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Valorization of Red Dacca Through Drying Technology into Value-added Food Products

D. M. Aarthi Achar[1]; Kavya N.[2]; Lokesh G. M.[3]; Ambrish S.[4]; Supritha[5]

[1,2,3,4]Student, Department of Agriculture Engineering, [5]Assistant Professor

[1,2,3,4,5]East West College of Engineering Bangalore, India

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Abstract: This research sought to make use of the pulp and peel of Red Dacca bananas through a two-step drying process to create stable, high-value food items. Fresh bananas were divided into pulp and peel and underwent osmotic dehydration in a 60°Brix sugar solution for six hours, followed by tray drying until safe moisture levels were achieved. Weight and moisture content were tracked throughout the drying process. The dried ingredients were then transformed into ready-to-use food products and evaluated for sensory attributes and shelf life. Findings indicated that the pulp underwent significant weight loss during osmotic dehydration, whereas the peel experienced substantial moisture reduction during tray drying. Both components reached low moisture levels, contributing to enhanced shelf stability and favorable sensory acceptance. The study demonstrates that combining osmotic dehydration and tray drying is an effective approach for minimizing post-harvest losses and promoting the sustainable use of Red Dacca bananas.

Keywords: *Red Dacca Banana, Osmotic Dehydration, Tray Drying, Drying Kinetics, Malt Mix, Curry Mix, Functional Foods, Peel Valorization.*

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I. INTRODUCTION

Bananas grow widely across the world, while India stands among top exporters. Red Dacca - Musa acuminata in its red form - is picked for bright hue, nutrient strength, and long tradition. Still, it vanishes fast after harvest due to soft flesh and highwater content. Much of what gets left unopened hides real value: the outer skin, tossed away without thought, holds active compounds, fiber, trace elements, and plant-based compounds.

Drying out perishable fruits works well when done simply and at little cost. Using osmotic drying along with tray methods boosts how things look - less browning shows up, shades stay brighter. Less power gets used this way compared to high-heat options. Turning banana scraps into powder fits better within reuse cycles, supports lasting practices, follows what buyers now want.

A closer look at Red Dacca pulp and peel reveals their physical and chemical traits. Under steady drying settings, how fast water leaves each layer gets examined. From dried pulp comes a malt blend, while dried peel gives rise to a curry mix waiting just to be cook.

II. MATERIALS AND MATHEDOLOGY

Selection of Raw Materials
↓
Physicochemical Analysis Red Dacca Pulp and Peel
↓
Drying Characteristics of Red Dacca Pulp and Peel
↓
Development of Value-Added Products
↓
Sensory Analysis

A. *Raw Material Selection*

In Bengaluru, Karnataka, local bulk traders imported red Dacca bananas belonging to the AAA genome group that are rich in anthocyanins and have red skin. At stages 4 through 5 on the banana color chart, maturity remains consistent. There are no surface scratches or major gash on the bunch. Freshness remains intact; no visible mold or bacterial development. The fruit measures sixteen to eighteen centimeters long. The weight of each item is from 110 to 130 grams. The uniformity of ripening shows down the cluster. The first thing the fruit did was to stand under running water to wash off its soil and stickiness. The hand peeling prevents any scratches throughout the process. The inside part of the fruit is edible and is the pulp. The outer layer was removed to keep other things clean. Thereafter, each part traveled on its own route.so

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things remain in line. A stainless-steel blade cuts the pulp in pieces of 2mm thick. This made heating and drying uniform across each piece. The peaches were evenly cut with small squares of about 2.5 centimeters by 3 centimeters. Because of their matching sizes, drying was uniform. Once sliced, everything ended up in sealed containers with ice packs. Cooling continued at four degrees Celsius until further actions commenced. Each bit remained there for not more than twelve hours before testing.

B. *Physicochemical Analysis*

➢ *Physical Dimensions*

Red Dacca bananas were sized evenly so each step after harvesting worked smoothly. Length ran between 16 and 18 centimeters; width stayed at 4 to 5 centimeters. To fit processing needs, fruit was cut into thin rounds - exactly 2 millimeters thick - with a diameter of 38 millimeters. Evenness here supported steady movement of water and warmth through the drying phase. Cutting banana peels into small squares made them roughly 25 mm long, just 5–6 mm wide, while being only 2 mm thick. By keeping dimensions like this, differences across pieces stayed small, which helped ensure consistent outcomes and stronger trust in the data.

➢ *Moisture Content Level*

Using the standard hot air oven drying technique from AOAC (2005), the water content in Red Dacca banana pulp and peel was measured. Around 20 grams of fresh material - pulp together with peel - were heated at 105 °C for 24 hours, drying completely before weighing again. After that, both percentage water by weight and solid content were worked out through simple formulas.

D.M percent equals 100 minus M.C percent Here, W_1 stands for the starting mass of the mixture in grams. The value W_2 represents what remains after drying - the last bit of solid left in grams. By using this approach, scientists got precise and repeatable measurements of water and solid levels in pulp and peel pieces alike.

➢ *Chemical Analysis*

Chemical breakdown of Red Dacca banana pulp and peel revealed key nutrients for potential food upgrades. Following established methods from AOAC 2000, each test ensured consistency and accuracy. Instead of typical lab jargon, protein levels came from Kjeldahl process. Fat was separated using Soxhlet setup. Crude fiber measurement involved acid plus alkali treatment. Finally, heating in a muffle furnace handled dry ash formation.

- Crude protein Content was Calculated from Nitrogen Content Using a Conversion Factor of 6.25:

$$\text{Crude Protein (\%)} = \text{Nitrogen Content (\%)} \times 6.25$$

$$\text{Nitrogen content (\%)} = \frac{(\text{Vacid} - \text{Vbase}) \times \text{N} \times 14 \times 100}{\text{Weight of Ssmple(mg)} \times 1000}$$

- Fat Content was Estimated Using the Soxhlet Extraction Method:

$$\text{Fat Content (\%)} = \frac{\text{Weight of Extracted fat}}{\text{Weight of sample}} \times 100$$

- Crude fibre Content was Determined after acid and Alkali Digestion followed by incineration:

$$\text{Crude fibre (\%)} = \frac{\text{Weight of Residue after digestion} - \text{Weight of ash}}{\text{Weight of Sample}} \times 100$$

- Ash Content was Calculated after incineration of the sample at $550°C$

$$\text{Ash Content (\%)} = \frac{\text{Weight of ash}}{\text{Weight of Sample}} \times 100$$

C. *Drying Characteristics of Red Dacca Banana Pulp and Peel*

➢ *Pretreatment of Red Banana Peel and Pulp.*

Red Dacca banana pulp and peel lost moisture faster when treated first, then soaked in a solution, finally dried on trays. Two steps instead of one sped up how quickly water left the material. Less time spent drying meant better taste, texture, and appearance after processing. Water moved more evenly during shift from wet to dry state. Browning slowed down because reactions did not spread so quickly. Colours stayed brighter since active sites lost activity earlier. Flavour held firm because unstable compounds faced fewer challenges.

➢ *Osmatic Dehydration of Red Banana Peel and Pulp*

A few fresh, nearly ripe Red Dacca bananas were picked because they fit stage 4 to 5 ripeness. After cleaning, peeling happened right away. From each one came pulp separated by itself from peel. To make sure everything dry's evenly, slices of pulp got trimmed down to just 2 millimetres. Meanwhile, peel got chopped into squares about 2.5 centimetres on each side. Size matching like this helps steady both heat and movement across material throughout drying steps. Next came soaking in a sweet liquid - 60°Brix thick with citric acid - where pieces floated inside it. Six hours passed while they sat there, five parts sugar mixture to one banana bit. Temperature stayed normal throughout that stretch. Once osmosis ended, each sample lost extra droplets by being blotted. After that, they dried inside trays.

Fresh Red Dacca Bananas
↓
Washing
↓
Peeling
↓
Separation of Pulp and Peel
↓
Size Standardization
(Pulp: 2 mm slices; Peel: 20 × 30 mm pieces)
↓
Blotting to Remove Surface Moisture
↓
Preparation of 60°Brix Sugar Solution

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Six hundred grams of sugar mix with three grams of citric acid and distilled water
↓
Now here's what comes next. The samples get submerged, mixed at a 1 to 5 dilution ratio.
↓
After six hours at room temperature, osmotic dehydration took place.
↓
Rinsing with Distilled Water
↓
Blotting and Weighing
↓
Arrangement on Drying Trays
↓
Tray Drying

- *Mass Transfer Parameters*

✓ Weight Reduction (WG): the amount of water pulled from the banana sample, was worked out by applying a specific mathematical equation

$$\mathrm{WR}(\%) = \frac{\mathrm{Wo} - \mathrm{Wt}}{\mathrm{Wo}} \times 100$$

✓ Solid gain (SG): shows how much soluble solid moves into a material from a solution. It comes from using this formula

$$\mathrm{SG}(\%) = \frac{\mathrm{Xt} - \mathrm{Xo}}{\mathrm{Wo}} \times 100$$

✓ Water loss (WL): showing all the moisture taken out during osmotic dehydration, can be found by:

$$\mathrm{WL}(\%) = \mathrm{WR} + \mathrm{SG}$$

At each Weight w_0 stands for the starting amount of sample, measured in grams. Over time, that shifts slightly - this is how much there is at time t, also in grams. Alongside, biological dry weight begins not at zero but at X_0 grams. Then, as days pass, that value adjusts - becoming xt grams by time t. Together, these values let researchers follow both physical loss and living change without assuming things like zero or steady gain.

➢ *Inside Red Dacca Trays, Drying Happens as Pulp and Peel Lose Moisture*

To finish dehydrating, tray drying came into play for osmotically processed Red Dacca banana pulp and peel. Heat from a tray dryer hit them at 60 °C, keeping things moving for roughly five hours. By that point, remaining moisture had dropped to around eight percent (based on dry weight). Evenness in the spread mattered, so each piece rested separately across the surface. Every fifteen minutes, someone checked how much had been lost through careful weighing. Once the mass stopped changing, drying ended and the dry material was gathered for next steps.

Osmotically treated banana pulp and peel
↓
Blotting with muslin cloth
(Removal of excess surface moisture)
↓
Uniform spreading on stainless-steel trays
(Single layer, no overlapping)
↓
Heat from the tray dryer hits 60 degrees Celsius
↓
Every 15 minutes, take weight readings regularly
(Digital balance; trays returned immediately)
↓
Sample dried in oven at 105 °C
Dry weight comes from w_n / w d
↓
Drying went on, stopping when the mass did not change
↓
Tray drying completed

- *Drying Kinetics Parameters During Tray Drying*

Every 15 minutes, readings taken - moisture levels both before and after drying, along with how fast it happened.

✓ *Moisture Content (Wet Basis, MC WB):*

Water content by weight within the sample.

$$\mathrm{MCwb} = \frac{\mathrm{W1} - \mathrm{W2}}{\mathrm{W1}} \times 100$$

At time t, the weight of the sample, w_1, differs from its oven-dry weight, w_2

✓ *Moisture Content (Dry Basis, MC DB):*

Work out the percent water by splitting the moisture reading from the wet basis.

$$\mathrm{MCdb} = \frac{\mathrm{MCab}}{100 - \mathrm{MCwb}} \times 100$$

✓ *Drying Rate (db):*

Moisture gets pulled out at a certain speed over time.

$$DR = \frac{\mathrm{MCdb(prev)} - \mathrm{MCdb(Current)}}{\Delta \mathrm{t}}$$

Time interval in minutes is Δt. Previous dry basis moisture goes by MC DB. The current dry basis moisture appears as MC DB (current)

D. *Develepment of Value-Added Products from Dried Red Dacca Pulp and Peel*

Dried Red Dacca banana pulp and peel were made into value-added products. What is Malt mix powder? Dried peel can also be utilized as a source of dietary fibre and minerals in the formulation of RTC Curry Mix.

In addition, there was also the idea of using the entire fruit without wasting any and adding some nutrition. Sensory assessment was performed to evaluate the acceptability of different samples for selecting the best formulations.

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➢ *Malt Mix Powder from Dried Banana Pulp*

Malt Mix Powder came from dried banana pulp powder mixed with almonds, cashew nuts, pumpkin seeds, along with certain spices like dried ginger, cardamom, and saffron. Not every banana slice made the cut - they were inspected carefully to discard any damaged ones. The nuts, seeds, and spices got roasted without added heat until they reached precise temperatures, which helped bring out stronger flavours while lowering water content and extending storage time. After that, every ingredient got crushed into small pieces, sorted by shape so nothing was too big or too small, mixed well until everything matched in both look and composition. At the very end came the saffron - slipped in last to keep its scent and bright hue intact. Once ready, the malt blend turned into powder that locked inside sealed pouches made of foil-wrapped layers. These bags kept things dry, blocked light, slowed down rust, made sure nothing went bad from air contact or dampness later on.

Three different formulations of the Malt Mix Powder were prepared to optimize sensory and nutritional

➢ *Formulation Ratios of Malt Mix Powder from Pulp*

T1 starts with 80 grams of pulp powder. Mixed into that are 20 grams of nuts and seeds. Scattered throughout is an additional 5 grams of spices

Seventy grams of pulp powder move into batch two. Alongside, thirty parts nuts and seeds join. Five units of spice round out the mix

T3 uses 60 grams of pulp powder mixed with 40 grams of nuts and seeds along with 5 grams of spices

Picture shows ingredients arranged neatly. Final malt mix powder comes from dried Red Dacca banana pulp.

T1=80g Pulp Powder + 20g Nuts & Seeds +5g Spices

T2=70g Pulp Powder + 30g Nuts & Seeds +5g Spices

T3=60g Pulp Powder + 40g Nuts & Seeds +5g Spices

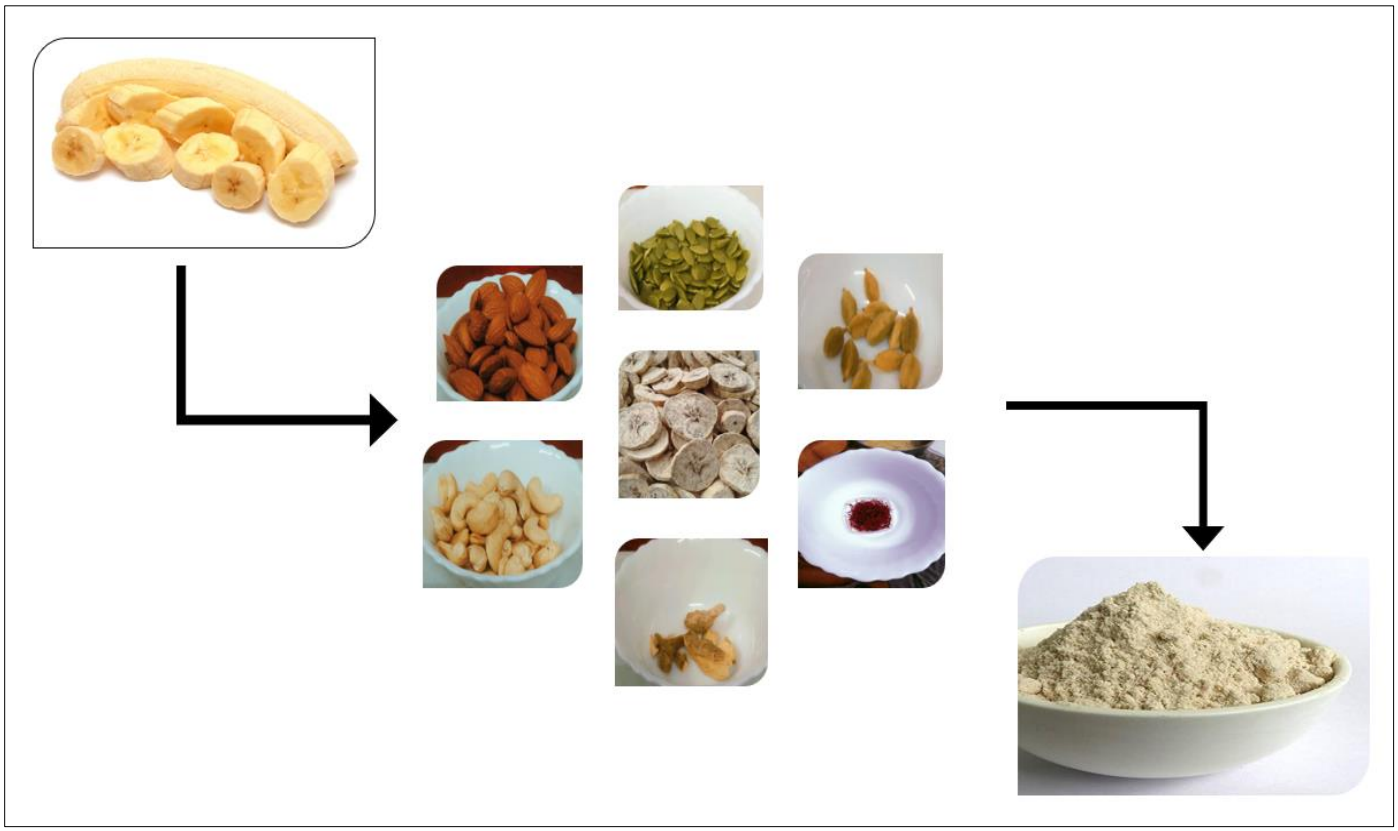

Fig 1 Visual Representation of Ingredients and Final Malt Mix Powder from Dried Red Dacca Banana Pulp

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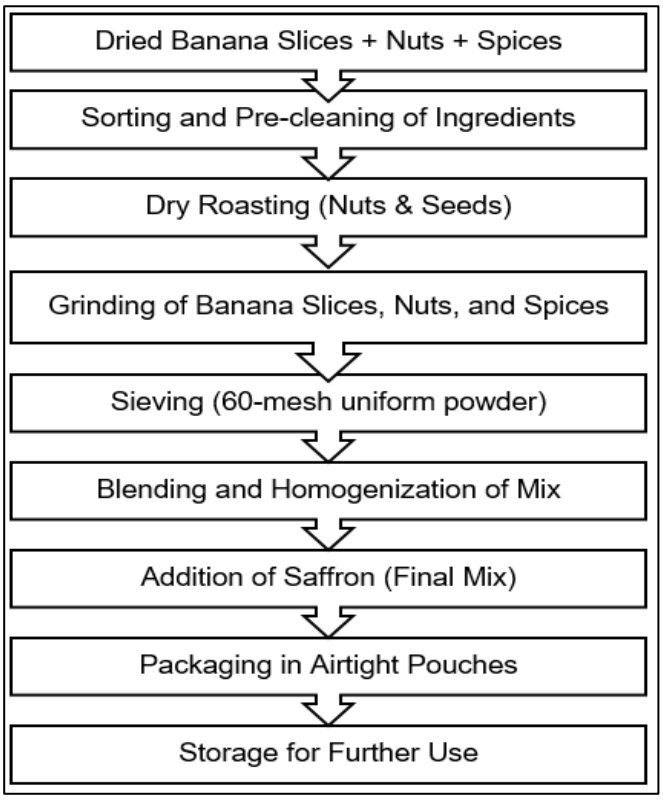

Fig 2 Flow Chart for Preparation of Malt Mix Powder

➢ *Ready-to-Cook Curry Mix from Dried Banana Peel*

Curry Mix, ready to cook, came into being after mixing dried banana peel powder with pulses, nuts, and old-style spices. First thing done - every ingredient got cleaned, then arranged by kind to toss out any specks or bits gone bad. Each item, like banana peel, dals, groundnuts, and spices, roasted separately without heat, just dry heat, helping bring out deeper taste, stronger scent, longer storage life. After roasting, everything got ground into soft powders through a fine mesh filter, making each bit identical in shape and size. Blending in salt helped spread taste and shade without gaps across the mix. Ready-to-cook curry bits ended up sealed up tight inside foil-wrapped bags that keep out damp air, prevent rancidity, while holding the scent just right over time. One version had less curry powder than others, another used slightly more coconut sugar, while the last combined different spice levels. Taste and texture shaped each change, along with adjustments in oil and salt amounts. Nutrition drove some tweaks too - like adding or reducing seeds for fat content.

➢ *Formulation Ratios of RTC Curry Mix Powder from Peel*

T1 made from 70 grams of peel powder mixed with 30 grams of dals and nuts plus 5 grams of spices.

Now here's the breakdown for T2: sixty grams of tamarind peel powder mixed with forty grams of dals and nuts, then fifteen grams of spices added in Fifty grams of peel powder mixes with fifty grams of dals and nuts, together adding fifteen grams of spices.

Picture showing ingredients along with the final RTC curry mix powder made from dried red chilli, Dacca chilli, banana peels, and other spices.

T1 = 70g Peel Powder +30g Dals & Nuts +5g Spices

T2 = 60g Peel Powder +40g Dals & Nuts +5g Spices

T3 = 50g Peel Powder +50g Dals & Nuts +5g Spices

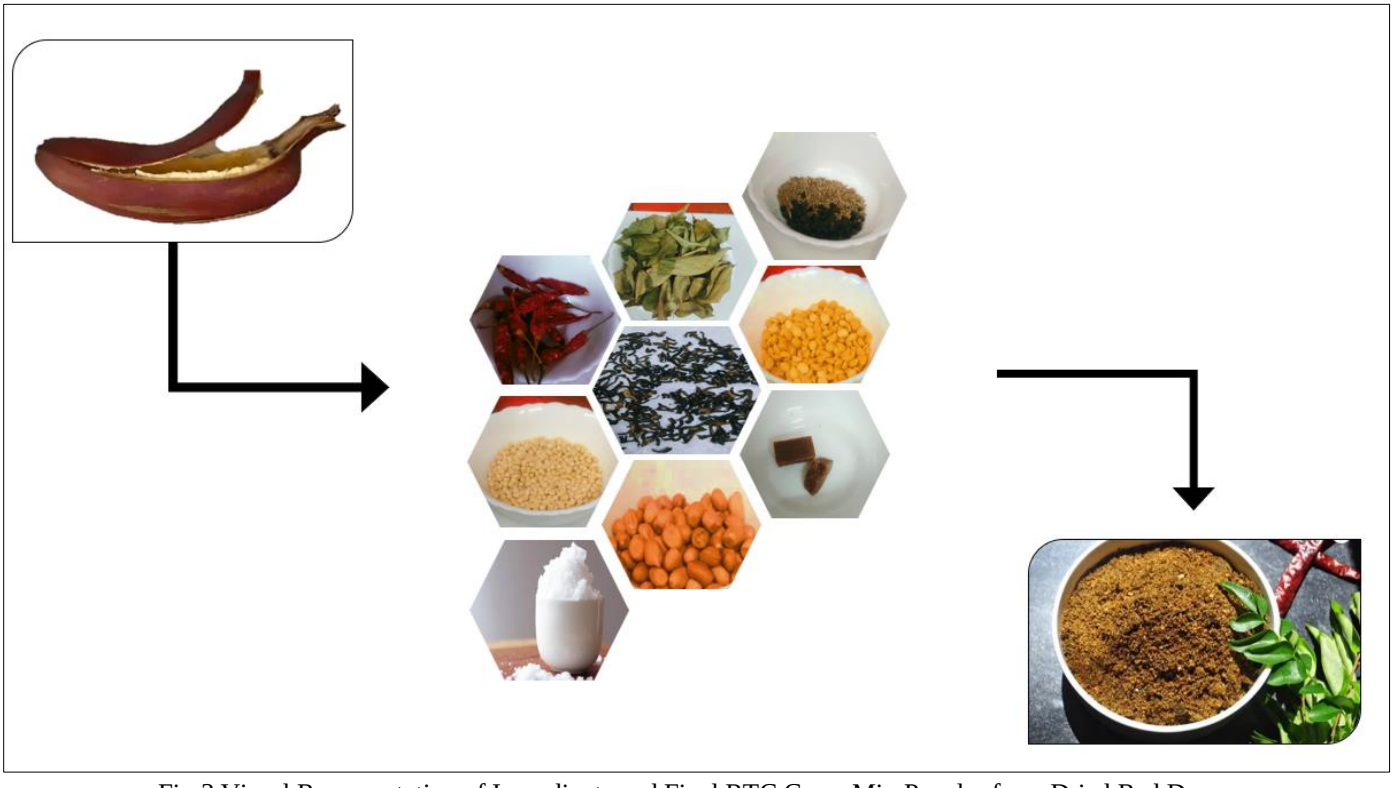
Fig 3 Visual Representation of Ingredients and Final RTC Curry Mix Powder from Dried Red Dacca

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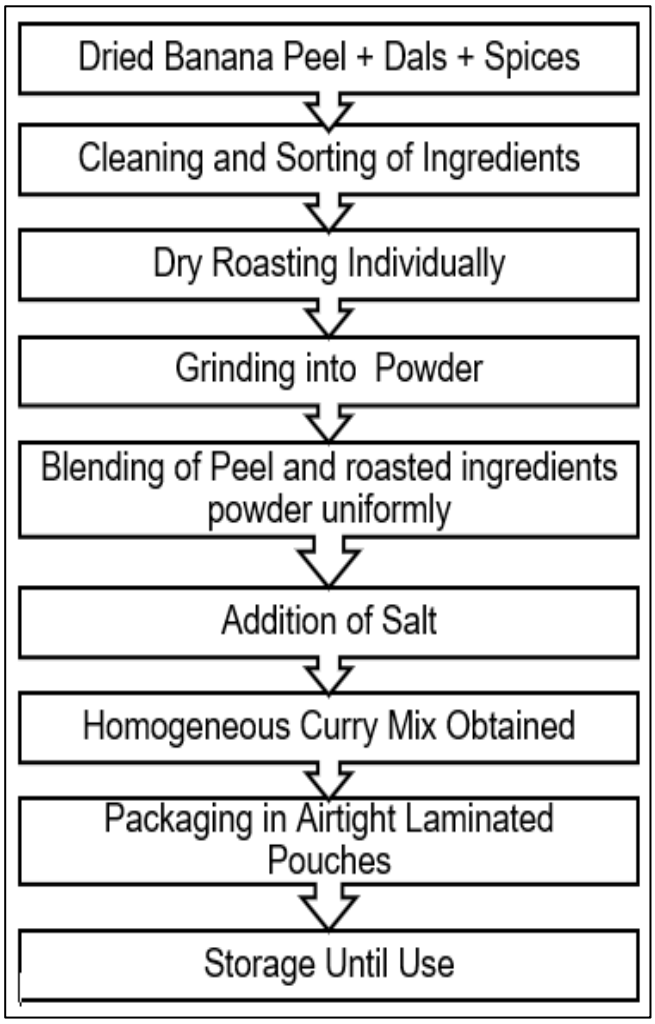

Fig 4 Flow Chart for Preparation of RTC Curry Mix Powder

E. *Sensory Evaluation of Value-Added Products from Dried Red Dacca Banana*

Testing senses - how people like the products - was done by checking what tasted best. This happened inside the Food Processing Lab at East West College of Engineering, located in Yelahanka New Town, Bengaluru. A group of 15 people, who had some training but weren't experts, took part. Before anyone started sampling, each learned exactly how things would be judged.

A score between 1 and 9 tracked how people felt about the food, where 1 meant strong dislike and 9 meant extreme liking. This method stands as a common choice across research for judging preferences.

➢ *9-Point Hedonic Scale:*

- 9 – Like extremely
- 8 - Like very much
- 7 - Like moderately
- 6 – Like slightly
- 5 – Neither like nor dislike
- 4 - I do not like it much at all.
- 3 - Dislike a bit
- 2 – Dislike very much
- Dislike is strong here

Malt Mix Powder got split into three versions - T1, T2, T3 - each mixed with heated milk to the same baseline amount. Curry Mix followed suit, turned into ready-to-cook blends by heating them all the same way for 3 to 5 minutes. Fresh batches arrived straight from preparation, tagged with separate three-digit codes, placed in matching cups near steady light. Between bites, participants rinsed their palates with tap water poured from a shared jug.

Each sample was assessed by panellists using traits like colour, smell, flavour, mouthfeel, heat level in the curry blend, along with how much people liked it overall. Their ratings were turned into averages - the version rated highest across all factors tended to stand out the most.

III. RESULTS AND DISCUSSIONS

➢ *Physical Dimensions of Red Banana*

The study interprets of the results obtained during the valorisation of Red Dacca banana by dehydration and product development. Evaluation of the physical properties, moisture properties, chemical properties, drying behaviour and sensory quality of value-added products from Red Dacca banana are included in results interpreted. According to the above chapter, Red Dacca banana is suitable for processing into value-added products for sustainable processing and waste to wealth.

The mean length of the banana was 145.29 mm, the mean width was 47.57 mm and the mean weight was 142.86 g. The banana's uniform size and weight made it easy to slice it uniformly, and reduced drying behaviour issues.

The bigger size and fat shape of banana resulted in more pulp recovery. A larger intact banana size also helped in uniform heat transfer during drying. The unbroken banana's uniform size and large plumpness make the fruit suitable for processing into value-added products.

Uniform circular slices/discs of banana pulp were made for drying studies. The slice had an average diameter of 44.20 mm, and thickness of 2 mm. Uniform slices of banana pulp ensured uniform removal of moisture during drying. Using uniform slices of banana pulp improved the efficiency of drying, since it increases the surface area over which moisture can be removed, or reduce the internal diffusion resistance to moisture migration during the drying. To provide for the above two phenomena the balance between them was.

The peels dried at a slower rate than the pulp because of their fibrous and tight structure during the dehydration of the fruits and vegetables.

➢ *Moisture Content of Fresh Dacca Pulp and Peel*

Fresh pulp of Red Dacca banana contained moisture between 74.4-74.7% while moisture content of peel was lower 70.3-70.9%. As the fresh pulp and peel of Red Dacca banana was found to have high moisture content, this shows that the fruit is highly perishable or that they must be processed immediately or its peel and pulp must be dried for longer

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storage. Peel had low moisture content in comparison to the peeling. The peel of fruits and vegetables could be useful. Fibre polysaccharides are more tightly hydrogen bonded to water than parenchymal tissues.

➢ *Chemical Composition of Red Dacca Pulp and Peel*

The pulp and peel of red Dacca banana differed in their chemical composition (Jain and Singh, 2018). The pulp's protein content was noted to be 1.32% which was comparatively higher than the fat content 0.41%, crude fibre content 0.85% and the ash content 0.72%. The pulp contains a considerable amount of carbohydrates; this pulp is also rich in fibres and minerals. It follows that pulp has the potential to be used as an energy ingredient in the preparation of malt mix powders.

On the contrary, the peel contained significantly higher nutritional values of 4.21% protein, 2.10% fat, 9.85% crude fibre and 7.42% ash. With their notable levels of fibre and ash, the peel could be a good source of important dietary fibres and minerals. This shows that Red Dacca banana peel has the potential of being used as a functional food ingredient which can be exploited in waste to wealth and sustainable food processing application.

➢ *Osmotic Dehydration Characteristics of Red Dacca Banana*

The Red Dacca banana pulp showed a continuous rise in weight loss, water loss and solid gain with increasing treatment time during osmotic dehydration. However, the difference between the treatments was not significant. After 180 minutes, the pulp had a 45.73% loss in weight, with 43.88% water loss and a 1.85% gain in solids. The enhanced mass transfer efficacy is due to the pulp's soft and porous structure, which enables easy diffusion of water and osmotic solutes. However, banana peel recorded comparatively lower dehydration efficacy. After 180 minutes of osmotic treatment, the peel underwent weight reduction, water loss, and solid gain of 39.65%, 38.25%, and 1.40% respectively. The waxy fibrous nature of the peel restricts the moisture entry due to which a reduction in mass transfer rate occurs. The results indicate the structural role of pulp and peel on osmotic dehydration behaviour.

➢ *Tray Drying Characteristics*

- *Tray Drying of Banana Pulp*

The moisture content of slices of Red Dacca banana pulp was estimated to decrease continuously during tray drying. It decreased from 129.97% (db) to 8.22% (db) over a drying time of 360 minutes. The drying rate which was high at the start (0.743 g/min) decreased over time which shows, falling rate drying period. The lack of constant rate period indicates that the controlling mechanism or drying of all most fruit materials was internal moisture diffusion.

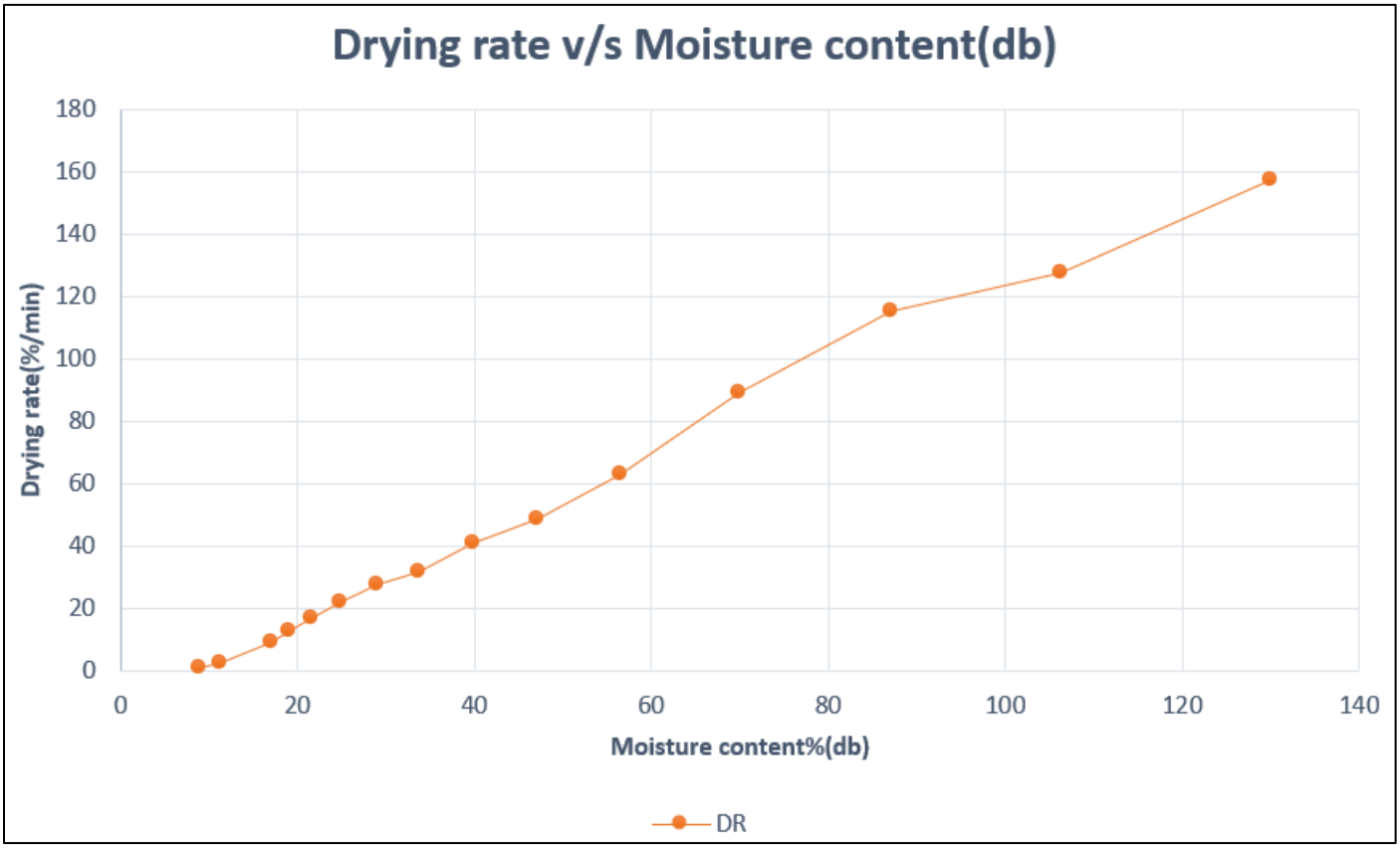

Fig 5 Variation of Moisture Content (DB) % W.R.T Time (min) of Pulp

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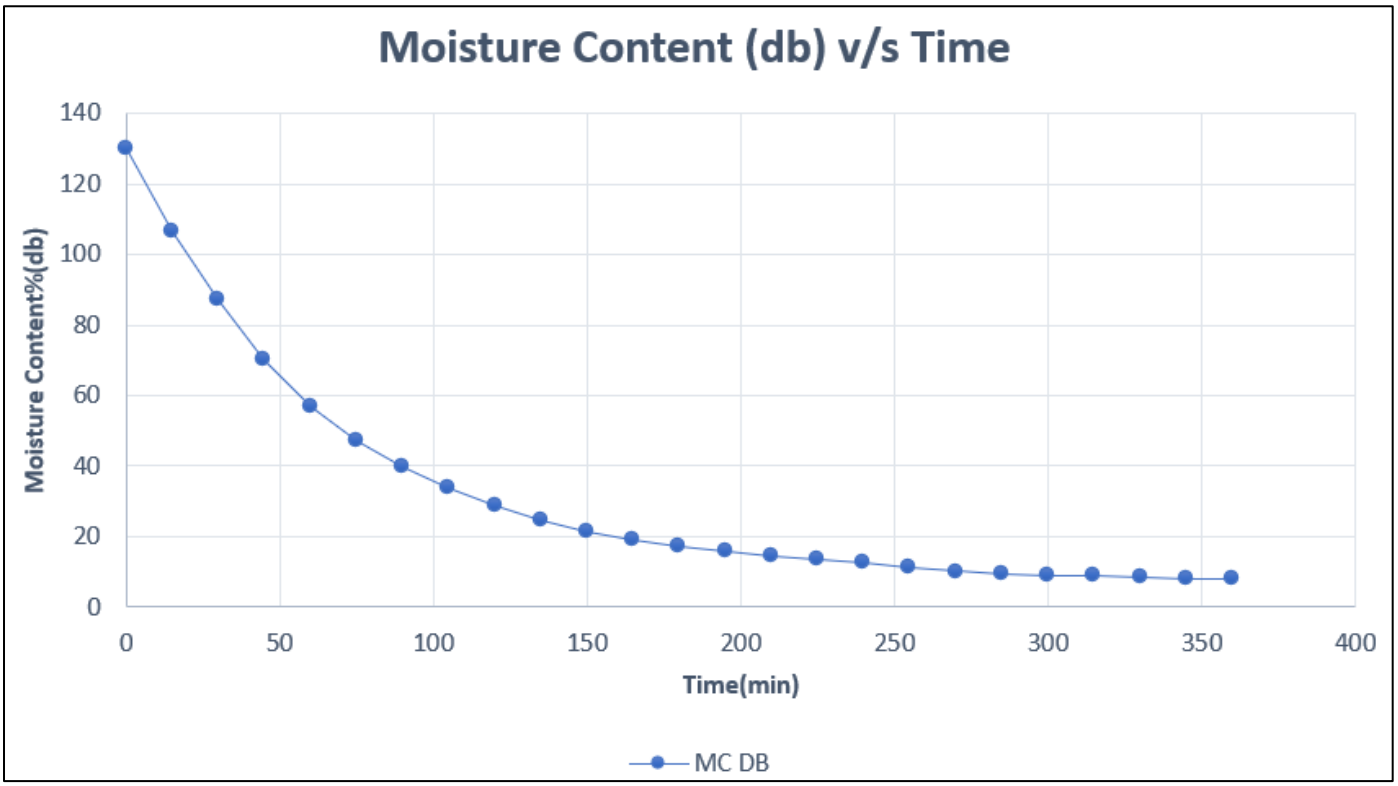

Fig 6 Variation of Drying Rate (%/min) W.R.T Moisture Content (DB) % of Pulp

- *Tray Drying of Red Dacca Peel*

The moisture content of Red Dacca banana peel reduced from 144.33% during 360 min tray drying to 5.97%. The peel recorded the drying rate of 0.685 g/min in the beginning and later declined slowly which is an indicator of falling rate drying period. Peel dries slower than pulp slices, due to its dense fibrous matrix and relatively thicker cellular structure that further restricts the internal moisture movement.

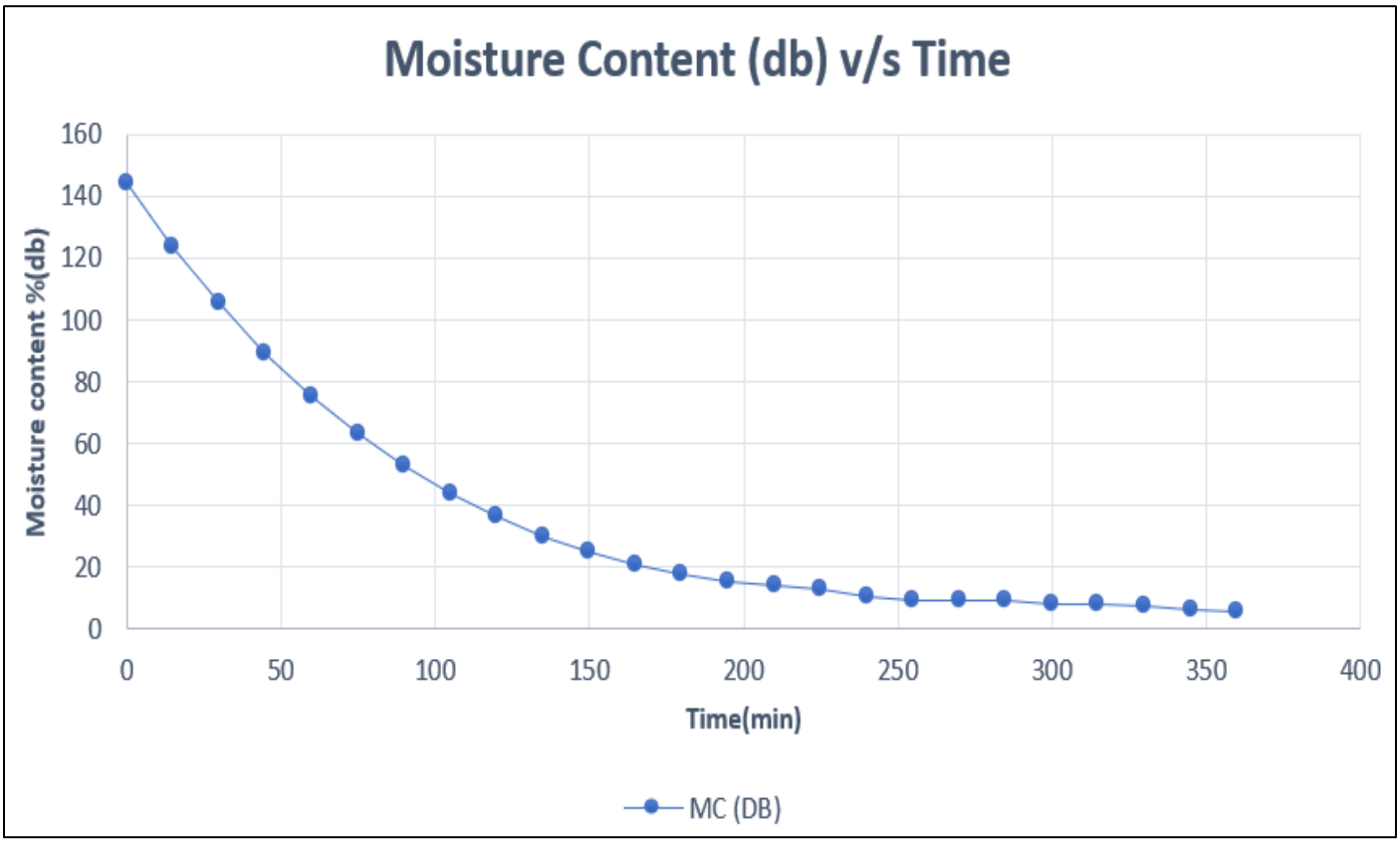

Fig 7 Variation of Moisture Content (DB) % W.R.T Time (Min) of Peel

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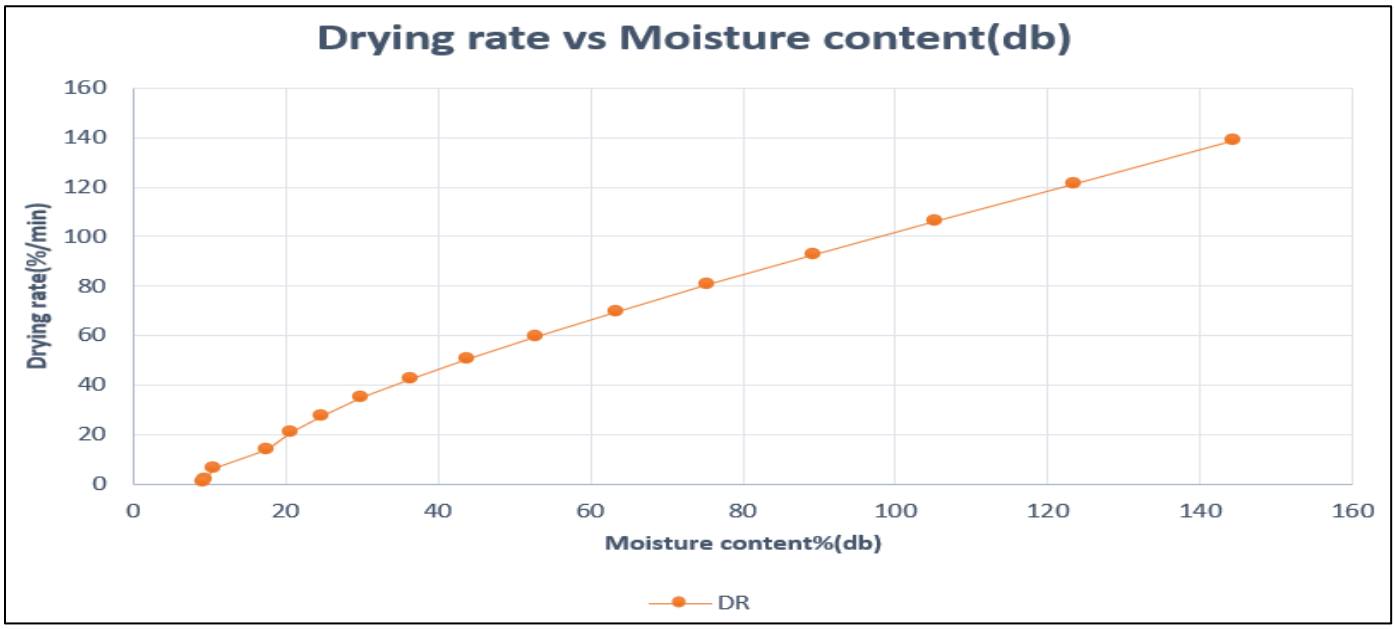

Fig 8 Variation of Drying Rate (%/min) W.R.T Moisture Content (DB) % of Peel

➢ *Product Development and Quality Evaluation*

The pulp and peel of red Dacca banana differed in their chemical composition (Jain and Singh, 2018). The pulp's protein content was noted to be 1.32% which was comparatively higher than the fat content 0.41%, crude fibre content 0.85% and the ash content 0.72%. The pulp contains a considerable amount of carbohydrates; this pulp is also rich in fibres and minerals. It follows that pulp has the potential to be used as an energy ingredient in the preparation of malt mix powders. The ready to cook curry powder was light brown in colour, free flowing, and had a roasted aroma. Rehydration properties during cooking were satisfactory, and it was microbiologically and physically stable for a period of 12 weeks at room temperature. In general, quality assessment revealed that both banana pulps and peels could be utilized for the production of functional and acceptable value-added food products.

➢ *Sensory Evaluation*

To evaluate consumers' acceptability of developed malt mix powder and ready to cook curry mix, sensory evaluation was carried out by using 9-point hedonic scale (Peryam and Pilgrim, 1957). 15 (Semi-trained) members were formed sensory evaluation (panel). Our analysis gauged the aroma, appearance, colour, texture, taste and overall acceptability of the product.

Amongst the malt mix powder formulations, T2 containing 70 g banana pulp, 30 g nuts and seeds and 5 g spices got maximum acceptability This was because the suitable dose of banana pulp helped in good sweet taste and nuts and seeds in smooth mouth feel. Also, spices contributed in flavour development. Furthermore, the uniformity of colour was very much appreciated by the consumer. According to the sensory panel members, the aroma was also quite pleasant.

The ready-to-cook curry mix with formulation T3 has components including 50 g banana peel and 50 g dals and nuts and 5g spices as most preferred, owing to its well-balanced flavour, reduced peel bitterness, improved texture, and desirable aroma. These results highlight the importance of optimized ingredient proportions in enhancing sensory quality.

IV. CONCLUSION

Right now, this work shows Red Dacca banana (Musa acuminata, red form) as a key ingredient for making useful food products using basic drying methods. Using two stages - first osmotic dehydration, then tray drying - helps remove water without losing taste, texture, or nutrients in both pulp and peel. Because of these steps, people can now enjoy malt mix powder made from pulp, along with ready-to-cook curry mix prepared from peel, proving how perishable parts plus overlooked peels can become reliable, safe, store-long food options. What stood out was how much better people liked the products after tweaks in the recipe. Taste, texture, and overall feel improved noticeably when adjustments were made. Looking closer at what consumers ate showed the pulp packs more calories than expected. Surprisingly, the skin of fruits added both fiber and useful minerals. Results pointed clearly toward using leftovers wisely - like feeding systems that reuse matter. Farm waste finds new purpose here, fitting patterns seen in closed-loop economies. Cost stayed low thanks to the method chosen for drying foods. Flexibility meant it worked well even at tiny production levels. Rural settings found it fit able, especially those run by women. Scale didn't slow progress down much. Real-world use now feels possible because of these outcomes.

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COMPETING INTERESTS

The authors declare that they have no known financial or personal relationships with other people or organizations that could have appeared to influence the work reported in this paper. Authors have declared that no competing interests exist.

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