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Antioxidant Properties of Oyster Plant (Tradescantia Spathacea) Extracts using Different Methods.

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Graphical Abstract

Figure 1. Oyster Plant (*Tradescantia spathacea*) from the Organic Garden at St. Thomas University.

Abstract

Plants are a large source of antioxidant compounds. This project presents the determination of the antioxidant capacity of the Oyster Plant (Tradescantia Spathacea). The samples consisted of ethanol/hexane extracts of the stems, roots, and leaves. The antioxidant activity was measured by three different assays: ferric reducing anti-oxidant power assay (FRAP), DPPH free radical scavenging (FRS) method *in vitro* antioxidant activity and is expressed as ascorbic acid (AA) equivalent antioxidant capacity (mg AA/100g). The total phenolic content (TPC) was determined with the Folin-Ciocalteau reagent and expressed as mg/g gallic acid equivalents (GAE). This study showed that Tradescantia Spathacea extracts contain a number of health promoting bioactive compounds, such as phenolic compounds, and are potential sources of natural antioxidants.

Introduction

Medicinal plants and plant derived products have been part of the health-care system since ancient human civilization. Traditional medicine is widely used, and plants are a large source of antioxidant compounds such as phenols, carotenoids, and flavonoids with potent antioxidant properties that have received much attention recently. The Oyster Plant (Tradescantia Spathacea) is a fleshy or succulent perennial garden herb ornamental plant and is found in many tropical countries. Medicinally, the plant is used for colds, sore throat, whooping cough, nasal bleeding, and is also used as an anti-inflammatory. The plant was grown in the organic garden at St. Thomas University and the ethanol/hexane extracts via maceration of the roots and leaves were analyzed to measure the antioxidant activity by three different assays: Ferric reducing power (FRAP), DPPH free radical scavenging (FRS) and total phenolic content (TPC).

Materials and Methods

Plant components were separated into three parts: leaves, roots, and stems. Extracts were prepared in different solvents: ethanol/hexane 3:1; ethanol/hexane 1:1; and ethanol alone for 24 hours. The wet portion was placed in refrigeration to prevent it from evaporating and receiving any sunlight. Ferric Reducing Antioxidant Power **(FRAP)** Assay**.** 2.5mL 0.2M phosphate buffer, 2.5mL potassium

ferricyanide, 2.5mL trichloroacetic acid, was added to 2.5mL of extracts at different concentrations. The mixtures were incubated at 50°C, centrifuged and added 2.5mL of methanol and 0.5mL of ferric acid. Absorbance values were taken at 700 nm.

2,2-diphenyl-1-picrylhydrazyl (**DPPH**) Free Radical Scavenging **(FRS)** Assay. 1 mL of different concentrated extracts were mixed with 1mL of DPPH. The test tubes were placed in a dark chamber for 30 min and 0.2 mL of each solution were placed into a well plate and read in a computer program (Gen-5).

Total Phenolic Content Assay **(TPC).** 2mL of methanolic extract solutions were mixed with 2.5mL of 7.5% sodium bicarbonate ($NaHCO_3$), and 2.5 mL of 10% Folin-Ciocalteu reagent. The test tubes were placed in an incubator shaker for 45 min at 45°C before the absorbance quantities were taken at 765 nm with a spectrophotometer.

Results and Discussion

The leaves and roots of the Oyster Plant (*Tradescantia spathacea*) were washed with tap water, dried for 2-3 days and made into a fine powder using the laboratory blender. Following that, the powder was extracted with different organic solvents by maceration to prepare the extracts. They were filtered to remove plant insoluble residue, protected from the light, and use immediately in the antioxidant assays procedures.

2,2-diphenyl-1-picrylhydrazyl (DPPH) Assay:

% Inhibition vs Concentration µg/mL
Expressed as ascorbic acid equivalent antioxidant capacity (mgAAmg/100 mg)

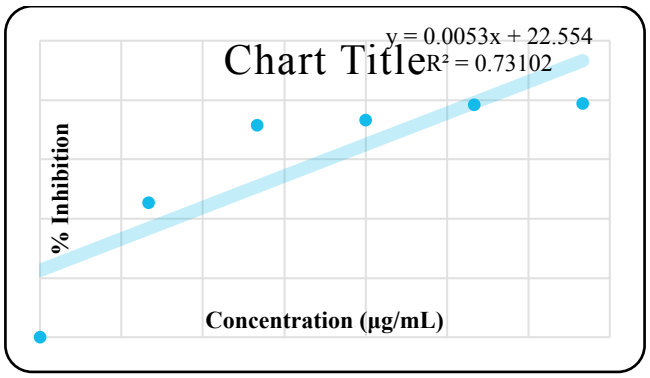

Figure 2. % Inhibition of Roots in 75/25 EtOH/hexane measured at 517 nm

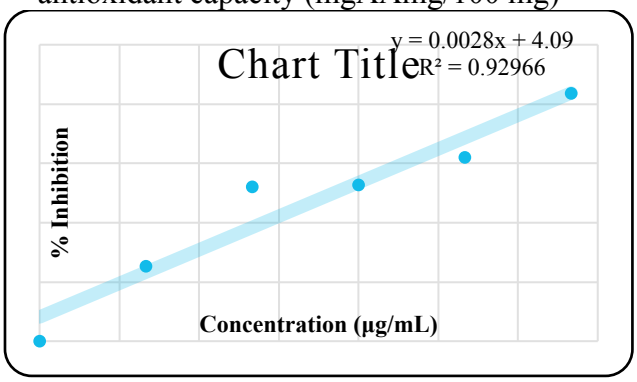

Figure 3. % Inhibiton of Roots in 50/50 EtOH/hexane measured at 517 nm

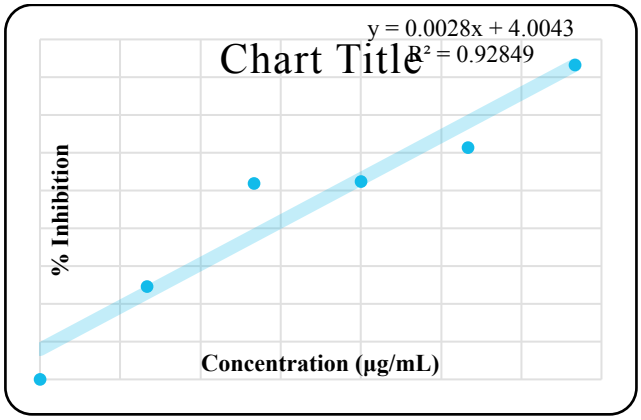

Figure 4. % Inhibition of Leaves in 50/50 Eth/Hex

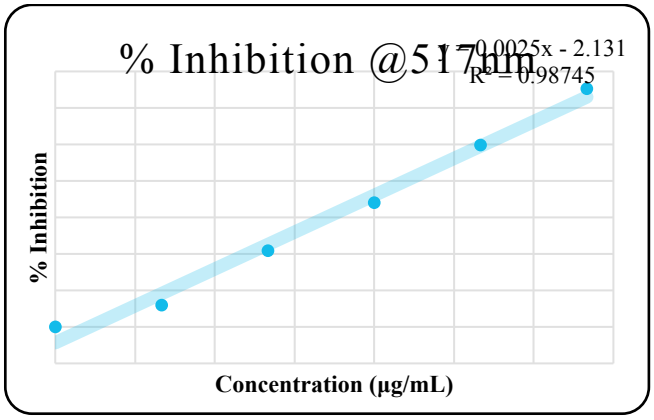

Figure 5. % Inhibition of Leaves in Ethanol

The spectrophotometric method with DPPH free readical scavenging assay applied to antioxidant capacity determination of the root extracts in 75/25 ethanol:hexane mixture generated the highest percent inhibition when we compare with other parts of the plant.

The ferric reducing power assay showed that the oyster plant extract of leaves which was placed in 100% ethanol had the highest antioxidant power. The oyster plant extract of roots which was placed in the mixture of 50:50 ethanol/hexane resulted with the highest antioxidant power.

The total phenolic content assay (**TPC**) exhibited that the roots and leaves of ethananolic/hexane solvent mixtures indicated very high values of antioxidant activity expressed in mg of gallic acid equivalent per gram of vegetal material.

Ferric Reducing Antioxidant Power (FRAP) Assay	
Plant Extract	mgAAE/g
75/25 EtOH/ Hex Leaves	3.37056 ± 0.914208266
50/50 EtOH/ Hex Leaves	2.46198 ± 0.333236353
100 EtOH Leaves	3.47914 ± 0.157170108
75/25 EtOH/ Hex Roots	3.82032 ± 0.752064523
50/50 EtOH/ Hex Roots	3.82252 ± 0.802147245
100 EtOH/ Hex Roots	2.83234 ± 0.701867310

Table 1 . Ferric Reducing Antioxidant Power (FRAP) Assay. Results shown in Mean ± SD

Total Phenolic Content Assay (TPC) Assay	
Plant Extract	mgGAE/g
75/25 EtOH/ Hex Leaves	770.32 ± 91.96666244
50/50 EtOH/ Hex Leaves	555.64 ± 33.02526306
100 EtOH Leaves	707.78 ± 44.09900226
75/25 EtOH/ Hex Roots	879.84 ± 311.7297916
50/50 EtOH/ Hex Roots	163.29 ± 120.6394879
100 EtOH/ Hex Roots	983.80 ± 103.4242960

Table 2. Total Phenolic Content (TPC) Assay. Results shown in Mean ± SD

Conclusions

The increasing interest gained by antioxidants is due to the health benefits provided mainly by natural sources. This consists in preventing the occurrence of oxidative-stress related diseases, as a consequence of the attack of free radicals in different biocomponents in the human body.

Extraction, thin layer chromatography, and various analytical methods using spectrophotometric measurements were employed for determination the antioxidant content and total antioxidant capacity. We report the preliminary study and further analysis will be made taking into account the present results.

The roots contained the highest antioxidant activity of the plant components tested. This could explain the ethno pharmacological applications of the plant. It is possible that most of the medicinal properties that have been observed could come mostly from the root components of the plant.

Further analysis of cytotoxicity and anticancer property evaluation has been started with different concentrations of plant extracts.

References

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