Evaluation of Antioxidant activity of Silver Nanoparticles of *Carica papaya* and *Camellia sinensis* aqueous extracts

B. Swapna*[1], K.B. Chandrasekhar[2], D. Madhuri[3], G. Sumathi[4]

[1]*Research Scholar, Department of Chemistry, Jawaharlal Nehru Technological University Anantapuramu. Anantapur, Andhra Pradesh, India.*
[2]*Professor, Department of Chemistry, Jawaharlal Nehru Technological University, Anantapuramu. Anantapur, Andhra Pradesh, India.*
[3]*Creative Educational Society's College of Pharmacy, Kurnool, Andhra Pradesh, India.*
[4]*Ananthalakshmi Institute of Technology, Anantapuramu, Anantapur, Andhra Pradesh, India.*
Corresponding Author: B.Swapna, Email: bswapna9494@gmail.com.

Article History: Received:15/12/22 Revised:21/12/22 Accepted: 09/01/23

Abstract

The present research study aimed to evaluate the Antioxidant activity of AgNPs of aqueous extract of seeds of *Carica papaya* and aqueous extract of leaves *Camellia sinensis* by DPPH method by measuring %scavenging activity. The diverse physical, chemical, and biological features, AgNPs have attracted more interest from researchers than other synthetic AgNPs. The optical effect of silver nanoparticles, localized surface plasmon resonance (LSPR), is size and shape dependant, AgNPs are often manufactured in non-spherical anisotropic forms. The Antioxidant activity measured by DPPH assay were 99.63% at a concentration of 350µg/ml for Cp-AgNPs and 89.63% at a concentration of 350µg/ml for Cs-AgNPs. The IC_{50} values found to be 1696.91µg/ml and 1978.5µg/ml for Cp-AgNPs and Cs-AgNPs respectively.

Keywords: DPPH, %Scavenging activity, $IC_{50,}$ Cp-AgNPs and Cs-AgNPs.

DOI: 10.48047/ecb/2023.12.1.623

1. Introduction

The papaya, often called pawpaw, is the fruit of the plant *Carica papaya*; it is the sole species in the genus *Carica* of the Caricaceae plant family. It's native to the American tropics, but it's now found all over the world.(1). Fresh papaya has a pleasant scent, high vitamin A and C content, and high fiber. Papaya skin, pulp, seeds, stems, and leaves include proteins, vitamins, and phytochemicals, including natural phenols

Silver nanoparticles have a key role in biosynthesis due to their high conductivity, chemical stability, catalytic and antibacterial activities (2,3). Silver nanoparticles have potent antibacterial and inhibitory properties, and have been utilized to treat a variety of disorders (4, 5). Metal nanoparticles can be synthesized using a variety of methods, including chemical, electrochemical, photochemical, and radiation. Toxic chemicals are produced by the chemical method, which could have

an unfavorable effect in medicinal applications; as a result, nanoparticles biosynthesis is needed.

Early research on the DPPH, hydroxyl, and superoxide free radical scavenging properties of different tropical fruits and the water extract fraction from fresh papaya seeds revealed that it had the highest activity. [7,8]. Because the antioxidant activities of the other extract fractions from papaya seeds had not been researched previously, it was necessary to investigate their antioxidant activities in order to assess the waste's possible usage.

Globally, green tea is one of the most consumed beverages in the culinary industry. Its consumption has been firmly linked to preventive medicine, as numerous studies have reported significant health advantages.(6) Such as digestion enhancing and antioxidant properties. Acceleration of the metabolic rate, regulation of triglyceride levels, and prevention of the distress caused by obesity, diabetes, cardiovascular disease, and cancer. These benefits are a direct result of the polyphenol content of tea, which acts as an antioxidant by reducing oxidative stress in cells and lipid peroxidation, among other mechanisms of action.Thus, new quality standards have become more stringent by requiring multiple and effective polyphenols

The advantages of plant extracts in nanomaterials synthesis are as follows: (a) they are very inexpensive; (b) they are readily available; (c) there is no danger of contamination; and (d) extract preparation does not require expertise, intensive labor, or complicated equipment.

Materials and Methods

Chemicals & Reagents : 1,1-Diphenyl-2-picrylhydrazyl (DPPH) (Merck), Distilled water. AgNPs of *Carica papaya* (Papaya), and *Camellia sinensis* (Green tea).(9,10)

Equipments

Digital Weighing balance (Con TECH), Centrifuge (REMI R2 Research Centrifuge), UV-visible spectrometer (Labindia 3000+),

3. Determination of Antioxidant Activity:

Free Radical Scavenging Activity by Using DPPH (1,1-Diphenyl-2-picrylhydrazyl (DPPH)

2,2-Diphenyl-1 picrylhydrazyl (DPPH) was used to measure free radical scavenging to establish antioxidant activity. A 0.1 mM DPPH solution was first diluted in 82% ethanol. The stock solutions of each Ag-Nps of *Carica papaya*, and *Camellia sinensis* were made by dissolving 100 mg in 100 ml of Distilled water. A series of concentrations ranging between 50-350 ug/ml were prepared from the above stock solution. The absorbance of 2 ml of DPPH in a 1 ml solution of different concentrations of Cp-AgNPs and Cs-AgNPs were measured in triplicate using a UV double beam spectrophotometer at 517 nm after 30 minutes of incubation. The ascorbic acid was utilized as a standard for comparison. A "blank" test was performed,

in which water was used in place of the sample [307]. Antioxidant activity is and IC_{50} values were calculated and presented in the table No 1 & table No 2

To calculate radical scavenging activity, the following equation was used.

% Radical scavenging activity = $A_0 - A_1/A_0 \times 100$

Where A_0=The absorbance of blank
A_1= The absorbance of the sample.

4. Results and Discussion

Determination of Antioxidant Activity:

As shown in the Fig No.1 and Fig No.2 the DPPH radical scavenging activity showed a concentration dependent and highest activity when compared with the standard. The results of % Scavenging activity and IC_{50} values were tabulated in the Table No.1 and Table No.2

Table No 1: The % scavenging activity of Cp-AgNPs by DPPH Method

Concentration(µg/ml)	% of DPPH Scavenging Activity	IC_{50} Values
50	43.25	75.29
100	53.56	345.56
150	66.56	615.83
200	75.25	886.10
250	84.25	1156.37
300	90.25	1426.64
350	99.63	1696.91

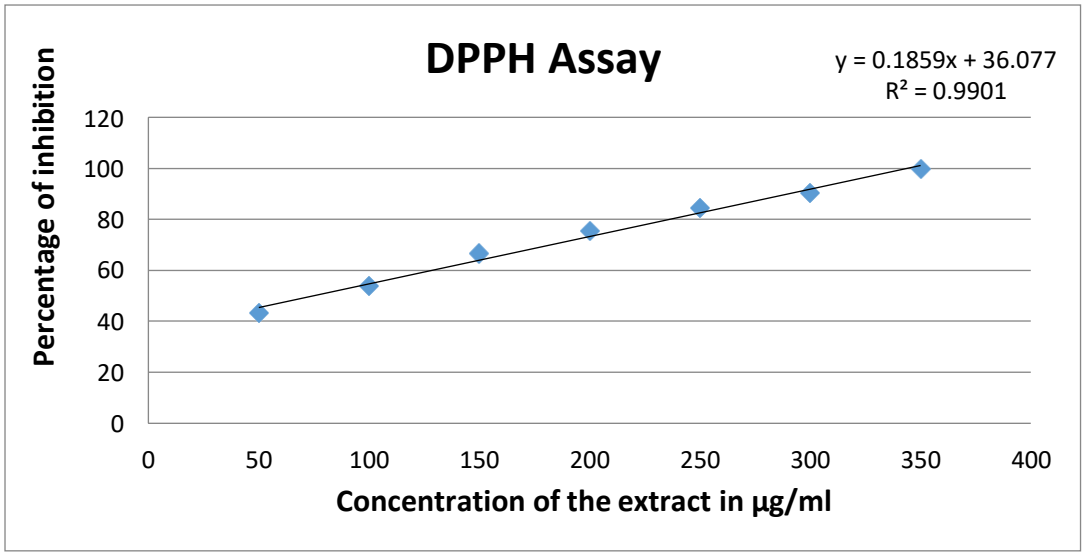

Figure No :1 Graphical representation of DPPH radical scavenging activity of Cp-AgNPs Values are expressed. Ascorbic acid was used as a standard.

Table No: 2: The % scavenging activity of Cs-AgNPs by DPPH Method

Concentration(µg/ml)	% of DPPH Scavenging Activity	IC $_{50}$ Values
50	40.23	103.5
100	51.28	416
150	56.59	728.5
200	65.98	1041
250	74.45	1353.5
300	80.56	1666
350	89.63	1978.5

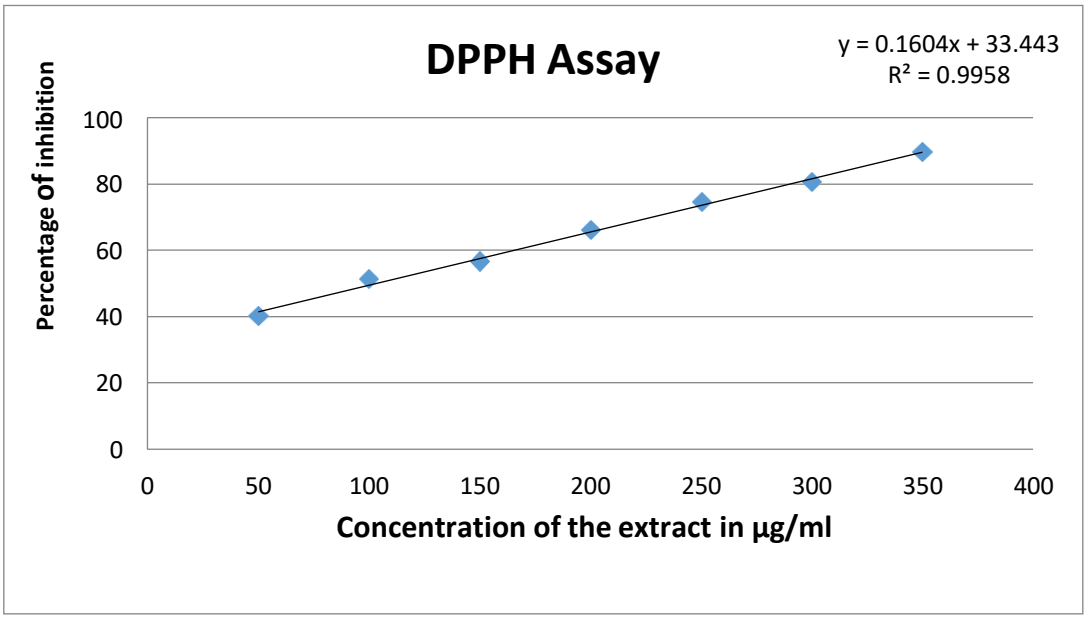

Fig.No.2 Graphical representation of DPPH radical scavenging activity of Cs-AgNPs Values are expressed. Ascorbic acid was used as a standard

5. Conclusion:

This study examines the application of eco friendly silver nanoparticles using *Carica papaya* seed extract and *Camellia sinensis* leaves extract These nanoparticles exhibited good antioxidant activity by DPPH method and % Scavenging activity and IC $_{50}$ values showed significant biomedical applications and can further be evaluated for anti cancer activities.

References:

1. Aravind, G., Bhowmik, D., Duraivel, S., and Harish. G.(2013). Traditional and medicinal uses of Carica papaya. Journal of Medicinal plants studies, 1(1), 7-15.

Graham HN (1992) Green tea composition, consumption and polyphenol chemistry, prev Med 21:334-350.

2.Vadlapudi,V., Kaladhar,D.S.V.G.K., Behara M., Naidu G. K., and Sujatha, B.(2013). Green synthesis of silver and gold nanoparticles. International Journal of chemical Studies, 1(4), 22-31.

3. Veeraswamy, R., Xin, T.Z., Gunasagaran, S., Xiang, T. F. W., Yang,E. F. C., Jeyakumar, N., et al.(2011). Biosynthesis of silver nanoparticles using mangosteen leaf extract and evaluation of their antimicrobial activities. Journal of Saudi Chemical Society, 15(2), 113-120.

4. N. Duran, A. B. Seabra, Biogenic synthesized Ag/Au nanoparticles: Production, Characterization, and applications. Curr. Nanosci. 14 (2018) 82-94.

5. J.Y. Song, B. S. Kim, Rapid biological synthesis of silver nanoparticles using plant leaf extracts. Bioprocess Biosyst. Eng. 32 (2009) 79-84.

6. S. Maiti, A. Nazmeen, N. Medda, R. Patra, and T. K. Ghosh, "Flavonoids green tea against oxidant stress and inflammation with related human diseases," Clin. Nutr. Exp., vol.24, pp. 1-14, 2019.

7. NorshaZila S., Syed zahir I., Musstapha Suleiman K., Aisyah M.R., Kamarul Rahim K. Antioxidant levels and activities of selected seeds of Malaysian tropical fruits. Mal. J. Nutr. 2010;16:149-159. [pubmed] [Google Scholar].

8. Kothari V., Seshadri S. Antioxidant activity of seed extracts of *Annona squamosa* and *Carica papaya.* Nutr. FoodSci.2010;40:403- 408.Doi:10.1108 /00346 651011062050. [CrossRef] [GoogleScholar].

9. B.Swapna, K.B.Chandrasekhar, D.Madhuri , G.Sumathi, Biological Synthesis and Characterisation Of Silver Nanoparticles Of *Carica Papaya* And Evaluation Of Its Biological Activity ,Journal of Pharmaceutical Negative Results, 2022 vol 13,issue 9,902-911.

10. B.Swapna, K.B.Chandrasekhar, D.Madhuri , G.Sumathi, Biological Synthesis and Characterization of Silver Nanoparticles of *Camelia Sinensis* and Evaluation of Its Biological Activity. 2022 Vol 20, issue 22 ,3558-3570|DOI: 10.48047/ NQ.2022. 20. 22.NQ10357