to lose weight, ward off high blood pressure and heart disease and to prevent cancer. Having an alcohol content of < 0.5%, it is not a federally regulated beverage. With rising popularity in developed countries in the early 21 st century, Kombucha had a global market size of US\$ 2.0 billion as of 2023 and this was expected to grow to US\$ 9.01 billion by 2031. With this background, proposed study is going to be undertaken with the following objectives:					
5.	Objectives	1. To develop a fermented tea beverage 2. To evaluate the quality parameters of fermented tea					
6.	Principal Investigator and Co-PIs	PI: Dr. H. G. Suthar, Asst. Prof., PHT, ACH, NAU Co-PIs: Dr. K. P. Suthar, Asso. Prof. PMBB, NMCA, NAU Dr. Dev Raj, Head & Prof., PHT, ACH, NAU Dr. Abhishek A. Mehta, Asso. Prof. FPU, CoF, NAU					
7.	Location and Agro climatic Zone	Dept. of Post Harvest Technology, ACH, NAU, Navsari					
8.	Year and Season	2025					
9.	Crop and Variety	<i>Cymbopogon citratus</i> - Lemon grass					
10.	Exp. Details						
	(a) Treatments	Factors- 4 and levels -2 (Treatment combinations – 8)					
		Factors		Levels		Treat. combination	
		Lemon Grass (L)		L ₁ - 2 %	L ₂ - 10 %	L ₁ S ₁ I ₂ T ₁	L ₂ S ₁ I ₂ T ₂
		Sugar (S)		S ₁ - 5 %	S ₂ - 10 %	L ₁ S ₁ I ₁ T ₁	L ₂ S ₁ I ₁ T ₂
		Inoculum size (I)		I ₁ - 5 %	I ₂ - 10 %	L ₁ S ₂ I ₁ T ₂	L ₂ S ₂ I ₁ T ₁
		Incubation temperature (T)		T ₁ - 25°C	T ₂ - 30°C	L ₁ S ₂ I ₂ T ₂	L ₂ S ₂ I ₂ T ₁
	(b) Expe. design	Plackett-Burman Design					
	(c) Replications	3					
	(d) Plot size	NA					
	(e) Spacing	NA					
	(f) Seed rate	NA					
	(g) Manure	NA					
	(h) Any other details	NA					
Null hypothesis:							
H0: There is no effect of treatments/factors on development of Kombucha tea							

H1: At least one treatment/factor has significant effect on development of fermented tea.		
11.	Observations to be recorded	<p><u>1. Microbiological parameters:</u></p> <p>i. Aerobic Plate Count (cfu/ml)</p> <p>ii. Yeast and mould count (cfu/ml)</p> <p><u>2. Physico-chemical parameters</u></p> <p>i. Total Soluble Solids (°B)</p> <p>ii. Acidity (%)</p> <p>iii. pH</p> <p>iv. Alcohol content by dichromate method (%)</p> <p>v. Anti-oxidant activity by DPPH method (%)</p> <p>vi. Total phenolic content (mg GAE/ml)</p> <p><u>3. Sensory parameters</u></p> <p>i. Color</p> <p>ii. Taste</p> <p>iii. Aroma</p> <p>iv. Overall acceptability</p>
12.	Methodology	<p><u>Process Flow Chart for Preparation of Kombucha</u></p> <ul style="list-style-type: none"> • For each factor at two levels will be tested using Plackett-Burman Design • Addition of Lemon grass Tea and Sugar into Water as per treatment • Boiling for 5 min • Cool to room temperature (<40°C) • Inoculation with <i>Saccharomyces cerevisiae</i> (10⁶ cfu ml⁻¹) : <i>Gluconobacter</i> isolate (10⁶ cfu ml⁻¹) - 1:1 • Incubation for 12 days • Analysis of the beverages • Factors having significant effect will be further optimized by Response Surface Methodology (RSM) • Identification of yeast and bacteria by ITS and 16S rRNA gene sequencing, respectively. • Optimized Kombucha will be filtered and packed in the plastic bottles (200 ml) and stored under refrigeration.