

## Red banana (*Musa acuminata* Colla cv. Red) pulp and peel based isotonic beverage for holistic cellular hydration and nutrition

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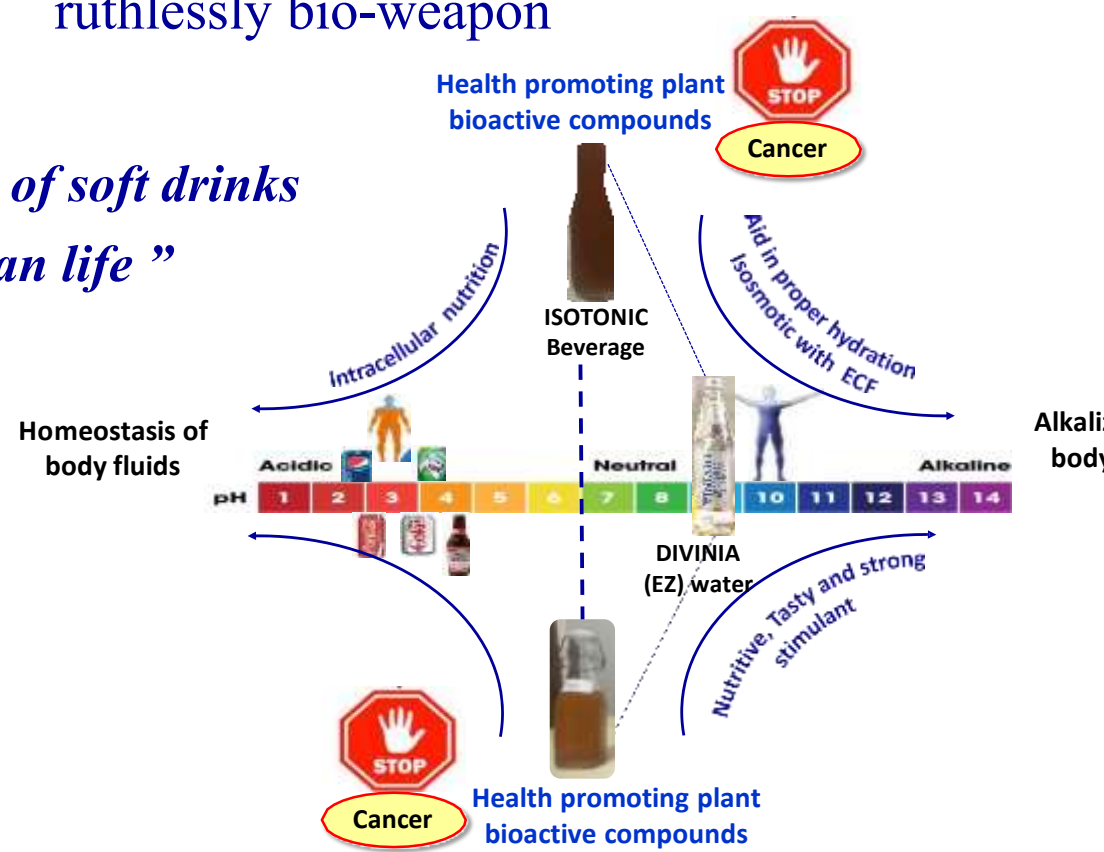
### INTRODUCTION & AIM

“Soft drinks acts as diuretic and depletes body fluid rather than replenishing them”

As currently available formulated carbonated and sugar based soft drinks are unsafe for regular consumption. FDA argues to regulate these products, that acts like a slow acting but ruthlessly bio-weapon

“The longer the shelf life of soft drinks the shorter the human life”

**CELL HOMEOSTASIS**  
Include the regulation of extracellular fluid, the concentrations of Na<sup>+</sup>, K<sup>+</sup> and Ca<sup>2+</sup> ions



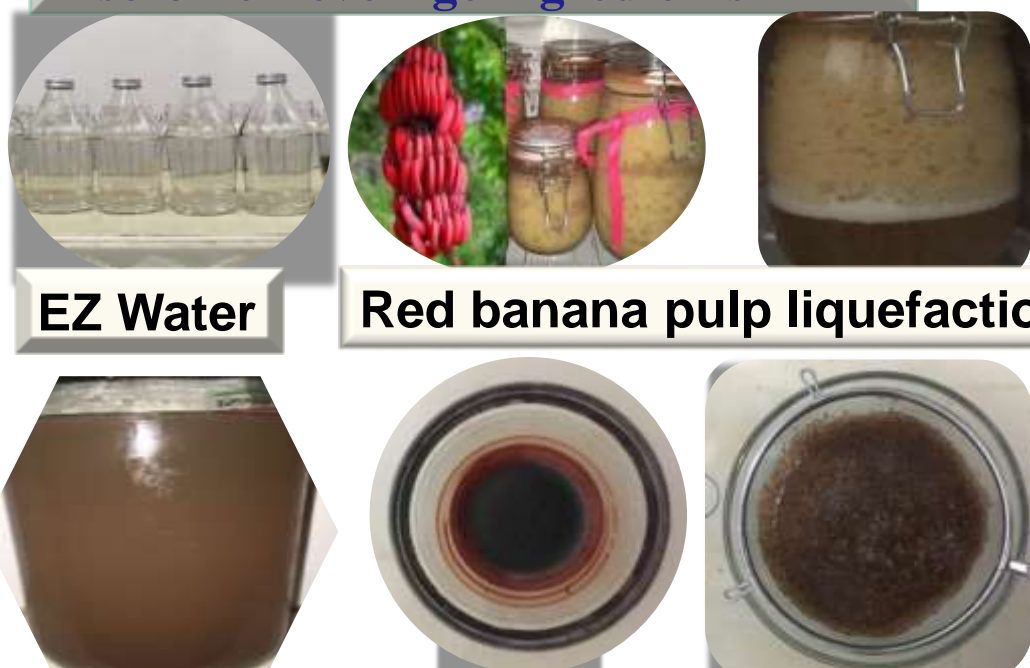
There is only one disease in the world: The compromising or ignorance of the cellular health. Cellular health depends on intracellular nutrition and homeostasis of body fluids and to maintain all these, it is prerequisite to keep the body alkaline.

Osmotic imbalance detrimental to body and hypertonic beverage dehydration draws fluid out and create disturbances in cellular homeostasis. Stable internal conditions of cells regulate pH, ion concentration and ensure enzymatic function.

The aim of present study was to develop isotonic beverage by using Exclusive Zone (EZ) water without synthetic chemical preservative, only using natural bee propolis as preservative and with functional attributes based on nonenzymatic liquefaction of red banana pulp derived juice and concentrated EZ extracts of red banana peel

### METHOD

#### Isotonic Beverage ingredients



Proximate composition (per 100gm)	
Energy	4.24 Kcal/100ml
Protein	0.17%
Carbohydrate	5.63%
Total sugar	8.20%
Sodium	1.23 mg
Potassium	324.53 mg
Magnesium	31.36 mg
Phosphorus	17.99 mg
Calcium	3.86 mg
Iron	0.05 mg
Tryptophan	<0.1g
Soluble dietary fiber	0.12%
Osmolality	290.33 mmol/Kg

Selection of ingredients (Distilled water, Biological water, Red banana pulp, peel, Isabgol, Almond gum, Low GI sugar, Bee glue, Himalayan pink salt, Bhandi mucilage)

Ingredients are incorporated in terms of weight percentage of ingredients in total volume of 240 ml

Measurement of specific gravity and pH of the solution

Measurement of osmolality in mmol/kg to confirm the treatment isotonic kept at room storage

Fill in to the hot sterilized bottles

Capping

Storage at room temperature

#### Technological flow chart for method of preparation



#### Formulated Red banana based isotonic beverages



D-optimal mixture design is a statistical tool was used to plan and optimize the isolates of different ingredients for preparation of isosmotic beverage. During formulation the sum of mixture's proportion in different ingredients kept for 100% in order to get same osmolality as serum in prepared beverage to restore normal body fluid volume of consumers

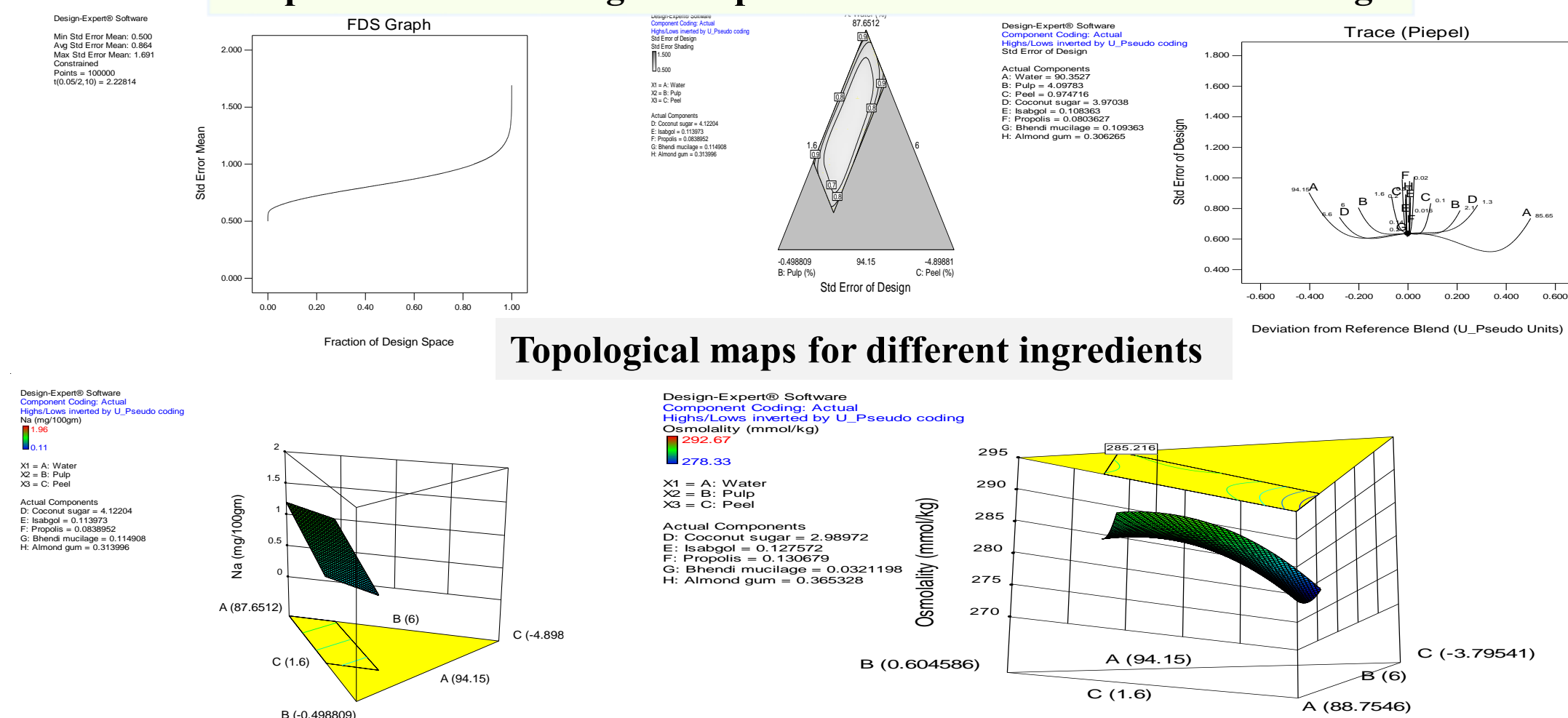
### RESULTS & DISCUSSION

#### Optimization of concentrations of ingredients for optimal osmolality

Component	Name	Minimum	Maximum	Coded	Values	Mean	Std. Dev.
A	Water	85.650	94.150	0.000=94.15	0.902=85.65	90.246	2.816
B	Pulp	2.100	6.000	0.000=6	0.414=2.1	4.114	1.759
C	Peel	0.100	1.600	0.000=1.6	0.159=0.1	0.911	0.685
D	Coconut sugar	1.300	6.600	0.000=6.6	0.563=1.3	4.141	2.317
E	Isabgol	0.016	0.200	0.000=0.2	0.020=0.016	0.088	0.082
F	Propolis	0.020	0.140	0.000=0.14	0.013=0.02	0.078	0.056
G	Bhandi mucilage	0.018	0.200	0.000=0.2	0.019=0.018	0.113	0.085
H	Almond gum	0.068	0.530	0.000=0.53	0.049=0.068	0.309	0.216

Response	Units	Minimum	Maximum	Mean	Std. Dev.	Ratio	Model
Na	mg/100g	0.110	1.960	0.886	0.619	17.818	Linear
Osmolality	mmol/kg	278.330	292.670	288.564	4.897	1.052	Linear

#### D-optimal mixture design for optimal formulation of Isotonic beverage



The findings revealed that a significant drop in urine volume (1766.45 80.80ml) and the salivary flow rate (0.56 0.05g/min to 0.66 0.04g/min) with a significant increase in serum [Na<sup>+</sup>] (1141.59 0.22 mmol/L) and osmolality (288.56 0.61 mmol/kgH<sub>2</sub>O), specific gravity (1.47) was recorded the formulated isotonic beverage. Its micro- and macronutrient composition was as follows: sodium (1.23 mg/100g), magnesium (44.77 mg/100g), calcium (5.59 mg/100g), energy (41.92Kcal/100g), protein (0.17%), soluble dietary fibre (0.87), total sugars (11.73%), carbohydrates (8.18%), vitamin B6 (0.31 mg/100g), and vitamin C (35 mg/100g). The findings indicate that this beverage is unique in aiding rehydration because it provides the right balance of nutrients and hydration for cells to stay healthy.

### CONCLUSION

It is possible to elaborate an prepared red banana based isotonic beverage drink with functional appeal without artificial colourants, flavorings, preservatives, based on optimization of ingredients and concentrated extracts of red banana fruit pulp and peel and bee propolis. The formulated beverage distinguished by substantial content of bioactive constituents and micro and micro nutrients indicates that this beverage is unique in aiding rehydration because it provides the right balance of nutrients and hydration for cells in an isosmotic condition to stay healthy

### FUTURE WORK / REFERENCES

Design of new isotonic beverages from locally available fruits and vegetables intended to replenish body fluids and electrolytes lost by athletes

- Benelam, B., and L. Wyness. "Hydration and health: a review." *Nutrition Bulletin* 35.1 (2010):3-25.
- Bendaali, Yasmina, et al. "Contribution of grape juice to develop new isotonic drinks with antioxidant capacity and interesting sensory properties." *Frontiers in Nutrition* 9 (2022): 890640.