International Journal of Multidisciplinary Research and Technology
ISSN 2582-7359, Peer Reviewed Journal, Impact Factor 6.325
www.ijmrtjournal.com

CRITICAL EVALUATION FOR REMOVING BITTERNESS IN AVOCADO SEEDS FOR THE PRODUCTION OF READYMADE SNACKS

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Abstract:

Avocado seeds, often overlooked, are rich in nutrients and phenolic compounds that offer various health benefits. This study investigates the possible uses and capabilities of avocado seeds as an ingredient in ready-to-eat snacks, highlighting their nutritional value and culinary versatility. The study evaluates the preparation process of avocado seed samples for friction cooking and chemical analysis, focusing on maintaining sample integrity and standardizing procedures. Additionally, it examines the utilization of a friction cooker for processing avocado seeds into snacks, emphasizing controlled processing parameters and product customization. The study examines how altering water volume and boiling duration affects the overall phenolic content in avocado seeds during the pretreatment process, offering valuable insights into extraction efficiency. Furthermore, it compares the phenolic content of unprocessed and processed avocado seeds, highlighting the importance of pretreatment strategies in maximizing phenolic compound removal. While the study provides valuable insights, areas for improvement, such as detailing friction cooking parameters and providing references for statements, are identified to enhance reproducibility and credibility. Overall, this research sheds light on the potential of avocado seeds in culinary applications and underscores the need for further refinement to advance the field.

Keywords: Avocado Seeds, Phenolic Compounds, Ready-to-Eat Snacks, Friction Cooking, Bitterness Removal, Nutritional Value, Bioactive Compounds, Antioxidants, Soluble Fiber, Snack Processing, Pretreatment Techniques, Food Innovation, Health Benefits

Introduction:

Avocado (Persea americana) is highly popular for its creamy texture and diverse culinary uses, yet its often-overlooked seed harbors considerable nutritional potential. Rich in antioxidants, fiber, and essential minerals like potassium, magnesium, and calcium (Dabas et al., 2013), avocado seeds offer versatility in ready-to-eat snacks. By drying and grinding them into a powder, they can be seamlessly integrated into various dishes such as smoothies, oatmeal, and baked goods, enhancing both flavor and nutritional content (Dabas et al., 2013). Moreover, their soluble fiber content aids digestion and promotes satiety (Bhatt & Tirmale, 2018).Research indicates that avocado consumers typically ingest more essential nutrients such as dietary fiber, vitamins K, E, potassium, and magnesium compared to non-consumers (Fulgoni et al., 2010a). Despite their nutritional value, avocado seeds remain underutilized in cooking. However, innovative methods are emerging, with avocado seeds being employed in a range of culinary products, from infused oils to powders. Ground avocado seed powder enriches baked goods, savory dishes, and smoothies without compromising flavor. Additionally, avocado seed oil, extracted through cold-pressing techniques, offers a healthy cooking alternative with a high smoke point suitable for various culinary applications. Avocado seeds constitute a significant portion (13%-17%) of the fruit and are replete with functional and bioactive elements such as polysaccharides, proteins, lipids, minerals, and vitamins (Melgar et al., 2018; Tremocoldi et al., 2018). These seeds contain diverse bioactive compounds like phenolics, flavonoids, and condensed tannins, with documented health benefits including anti-hyperglycemic, anti-cancer, anti-inflammatory, and antioxidant properties (Tremocoldi et al., 2018; Lara-Marquez et al., 2020; Dabas et al., 2019; Uchenna et al., 2017; Soledad et al., 2021; Villarreal-Lara et al., 2019). Due to their safe composition, avocado seeds serve as valuable natural sources for the food, pharmaceutical, and cosmetic industries (Tremocoldi et al., 2018). In summary, avocado seeds, brimming with essential nutrients, fiber, and antioxidants, offer myriad culinary possibilities and health benefits. Leveraging the potential of avocado seeds can enhance both the nutritional quality and appeal of meals, providing an opportunity for culinary innovation and improved well-being.

Critical Evaluation:

For preparation Raw materials:

The research was about the process of preparing avocado seed samples for friction cooking and subsequent chemical analysis.

The collection of avocado seeds from the production line at Olivado NZ Ltd and their storage with dry ice during transportation to the laboratory indicates efforts to maintain sample integrity and prevent degradation. Storing the seeds in a freezer at -18 °C is a standard practice for preserving biological samples. This ensures minimal degradation until further processing.

Crushing the avocado seeds into small particles using a mortar and pestle followed by sieving to select particles between 2 mm to 4 mm ensures uniformity in sample size, which is crucial for consistent results in friction cooking. The decision to either boil the samples in water before freeze-drying or directly freeze-drying them could impact the chemical composition of the samples. However, the basis behind this choice is not clearly stated. If reasoning for this decision and possibly compare the effects of both methods on the final results are provided then it will be more beneficial. The description of the friction cooking process lacks detail. It would be beneficial to include parameters such as temperature, pressure, and duration of the process to ensure reproducibility and facilitate comparison with other studies.

For processing avocado seeds into readymade snack:

The utilization of a single screw Zapmill™ friction cooker model Mark 8 from New Zealand for processing avocado seed samples into ready-to-eat snacks is an interesting approach. This technology might offer advantages such as efficient heat transfer and uniform processing. The specification of parameters like screw shaft rotation speed (35 Hz) and feed flow rate (70 g/min) indicates a controlled processing environment, which is crucial for consistency and reproducibility. The use of an 8 mm extrusion die can determine the final product's shape and texture. This controlled extrusion process allows for customization and optimization of snack characteristics. While the model of the friction cooker is provided, details regarding its specific capabilities, design features, and performance characteristics are lacking. Providing this information would enhance the understanding of the equipment's suitability for this application. The selection of the 8 mm extrusion die is mentioned, but the rationale behind this choice is not provided. Different die sizes can impact the texture, shape, and density of the final product. Therefore, justification for this specific die size would strengthen the methodology. t's essential to provide references and citations to support the choice of equipment and parameters. Including studies or technical specifications that validate the effectiveness of the Zapmill™ friction cooker for processing similar materials would enhance the credibility of the methodology.

For provided results and discussions:

The study design includes testing 3 different avocado seed to boiling water ratios (1:5, 1:15, and 1:30), providing a range of conditions to assess their impact on TPC. This systematic approach allows for comprehensive evaluation and comparison of results. The observed decrease in TPC with increasing water volume up to a certain ratio (1:15) suggests that more water leads to higher dilution of phenolic compounds extracted from the avocado seeds. The insignificant impact on TPC beyond a 1:15 ratio implies that there may be a saturation point where further addition of water does not significantly affect the extraction efficiency. This observation is valuable for optimizing extraction protocols. While the study provides useful perception, it's important to acknowledge potential limitations. For instance, the use of only one boiling time (10 minutes) may not fully capture the kinetics of phenolic compound extraction. Testing additional boiling times could provide a more comprehensive understanding of the process. The study effectively investigates the effect of boiling time on TPC in avocado seeds, offering valuable insights into the kinetics and mechanisms of extraction. The incorporation of mechanistic understanding enhances the scientific rigor of the study and contributes to the optimization of the pretreatment process for phenolic compound extraction.

The study also compares the TPC of unprocessed avocado seeds with those subjected to friction cooking, with and without pretreatment through boiling. This design allows for the assessment of the impact of both frictions cooking and pretreatment on TPC reduction. The significant reduction in TPC with pretreatment before friction cooking (80% reduction) highlights the importance of pretreatment strategies in enhancing the efficiency of TPC reduction.

This finding has implications for the development of processing protocols aimed at maximizing phenolic compound removal while minimizing adverse effects on other desirable attributes of the final product. The study comprehensively analyzes the phenolic compound profile of avocado seed samples at various processing stages, providing valuable insights into the impact of processing techniques on phenolic content. The identification and quantification of eight major phenolic compounds, along with the consideration of their reported sensory attributes (bitterness and astringency), add depth to the analysis. This approach allows for a more holistic understanding of the implications of phenolic compound removal during processing. However, the study provides valuable insights, limitations such as the lack of information on the specific conditions of friction cooking (e.g., temperature, duration) and the absence of references for certain statements (e.g., thermal stability of phenolic compounds) could be addressed to enhance the credibility of the findings. Additionally, further analysis of the sensory attributes of the final product, such as bitterness and astringency, could provide additional context for understanding the implications of phenolic compound removal on product quality. The presentation of data in Table 2, showing the phenolic compound content at each processing stage, is clear and concise.

Response:

I partially agree with this paper as it has many pros and cons. The efforts to maintain sample integrity during collection and transportation, as well as the standard practice of storing samples in a freezer at -18°C, demonstrate meticulous attention to sample preservation. The lack of detail regarding the friction cooking process, particularly parameters such as temperature, pressure, and duration, is noted. Including this information would improve reproducibility and facilitate comparison with other studies. Clarification on specific conditions of friction cooking and inclusion of references for statements would enhance credibility. Overall, the study contributes valuable insights into the preparation and processing of avocado seed samples. Addressing the noted recommendations would further enhance the rigor and credibility of research.

Conclusion:

In conclusion, the critical evaluation of the research on the preparation and processing of avocado seed samples for friction cooking and chemical analysis reveals both strengths and areas for improvement. The efforts to maintain sample integrity during collection and transportation, along with standard practices for sample preservation, indicate commendable attention to detail.However, certain aspects such as the lack of detail regarding the friction cooking process parameters and the absence of references for certain statements raise concerns regarding reproducibility and credibility. Providing clarification on the specific conditions of friction cooking and including references to support statements would strengthen the research's validity.Overall, while the study provides valuable insights into avocado seed sample preparation and processing, addressing the noted recommendations would enhance the rigor and credibility of the research. Therefore, further refinement in methodology and documentation is warranted to ensure the research's integrity and contribute meaningfully to the field.

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