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PHYTOCHEMICAL SCREENING AND ANTIOXIDANT ACTIVITY ON THE COMPOSITION OF *Selenicereus undatus* and *Musa acuminata* Colla

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ABSTRACT:

A different study shows that certain plants have medicinal properties that are used for the treatment of some diseases. Specifically, fruits and vegetables have many bioactive components that are part of the human diet. Fruits have the capability to improve health and protect against non-communicable diseases such as autoimmune diseases, heart disease, diabetes, cancer, and neurodegenerative disease. This study focuses on the composition of two fruits, *Selenicereus undatus* (dragon fruit) and *Musa acuminata* Colla (red banana), and their activity. This fruit extract is prepared using a hydroethanolic extract. The plant extract undergoes phytochemical screening, Antioxidant.

Keywords **- Bioactive compounds, Fruits, Hydroethanolic solution, Composition, Antioxidant.**

INTRODUCTION

In recent years, the plant kingdom has become a wide source of potential drugs that offer several health benefits to humans. A variety of studies have indicated that certain plants can be used as remedies for various diseases (Bassiag *et al.,* 2023b). Consumption of fruits may be part of religious practices and as nutritional therapy in different human traditions around the world. Studies show that the role of fruits and their nutrients in protecting against NCDs could be stronger than that of vegetables (Chang *et al.,* 2016). In this study, the work focuses on white dragon fruit *(Selenicereus undatus)* and red banana (*Musa acuminata* Colla*)* with the aim of identifying the bioactive compounds present in these fruits and estimating their potential therapeutic effects (Bassiag *et al.,* 2023c). *Selenicereus undatus* (White Pitaya), which has red-skinned fruit with white flesh (Rathi *et al.,* 2023), *Musa acuminata* Colla (Red banana) has flesh that is cream to light pink in color with reddish-purple skin (Raja *et al.,* 2022). By studying their phytochemical properties, it is required to harness their goodness into the diet of the people (Saikia *et al.,* 2016). These phytochemicals possess very strong antioxidant activities and exhibit antimicrobial, anti-inflammatory, antispasmodic, antiviral, and neuroprotective activities (Kumar *et al.,* 2023). This is to highlight the benefits of phytochemical screening and Antioxidant on the composition of the fruits *Selenicereus undatus* and *Musa acuminata* Colla (Al-Snafi, 2021).

MATERIALS AND METHODS

Collection of plant samples

Selenicereus undatus (white dragon fruit) and *Musa acuminata* Colla (red banana) are collected at Avarampalayam, Coimbatore, Tamil Nadu, India.

Extraction methods

The collected samples are cleaned properly. Two fruits are taken in equal amounts (1:1), cut into small pieces, and ground by mortar and pestle into a fine mixture. The mixture is soaked in the prepared 70% ethanol solvent. The extracts of the sample are prepared at 25g in 100 ml (1:4) of hydroethanolic solvent in a conical flask and mixed well. Then aluminium foil paper is used to seal the conical flask and mark it for identification. The extracts are stored at room temperature for 24 hours. The extract is used for phytochemical and antioxidant analysis (Kibria *et al.,* 2019).

PHYTOCHEMICAL EVALUATION

Qualitative analysis

Detection for Alkaloids (Wagner's test)
A 1 ml of extracts is treated with a few drops of Wagner's reagent, and the formation of a reddish-brown precipitate confirms the presence of alkaloids (Santhi & Sengottuvel, 2016).

Detection of Saponins (Foam test)
About 0.5 ml of the extract was shaken with five ml of distilled water. The formation of frothing (the appearance of a creamy mass of small bubbles) shows the presence of saponins (Santhi & Sengottuvel, 2016b).

Detection of Tannins (Blaymer's test)
2 ml of extracts were taken into a test tube, and a few drops of 10% ferric chloride were added. A blue-green black color indicates the presence of tannin (Kibria *et al.,* 2019b).

Detection of Glycosides (Borntrager's Test)
2 ml of extract were mixed with 3 ml of $CHCH_3$. The chloroform layer is separated, and a 10% ammonia solution is added carefully and shaken gently. A pink color indicated the presence of glycosides (M. Gupta *et al.,* 2013).

Detection of Terpenoids (Salkowshi Test)
A few ml of chloroform was added to the extract, and the mixture was homogenized. Then, a few drops of conc. sulfuric acid are added. A red-brown color formed, indicating the presence of terpenoids (Usta *et al.,* 2020).

Detection of Flavonoids (Pew's test)
5 ml of the extract was mixed with 0.1g of metallic zinc and 8 ml of concentrated sulfuric acid. The mixture was observed to have a red color as an indication of flavanols (Shaikh & Patil, 2020).

Detection of steroids (Salkowski's test)
2 ml of extract is mixed with 2 ml of chloroform, and then 2 ml of concentrated sulfuric acid is added. The formation of a red color and yellowish green fluorescence indicate the presence of steroids (Ishaku *et al.,* n.d.).

Detection of carbohydrate (Benedict's test)
Extract was mixed with 2 ml of Benedict's reagent and boiled. The formation of a reddish-brown precipitate indicates the presence of carbohydrate (Yadav & Agarwala, n.d.).

ANTIOXIDANT ACTIVITY

DPPH Radical Scavenging Assay

The antioxidant activity of the extract is analyzed using the DPPH free radical scavenging assay. In a series of test tubes, 0.5–2.5 ml of ascorbic acid is added as standard. In a series of test tubes, 0.5–2.5 ml of sample is added, respectively. Then 0.5 mL of a 0.2 mg/mL DPPH solution is added to all test tubes. Volume is made up to 3 ml with ethanol. The mixture is shaken vigorously and allowed to stand at room temperature, protected from light, for 30 minutes. A control is prepared using 0.5 ml of filtrate/ascorbic acid. 80% ethanol was taken as a blank. Absorbance is measured at 517 nm by a UV spectrophotometer (Mahdi-Pour *et al.*, 2012).

$$\% \text{ of Inhibition} = \frac{\text{Absorbance of control} - \text{Absorbance of standard}}{\text{Absorbance of control}} \times 100$$

The Ferric Reducing Antioxidant Power (FRAP) Method

The antioxidant activity of all extracts is determined using the ferric-reducing antioxidant power (FRAP) method. In a series of test tubes, 0.5–2.5 ml of ascorbic acid is used as a standard. In a series, 0.5 ml of sample is added, respectively. Then 3.8 mL of FRAP reagent was added. This reagent is prepared by mixing 10 parts of 300 mM sodium acetate buffer solution at pH 3.6, 1 part of 10 mM TPZT, and 1 part of 20 mM $FeCl_3$ hexahydrate. The resulting mix is incubated for 30 minutes at 37 °C. The absorbance increase is measured at 593 nm in a UV spectrophotometer. A control is prepared using 0.5 ml of the respective vehicle in place of filtrate or ascorbic acid. Blank reacted with distilled water (Chaves *et al.*, 2020).

$$\% \text{ of Inhibition} = \frac{\text{Absorbance of control} - \text{Absorbance of standard}}{\text{Absorbance of control}} \times 100$$

Hydrogen Peroxide (H_2O_2) Scavenging Assay

The antioxidant activity of individual extracts is evaluated using the H_2O_2 method. 0.5 ml, 1.0 ml, 1.5 ml, 2.0 ml, and 2.5 ml samples were added with 3.4 ml of 0.1 M phosphate buffer and 0.6 ml of 40 M H_2O_2. This mixture is incubated for 10 minutes at room temperature. After incubation, absorbance is read at λ max 230 nm against blank solution. Ascorbic acid is used as a standard at different concentrations. A control is prepared using 0.5 ml of the respective vehicle. The percentage scavenging of H_2O_2 is calculated using the equation (M. Gupta *et al.*, 2022).

$$\% \text{ Scavenging of } H_2O_2 = \frac{\text{Absorbance of control} - \text{Absorbance of standard}}{\text{Absorbance of control}} \times 100$$

RESULTS AND DISCUSSION

COLLECTION OF PLANT SAMPLES AND EXTRACTION METHODS

The plant samples are collected at a department store in Coimbatore, Tamil Nadu, India. The composition of *Selenicereus undatus* and *Musa acuminata* Colla (1:1) is extracted using a 70% hydroethanolic solution.

Figure1: Composition of *Selenicereus undatus* and *Musa acuminata* Colla (1:1) of 70% hydroethanol

PHYTOCHEMICAL EVALUATION

The phytochemical result shows that it has bioactive compounds.

Table 1 Qualitative phytochemical screening

Metabolites	Test	Result
Alkaloids	Wager's test	+
Saponins	Foam test	+
Tannins	Blaymer's test	+
Glycosides	Borntrager's test	–
Terpenoids	Salkowshi test	+
Flavonoids	Pew's test	+
Steroids	Salkowski's test	+
Carbohydrates	Fehling's test	+

(+: Presence, –: Absence)

Analysis of the extract revealed the presence of alkaloids, saponins, tannins, terpenoids, flavonoids, steroids, carbohydrates, and the absence of glycosides.

ANTIOXIDANT ACTIVITY

DPPH Radical Scavenging Assay

The inhibition of antioxidant activity increases with the concentration of the extract. This extract shows radical scavenging activity by DPPH with ascorbic acid as a standard compared to the sample.

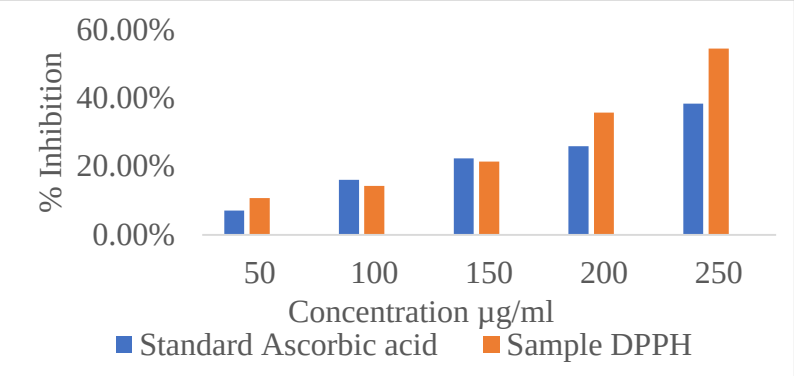

Figure 2: Evaluation of DPPH assay

In comparison to ascorbic acid, the fruit sample extract showed 10.71%, 14.29%, 21.43%, 35.71%, and 54.46% of inhibition, with a high of 54.46% at the 50 µg/ml concentration of the extract.

The Ferric Reducing Antioxidant Power (FRAP) Method

The fruit extract was investigated using the Ferric Reducing Antioxidant Power (FRAP) assay.

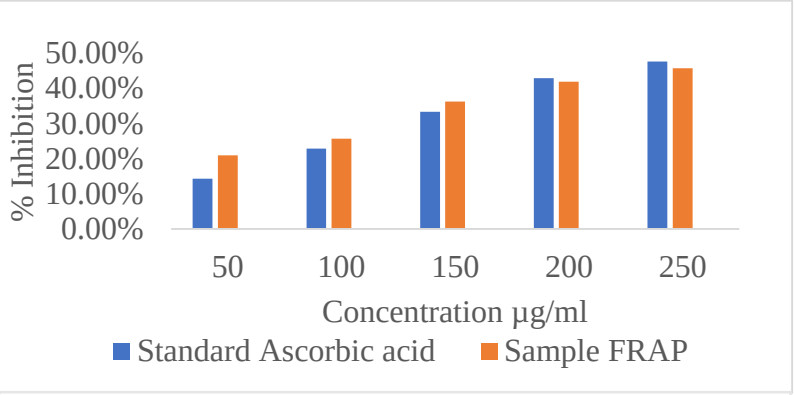

Figure 3: Evaluation of FRAP method

In comparison to the fruit extract, the FRAP assay evaluation showed 20.29%, 25.71%, 36.19%, 41.90%, and 45.71%, with a maximum inhibition of 45.71% at 50 µg/ml concentration of extract. Ascorbic acid was used as a reference.

Hydrogen Peroxide (H_2O_2) Scavenging Assay

The inhibition activity of the fruit sample is analyzed by the H_2O_2 Scavenging Assay.

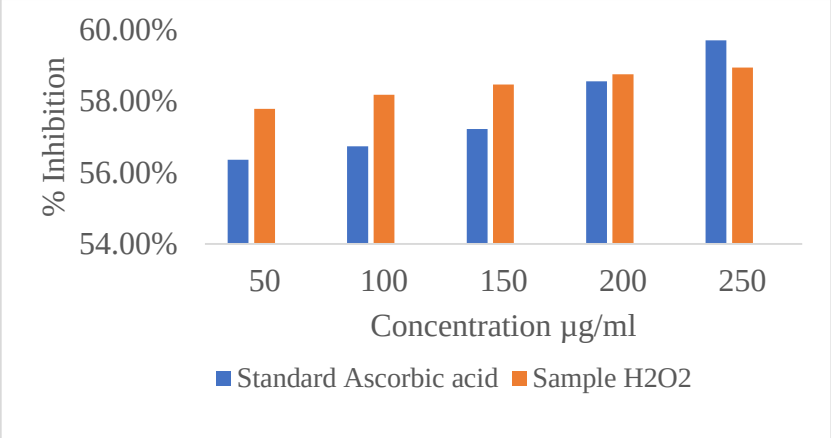

Figure 4: Evaluation of H_2O_2 Scavenging Assay

Estimation by the H_2O_2 method with ascorbic acid as a standard compared to fruit extract exhibited 57.79%, 58.18%, 58.47%, 58.76%, and 58.95% and a maximum inhibition of 58.95% at the extract concentration.

CONCLUSION

The current study shows that the composition of *Selenicereus undatus* and *Musa acuminata* Colla (1:1) has alkaloids, saponins, tannins, terpenoids, flavonoids, and carbohydrates. Many studies have confirmed that these phytochemical compounds provide medicinal properties to plants. The extract has strong antioxidant activity, which reduces oxidative stress and reduces disease caused by free radicals. Furthermore, studies need to analyse and understand a clear thought representing a combination of fruits.

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