How to Cite:
Gassad, S. H., & Fajer, A. N. (2022). Comparison between effective compounds between peel and seeds of Capparis Spinosa. *International Journal of Health Sciences*, *6*(S4), 11012–11021. https://doi.org/10.53730/ijhs.v6nS4.11385

Comparison between effective compounds between peel and seeds of Capparis Spinosa

Sara Hameed Gassad
Chemistry dept. Education college / AL-Qadissiya University/ Iraq
Corresponding author email: edu-chem.post67@qu.edu.iq

Ali Noory Fajer
Chemistry dept. Education college / AL-Qadissiya University/ Iraq
Email: ali.fajer@qu.edu.iq

***Abstract*---**Capparis Spinosa is considered among the most important commercial crops in the Caper family, Where the height of the Capparis spinosa tree ranges from 1 to2m and its roots reach 40cm the plant is ever green in a green blue color ,and the branches creeping and semi-break easy to break, the leaves are thick circular or oval. Capparis Spinoza has been selected because of its medical advantages where it uses a painkiller ,treatment of intestinal bacterial infection and uses its leaves as food spices. These effective compound were detected using GC-MS, which is considered as strong antioxidant , and when the plant was extracted with the GC-MS device, the peel appeared to be more effective than the seed ,because they contained high effective compounds, where the peel included the highest percentage in dl- alpha- Tocopherol succinate,which reached about 29.384 is one of the strong antioxidants that inhibit free radicals and protect cells from oxidative stress and is considered the most active of the compounds tocopherol in relation to seeds, it included 28.901 E-11-Tetradecenoic acid and n-Hexadecanoic acid ,phytol ,the capparis spinosa plant is rich in phenolic compounds due to the presence of many flavonoid compounds in different parts and in high quantities. The results of the study are show the nanoparticles and extracts high inhibition of hydrogen peroxide in peel, but the seed extract show decrease because contains effective compounds with a higher amount of seed where it contains phenol and flavonoide compounds. The results of the study also are show the nanoparticles and extracts high inhibition of hydroxyl in seed extract but the peel showed decrease because effective compounds are less than peel.

***Keywords*---**Capparise spinosa, XRD, SEM, H_2O_2, OH.

Introduction

Nanotechnology is one of the branches of science and the most active area of research in modern materials science. Nanoparticles are typically referred to as(1-100 nm) sized particles in at least one dimension [1,2]. Nanoparticles exhibit new and improved properties based on the size, distribution and morphology of larger particles of bulk materials that make up the nanoparticles [3]. Nanotechnology has attracted many researchers from various fields such as biotechnology, physics, materials science, chemistry, engineering, and medicine [4,5,6]. In the field of nanotechnology, the development of reliable and environmentally friendly nanotechnologies for the controlled synthesis of metallic nanoparticles of well-defined size, shape and composition, for use in many fields, is a major challenge [7]. During the past decade, nanomaterials have received great attention due to their excellentchemical and physical properties different from their bulk counterparts [8]. It is widely accepted that these properties are often determined by their size, shape, crystallinity, composition and structure, and thus, controlling the composition of nanomaterials of specific shape and uniform size is one of the most effective ways to recognize that they are desirable properties[9]. Nanomaterials provide solutions to environmental and technological challenges in the fields of solar energy conversion, medicine, and water treatment [10]. Nanomaterials, especially metallic nanomaterials, have gained a great deal of importance as they often exhibit unique and significantly modified physical, chemical and biological properties. compared to their counterparts [11]. Metal nanoparticles have been widely used in catalysis, photons, magnetism, semiconductors and other fields thanks to their unique physical and chemical properties. In recent years, inorganic nanoparticles have focused largely on the field of tribology, the science of engineering interacting surfaces in relativistic motion. It has been found that there are new methods for nanoparticle synthesis, which should require a less expensive, and environmentally friendly and less severe reaction conditions [12].And metallic nanoparticles have attracted the attention of many researchers for their application in wound dressings and biocidal properties, and the process of preparing synthetic materials saturated with silver nanoparticles, which can be used as a coating containing nanoparticles that has antibacterial and antiseptic properties, and laboratory tests confirmed that the inhibition of bacterial flora, with The effect was maintained for another 72 hours [13,14,15]. Hydrogen peroxide is formed secondary by the dismutation reaction of a superoxide anion, it is not considered afree radical, but it is highly reactive and has a high oxidation capacity[16].but the hydroxyl radical it is produced according to the Haber-Weiss reaction, the hydroxyl radical is thousands of times more reactive than the peroxide radical. It stimulates the production of new radicals by removing ahydrogen atom or transferring it is electron[17].

Aim of the study:

- Characterization of silver nanoparticels using visible UV radiation,XRD, SEM.
- Check the ideal state of synthesis of silver nanoparticles , such as PH,reaction,time,temperature, concentration of silver nitrate.

Materials and Methods

Preparation of aqueous extract of capparies spinosa

The leaves of the plant were obtained from the outskirts of Najaf in the summer of 2022 between Jun and July. The leaves were thoroughly washed several times using normal tab water , then this was continued by distilled water to remove the impurities, dried grinding and kept until use, 20gm of ground leaves were boiled in 100 ml. filtered water for half an hour using a shaking waterbath and then save the solution with sulfan paper for 24 hours Filtration was established using Whatman filter papers no.1 [18]. Measuring the acidity of the solution by pH meter and change of acidity by adding NaOH, the best value of pH was 8.30.

Preparation of silver nanoparticles

Putting of 30 mL of 1mM (weight 0.0016gm from silver nitrate and dissolve it in 100mL deionized water) aqueous solution of silver nitrate in flask ; Then(5,10,15,20 30) .mL of plant extract were added separately to it at room temperature , then heated with shaking water bath at 70C ° for 80 min and the flask must be covered with aluminum foil . The formation of brown color indicated the synthesis of silver nanoparticles [19]. The color was starting to change after 10 min, and during 80 min it was changed into a dark brown.This change in color indicates the formation of AgNPs. The solution was kept at room temperature for 24 hours and in a dark place for the complete stability of nanoparticles . After 24 hours . Centrifugation the solution at 15000 rpm for 15 min, and then filtering by use filter paper [20]. Pour the solution into a dish and let it . dry and also in the dark and then collect the powder . The experiment was conducted in several conditions, such as silver ion concentration, pH,temperature and time in order to achieve optimum conditions for the synthesis of nanoparticles.

Hydroxyl radical inhibition activity

Principle

Hydroxyl radical inhibition activity of extract and silver nanoparticles by way of inbathamaz [21].Hydroxyl radical is one of the most interactive free radical in theBiological system and has the ability to prevent antioxidants.The free radical of hydroxyl can be generated by the fenton reaction between iron and peroxide[22].The fenton detector is a hydrogen peroxide solution with iron as acatalyst used to oxidante pollutants[23] .Where the iron ll reacts witheperoxide to the iron lll and producing the free radical of hydroxyl.

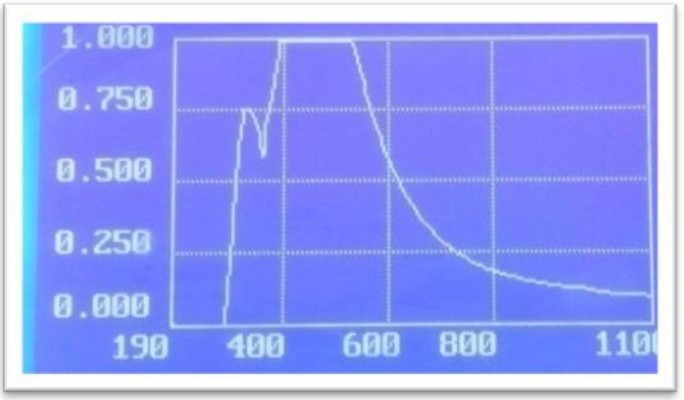
Hydrogen peroxide inhibition activity

Principle

Hydrogen peroxide inhibition of the extract and silver nanoparticles was estimated by replacement titration[24]. Hydrogen peroxidewas principle by the interaction of dismutation of anion oxide,hydrogen peroxide is not considered a

free radical but it shares many interactions and has a high capacity for oxidation wher it decomposion in the presence of iron Fe^{2+} and according to the interaction of Fenton to produce hydroxyl and the free radical of hydroxyl[25].

Results & Discussion



UV-Visible Spectral Analysis

The visible spectra of ultraviolet and absorption spectra were important characteristics of AgNPS[26] . The Table (1) shows the Ultraviolet radiation –the visible spectra of the capparis spinosa

X-ray diffraction

The green synthesis of AgNPS composite nanoparticles bodies was further carried out through XRD radiation by the 11015apparis spinosa extracts to find the crystalline nature of composite green nanoparticls[27].

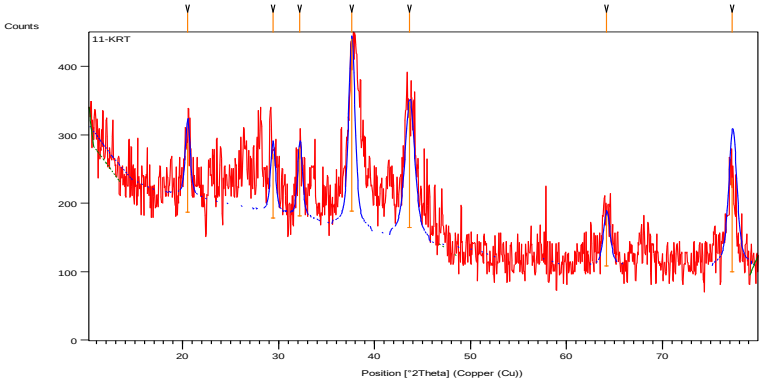


Figure (2) shows XRD of nanoparticles in capparise spinosa peel extracte

As for the seeds,the XRD spectra showed aclear contrast between the composition of silver nanoparticles by the plant extracts used in this study.

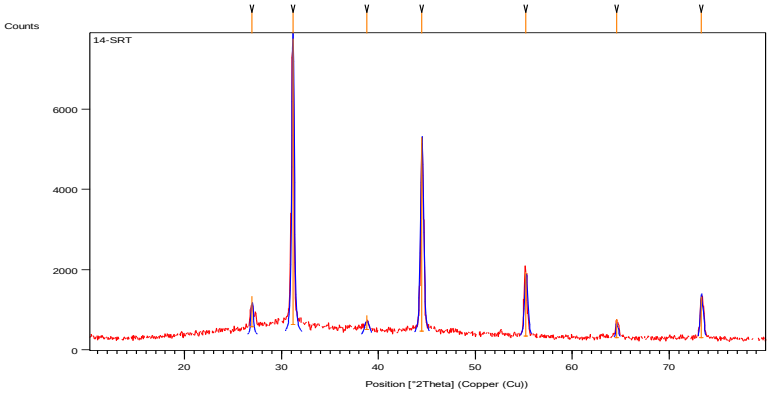


Figure (3) shows XRD of nanoparticles in capparise spinosa seed extracte

Scannig Electron Microscope (SEM)

Is anther technique used to determine the size, shape and distribution of composite green nanoparticles[28].

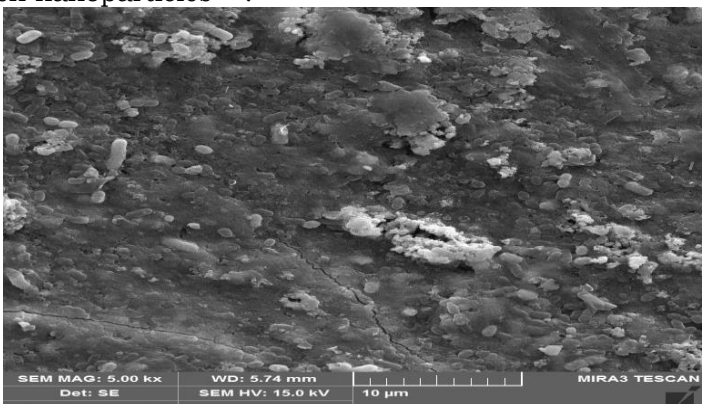


Figure (4) shows the results of the SEM for Silver nanoparticles inpeel extracts

The results of the SEM seeds described in figure (5) showed also heterogeneous froms of silver nanoparticles it different seed extracts were used.

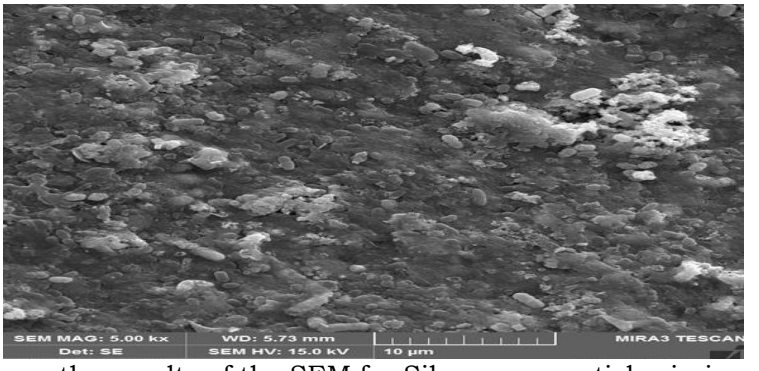


Figure (5) shows the results of the SEM for Silver nanoparticles in in seed extracts

Comparison between hydroxyl and hydrogen peroxide inhibition in Peel and Seed

Nanopartical molecules and extracts show high inhibition of hydrogen peroxide in peelbecause they contained high effective compounds of phenolis and flavonoid compounds where contained ahigh percentage of the following compounds .Table (6) show the value peel and seed in hydrogen peroxide dl-alpha-Tocopherol succinateandDimethyl2,7,12,18-tetramethyl-3,8-di(1-cyclohexyloxyethyl)- 1H,23H porphine,Myricetin,hexakinis (tetramethylsilyl)ether Figure (6) show the inhibition of hydrogen peroxide in the peel and seed. The Table(6) show the value peel and seed in hydrogen peroxide

Mean(g/mol)	S.E
Seed 43.2520 b	3.58977±
Peel 47.5740 a	3.05411±

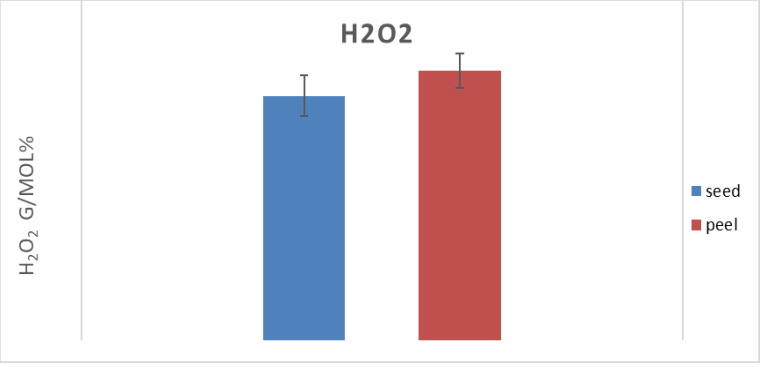


Figure (6)show the inhibition of hydrogen peroxide in the peel and seed

Nanoparticels molecules and extracts show less inhibition for hydrogen peroxide and hydroxyl in the seeds because they contained less effective compounds,particularly phenolic compounds and flavonoid compounds compared to peel , where it contained a high percentage of the following compounds .Table (7) show the value peel and seed hydroxyl E-11-Tetradecenoic acid and n-Hexadecanoic acid ,phytol Figure (7)show the inhibition of hydroxyl in the peel and seed Table (7) show the value peel.

Mean(g/mol)	St.Er
Seed 80.7500 b	6.67727±
47.8750 a peel	7.04228 ±

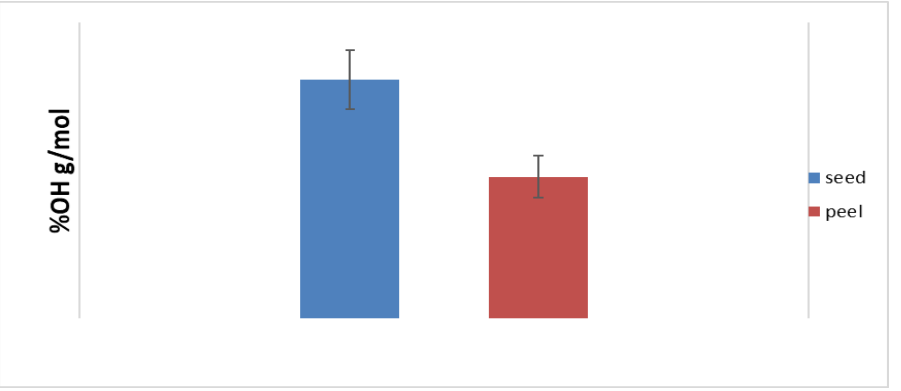


Figure (7)show the inhibition of hydroxyl in the peel and seed

Detection of chemical compound of the extracts of seed,peel of capparis spinosa using gas chromatography –mass spectrometry

The GC-MS device was used to detect the active compounds and it was found that the aqueous extract of the capparis spinosa plant consists of several chemical compounds. The results of chemical detection of the active compounds present in the aqueous extract of the capparis spinosa plant, the peel and seeds, that is, it contains a number of active compounds. The results showed that the extract contained effective compounds such as phenols, alkaloids, and a percentage of carbohydrates, flavonoids, terpenes, steroids, soaps, resins, sugars,and polysaccharides. Poly, Botanical, Polyphenols, and Resins, [29]. and Figure (8) shows a real-time section of an extract of capparis spinosa husks for GC-Mass analysis. Table (8) shows the determination of the organic and inorganic compounds in the aqueous extract of the capparis spinos plant, where nineteen of the active chemical compounds were obtained using the technique of gas chromatography-mass spectrometry, where the composition and weight of each organic compound within a sample were obtained. The table below shows the most important Chemical structures, molecular formulas and detention time present in the scale extract sample extracted with inorganic (aqueous) medium,a different chemical compound and different retention time were obtained. Figure (8) shows the highest peak of the scale extract sample at 29.384The figure(8) shows the results of the Gc-masspeel of the capris spinosa plant .

The Table shows(8) the results of the peel of the capparis spinosa plant

Peak Report

Name	Area%	Area	R.Time	Peak#
S-[2-[N,N-Dimethylamino]ethyl] N,N-dimethylcarbamoylthiocarbohydroximate	36.64	25125267	9.110	1
Phytol	1.48	1015186	10.687	2
2-Butenoic acid, 3-amino-, phenylmethyl ester	0.34	229835	11.717	3
2-Methoxy-4-vinylphenol	0.33	224245	14.996	4
Nopyl acetate	1.41	966978	17.482	5
2-Nonadecanone	0.42	287099	17.575	6

E-2-Tetradecen-1-ol	0.54	370203	17.978	7
n-Hexadecanoic acid	12.09	8290266	19.232	8
Megastigmatrienone	2.63	1803113	20.521	9
3-Tetradecyn-1-ol	27.25	18685667	21.058	10
n-Hexadecanoic acid	6.15	4215766	21.276	11
Z-12-Tetradecen-1-ol	2.05	1408852	21.539	12
1-Methyl-pyrrolidine-2-carboxylic acid	0.25	171334	22.213	13
Hexadecanoic acid,2,3-dihydroxypropyl ester,(.+/-.)-	0.99	679562	24.477	14
Stigmastan-3-en-6-ol	1.67	1143017	25.728	15
Myricetin, hexakis(trimethylsilyl) ether	3.80	2604508	26.045	16
Myricetin, hexakis(trimethylsilyl) ether	0.67	462184	26.250	17
Dimethyl 2,7,12,18-tetramethyl-3,8-di(1-cyclohexyloxyethyl)-21H,23H-porphine13,17-	0.47	322362	28.908	18
dl-.alpha.-Tocopherol succinate	0.82	560895	29.384	19
100 0068566339				

and Figure (9) shows a real-time section of an extract of capparis spinosa husks for GC-Mass analysis. Table (9) shows the determination of the organic and inorganic compounds in the aqueous extract of the capparis spinosa plant, where teen of the active chemical compounds were obtained using the technique of gas chromatography-mass spectrometry, where the composition and weight of each organic compound within a sample were obtained. The table below shows the most important Chemical structures, molecular formulas and detention time present in the scale extract sample extracted with inorganic (aqueous) medium, a different chemical compound and different retention time were obtained. Figure (9) shows the highest peak of the scale extract sample at28.901.

The Table shows(4) the results of the Gc- mass peel of the capparis spinosa plan

Name	Area%	Area	R.Time	Peak#
Dimethyl 2,7,12,18-tetramethyl-3,8-di(1-cyclohexyloxyethyl)-21H,23H-porphine-13,17-	0.37	184236	17.481	1
Pentacyclo[19.3.1.1(3,7).1(9,13).1(15,19)]octacosa-1(25),3,5,7(28),9,11,13(27),15,17,1	1.16	573194	19.012	2
Wilfortrine	16.84	8315275	19.231	3
Bicyclo[4.1.0]hept-3-ene, 7,7-dimethyl-3-vinyl-	0.26	127608	20.520	4
17-Octadecynoic acid	58.14	28705328	21.076	5
n-Hexadecanoic acid	9.38	4632806	21.282	6
6-Octen-1-ol, 3,7-dimethyl-, propanoate	2.06	1017601	21.547	7
Phytol	0.34	168820	22.968	8
n-Hexadecanoic acid	10.77	5317324	28.566	9
E-11-Tetradecenoic acid	0.67	331433	28.901	10
100 49373625				

References

1. Abd Elkodous, M., et al. "Therapeutic and diagnostic potential of nanomaterials for enhanced biomedical applications." *Colloids and Surfaces B: Biointerfaces* 180 (2019): 411-428.
2. Akar, Zeynep. "Chemical compositions by using LC–MS/MS and GC–MS and antioxidant activities of methanolic extracts from leaf and flower parts of Scabiosa columbaria subsp. columbaria var. columbaria L." *Saudi journal of biological sciences* 28.11 (2021): 6639-6644.
3. Al Badri, S. R. H., and N. M. S. Al Janabi. "Estimation of the antioxidant activity of local capparis spanosa leaves." *The Iraqi Journal of Agricultural Science* 49.1 (2018): 64-70.
4. Barbosa, Marcus Paulo Rosa, et al. "Degradation of pesticide mixture by electro-Fenton in filter-press reactor." Journal of Water Process Engineering 25 (2018): 222-235.
5. Bayda, Samer, et al. "The history of nanoscience and nanotechnology: from chemical–physical applications to nanomedicine." *Molecules* 25.1 (2019): 112
6. Bayda, Samer, et al. "The history of nanoscience and nanotechnology: from chemical–physical applications to nanomedicine." *Molecules* 25.1 (2019): 112.
7. Berra, D., et al. "Green synthesis of copper oxide nanoparticles by Pheonix dactylifera L leaves extract." *Digest Journal of Nanomaterials and Biostructures* 13.4 (2018): 1231-1238
8. Costa, Tiago J., et al. "The homeostatic role of hydrogen peroxide, superoxide anion and nitric oxide in the vasculature." Free Radical Biology and Medicine 162 (2021): 615-635.
9. Danish, Mohammad, et al. "Green synthesized silver nanoparticles mitigate biotic stress induced by Meloidogyne incognita in Trachyspermum ammi (L.) by improving growth, biochemical, and antioxidant enzyme activities." ACS omega 6.17 (2021): 11389-11403.
10. Donahue, Nathan D., et al. "Assessing nanoparticle colloidal stability with single-particle inductively coupled plasma mass spectrometry (SP-ICP-MS)." *Analytical and Bioanalytical Chemistry* 412.22 (2020): 5205-5216.
11. Fatima, Nabira, et al. "Recent developments for antimicrobial applications of graphene-based polymeric composites: A review." *Journal of Industrial and Engineering Chemistry* 100 (2021): 40-58.
12. Giri, Alok Kumar, et al. "Green synthesis and characterization of silver nanoparticles using Eugenia roxburghii DC. extract and activity against biofilm-producing bacteria." *Scientific Reports* 12.1 (2022): 1-9.
13. Gün Gök, Zehra, Mine Karayel, and Mustafa Yiğitoğlu. "Synthesis of carrageenan coated silver nanoparticles by an easy green method and their characterization and antimicrobial activities." *Research on Chemical Intermediates* 47.5 (2021): 1843-1864.
14. Hemmatyar, Omid, et al. "Enhanced meta-displays using advanced phase-change materials." *arXiv preprint arXiv:2107.12159* (2021). Oves,
15. Ifeanyi, Obeagu Emmanuel. "A review on free radicals and antioxidants." *Int. J. Curr. Res. Med. Sci* 4.2 (2018): 123-133.
16. Jamkhande, Prasad Govindrao, et al. "Metal nanoparticles synthesis: An overview on methods of preparation, advantages and disadvantages, and applications." *Journal of drug delivery science and technology* 53 (2019): 101174.

17. Lateef, A., O. M. Darwesh, and I. A. Matter. "Microbial nanobiotechnology: the melting pot of microbiology, microbial technology and nanotechnology." *Microbial Nanobiotechnology*. Springer, Singapore, 2021. 1-19.
18. Mazari, Shaukat Ali, et al. "Nanomaterials: Applications, waste-handling, environmental toxicities, and future challenges–A review." *Journal of Environmental Chemical Engineering* 9.2 (2021): 105028.
19. Mohammad, et al. "Green synthesis of silver nanoparticles by Conocarpus Lancifolius plant extract and their antimicrobial and anticancer activities." *Saudi journal of biological sciences* 29.1 (2022): 460-471.
20. Nasef, Mohamed Mahmoud, et al. "Engineered bioactive polymeric surfaces by radiation induced graft copolymerization: Strategies and applications." *Polymers* 13.18 (2021): 3102.
21. Pearce, Amanda K., et al. "Synthesis and applications of anisotropic nanoparticles with precisely defined dimensions." *Nature Reviews Chemistry* 5.1 (2021): 21-45.
22. Phan, Hoa T., and Amanda J. Haes. "What does nanoparticle stability mean?." *The Journal of Physical Chemistry C* 123.27 (2019): 16495-16507.
23. Saleh, Tawfik A. "Nanomaterials: Classification, properties, and environmental toxicities." *Environmental Technology & Innovation* 20 (2020): 101067
24. Schneider, Willian Daniel Hahn, Aldo José Pinheiro Dillon, and Marli Camassola. "Lignin nanoparticles enter the scene: A promising versatile green tool for multiple applications." *Biotechnology Advances* 47 (2021): 107685.
25. Sivakumar, Thirumal. "A modern review of silver nanoparticles mediated plant extracts and its potential bioapplications." *Int. J. Bot. Stud* 6.3 (2021): 170-175.
26. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2022). Post-pandemic health and its sustainability: Educational situation. *International Journal of Health Sciences*, *6*(1), i-v. https://doi.org/10.53730/ijhs.v6n1.5949
27. Susilo, C. B., Jayanto, I., & Kusumawaty, I. (2021). Understanding digital technology trends in healthcare and preventive strategy. *International Journal of Health & Medical Sciences*, *4*(3), 347-354. https://doi.org/10.31295/ijhms.v4n3.1769
28. Tabassum, Nishat, Shoeb Ahmed, and M. Azam Ali. "Chitooligosaccharides and their structural-functional effect on hydrogels: A review." *Carbohydrate Polymers* 261 (2021): 117882.
29. Vurro, Maurizio, Cristina Miguel-Rojas, and Alejandro Pérez-de-Luque. "Safe nanotechnologies for increasing the effectiveness of environmentally friendly natural agrochemicals." *Pest management science* 75.9 (2019): 2403-2412.
30. Walter, Martin, et al. "Identifying the reactive sites of hydrogen peroxide decomposition and hydroxyl radical formation on chrysotile asbestos surfaces." *Particle and fibre toxicology* 17.1 (2020): 1-15
31. Zhang, Huiling, et al. "Comparation of the phytotoxicity between chemically and green synthesized silver nanoparticles." *Science of The Total Environment* 752 (2021): 142264.