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Exploring the Nutritional and Probiotic Potential of Palmyra Sprouts: A Study on Gut Microbiota Enhancement

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Abstract

Introduction: The Palmyra tree's botanical name is *Borassus flabellifer L*.It is more fibrous and nutritious and is called Palmyra Sprout in English. Palmyra sprout is a sprout that develops on Palmyra palms or *Borassus flabellifer*. It aids in decreasing body heat and averts irregular stool. **Objectives:** In our study, we are analyzing whether palm sprout enhances gut microbiota health using prebiotics. **Methods**: Prebiotics are described as a non-digestible dietary component that benefits the host by favorably influencing the development or functioning of a small number of microbes in the colon, thereby enhancing host health and analyzing powder characterizations by employing the physicochemical tests (loss on drying, ash test, crude fiber content, water-soluble extraction), and determination of calcium, and carbohydrates. For gut microbiota health, the beneficial bacteria are *Lactobacillus*. **Results:** we finally checked the

growth of the palm sprout on nutrient agar by microbial growth of *Lactobacillus* for 24 hours. We also evaluated the

palm sprout and nutrient agar absorbance at 570 nm on a colorimeter for 24 hours. From the results, we observed that the *Lactobacillus* can grow in the palm sprout medium. **Conclusion:** The palm sprout enhances the gut microbiota health using prebiotics were examined successfully.
Keywords: *Borassus flabellifer*, Gut Microbiota, Prebiotics, and Physicochemical tests.

Introduction

The name Palmyra, which is derived from the Portuguese word Palmeira, refers to the palm and is first applied to the Palmyra palm. The Palmyra tree's botanical name is *Borassus flabellifer*. The palm in question is a member of the genus Borassus, subfamily Borassoideae, and group Arecaceae. The sex of the Palmyra trees cannot be determined until they flower because they are slow-growing dioecious perennials. Only after 12 to 15 years of maturity does the palm tree begin to bloom (Rao et al., 2021). Palmyra palms are extensively grown and commercially advantageous, particularly in South and Southeast Asia. With approximately 800 applications, the palmyra palm is one of the most significant trees in India and Cambodia. The Palmyra tree serves as Tamil Nadu's national tree. The seeds are sown, and made to sprout, and the soft stems are boiled or roasted before being consumed in the Indian states of Tamil Nadu, Andhra Pradesh, Sri Lanka, etc. It is incredibly healthy and fibrous. In Tamil, it is referred to as Panangkizhangu (Upadhyaya and Sonawane 2022). A Palmyra sprout, commonly referred to as a Palmyra tuber, is a sprout that develops on *Borassus flabellifer* or Palmyra palms (Figure 1).

Figure 1. Palm Sprout image

Prebiotics are "a non-digestible food component that favorable impacts on the host through selectively promoting the development and function of a single or small number of microbes in the colon, and then enhances host health." A substance is classified as a prebiotic if it meets the following necessities: (i) it must be impermeable to the stomach's acidic pH; (ii) it must be fermentable through the intestinal microbiota; and (iii) it must be capable to specifically promote the development and activity of the microbes in the gut. This method enhances the health of the host organism (Wang et al., 2020). Though not all prebiotics are produced from carbohydrates, the below 2 conditions are employed to distinct fiber: Fibres are described as (i) carbohydrates by a degree of polymerization (DP) equal to or greater than 3 and (ii) unable tohydrolyzed through endogenous enzymes in the small intestine. Considering that the fermentability or solubility of the fiber is not important (Bamigbade *et al*., 2022).

The gut microbiota denotes the diverse group of bacteria that live inside the human gastrointestinal system. According to Collinset al., (2016), there are 1010–112 living bacteria per gram in the human colon. The fermentation products are

governed by the structure of prebiotics and the microbial makeup of the gut (Ballini *et al*., 2023). The impacts of prebiotics on human health are transmitted by the breakdown products produced by microbes. For example, butyrate has an impact on intestinal epithelial cell development. Since SCFAs may spread to circulation in the blood by enterocytes, prebiotics can affect remote site organs as well as the digestive system (Bedu-Ferrari *et al*., 2022). The biggest family of lactic acid bacteria is called *Lactobacillus*. They are mostly employed as probiotics or in the production of fermented dairy, sourdough, meat, and vegetable dishes. The GRAS (Generally Recognised as Safe) status of the *Lactobacillus* species is linked to their widespread benefit, and it depends on the availability of affordable techniques for cultivating and delivering viable cultures. The purpose of our work is to enhance the gut microbiota health using prebiotics from *Borassus flabellifer*.

Statistical data based on literature study

Wang et al., 2021 stated that an impact of ginger juice has numerous beneficial agents, on healthy persons or about its interaction with variations in the composition of the gut microbiota. Ginger is a commonly used functional food and food additive.A 16S rRNA sequencing study is used to describe the variance in the gut microbiota. They discovered that adding ginger juice to the diet enhanced the diversity of the intestinal flora.When they did not account for gender, they discovered variations in microbial diversity brought on by ginger intervention in both community evenness and richness. Ginger juice altered the bacterial -diversity differently in men and women. We discovered 19 categories of bacteria with substantial variations among the control which is women ginger which is women and 15 substantial variations among the men control and men's ginger group.Our findings show that shorter-term use of ginger as juice significantly altered the configuration and operation of the gut microbiota in well individuals. Additionally, our study emphasized the value of examining both male and female persons to learn more about how ginger affects gut flora. It will take more research to verify these results.

Mônica Cerutti Martellet et *al.*, 2022 study showed an inequity in physical processes that may include inflammation and metabolic-based pathways and result in chronic, complex, and idiopathic inflammation diseases characterized by gastrointestinal tract disorders. Since they lessen and prevent the bond of infective microbes in an enteric atmosphere, probiotics and prebiotics can treat these afflictive circumstances. To maintain a balanced intestinal microbiota, this paper emphasizes the value of utilizing probiotics combined with psyllium fibers as prebiotics. We also discuss the coating technologies and materials that will help these strains survive longer when they are exposed to the digestive system. Developing illnesses and scientific advancements will drive particular methods in biotechnology to identify and assess novel probiotics as well as prebiotics that may improve human wellness. The significance of products featuring probiotics and fibers from Psyllium as prebiotics grows more apparent on a well-being bias.

Liu et al., 2022 study in current times stated, that due to its vital function in health as well as illness, the gut microbiota has gained a lot of attention. A variety of metabolites, including short-chain fatty acids (SCFAs), secondary bile acids, tryptophan, and indole derivatives, can be produced by the gut microbiota. Numerous research conducted over the last ten years have demonstrated whether oral polysaccharides can travel through the colon and collaborate with the gut bacteria. The relationships among polysaccharides as well as the intestinal microbiota have not yet been well investigated, particularly considering such additional intestinal microbiota compounds as trimethylamine and tryptophan.In the present overview, we first provided a summary of the complex interactions among polysaccharides and microbiota in the gut, like control of the makeup of gut microbiota through polysaccharides, metabolism of polysaccharides to SCFAs through the gut microbiota, and control of the generation of gut microbiota metabolites such as trimethylamine, tryptophan, lipopolysaccharides, etc. by polysaccharides. Furthermore, we also reviewed the indirect impacts of polysaccharides on gastrointestinal barriers and presented our ideas for future studies on polysaccharides. The article not only assists in clarifying the fundamental workings of polysaccharides, it additionally offers an acceptable benchmark for better use of polysaccharides.

A study by Palmnäs-Bédard et al., 2022 demonstrated how important the gut microbiota is to human nutrition and

metabolism, and how it may directly affect type 2 diabetes and its related preconditions. New opportunities for type 2 diabetes management may arise from a good kind of connection between human intestinal microbiota and glucose metabolism, but reviews of the human observational studies reporting on such findings are lacking. This research on relations among intestinal microbiota and phases of glucose dysregulation in grown persons in good health with metabolic disorders and risky issues. We outline the most recent research on key bacteria that have been identified, as well as their potential contributions to glucose metabolism without regard to excess weight. We encourage SCFAs to intercedein these impacts and examine the impact of nutrition, and metabolites arising from diet and intestinal microbiota relationships. 45 original studies were eligible from the 5983 PubMed records that were first discovered and examined. α-Diversity as well as 45 microbial taxa were linked with designated results. These developments in an area, along with mechanical and potential research and inquiries into diet-intestinal microbiota connections, have an opportunity to provide a crucial vision of the functions of intestinal microbiota and bacterial metabolites in human glucose absorption as well as to give to the creation of new preventive type-2 diabetes methods, such as accuracy nutrition.

According to Inês Parente *et al*., a report from 2022, short-chain fatty acids (SCFA) were crucial to the interaction among the microbiota, intestine, and brain. Studies examining the impact of microbiota-focused interventions, like pre-biotics, and pro-biotics, are still rare, especially in humans. In our study, differentiated co-cultures were used to test the by-products of the fermentation of prebiotic-riched medium through microbes from primary human fecal specimens. To prevent cytotoxicity, the conditions of experimentation (contact duration and low dilution) for testing the pre-biotics raffinose as well as fructo-oligosaccharides (FOS) are optimized. The strength of the epithelium of the intestine is not jeopardized by the optimum circumstances. Additionally, the lack of fermentation byproducts caused an allergic response. The results of FOS-enriched medium fermentation showed a modest level of shielding against the formation of reactive oxygen species. This work serves as a crucial foundation for the development of in vitro experiments using straightforward techniques to investigate host-gut microbiome relationships.

The developing sign suggests that intestinal microbiota is an important reason for their population heterogeneity, and Gibbons *et al.*, 2022 stated that humans frequently display variable reactions to nutritional, pre-biotic, and pro-biotic actions. In this section, we offer a summary of a few of the main computationally and investigational techniques used to address important issues of microbiota-linked personalized nutrition and well-being. Third, we investigate in vivo methods, including human feeding trials, crossover interventions, nonhuman animal models, and human observational studies, for a good knowledge of the individual, microbiota-linked reactions to diet, pre-biotics, and pro-biotics. We provide examples of accurate nutrition stages that are presently utilizing intestinal microbiota and are consumer-facing. We also cover how a wider combination of the methods and tools covered in this article can produce the information required to support a wider range of precision nutrition approaches. We conclude by presenting a future scenario for precision nutrition and healthcare that makes use of gut microbiota to create efficient, individualized therapies.

A study by Zhang et al., 2023 proved developing research proposes intestinal microbiota position disturbs human health, and microbiota imbalance will persuade various diseases. Natural products are gaining popularity because they provide therapeutic advantages and do not have any negative side effects. New research confirms that the gut microbiota regulates natural products' effects on the gut microbiota whereas many natural goods' activity relies upon it. In this article, we discussed the connection between host disease and the microbiota of the gut in addition to the recently found molecular processes underlying the association between natural goods and the microbiota in the gastrointestinal tract.We focused on the microbiota in the intestine’s metabolite of various natural substances as well as the effect of natural products on intestinal microbiota while summarising the biological transformation pathways of organic items and discussing the effect of natural goods on the structure and control of the intestinal microbiota, safeguarding the gut mucosal obstacle, and control of the intestinal microbiota metabolites. Understanding how the gut microbiota and natural products interact will make it easier to understand how they work as medicines.

Materials and Methods

Plant materials

Freshly harvested palm sprouts (*Borassus flabellifer*) 1 kg of *Borassus flabellifer* was purchased from the Madurai market.

Apparatus required

Evaporating dish, Palm Sprout Powder Sample, Hot air oven, Desiccator, Weighing Machine, Crucible, Muffle Furnace, China dish, Conical flask, Water bath, Centrifuge tube, Petri plate, Micropipette, Micropipette tip, SMF (Standard Muffle Furnace), Beaker, Centrifuge tube, Burette, Demineralised water, Magnetic stirrer, UV Spectrophotometer, Measuring cylinder, Laminar air flow, BOD Incubator, Metallic loop, Test Tube, Colorimeter.

Chemicals Required

Ethanol, Ammonia, Ammonium chloride, Petroleum ether, H_2SO_4, NaOH, EDTA (Ethylene diamine tetra acetic acid), Buffer solution, Solochrome indicator, H_2O, N-HCl, Anthrone Reagent, Standard glucose, Toluene, 2.5 N-HCl.

Methods

Determination of physicochemical properties

Loss on drying

The *Borassus flabellifer* sample was weighed accurately between 1-3 g in an evaporating dish. Switch on the hot air oven and allow the oven to reach 105℃ temperatures. Place the evaporating dish containing the sample in the hot air oven of thesample taken. Run the oven for the specified time. Afterward, place it in desiccators, cooled and weighted. Replace the evaporating dish in the oven and heat further for an hour. Subsequently, it was cooled and weighted. Repeated this till constant weight is obtained. Calculate the percentage of loss on drying from (LOD) the weight of a sample taken (Fortier et al., 2014).

$$\% \text{ LOD} = \frac{\text{Difference in weight of sample after drying}}{\text{Wei of sample taken}} \times 100$$

Ash content test

The ash content was examined by the AOAC method. Weighted the empty crucible and noted down the reading. Then take 2g of sample in anempty crucible.The sample was kept in a muffle furnace at 450℃ for 3 hours. After 3 hours the sample is kept in the desiccator for the cooling process. After cooling, then weighted the sample and calculated the ash content (Liu 2019).

$$\% \text{ Ash} = \frac{\textit{weight of total ash}}{\textit{weight of sample taken}} \text{x} 100$$

Crude fibre content

Take 5g of the sample in a 250ml conical flask. Then add 50ml of petroleum ether. And mix it well. Then it is transferred into the china dish and heated for 5 mins in a water bath. Petroleum ether is evaporated in a water bath. Again add 25ml of petroleum ether, and heat for a specified time in a water bath. After the water bath, it remained only the residue. Then it is measured and weighed. This is considered as a fat content.Then the residue sample is mixed with 2.5ml of H_2SO_4 in 200ml of distilled water. Heat 30 minutes in a water bath and then it cools and centrifuges the sample. After the centrifugation, remove the upper layer (Aqueous layer). Then the residue is present under the centrifuge tube. The residue was mixed with 2.5ml of NaOH in 200ml of DM water. Again heat for 30 mins in the stirrer. After the precipitate is obtained. That is the presence of fiber content in the sample (Busuttil-Griffin et al., 2015).

$$\% \text{ crude fiber} = \frac{\text{Residue weight}}{\text{Weight of the sample}} \text{x } 100$$

Water soluble extraction

Take 1g of palm sprout sample in a conical flask. Then, add 50ml of H_2O into the conical flask and constantly stirfor 30 mins. Afterward, the sample is centrifuged for 10 minutes in a centrifuge tube. Then, there is a presence of two-layer (a) H_2O (b) undissolved residue first layer of the H_2O isevaporated. The undissolved residue is taken in a petri dish. Then it isplaced in a hot-air oven at the specified time. After the hot air oven, the sample is kept in a desiccator for cooling. Eventually, the sample was weighed and the water-soluble was evaluated.

% water soluble = $\frac{\text{Residue weight}}{\text{Total sample weight}}$ x 100

Determination of calcium content

Preparation of Ethylene Diamine Tetra Acetic Acid (EDTA)

Weigh 1.33 g of EDTA in SMF (Standard muffle furnace) and add 250ml of distilled water followed by constant stirring (Barrows and Simpson 1962).

Preparation of buffer solution

Weigh 17.5g of ammonium chloride and 17.0032g of ammonium in SMF. Then add 250ml of water in SMF and shake it well.

Calcium content test

Take 10g of sample in the beaker and then add 40ml of distilled water, mix it well. Filter the sample by using Whatmann filter paper. After filtering, then take 10 ml of the sample in a conical flask followed by EDTA in the burette.In a conical flask, add the 15ml of buffer solution and add the 25ml of distilled water. Mix it properly, and add one pinch of solochrome indicator. The solution changed toa pink color. After titrating the solution, the blue color should be formed.

$V_1N_1=V_2N_2$

Determination of total carbohydrates

Preparation

1) Anthrone Reagent: Dissolve 200mg anthrone in 100 ml of ice-cold 95% H_2SO_4.

2) Standard Glucose: Stock – Dissolve 100mg in 100ml water.

3) Working Standard: 10ml of stock diluted to 100ml with distilled water. Store refrigerated after adding a few drops of toluene.

Carbohydrate test

The qualitative tests were executed to recognize the carbohydrates that areMolish, Fehcing's test and so on. For this, 100 mg of the material was weighed into the boiling tube. Keep it in a boiling water bath for 3 hours with 5 ml of 2.5N HCL, then let it cool to room temperature to hydrolyze. Use solid sodium carbonate to neutralize it till the effervescence stops followed by centrifugation. Add 0.5- and 1-ml aliquots of the supernatant were taken for examination. Then, take 0, 0.2, 0.4, 0.6, 0.8, and 1 ml of the working standards for preparing the standards. '0' is used to represent a blank space. Add distilled water to every tube, including the specimen tubes, to bring the volume to 2 ml. Then 4ml of the anthrone reagent is added. Heat in a bath of boiling water for eight minutes. Cool quickly and measured at 630 nm which is the formation from green to dark green color. Take note of the absorbance and compute the specimen's carbohydrate content (Chlumská et al., 2014).

Palm sprout powder

Take 1kg of uncooked fresh palm sprouts. Then, peel the outer layer of the palm sprout. Weigh the total weight of the palm sprout and note the value. Then, the palm sproutsare sliced into 3mm of thickness. And dried at 100℃ for 9 hrs in a hot air oven. Again, weighed the dried palm sprout piece. Then milling into flour and sieve the flour in 250 µm. Then finally weighed the fine powder form of palm sprout.

Microbial growth

Medium preparation of nutrient agar

Suspend 5.6 g of nutrient agar powder is taken in the 500 ml of conical flask. And add to the 200ml of distilled water. It is mixed and melted completely. Then, sterilized by autoclave at 121℃ for 30 mins. Then, pour the liquid nutrient agar sample into the petri dish and wait for minutes to coagulate. Cool the sterilized apparatus in laminar air flow for 15 minutes.

Medium preparation of palm sprouts

Suspend 5.6 of palm sprout powder is taken in the 500 ml of conical flask. Added 2g of agar-agar type-1 dissolve in the 200ml of distilled water. It mixed well. Then, sterilized by autoclave at 121℃ for 30 mins. Then, pour the liquid palm

sprout medium into the petri dish and wait for minutes to coagulate. Cool the sterilized apparatus in the laminar air flow for 15 minutes (Figure 2).

Figure 2. Medium preparation of Nutrient Agar and Palm Sprout

Serial dilution of microbial growth

Seven test tubesare taken for serial dilution. In the test tube, add 1g of *Lactobacillus*dilute in 10 ml of DM water, and mix well. Then, 1ml of *Lactobacillus* sample from test tube 1 was added to test tube 2, and 9ml of DM water. This is followed by the same procedure till the test tube 7. Take dilution 10^3 and 10^5 test tubes (3,5). Then 0.5 ml of dilution 10^3 and 105 isadded to the palm sprout sample of control and duplicate petri plate. It is kept in laminar air flow for 15 minutes. After 15 minutes it was kept in a BOD incubator. Then check the growth after the 12 – 16 hours. After 12 hrs, the microbial colony is formed. From 10^3 and 10^5 the nutrient agar medium controlled and duplicated the microbial growth colony from the petri plate by metallic loop and inoculated in the palm sprout medium.

Determination of sample absorption

Palm sprout preparation

Take 100mg of palm sprout powder in a 50 ml conical flask. Add 20ml of DM water. Mix it well. Then, the conical flask is covered with a cotton plug. And kept in an autoclave at 121℃ for 1 hour.

Nutrient agar preparation

Take 100mg of nutrient agar in a 50 ml conical flask. Then add 20ml of DM water. Mix it well. Then, the conical flask is covered with a cotton plug. And kept in an autoclave at 121℃ for 1 hour.

Lactobacillus preparation

Take 1g of *Lactobacillus* powder in a test tube followed by adding10 ml of DM water. Mix it well.

Colorimeter absorbance

The calorimeter was used to measure the absorbance of the sample. In this, cuvette 1 is used as a test sample and cuvette 2 is blank. And two cuvettes for nutrient agar. Cuvette 1 is control and cuvette 2 is blank. The remaining cuvette is used for DM water. Add 500 µl of *Lactobacillus* into cuvette 1 of the palm sprout. Add 500 µl of *Lactobacillus* into the cuvette 1 of the nutrient agar and mix properly. Inert test tube containing black solution. Set blank controls judicially to read 000 on display. Replace the test tube containing the palm sproutand nutrient agar solution. Then note the display reading every 2hrs until 24 hrs.

Results

Determination of physicochemical properties

Determination of loss on drying

In the study of physicochemical properties of Palm sprouts to determine the loss on drying by heating the powder sample below its melting point in a hot air oven at 105℃ for 3 hours to loss the moisture content in the powder and it includes all volatile matter and solvents. Removing not only water but all other volatile impurities like alcohol. Sample powder is weighed before and after treatment, and the weight difference is measured (Figure 3). The % of LOD was determined as 2.7919 %. Pulp should be dried for storage since its shelf stability increases with decreasing moisture content.

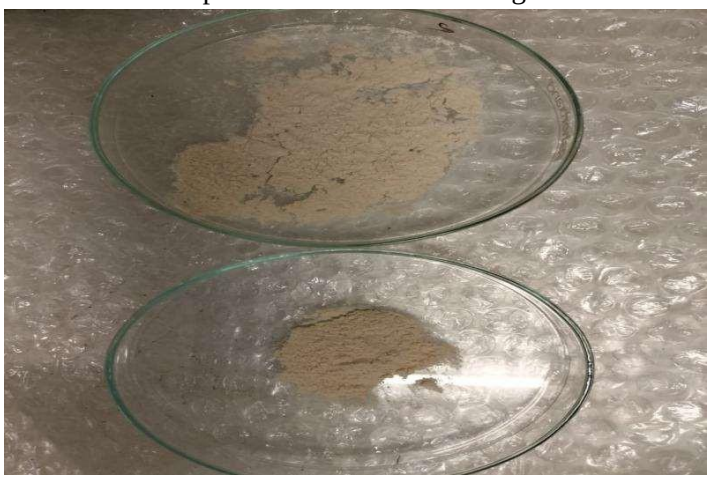

Figure 3. Loss on Drying

Determination of ash content test

The purpose of ashing crude pharmaceuticals is to get rid of any biological debris that might interfere with an analytical result. The amount of ash in a crude medicine tells you how carefully it is made. Particularly when silica might be present or when the calcium oxalate composition of powder medicine is particularly elevated, a greater restriction of acid-insoluble ash is added. Before ashing and manufacturing, several researchers advised combining acids like $H_2SO_4$with the powdered crude medication beforeashing and sulfating the ash, which makes it typically less flammable than regular ash (Figure 4). Eventually, the total ash content was determined as 2.46 %.

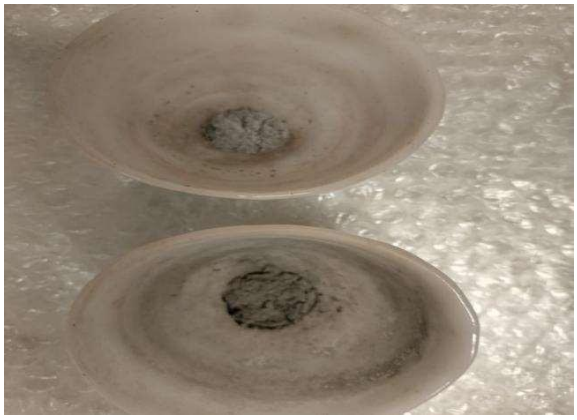

Figure 4. Ash Content Test

Determination of crude fiber content test

Crude fat

The fresh pulp of the sample had 0.8% fat content. This value is comparable to that reported by Sankaralingam et al. and is comparatively high when compared to other pulps (Figure 5).

Figure 5. Palm sprout fiber and fat content

Carbohydrate

Carbohydrate was the pulp's main ingredient. The study's value for fresh pulp was 25.27%, indicating a greater level of carbohydrates.

Microbial growth colony count of palm sprout

In the growth of the microorganism in the palm sprout the fibers that nourish the good bacteria lactobacillus organism colony grow in the palm sprout medium. Incubate in a BOD (Biochemical Oxygen Demand) Incubator for 24 hours the colony grew after 12 hours in the palm sprout medium. The colony count increases gradually. Until 24 hours colony count is noted for the microbial growth and the comparative results between palm sprout and agar was shown in Figure 6. From this, it was clear that the nutrient agar's colony count is higher than the palm sprouts. However, it has the microorganism's growth to enhance the gut microbiota when intake of palm sprouts as the prebiotics (Figure 6).

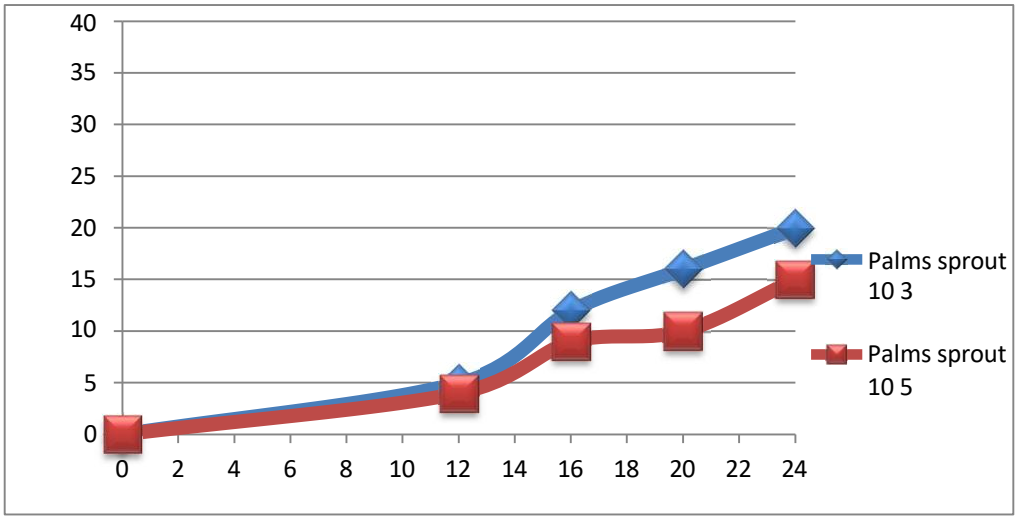

Figure 6. Microbial growth of palm sprout colony

UV-colorimeter

The ability of Colorimeter to gauge light wave absorption. When measuring color, electromagnetic radiation's alteration in brightness in the visible wavelength part of the spectra after it has been reflected or transmitted by an object or solution specimen is recorded. At 570nm measuring the absorbance of palm sprout and nutrient agar. Set blank controls judicially to read 000 on display. Replace the test tube containing the palm sprout & and nutrient agar solution. Then note the display reading at 2hrs once till 24 hrs. We use the two blank solutions one is palm sprout and nutrient agar as the blank

solution another one is the DM water as the blank comparing the absorbance reading in both blank solutions. And also measuring the absorbance reading for 24 hours at the difference of 2 hours(2,4,6,16,24) and 30 minutes at the difference of (5,10,15,20,25,30). Just analyzing whether the palm sprout sample enhances the gut microbiota health using the prebiotics (Figure 7-10).

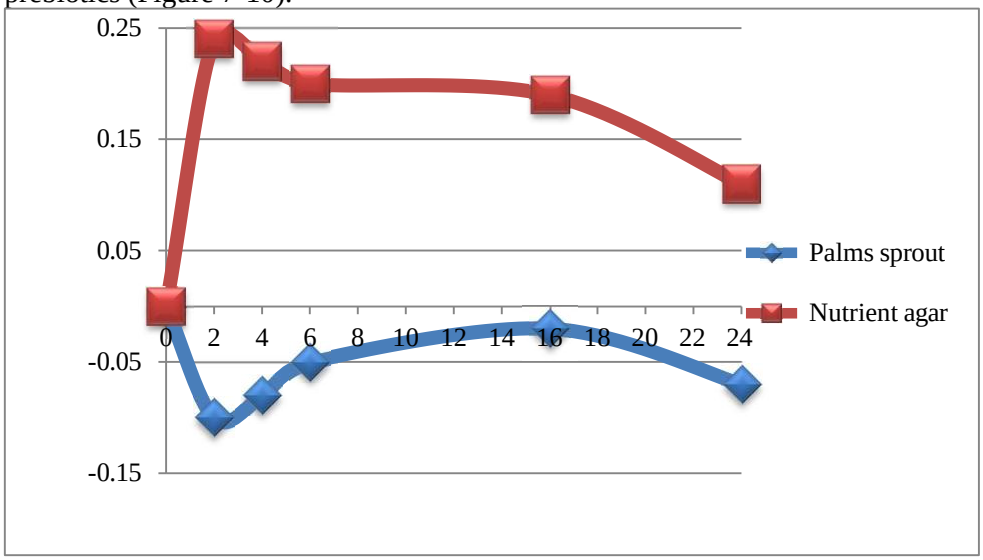

Figure 7. Absorbance of Nutrient Agar and Palm Sprout by Colorimeter
Graph for hours (palm sprout as blank)

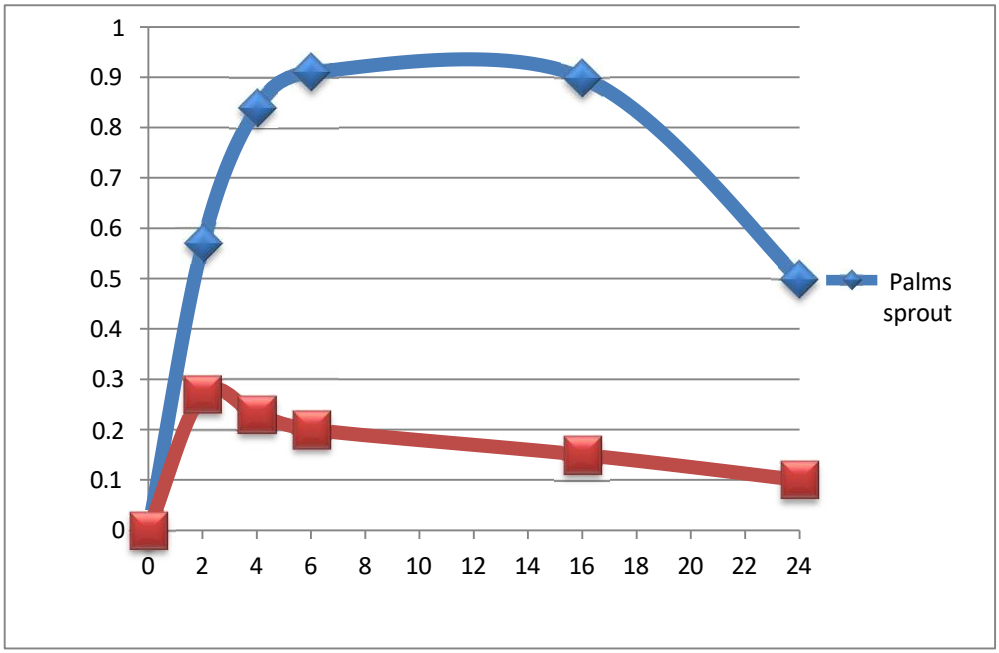

Figure 8. Absorbance of Nutrient Agar and Palm Sprout by Colorimeter
Graph for hours (water as blank)

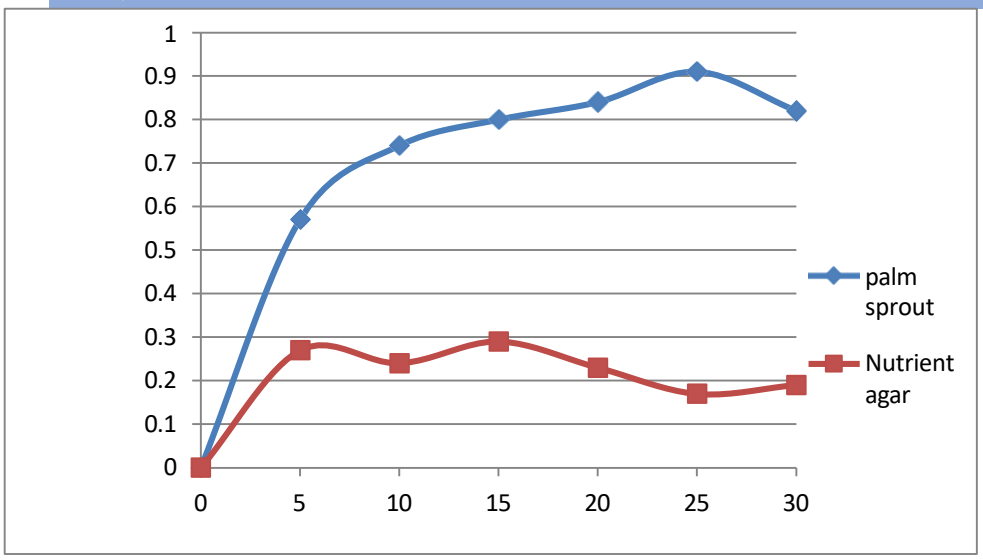

Figure 9. Absorbance of Nutrient Agar and Palm Sprout by Colorimeter
Graph for Minutes

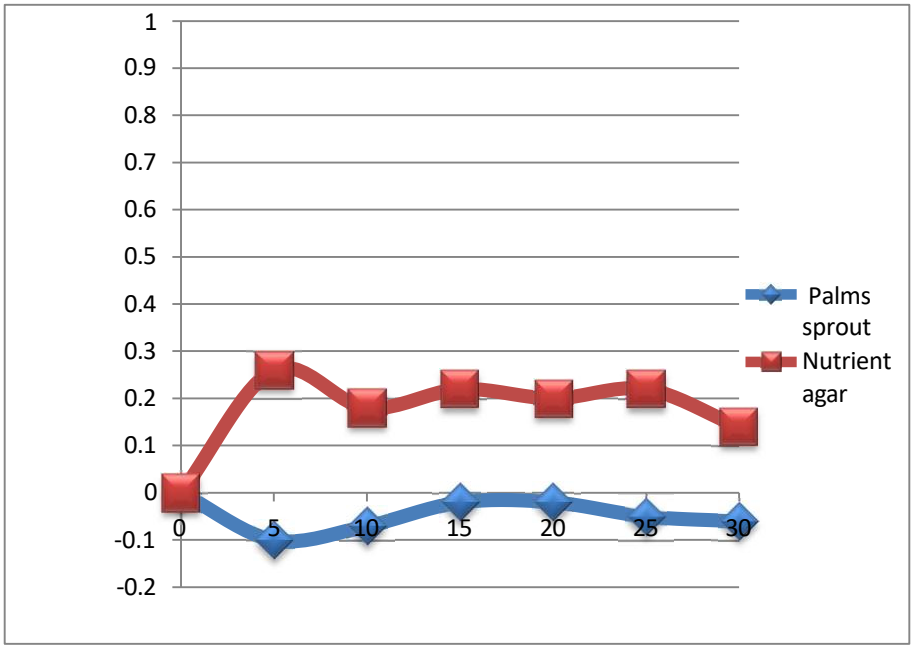

Figure 10. Absorbance of Nutrient Agar and Palm Sprout by ColorimeterGraph for minutes

Conclusion and Discussion

Our study outcome revealed enhancement of gut-microbiota health using prebiotics from palm sprouts. The powder characterization is analyzed for palm sprouts. For the microbial growth of the palm sprout and nutrient agar. In the medium preparation of the palm sprout, the solution dissolved in the 2 g of agar-agar to solidify. The nutrient agar medium preparation is kept in the autoclave for 1 hour for sterilization. To avoid the contamination from the bacteria. The bacteria growth in the medium after 12 to 16 hours in the palm sprout and nutrient agar was visible to the vision. The *Lactobacillus* organism is diluted at the different concentrations 10^3 and 10^5. In the palm sprout medium, the lactobacillus colony ispresent. so, the palm sprout enhances the gut microbiota health.From this study, wedetected that the palm sproutcontains, the LOD was determined as 2.7919 %.The total ash and fat content was determined as 2.46 % and 0.8 % respectively. The carbohydrate content was identified as 25.27%. The values givessignificant values which

can utilized direct or combined with otherpulps for preparation of foods and has a lot of potential in the food industry, especially its uses as nutritional enrichment in food and foodbased products. Here, we just checked the palm sprout growth not compared with the nutrient agar. It aids in decreasing body heat and avert irregular stool. It contains more fiber so; it reduces weight and cholesterol. It prevents stomach problems and helps to improve immunity. Palmyra sprouts can strengthen the bones and are good for the uterus.

Additional Information

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue. Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue. Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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Conflict of interest statement

"Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement, etc.) that might pose a conflict of interest in connection with the submitted article".

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