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AN OVERVIEW OF PHYSICAL AND CHEMICAL PROPERTIES METHOD FOR FRUITS AND/OR VEGETABLES

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Abstract:

The paper reviews recent studies on the method of obtaining physical and chemical properties of fruits and/or vegetables which pointing out the characteristics of the fruits. Some of the authors describe the fruits as underutilized fruits because the species is unexposed to the public with its advantages and currently being handled manually. Additionally, the journal mostly highlighted the purposes of the fruits and/or vegetables to humans. This study aims to determine the best method of acquiring physical and chemical properties of fruits and/or vegetables to provide applicable details in order to contribute an improvement to practical information to ease machine design for handling and processing.

Keywords:

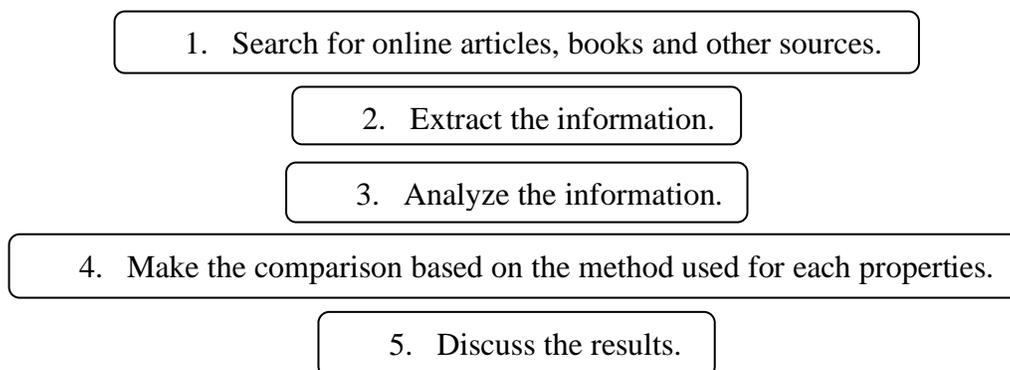
Method; Physical and chemical properties; Review

Objectives:

- To differentiate the method to gather some physical properties of fruits and vegetables which could be advantages to develop the appropriate technologies for fruits processing and handling.
- To investigate some methods to obtain chemical properties of fruits and vegetables which could be useful to investigate the nutrient content of the fruits.

Methodology:

For the review and comparison paper, the methodology use is more on reading and analyzing the data from the article, journal, and books. The very first step is to search for an online database for sources in researching the paper. There is a lot of databases that can be used to search the articles that are useful for this review paper such as Science Direct, Academia, Sci-hub, and few other sites. The straightforward way to ease the research is to find the article that synchronizes with the title. The next step is to extract the information from the found articles. Then the data obtained need to be analyzed. The analyzed data is then classified into physical methods and chemical methods. The comparison will be made with the data extracted from the articles. Last but not least, the results will be discussed and choose the best physical and chemical methods to be used in analyzing fruits and/or vegetables' physical and chemical properties



Results:

Based on all the methods reviewed, some methods used are outdated. This is relevant because the more accurate method was not published in the 1980s. For instance, the method for moisture content from AOAC 1984 method is less accurate due to moisture determination has a significant loss which resulting in measurement errors. Thus, the latter method was adopted in the ASAE standard method (2003). As stated, there is no standard procedure published for the determination of the moisture content in further discussion but some scientists contend that drying at 103⁰C drives off volatiles other than water and that 103⁰C should not be used under any circumstances.

There is some discrepancy in the method for obtaining the dimension and mass of the fruits which is the accuracy for the tools which 0.01 and 0.001. This also happened for the calculation for the surface area as some of the fruits and vegetables are not spherically in shape, hence it will lead to inaccurate data in order to create a machine to process the fruits. Then the geometric mean diameter (D) is used to standardize the value of the diameter.

For attaining the sphericity, aspect ratio, volume, true and bulk density, and porosity do not have any differences in the methods. For the coefficient of static friction, three surfaces are used, some of the researchers used four surfaces to compare the friction.

In determining the chemical properties of fruits, the value of pH is determined is used glass-electrode methods via pH meter. The glass-electrode method uses two electrodes, a glass electrode, and a reference electrode, to determine the pH of a solution by measuring the voltage

between them. This is one of the commonly used for pH measurement because the method can be used on various types of solutions with oxidizing or reducing substances. It's widely used and not only use in industry but also in other fields.

The hydrogen-electrode which is standard among the various method for measuring pH. Since there is a lot method to determine the pH of the fruits, measuring pH value using indicator become irrelevant because it has a various error which due to the temperature, high salt concentration and organic substance in the test liquid.

The vitamin C method of determination used is using 2, 6 – dichlorophenolindophenol (DCPIP) solution via the visual titrimetric method described by AOAC (2005) standard method. This method can lean towards human error. Other than that, UV-VIS or direct ultraviolet spectrophotometry, potassium permanganate as the chromogenic reagent is more accurate compared to the former method as it is widely used for industrial purposes.

The most common method for sugar content determination is liquid chromatography (HPLC) using a refractive index (RI) detector due to the simplicity of analysis, lower costs of equipment and reagent when compared with other techniques. But the method used for sugar content determination in most of the previous literature is using the refractometer.

Conclusion:

The study revealed the physical and chemical properties identification method for fruits and vegetables has improved over the years and some studies have shown an improvement in results accuracy due to the advancement in the technology nowadays. Even though some of the methods are simple, it is reliable and can provide an excellent result for the determination of physical and chemical properties of fruits and vegetables. Analysis of the journal reviewed in this project shows that the uses of modern technologies ease the detection of fruits properties. It is recommended that higher accuracy equipment such as the spectroscopy method and chromatography method is used for analysis in the chemical properties of the fruits. Even for measurement of the dimension of the fruits can use laser technologies, it is not recommended since it needs high-cost pieces of equipment but it is widely used in many industries.