

3.3.1.1. Number of research papers in the journals notified on ugc care year wise during the last year 2023-2024

Sl. No.	Title of paper	Name of the author/s	Department of the teacher	Name of the journal	Year of publication	ISSN number	Link to the journal		
							Link of the website of journal	Link of the article	Is it in ugc care list
1	BP-1C Targets Inflammatory Hypoxic Tumor Micro Environment to Counteract ROS Mediated Angiogenesis in Lung Cancer	Dr. Prabhakar B T	Biotechnology	Biological Forum – An International Journal	2023	0975-1130	https://www.researchtrend.net/bfj/bfj.php	https://www.researchtrend.net/bfj/pdf/BP-1C-Targets-Inflammatory-Hypoxic-Tumor-Micro-Environment-to-Counteract-ROS-Mediated-Angiogenesis-in-Lung-Cancer-BT-Prabhakar-56.pdf	No
2	Steroid alkaloid solanidine impedes hypoxia-driven ATM phosphorylation to switch on anti-angiogenesis in lung	Dr. Prabhakar B T	Biotechnology	Phytomedicine	2023	0944-7113	https://www.sciencedirect.com/journal/phyto	https://www.sciencedirect.com/journal/phyto/article/abs/pii/S094471132300342	Yes

	adenocarcinoma						medicine	2	
3	"Management principles in agricultural activities"- a study with specific reference to paddy crop in southern part of karnataka	Dr. Pallavi M., Ms. Nethravathi A M	Biotechnology	European Chemical Bulletin	2023	2063-5346	https://www.eurchembull.com/	https://www.researchgate.net/publication/372244419_Management_Principles_in_Agricultural_Activities-A_Study_with_specific_reference_to_Paddy_crop_in_Southern_part_of_Karnataka	Yes
4	Isolation purification and anticancer potency of novel compound 6-ethyl-3-hydroxy-4-methyl-8ah-xanthen-9(10ah)-one from mesuaferren Linn from westernghats of karnataka	Dr. Syed Murthuza	Biotechnology	Indian Journal of Pharmaceutical Sciences	2023	1998-3743	https://www.ijpsonline.com/	https://www.ijpsonline.com/articles/isolation-purification-and-anticancer-potency-of-novel-compound-6ethyl3hydroxy4methyl8ahxanthen910ahone-from-	Yes 20843

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							emmesua-ferreaem-linn-5208.html		
5	Taxonomic diversity and distribution of herbs and shrubs in Sringeri forest range western ghats, Karnataka	Krishna swamy K Anushree hebbark	Botany	Indian forester	2023	0019-4816	https://www.google.com/search?q=taxonomic+diversity+and+distribution+of+herbs+and+shrubs+in+sringeri+forest+range+western+ghats+karnataka&ie=utf-8	https://www.researchgate.net/publication/376832488_taxonomic_diversity_and_distribution_of_herbs_and_shrubs_in_sringeri_forest_range_western_ghats_karnataka	Yes



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No	https://www.researchgate.net/publication/373106377_Study_of_Leaf_Epidermal_Charmers_of_Some_Species_of_the_Genus_Desmodium_Papilionoideae-Leguminosae of Chitradurga_Karnataka_India	https://www.google.com/search?q=Study_of_Leaf_Epidermal_Charmers_of_Some_Species_of_the_Genus_Desmodium_Papilionoideae-Leguminosae of Chitradurga_Karnataka_India	2023	International research journal of plant science	Botany	Rachitha C J Krishna Swamy K	6 Study of leaf epidermal characters of some species of the genus Desmodium Desv. (Papilionoideae-Leguminosae) of Chitradurga, Karnataka, India

							+(+Papili onoideae - +Legumi nosae)+to f+Chitrad urg%2C+ Karnatak a%2C+In dia&aqs= chrome.. 69j57.15 08j015& sourceid =chrome &ie=UT F-8		
7	Tree diversity, and regeneration ecological status in Koppa forest division, central western ghats, India	Anushree Hebber, K. and Krishnaswamy, K.	Botany	International journal of ecology and environmental sciences	2024	2320-5199	tree diversity, regeneration and ecological status in koppa forest division, central western ghats, india international journal of ecology	https://doi.org/10.55863/ijeess.2024.0083	No

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						and environm ental sciences (nieindia. org)		
8	Terrestrial orchid diversity in Hoanagara taluk of Shimogga district central western ghats region of Karnataka	Mahabaleshwar hegde Soumya, K Krishnaswamy	Botany	Trends in current biology	2024	https://doi.org/10.14719/tcb.2983	terrestrial orchid diversity in hoanagara taluk of shimogga district central western ghats region of karnatakater restrial orchid diversity in hosanagara taluk of shimogga district central western ghats region of karnataka. trends in current biology (horizonapu blishing.co m)	No



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9	Diversity and conservation status of Angiosperms in Sringeri forest range of central western ghats, Karnataka	K. Anushree Hebbar, K. Krishna Swamy and E.S. Kumar swamy udupa	Botany	Indian forester,	2024	0019-4816	https://www.bing.com	Doi:10.3680/8/i/2024/v15016/170279	No
10	Survey study on storage practices of finger millet	Srushti S.N.R Rajeshwari N, Ramesh Babu H.N	Botany	Indian J. Applied & Pure Bio	2023	0970-2091	https://www.bing.com	ijapb38-3-21.pdf (biology-journal.org)	No
11	Diversity of phytoplankton in rice fields of Honnali taluk Davanagere district Karnataka india	Prashanth Kumar CS, Parameshwara Naik T, Malthesh Pari	Botany	Journal of survey in fisheries sciences	2023	2368-7487	https://www.bing.com	Final_Vol_1_0_Issue_1_Journal-tof+Survey+tin+Fisheries+Sciences.pdf	No
12	Evaluation of soil fertility using soil nutrients and chemical properties as parameters in fields of Honnali Davanagere district, Karnataka	Prashanth Kumar Cs, Parameshwara Naik T, Malthesh Pari	Botany	International journal of biosciences	2023	2220-6655	http://www.wimnesp ub.net	http://dx.doi.org/10.1269/2/jib/22.2.231-238	48663 yes
13	A Brief review on seaweed culture	K.Kishore Naik, Prashanth Kumar CS and T.Parameshwara Naik	Botany	Global journal of current research	2024	2320-2920	http://www.crdeepjournal.org/category/journal-s/global-journal-of-current-research-gic	Doi:10.13140/RG.2.2.18360.35848	No

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14	Transition metal chelates of novel ligand bearing Isatin moiety: synthesis, Molecular docking and biological evaluation	Lubnaafroz, H.M.V agdevi, Malatheshpari, R Mohammedshafeu Ila, Aneesfathima	Chemistry	Journal of molecular structure	2023	0022-2860	www.elsevier.com/locate/molstr	https://doi.org/10.1016/j.molstruc.2023.136200	Yes 24702
15	Synthesis and characterization of CuO-NiO nanocomposite for dye Degradation and electrochemical sensing of dopamine	H.C. Anitha, Sathisha G. Krishnamurthy, Malathesh Pari, T.L. Soundarya, G. Nagaraju	Chemistry	Chemical data collections	2023	24058300	www.elsevier.com/locate/cdc	https://doi.org/10.1016/j.cdc.2023.101081	5440 yes
16	In situ growth of bivo4-bivo4 p-n heterojunction nanocomposite via facile green combustion method: efficient photocatalytic activity under visible light, photoluminescence and biosensing applications.	E.Vinay Kumar, T.L. Soundarya, Anitha G. B.E. Kumara Swamy, Nagaraju	Chemistry	Materials chemistry and physics	2024	0254-0584	https://doi.org/10.1016/j.matcomphys	In situ growth of BiVO4-Bi2O3 p-n heterojunction nanocomposite via facile green combustion method: Efficient photocatalytic activity under visible light,	3971 yes 

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								photoluminescence and biosensing applications - ScienceDirect	
17	Green synthesis of polyoxometalate Cu ₃ Mo ₂ O ₉ nanoparticles for efficient degradation of organic dyes under visible light irradiation and their photoluminescence	E.Vinay Kumar, Anitha, G. B.E. Kumara Swamy, Suma G.R, Nagaraju	Chemistry		2024		https://doi.org/10.1016/j.ceramint.2024.02.016	Green synthesis of polyoxometalate Cu ₃ Mo ₂ O ₉ nanoparticles for efficient degradation of organic dyes under visible light irradiation and their photoluminescence - ScienceDirect	5336 yes
				Ceramics international		0272-88			
18	Facile green synthesis of Zn doped MoO ₃ nanoparticles and its photocatalytic and photoluminescence studies	E.Vinay Kumar, R, Harini Bhuvaneshwari H.S, Sushma P.M, Sushmitha D.S, Kumara Swamy B.E, Anitha, G. Nagaraju G	Chemistry	Journal of molecular structure	2024		www.elsevier.com/locate/molstruc	http://doi.org/10.1016/j.molstruc.2024.1332	24702 Yes
19	Butea monosperma aided green synthesis of α-moo3	E.Vinay Kumar, T.L. Soundarya, Anitha, G. B.E. Kumara	Chemistry	Environmental nanotechnology, monitoring and	2024	2215-1532	www.elsevier.com/locate/m/locate/	Butea monosperm aided	19809 yes 

	nanoparticles: and biosensing photocatalytic activity towards hazardous dyes and rangoli colorants	Swamy, Nagaraju		management				green synthesis of α -MoO ₃ nanoparticle s: Biosensing and photocatalytic activity towards hazardous dyes and rangoli colorants - ScienceDirect	No
20	Facile green synthesis of Ni/NiO/MoO ₃ nanocomposite for photocatalytic, chromium (vi) reduction electrochemical dopamine (da) and humidity sensor applications.	M. V. Naveen , T.L.Soundarya , Y.T. Ravikiran, G. Krishnamurthy, Anitha, G. Nagaraju	Chemistry	Inorganic chemistry communications	2023	1387-7003	https://www.bing.com	https://doi.org/10.1016/j.inche.2023.111846	No
21	Facile synthesis of Cu ₂ S-NiS ₂ nanocomposite with highly active visible light photocatalyst for dye removal and biological evaluation	H.C.Sathisha, Anitha, G.Krishnamurthy, Lubna Afroz, R. Harini, G.Nagaraju	Chemistry	Polyhedron	2024	0277-5387	https://www.bing.com/ck/a?!&app=395ad1cbf88c7fb57604f034b25d39564bdd8b1df11c5dd	Facile synthesis of Cu ₂ S-NiS ₂ nanocomposite with highly active visible light photocatalyst for dye	No



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							64655cb 81e6c741 b9jmltd HM9MT cyNDU0 NDAwM CZpZ3V pZD0zY TU1MT VIMC0z NzA1LT YzOWYt M2lxNi0 wNDFh MzZmMj YyOTU &nb=1	removal and biological evaluation Semantic Scholar	
22	Electrochemical determination of glucose and h2o2 using co(ii), ni(ii), Cu(ii) complexes of novel 2-(1,3- benzothiazol-2- ylamino)-n-(5-chloro- 2- hydroxyphenyl)acetam ide: synthesis, structural characterisation, Antimicrobial, anticancer activity and docking studies	N. Ranjitha , G. Krishnamurthy* , M.N. Manjunathac , H. S. Bhojya Naik B , Malathesh Pari A , Vasantakumarnaik N Ka , J. K. Lakshminantha, K. Pradeepa	Chemistry	Journal molecular structure	of 2023	0022- 2860	www.els evier.co m/locate/ molstr	https://doi.or g/10.1016/j. molstruc.20 22.134483	No
23	Synthesis, structural elucidation and biological studies on	Shridhar P Melkeril , P. Parameshwara D Naik, Yadav D	Chemistry	heterocyclic letters	2023	2231- 3087	http://het eroletters .org	Vol13issue2 .pdf (heteroletter	Yes 

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	3d-metal complexes of the heterocyclic ligand 3-{2-[4-(4-chlorophenyl)-1, 3-thiazol-2-yl] hydrazine	Bodke, Ranjitha. N, Vasanta Kumar Naik N.						s.org)	
24	Biological importance of the pyrimidine nucleus in recent years: a comprehensive review	Prabhakar W.Chavan ¹ , Prashant Hanamshetty ² & C. Nagabhushan M	Chemistry	Heterocyclic letters	2023	2231-3087	http://heteroletters.org	A study on methods of synthesis of pyrimidine derivatives and their biological activities (heteroletter s.org)	No
25	Synthesis, spectral study of novel 4-[(c)-(2-Nitrophenyl)diazenyl]-1,3-thiazol-amine (nta/c9h7n5o2s) and its coordinated metal [co(nta)2.(h2o)2] and [ni(nta)2.(h2o)2] complexes; Antioxidant activity study	Vasantakumarnaik N.K1, Bindu Pavan.V, Krishnamurthy. G, Malathesh Pari, Venughopal. N, Sunil Kumar. N Prabhakar N Walnik, Manjuraj .T	Chemistry	eur. chem. bull.	2023	20635346	https://www.researchify.com/impact/details/21100898023#:~:text=the%20dissn%20of%20europen%20chemic al%20bulletin%20journal%20is%2020635346	10.48047/ecb/2023.12.11.36	No
26	Synthesis, characterization of 4-[(c)-(2-hydroxy-3-	N.K. Vasantakumarnaik, G. Krishnamurthy	Chemistry	Journal of molecular structure	2023	0022-2860	www.cls.evier.com/locate/	https://doi.org/10.1016/j.molstruc.2023.12.11.36	No

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	(R2)-1,5-thiazol-2-ylthiocarboxylhydrazide-1,3-yl) Methylideneamino)benzoic acid and its transition metal complexes: Biopharmaceutical activities and electrochemical detection of ciprofloxacin	Malathesh Pari, N. Rangitha, H.A. Anilkumara, G.Y. Akash, M.N. Manjunatha					molstr	23.136405	
27	Synthesis and characterization of biopotent transition metal complexes of Schiff base 2-((1)-1-[2-(1,3-benzothiazol-2-yl)hydrazinylidene]eth-yl)-6,10b-dihydro-3H-benzof[chromen-3-one and their biological evaluation	Shridhar P. Melkeri, P. Parameshwara Naik, N.D. Satyanarayan, the Pushpavathi, G. Krishnamurthy, And Prabhakar W. Chavana	Chemistry	Asian journal Of chemistry	2024	ISSN: 0970-7077	https://asiampubs.org/	https://doi.org/10.14233/ajchem.2024.31148	No
28	Synthesis and characterization of CuO-nio nanocomposite for dye degradation and electrochemical sensing of dopamine	H.C.Sathisha, Anitha, G.Krishnamurthy, Malathesh Pari, T.L. Soundarya, G. Nagaraju	Chemistry	Chemical data collections	2023	2405-8300	Chemical Data Collections Journal Sciencedirect.com by Elsevier	Synthesis and characterization of CuO-NiO nanocomposite for dye degradation and electrochemical sensing of dopamine Sciencedire	No

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29	Two-phase simulation of entropy optimized mixed convection flow of two different shear-thinning nanomaterials in thermal and mass diffusion systems with Lorentz forces	S. Suresha Umair Khan S. Suresha Umair Khan Soumya D.O. Pilli Venkatesh Hatem Gasmi M. Sunitha Aurang Zaib Ahmed Al-Naghi Hatem Karoui Anuar Ishak Walter Ojok	Mathematic	Scientific reports	2024	https://doi.org/10.1036/s41598-023-50725-w	https://ouci.dntb.gov.ua/en/works/7qyqr5K7/	No
30	Significance of tio2-water nanofluid, buoyant strength and ohmic heating in the enhancement of microchannel efficiency	Soumya D.O. Pilli Venkatesh Soumya D.O. Pilli Venkatesh Pudhari Srilatha Jasgurpreet Singh Chohan Prasannakumara B.C Nehad Ali Shah Jasgurpreet Singh Chohan Prasannakumara B.C	Mathematics	Case studies in thermal engineering	2024	www.eisvier.com/locate/csite https://www.researchgate.net/publication/380916850_significance_of_tio2-water_nanofluid_buoyant_strength_and_ohmic_heating_in_the_enhance	http://dx.doi.org/10.1016/j.csite.2024.104605	No

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31	Generalized coquette flow of nanoliquid among two concentric channels with particles injection	D.O Soumya, B.J.Gireesha & P.Venkatesh	Mathematics	International journal of ambient energy	2024	1430750	https://www.tandfonline.com/	https://doi.org/10.1080/01430750.2024.2353305	2540
32	Comparative analysis of thermal behaviour in functionally graded material fin under convective heat transfer: homotopy perturbation method	P.L. Pavan Kumar, B.J.Gireesha & P.Venkatesh	Mathematics	International communications in heat and mass transfer	2024	0735-1933	https://www.sciencedirect.com/science/article/abs/pii/S0735193324003221	https://doi.org/10.1016/j.icheatmasstransfer.2024.107560	No
33	Impact Of Tri Hybrid Nanofluid On The Transient Thermal Performance Of Binevlined Dovoetail Fin With Emphasis On Internal Heat Generation	P.L. Pavan Kumar, B.J.Gireesha & P.Venkatesh	Mathematics	Eur.phys.j.plus	2024	2190-5444	Home The European Physical Journal Plus (springer.com)	Impact of trihybrid nanofluid on the transient thermal performance of inclined dovetail fin with emphasis on internal heat generation The European Physical Journal Plus	No



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34	Transient Thermal Behavior And Efficiency In Fully Porous Longitudinal Fin: The Influence Of Shape – Dependent Hybrid Nanofluid Internal Heat Generation	P.L. Pavan Kumar, B.J.Gireesha And P.Venkatesh M.L.Kerthi	Mathematics		2024	1040-7782	Transient thermal behavior and efficiency in fully wet porous longitudinal fin: The influence of shape-dependent hybrid nanofluid and internal heat generation: Numerical heat transfer, part a: applications	search results taylor francis online (tandfonline.com) &	NO
35	Comprehensive Investigation Of	M.N.Chandrasekar	Physics	Optical materials	2024	0925-3467	www.elsevier.com (tandfonline.com) Access (tandfonline.com)	https://doi.org/10.1016/j.ijthermas.2024.107167	

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	Borate-Based Glasses Doped With Bao: An Assessment Of Physical, Structural, Thermal, Optical And Radiation Shielding Properties						m/locate/optomat	optomat.2024.115176	
36	A Multifaceted Study B2O3-Bao-Pbo-Wo3 Glasses Doped With Bi2O3: Insights From Physical, Structural, Mechanical And Optical Towards Improved Shielding Properties	M.N.Chandrasekhar	Physics	Ceramics international	2024	02728842	www.elsevier.com/locate/ceramint	https://doi.org/10.1016/j.ceramint	5336
37	Synergistic Optimization Of Physical Thermal Structural Mechanical Optical And Radiation Shielding Characteristics In Borate Glasses Doped With Bi2O3	M.N.Chandrasekhar	Physics	Optical materials	2024	0925-3467	www.elsevier.com/locate/optomat	https://doi.org/10.1016/j.optomat.2024.115815	No
38	A Review On Natural Fiber Composites And Its Applications	Nagaraj N	Physics	International journal for modern trends in science and technology	2023	2455-3778	http://www.wjntst.com/vol9issue04.html	https://wjntst.com/volum9issue04/65.wjntst0904167.pdf	yes 43137
39	A comprehensive review on natural fiber based super capacitors	Nagaraj N	Physics	International journal for modern trends in science and technology,	2023	2455-3778	http://www.wjntst.com/vol9issue06.html	https://doi.org/10.46501/wjntst0906012	yes 43137 

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40	Mechanical and thermal properties of agave fibre surface treatment of epoxy composite samples selected from shivamogga district of karnataka	Nagaraj N	Physics	International journal for modern trends in science and technology,	2023	2455-3778	http://www.w.jimst.com/vol9issue02.htm	https://doi.org/10.46501/jimst0902042	yes 43137
41	Green synthesis of Fe_3O_4 , ZnO & Fe_3O_4 - ZnO nanoparticles stabilized by a lemon fruit (citrus limon) peel extract for antioxidant activity	Nagaraj N	Physics	International journal for modern trends in science and technology,	2023	2455-3778	http://www.w.jimst.com/vol9issue02.htm	https://doi.org/10.46501/jimst0902043	yes 43137
42	Determination of thermal insulating properties of cenosphere powder-filled areca husk fibre reinforced epoxy composites	Nagaraj N	Physics		2023	0972-172x	home journal of the indian academy of wood science (springer.com)	determination of thermal insulating properties of cenosphere powder-filled areca husk fibre reinforced epoxy composites journal of the indian academy of wood science (springer.com)	No
43	Optical, structural and conductivity properties of ferrous sulfate	K. Subramanya	Physics	Materials today: proceedings	2023	1369-7021	https://doi.org/10.1016/j.mat	optical, structural and	

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	doped polyaniline						pr.2023.0 5.384	conductivity properties of ferrous sulfate doped polyaniline - sciencedirect	
44	A preliminary checklist of avifauna in hullathi section of ranebennur blackbuck sanctuary, haveri district, karnataka, india	Dr. Naik K.L	Zoology	J.bio. & env.sci	2023	2220-3045	https://innsnpub.net	https://innsnpub.net/avifauna-in-hullathi-section-of-ranebennur-blackbuck-sanctuary-haveri-district-karnataka-india/	no
45	Avian species diversity in different habitats of shivamogga, karnataka, india.	Dr. Naik K.L	Zoology	Asian journal of biological and life sciences	2023	e-2278-5957 p-2278-747x	https://www.ajbbs.com/articles/default/files/asianbiology-fesci-12-1-160.pdf... https://innsnpub.net/avian-species-assemblage-across-a-rural-urban-gradient-in-and-around-	https://www.ajbbs.com/articles/default/files/asianbiology-fesci-12-1-160.pdf... https://innsnpub.net/avian-species-assemblage-across-a-rural-urban-gradient-in-and-around-	no

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46	Assessment of physico-chemical parameters of the vanivilasa sagara reservoir, chitradurga district, karnataka.	Dr.Ashashree H.M	Zoology	Indian journal of applied & pure biology	2024	0970-2091	https://www.bing.com	shivamogga-karnataka-ijapb39-2-64.pdf (biology-journal.org)	No
47	Zooplankton occurrence in purple pond of shivamogga district, karnataka	Dr.Ashashree H.M	Zoology	International journal of entomology research	2024	2455-4758	https://www.bing.com	Zooplankton occurrence in purple pond of Shivamogga district, Karnataka (entomology journals.co m)	No
48	Comparative studies on the physiology of bagrid cat fish, mystus cavatus in tunga and bhadra rivers, karnataka.	Dr.Ashashree H.M	Zoology	International journal of entomology research	2024	2455-4758	https://www.entomologyjournals.com	Comparative studies on the physiology of Bagrid cat fish, Mystus cavatus in Tungas and Bhadra rivers, Karnataka (entomology journals.co m)	No

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BP-1C Targets Inflammatory Hypoxic Tumor Micro Environment to Counteract ROS Mediated Angiogenesis in Lung Cancer

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²Postgraduate Department of Studies and Research in Biotechnology, Kuvempu University, Shankaraghatta (Karnataka), India.

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ABSTRACT: Lung Cancer is a prime and defied malignancy tumor with multiple hall marks of cancer. Establishing the treatment strategy for lung cancer is extremely challenging due to aggressive adaptation of cancerous cell to TME. The ROS, inflammation and hypoxia are the major key parameters which are interconnected and interdependent in lung cancer responsible for angiogenesis. Understanding the relationship between these TME parameters could be the advantageous to develop the therapeutic targets. Previously we have reported that, BP-1C induces apoptosis and anti-angiogenesis mediated antitumor properties in both ascites and solid tumor model. Further investigation has identified JAK2/STAT3 signaling mediated regression of lung cancer. Current research postulates that, BP-1C targets pathological features of Lung TME, particularly ROS and hypoxia to counteract lung cancer. The *in-vitro* study results revealed that, BP-1C reduces hypoxia as verified by EF5, a hypoxic marker and reduced ROS and lipid per oxidation assay with increased Glutathione. Further, reduced pro-inflammatory cytokines such IL-6, IL-1 β and TNF- α , as well as angiogenic players such as VEGF, MMP-2 & 9 were evident. The results correlates with earlier findings of BP-1C medicated affect, such as induction of apoptosis and anti-angiogenesis. The current investigation establishes molecular cause of these events induced by BP-1C. The research outcome states that, BP-1C could be developed as an effective target specific molecule to counteract Lung cancer.

Keywords: Lung cancer, ROS, Inflammation, Hypoxia, BP-1C, Angiogenesis.

INTRODUCTION

Lung Cancer is a prime and defied malignancy tumor all over the world with high number of mortality due to its complexity (Dela Cruz *et al.*, 2011). The lung cancer tumor micro environment is tightly associated with diseases progression and rapidity, in which inflammatory micro environment plays a remarkable role over the disease occurrence and development (Whiteside, 2008). Prevailing hypoxia and elevated Reactive Oxygen Species (ROS) in lung cancer TME, activates multiple signaling pathways which contributes overall prognosis of the disease. Several studies signify the strong association between lung cancer pathology, hypoxia and ROS (Tan *et al.*, 2021). Understanding the relationship between these pathological conditions in lung cancer progression could be the advantageous to identify the more therapeutic targets for lung cancer treatment.

Hypoxic microenvironment arises due to consumption of excessive oxygen by growing tumor cells and insufficient oxygen supply by dysfunctional tumor vessels. Hypoxic nature is a predominant feature of tumors and a crucial constituent of the TME, as it influences numerous aspects of tumor biology, resistance to apoptosis, angiogenesis, metastasis, immune evasion as well as drug resistance (Muz *et al.*,

2015). One of the Key important transcription factor produced in hypoxic TME is HIF-1 α which is over expressed in many cancer condition including lung cancer, which is strongly associated with the up regulation of a variety of angiogenic factors such as VEGF, Angiopoietins, MMP's and thereby contributing poor prognosis (Al-Ostoot *et al.*, 2021).

On the other hand, ROS generated through metabolism influence numerous biological processes. Excessive ROS formation usually leads to diseases, including cancer, owing to its detrimental effects on biological macromolecules. ROS levels are increased in cancers and cancer cells fine-tune ROS concentrations via ROS inducers and scavengers to benefit their proliferation and metastasis (Liou and Storz 2010). ROS contributes to overall disease progression through over expression of many proinflammatory cytokines such as IL-6, IL-1 β , and TNF- α by activating numerous signaling pathways (Pawluk *et al.*, 2020). These processes ultimately initiate establishment of tumors through abnormal angiogenesis, which is eventually regulated by hypoxia and its regulators. Intriguingly, hypoxic system regulates ROS production, which in turn modulates the stability or activity of HIF, thereby prognosis of the disease (Tafani *et al.*, 2016). Thus, modulation of ROS or ROS-interconnected hypoxic signaling has been considered as a promising

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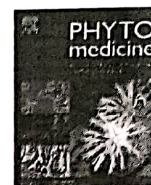
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Original Article

Steroidal alkaloid solanidine impedes hypoxia-driven ATM phosphorylation to switch on anti-angiogenesis in lung adenocarcinoma

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ABSTRACT

Purpose: The declined oxygen tension in the cancer cell leads to the hypoxic adaptive response and favors establishment of tumor micro environment [TME]. The complex TME consists of interwoven hypoxic HIF-1 α and DNA damage repair ATM signaling. The ATM/HIF-1 α phosphorylation switch on angiogenesis and abort apoptosis. Targeting this signaling nexus would be a novel therapeutic strategy for the treatment of cancer.

Background: Steroidal alkaloid solanidine is known for varied pharmacological role but with less molecular evidences. Our earlier findings on solanidine proven its anti-neoplastic activity by inducing apoptosis in lung cancer. In continued research, efforts have been made to establish the underlying molecular signaling in induction of DNA damage in prevailing hypoxic TME.

Methods: The solanidine induced DNA damage was assessed through alkali COMET assay; signaling nexus and gene expression profile analysis through IB, qRT-PCR, Gelatin Zymography, IHC, IF and ELISA. Pathophysiological modulations assessed through tube formation, migration, invasion assays. Anti-angiogenic studies through CAM, rat aorta, matrigel assays and corneal neovascularization assay. Anti-tumor activity through *in-vivo* DLA ascites tumor model and LLC model.

Results: The results postulates, inhibition of hypoxia driven DDR proteins pATM^{ser1981}/pHIF-1 α ^{ser696} by solanidine induces anti-angiogenesis. Systematic study of both non-tumorigenic and tumorigenic models *in-vitro* as well as *in-vivo* experimental system revealed the angio-regression mediated anticancer effect in lung cancer. These effects are due to the impeded expression of angiogenic mediators such as VEGF, MMP2&9 and inflammatory cytokines IL6 and TNF α to induce pathophysiological changes

Conclusion: The study establishes new role of solanidine by targeting ATM/HIF-1 α signaling to induce anti-angiogenesis for the first time. The study highlights the potentiality of plant based phytomedicine solanidine which can targets the multiple hallmarks of cancer by targeting interwoven signaling crosstalk. Such an approach through solanidine necessary to counteract heterogeneous complexity of cancer which could be nearly translated into drug.

Abbreviations: ATM, Ataxia-Telanglectasia-Mutated; BER, Base Excision Repair; Chk2, Checkpoint Kinase 2; DDR, DNA Damage Repair; DNA DSB, Double-Strand Breaks; DAPI 4', 6-diamidino-2-phenylindole; ELISA, Enzyme Linked Immuno Sorbent Assay; ECM, Extra Cellular Matrix; HIF-1 α , Hypoxia Inducible Factor-1 Alpha; HRE, Hypoxia-Response Element; HR, Homologous Recombination; IL6, Interleukin 6; LLC, Lewis Lung Cancer; MMP 2&9, Matrix metalloproteinases 2&9; MVD, Micro Vessel Density; TME, Tumor Micro Environment; TNF α , Tumour Necrosis Factor Alpha; VEGF, Vascular Endothelial Growth Factor; XRCC1, X-ray repair cross-complementing protein 1.

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"MANAGEMENT PRINCIPLES IN AGRICULTURAL ACTIVITIES"- A STUDY WITH SPECIFIC REFERENCE TO PADDY CROP IN SOUTHERN PART OF KARNATAKA

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Abstract

The entire world has come to the conclusion that, in this chaotic and perplexing environment, the only way to conduct any activity with the knowledge of reaching tremendous heights is by adhering to a methodical approach, which is exactly management principles represent. Management ideas have recently become quite important for obvious reasons. Regardless of the industry, the work of decision-makers is more trivial than ever before in the VUCA era. In light of this context, the current paper begins with the three major goals of comprehending the process of paddy cultivation, determining the extent to which management principles are used, and finally to find out the impact of following management principles in the process of Paddy cultivation. The study also made an effort to find out the significance of the planning principles in controlling the diseases of the Paddy crop. The article concluded by saying that even an illiterate farmer also uses all the principles of management appropriately. Therefore, through some training or up-skilling programs, if the farmers are sensitized, perhaps good yield in almost all the crops can be expected. Many a time without knowing the market, price, quality of the seeds, and knowledge of various diseases many farmers lose the entire crop of the year, to avoid such untoward situations, effective usage of principles of management may help the farmer's community.

Keywords: Farmers, Paddy crop, management principles, modern method of cultivation

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Isolation, Purification and Anti-Cancer Potency of Novel Compound 6-Ethyl-3-Hydroxy-4-Methyl-8aH-Xanthen-9(10aH)-One from *Mesua ferrea* Linn from Western Ghats of Karnataka

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Murthuza *et al.*: Anti-cancer Potency of 6-Ethyl-3-Hydroxy-4-Methyl-8aH-Xanthen-9(10aH)-One of *Mesua ferrea*

Cancer is one of the leading causes of death worldwide. With the help of current scientific developments and traditional knowledge about medicinal plants, great progress could be made in the fight against cancer. The present study attempts to scientifically validate the ethnomedicinal and anticancer effects of *Mesua ferrea* Linn from the Western Ghats of Karnataka, India. Using preparative HPLC, two main fractions (C1 and C2) were isolated from the methanolic extract of *Mesua ferrea* and their bioactivity was investigated. Gas chromatography/Mass spectrometry analysis of *Mesua ferrea* methanol extract revealed the presence of 7 phytocomponents. Fraction C2 shows maximum potency against liver HepG2 cancer cell lines. Fraction C2 was further purified and subjected to spectroscopic analysis by ¹³C NMR, ¹H NMR, FTIR and liquid chromatography-mass spectrometry techniques. The structure is predicted and identified as 6-ethyl-3-hydroxy-4-methyl-8aH-xanthen-9(10aH)-one. This compound was found to have antiproliferative activity with an IC₅₀ value of 352.007 µg/ml compared to the standard drug (camptothecin) with an IC₅₀ value of 52.253 µg/ml and a crude drug of 177.006 µg/ml. Anticancer efficacy of the purified compound assessed by Annexin V apoptosis Study Using HepG2 cell lines. The compound exhibits significant early and late apoptosis of 13.6 % and 15.5 %, respectively, compared to the standard drug camptothecin with 28.7 % and 18.7 % early and late apoptosis and 7.02 % and 11.8 %. Caspase-3 expression analysis using HepG2 cell lines revealed that the purified compound inhibited early apoptosis in HepG2 cells at a concentration of 352 µg/ml, activating the caspase-3 cascade by 15.3 % compared with 17 % of the standard drug CTP. The result of the DNA fragmentation test supported the results of Annexin V and caspase 3 expression and showed significant protection. Our results indicate that 6-ethyl-3-hydroxy-4-methyl-8aH-xanthen-9(10aH)-one isolated from *Mesua ferrea* may be a new lead molecule for the development of an antiproliferative, DNA-protective and effective anticancer drugs.

Key words: Ethnomedicine, *Mesua ferrea*, anti-cancer, apoptosis, caspase, Annexin-V

Advances in molecular and genomic research have shed light on complexities and changed perceptions of cancer. Ongoing research has increased our understanding of how cancer develops and how drugs can be used to target specific types of cancer. However, cancer remains a major global health problem, with lifestyle, environmental and genetic factors increasing the risk of developing cancer. In chemotherapy approaches, researchers continually

seek scientific validation of traditionally recommended medicinal plants for their anti-cancer properties.

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(III)

Taxonomic Diversity and Distribution of Herbs and Shrubs in Sringeri Forest Range, Western Ghats, Karnataka

A forest comprises of different layers, where herbs and shrubs are the major community belong to understory layer. The herb layer of the forest is dominated by herbaceous (or soft-stemmed) plants such as grasses, ferns, wildflowers, and other ground covers. Vegetation in the herb layer often gets little light and in forests with thick canopies, shade tolerant species are predominant in the herb layer. The shrub layer is characterized by woody vegetation that grows relatively close to the ground. Bushes and brambles grow where enough light passes through the canopy to support shrub growth. They also play an important role in determining vegetation type of a forest. The present study is undertaken to get the current status of diversity of herbs and shrubs in forest areas of Sringeri range with the information of exact distribution and frequency along with the Statistical analysis as a part of flora of Chikmagalur district, a revision.

Sringeri Range is comes under Malnad region of Chikmagalur district of Karnataka State with a geographical area of 7201 km² (Fig. 1). The place with hills and plains traversed by the river Tunga and its tributaries has bestowed rich diversity of plant wealth.

The study area is situated between 13°30'50" to 13°11'34" N and 75°04'35" to 75°19'53" E. Sringeri has well defined physiographic regions. It has surrounded by many hills, the elevation ranges about 600-900 m. Lateritic and red loams are found in Sringeri. Sringeri and its part receive rainfall from south West Monsoon and North East monsoons. The average rainfall is around 3000 mm. The maximum temperature reaches 36°C during summer and minimum around 12°C during winter. Considering topography, bio climate and soil, the vegetation of the region is broadly categorized under evergreen, semi evergreen/moist deciduous and dry deciduous. Tropical evergreens occupy the western region and higher altitudes with gradual change in species composition towards the eastern side leading to disturbed evergreen with moist deciduous elements and dry deciduous species in the open and disturbed hills (Gowda, 2004).

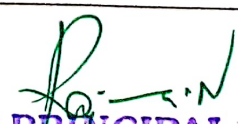
Field work

A frequent field visits were under taken in different vegetation in the forest range to document the diversity of plant species. Before going to the field survey, a basic

Table 1: Diversity of herbs

SI No	Species name	Family	A	D	F	SIV
1	<i>Alpinia galanga</i> (L.) Willd.	Zingiberaceae	1.00	0.01	0.01	1.31
2	<i>Arundinella pumila</i> (Hochst.) Steud.	Poaceae	2.56	0.23	0.09	16.24
3	<i>Canscora diffusa</i> (Vahl) R.Br. ex Roem. & Schult.	Gentianaceae	2.33	0.07	0.03	5.20
4	<i>Crepidium acuminatum</i> (D.Don) Szlach.	Orchidaceae	1.00	0.01	0.01	1.31
5	<i>Curculigo orchoides</i> Gaertn.	Hypoxidaceae	1.50	0.03	0.02	2.94
6	<i>Elephantopus scaber</i> L.	Asteraceae	2.94	0.5	0.17	32.76
7	<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult.	Poaceae	4.80	0.24	0.05	12.59
8	<i>Justicia japonica</i> Thunb.	Acanthaceae	3.61	1.3	0.36	77.04
9	<i>Oldanlandia corymbosa</i> L.	Rubiaceae	4.17	0.25	0.06	13.90
10	<i>Ophiorrhiza mungos</i> L.	Rubiaceae	3.17	0.19	0.06	11.99
11	<i>Melinis repens</i> (Willd.) Zizka	Poaceae	1.67	0.2	0.12	18.25
12	<i>Spermacoce verticillata</i> L.	Rubiaceae	5.00	0.1	0.02	5.16
13	<i>Themeda triandra</i> Forssk.	Poaceae	1.00	0.01	0.01	1.31

Note: A-Abundance, D-Density, F-Frequency, SIV – Species Importance value index


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Research Article

Study of Leaf Epidermal Characters of Some Species of the Genus *Desmodium* Desv. (Papilionoideae-Leguminosae) of Chitradurga, Karnataka, India

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Abstract

The epidermal study of three species of *Desmodium* Desv viz *Desmodium dichotomum* (Willd.) DC. Synonym of *Bouffordia dichotoma* (Willd.) H. Ohashi and K. Ohashi, *Desmodium scorpiurus* (Sw.) Desv. *Desmodium triflorum* (L.) DC. Synonym of *Grona triflora* (L.) H. Ohashi and K. Ohashi found in Hosadurga and Holalkere taluks of Chitradurga, the epidermal characters including the properties of epidermal cells (shape, size and frequency), stomatal properties of both adaxial and abaxial (type of stomata complex, length, width, frequency and index), type and length of trichome were investigated. All the three species are amphistomatic and shows different types of stomata such as anisocytic, diacytic, paracytic, hemiparacytic and tetracytic were documented. Trichomes were present in adaxial and abaxial surface of all species of *Desmodium* but absent in abaxial surface of *D. triflorum* and reported unicellular eglandular unbranched trichomes of long and short. In the present study of leaf epidermis of all three species of *Desmodium* revealed inter specific relationship among species, which could be used as taxonomic tool in identification of species.

Keywords: *Desmodium* Desv, Epidermal Characteristics, Chitradurga, Stomata, Trichome

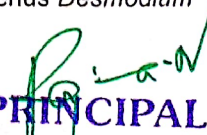
INTRODUCTION

The genus *Desmodium* Desv was commonly known as Tick clover or beggar weed contains about 280 species about 49 species were recorded in Flora of British India and is native to tropics and subtropics. Mostly herbs, subshrubs, shrubs and rarely climbers or trees, leaves pinnately 3-foliate or 1-foliate by reduction of laterals leaflets, stipulate. Flowers usually smaller in racemes or panicles, axillary or terminal, rarely solitary or binate in leaf axils.

Bracts persistent or early deciduous; bracteoles present or absent, calyx campanulate, 4 or 5-lobed, bivariate upper 2 lobes connate for all or most of length entire or 2 toothed at apex, lower lobes free longest. Corolla white, green-white pink, purple or violet; standard elliptic or obviate to nearly orbicular; wings, ovary sessile 2 many, legumes usually stipulate or sometimes sessile, well exerted from the calyx, compressed, usually indehiscient,

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Tree Diversity, Regeneration and Ecological Status in Koppa Forest Division, Central Western Ghats, India

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ABSTRACT

Forests and their trees support human and animal lives by the provision of food and food-associated materials, fodder and foraging sites for their livestock, and medicinal materials, as well as multiple ecological services. However, unbalanced utilization of these resources and the biotic and abiotic disturbances interrupt their sustainability and ecological functions. We studied the tree population structure, diversity, and regeneration status of tree species in the Koppa Forest Division. The present study reports 207 species of adult trees belong to 140 genera and 49 families were present in the area and nine species were present only as regenerating individuals. The ecological status of the tree species of the region according to International Union for Conservation of Nature, red list indicates that four species are of data deficit, five species are endangered, six are nearly threatened, 17 are vulnerable and 81 species are of least concern. The study concludes that among the recorded 207 tree species, 22 species showed a frequency value of < 0.01 and 185 species showed ≥ 0.01 , which indicates that only 10% of the species were less frequently found in the region. This indicates the species richness of the area. To maintain the diversity the rate of survival of regenerating individuals should be increased. This study may pave the way for further research on regeneration potentials of the native species for conservation and enhancement of forests in the future.

Key words: Diversity, Forest, Regeneration, Conservation, Distribution, Western Ghats

INTRODUCTION

Natural forests are biodiversity-rich habitats on the globe because they host diversified flora and fauna species. They support human and animal lives by the provision of various products and services. While forest products include edible fruits, fodder, timber, and medicinal materials, their services cover soil protection and influence water cycles, nutrient cycling, weather amelioration, shelter for animals, nests for birds and quality of recreation sites. These products, services, and roles are important for the rural, urban, forest-based communities, and for human societies in all the developing countries. However, the sustainability of these resources and their functions are continuously influenced by overexploitation, overgrazing, intensive browsing, illegal harvesting, agricultural expansion, urbanization, climate variability, and climate change. Thus, it is important to know the current state of forest tree populations, their dynamics, and the potential disturbances as a pre-requisite towards their sustainable management and species conservation.

Furthermore, other environmental issues such as global climate change, habitat fragmentation, land degradation, land use change, and forest canopy gaps due to intensive logging have potential influence on the forest tree populations and their diversity (Mohammed et al. 2021). This study aims to explore the status of tree population, diversity, and natural regeneration, as well as the potential disturbances that may hinder the sustainability of forest resources in Koppa division forests of Western Ghats, which is one of the hotspots of diversity. We compared the tree population's structure (abundance, dominance, frequency, importance value, and species richness) and regeneration status of tree species

MATERIALS AND METHODS

Study area

Koppa Division belongs to Chikmagalur district of Karnataka State with a geographical area of 2,000.24 km² (Fig. 1). Koppa forest division is situated in central Western Ghats, the south-western part of Karnataka state. The division covers the

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RESEARCH ARTICLE

Terrestrial orchid diversity in Hosanagara taluk of Shimogga district Central Western Ghats region of Karnataka

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Abstract

The current article evaluates the study of terrestrial orchids in the Hosanagara taluk of Shimogga district, reports a total of 30 terrestrial orchid species in the Hosanagara taluk region Shimogga district Karnataka from the period of January 2019-January 2022, and provides information on their distribution, phenology aspects, and biological status in the Hosanagara taluk of Shimogga district. Extensive field surveys were carried out periodically in different parts of the taluk, particularly in grasslands and hilly regions, to study the plant's diversity and phenological character. It was noticed that, when compared to other species, the *Habenaria* species is richly distributed in the Hosanagara taluk region. During field trips, some anthropogenic activities that have a significant impact on the diversity of terrestrial orchids were also observed. To learn more about the variety and current state of terrestrial orchid species in the Hosanagara taluk in the Shimogga District of Karnataka, further research must be conducted.

Keywords

Western Ghats; Hosanagara taluk; phenology; terrestrial orchids

Introduction

The Orchidaceae is one of the largest and widespread families of flowering plants, the Orchidaceae exhibits highly developed and specialized plant characteristics. There are around 25,000-35,000 currently recognized species in the Orchidaceae, which are divided into 600-800 genera (1, 2). The richest orchid environments in India are found in the Eastern Himalaya and Western Ghats. According to recent studies, India has 1300 species divided among 151 genera (3). More than 46% of the known orchid species are native to the Western Ghats (3). In Karnataka, the Orchidaceae family has 59 genera and roughly 203 species (4, 5). Although the family's blooms exhibit a very consistent structure, the arrangement of the vegetative elements varies significantly between species (6). These characteristics enable the family to flourish in a variety of conditions and increase the variety of its grow forms.

The orchids can be divided into epiphytes, terrestrial, saprophytes, or lithophytes since they have evolved to adapt to various habitats (7). These environmental changes are a factor in the structural changes of vegetative organs (8). Except for dry regions, orchids are extremely diverse plants that can be found all over the world. They can be found anywhere between sea level and 4,000 meters in elevation, but between 500 and 2,000 metres above sea level is where they are most common. About 200 species were known to occur in the Western Ghats at the time (9, 10) contributed significantly to the understanding of orchids in peninsular India.

Diversity and Conservation status of Angiosperms in Sringeri Forest Range of Central Western Ghats, Karnataka

The present study has shown that the Sringeri forest range has a good floristic diversity of trees, climbers, herbs and shrubs, which contribute to the overall biodiversity of the forest. To document the floristic diversity quantitative and qualitative methods were used. The study yielded a total of 413 angiosperm species of herbs, shrubs, climbers and trees. Among them three species are in endangered and four species are in nearly threatened and status according to IUCN Red list. Statistical analysis of the endangered species shows that *Hopea ponga* is the most abundant trees in the region and also highest abundantly regenerated species observed in sapling condition. Another endangered species *Syzygium caryophyllatum* has showed highest density among the regenerated species observed in seedling condition. The reasons are discussed in this article to encourage this kind of studies which showers light on the importance for conservation. The area of study might be small with a geographical area of 7201 km² but it can impact on others to make this kind of ecological studies that helps in determining the ecological status of those areas.

Key words: Conservation, Distribution, Diversity, Ecology, Regeneration, Plant population

Introduction

Plants are the indicators of prosperity. Plant diversity indicates fertility of the land. Plants reflect the rich tradition, culture and history of the land. In India, southern and north eastern region portray a grand picture of our luxury in plant wealth and its destruction for variety of reasons has threatened the very existence of the life forms (Yoganarasimhan *et al.*, 1982).

Trees, due to their large biomass, play a crucial role in many ecosystems by influencing ecosystem processes such as nutrient cycling, carbon storage, and regulation of understory microclimate (e.g. shading, moderating temperature and humidity extremes, reducing precipitation through fall). In vegetation studies, trees are commonly used to understand ecological correlates of composition, richness and density. Other plant life-forms, such as lianas, herbs, and ferns, also contribute substantially to plant richness and density. First, landscapes are likely to support multiple plant communities composed of different species in response to resource gradients across the landscape and these plant communities (Pasion *et al.*, 2018). Plant studies have acquired increasing importance in recent years in response to the need of developing and under developing countries to assess their plant wealth (Chavda and Mehta, 2015).

Chikmagalur district of Karnataka State is one such district which is endowed with rich natural resources. The present study area, Sringeri Forest Range is a part of Chikmagalur district is selected because the information regarding the floristic diversity of the district is already done once and we can study the changes by comparative analysis. It is our

The study on
angiosperm diversity of
Sringeri forest range
yielded a total of 413
angiosperm species of
herbs, shrubs,
climbers and trees
given with IUCN Red
list status, which
showers light on the
importance for
conservation.

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Survey study on Traditional storage practices of Finger millet

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Abstract

Current study aimed to assess the traditional storage practices being practiced in southern dry zone of Karnataka viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara districts and to identify the best storage practices being followed in these districts. Field survey was undertaken in major finger millet [*Eleusine coracana* (L.)] growing region of all five districts of Southern Dry Zone of Karnataka viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara. Information was documented by using Participatory Rural Appraisal (PRA) technique like observation and discussion. The data on various methods was collected by contacting the respondents through one-to-one interaction and group discussion methods, the indigenous technologies used by dry land farmers for storage of seed were documented. Survey observations delineated that hagevu, metal bin and gunny bag type of traditional storage practices being followed for the storage of finger millet in southern dry zones of Karnataka viz. Mysuru, Mandya, Hassan, Tumkur & Chamarajanagara districts. Precautionary measures before storage, during storage, and after receipt of grains highlighted in our study were being practiced by farmers in these regions to ensure protection from spoilage of grains. It was demonstrated through our field study that traditional technical skill teaches us how best the utilization of natural sources could be useful for storage and protection of life of grains or seeds.

Key words : Traditional storage, Finger millet, Metal bins, Hagevu, Gunny bag.

Almost 54.6% of the population engaged directly or indirectly in agriculture and allied activities, and hence agriculture is the backbone of Indian economy that plays a vital role in its development. In coarse cereal crop, Finger millet crop is one of the major crops

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Diversity Of Phytoplankton In Rice Fields Of Honnali Taluk Davanagere District Karnataka India

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Abstract

The present study was conducted in Honnahalli Taluk Davanagere district of various region of paddy. The analysis of the phytoplankton diversity of various locality of paddy field at Honnahalli Taluk davanagere district Karnataka. A slandered procedure was used to conducting to complete this experiment and samples are collected at different regions of paddy fields near Tungabhadra River. Through a field survey, six species of Phytoplankton were recorded namely Spirogyra, Chara, Euastrum, Ankistrodesmus Falcatus, Euastrumspinulsoum, Odegonoium and also order of the species is Zygnematales, charales, Zygnematales, Oedogoniales, Desmidiiales. The mentioned species were observed light intensity, light nutrients and more water availability appears to be better condition for algal growth in paddy fields. This study reveals that maximum diversity of phytoplanktons present in the rice field in Ujjanipur as compare to other locality of paddy field.

Keywords: Diversity, Phytoplankton, Paddy fields, Honnali region

INTRODUCTION

Algae are numerous in forms; reflecting genetic-molecular and morphological diversities. Their ecological distribution cuts across many habitats, of algal diversities, the phytoplankton are the largest and the most common group in the paddy field. Honnali-577217 is situated in Davanagere District, Karnataka State. And further its Latitude = 14.2625177 and Longitude = 75.3598953. paddy field receive the water from thunga river near Honnali, Tunga canal and waste water from Honnali Thaluk. It is located in Honnali taluk, 43 km away from Shivamogga city. In India, In the year 1939,

De [1] was first time introduced blue green algae used as biofertilizer for paddy crop. Algalization seems to have little effect on the physical properties of the soil and it may improve soil aggregation [2] and algae fertilizer used as source of nitrogen [3,4]. Rice is an exclusive crop plant of aquatic habitat, largely raised in an anaerobic or partially anaerobic submerged environment. Diversity of paddy fields provides favourable environment for the growth of various group of algae with respect to their requirement of light, water, temperature and nutrient availability. The chemical properties which undergo changes on submergence are



RESEARCH PAPER

OPEN ACCESS

Evaluation of soil fertility using soil nutrients and chemical properties as parameters in fields of Honnalitaluk of Davanagere District, Karnataka

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Key words: Soil nutrients, Soil fertility, Chemical properties, Soil analysis

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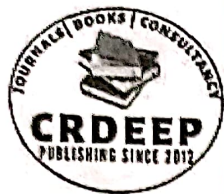
Article published on February 13, 2023

Abstract

A study was conducted to analyse the nutrient status and chemical properties of soils of Honnali Taluk of Davanagere District, Karnataka state. Eight villages were included in the study. Soil samples were collected and analyzed as per the standard protocols. Chemical properties viz pH, electrical conductivity and organic carbon content were found to be good for crop growth. Amount of primary nutrients was high except for nitrogen. Other nutrients viz sulphur, zinc, iron, manganese and copper were also high in the soil except for boron. Supplementation need to be given for nitrogen and boron. Crops like cereals, pulses, vegetables, flowers and plantation crops can be successfully grown in these soils with proper management practices.

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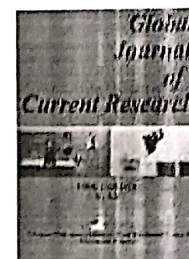

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Review Paper

A Brief Review on Seaweed Culture

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ARTICLE DETAILS

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Key words:

Seaweed, Microalgae,
Algae, Fertilizer, carbon
dioxide

ABSTRACT

In global terms, cultivation of macro algae is the fastest growing sector within aquaculture, but despite good natural conditions (cold, nutrient-rich waters), it is relatively under developed in India. Aqua Agri is seeking to identify how to develop sustainable large-scale cultivation of macro algae in India. Cultivation of macro algae has many advantages over land-based biomass production. Macro algae grow faster than terrestrial plants and are therefore more efficient at capturing carbon dioxide. In addition, cultivation in these does not require fertilizer, pesticides or irrigation and does not occupy valuable arable land. Instead, the nutrients in coastal waters are utilized and by using macro algae for food feed and fertilizer, a link to agriculture can be established.

1. Introduction

The Seaweeds are macrophytic algae, a primitive type of plants lacking true roots, stems and leaves. Seaweeds grow in the shallow waters, and lack root system and conducting tissues like land plants. Four groups of seaweeds are recognized according to their pigments that absorb light of particular wave lengths and give them their colors of Chlorophyceae (green), Cynophyceae (blue green), Pheophyceae (brown) and Rhodophyceae (red). The greatest variety of red seaweeds is found in sub tropical and tropical waters, while brown seaweeds are more common in cooler and temperate waters. Seaweeds provide valuable source of raw material for industries like health food, medicines, pharmaceuticals, textiles, fertilizers and animal feed. Seaweeds is also used for production of Agar, Alginates and Carrageenan. Chemicals from brown seaweeds such as alginic acid, mannitol, laminarin, fucoidin and iodine are extracted on a commercial basis.

As a staple food in Japan and China, Seaweeds are rich in minerals, vitamins, trace elements and bio active substances, and are called medical food of the 21st century. Seaweeds are cultivated for supply of raw materials to the seaweed industries and for their use as human food. In India, seaweeds collected from wild are used raw material for the production of agar and alginate. Nearly 25 agar and 10 algal industries are functioning at different places in maritime states such as Tamil Nadu, Kerala and Karnataka. Annually about 5000 tons (dry wt) of alginophytes, *Sargassum* spp., *Turbinaria* spp. and *Cystoseira* spp. and so many tonnes of agarophytes *Gelidiella acerosa*, *Gracilaria edulis*, *G. crassa* and *G. foliifera* exploited from the natural seaweed beds mostly from south Tamil Nadu coast, are used as raw materials by these industries. These quantities, particularly agar yielding seaweeds, are inadequate to meet the raw material requirements of Indian seaweed industries. As a number of seaweed industries are coming up every year, there is an increasing demand for the raw materials which the existing resource cannot meet [1- 4]. Hence, commercial scale cultivation of seaweeds is necessary for uninterrupted supply of raw material to industries.

There are several advantages in the culture of seaweeds. In additions to continuous supply of alga, crop of single species could be maintained continuously. By adopting scientific breeding and other modern techniques of crop improvement the yield and quality of seaweeds could be improved, Further, if seaweed culture is carried out on large

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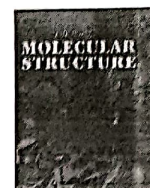
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Transition metal chelates of novel ligand bearing Isatin moiety: Synthesis, Structural characterization, Voltammetric analysis of heavy metals, Molecular docking and Biological evaluation

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ARTICLE INFO

Keywords:

Heterocyclic compounds
Transition metal complexes
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Electrochemistry
Heavy metals
Molecular docking

ABSTRACT

This study endorses the combination of experimental and pharmacological studies of 3d-metal chelates (Co(II), Ni(II), Cu(II) & Zn(II)) of novel ligand (E)-2-hydroxy-N'-(2-oxoindolin-3-ylidene)benzohydrazide (HBH) bearing isatin moiety. An array of physical and spectroscopic methods were employed to characterize the synthesized ligand and its 3d-metal complexes. In accordance with the spectroscopic methods, all the metal-coordinated compounds exhibited tridentate coordination and octahedral geometry. Further, a modified cobalt(II) metal complex carbon electrode with MWCNTs served as a sensor to identify three most noxious heavy metal ions (Pb^{2+} , Hg^{2+} , Cd^{2+}) individually and simultaneously using CV and LSV methods. Generally, the proposed sensor was reliable, repeatable with high sensitivity ensuring its practical implementations in real samples with agreeable results. Also, an important aspect of this study was the exploration of the antimicrobial, antioxidant, antiobesity and anticancer properties of ligand HBH and its 3d-metal complexes. The results from the biological screening exposed the fact that the coordinated compounds demonstrated significantly higher pharmacological activities than their ligand. Additionally, molecular docking study was undertaken for antimicrobial and anti-cancer receptors to determine binding modes of ligand and its metal chelates.

1. Introduction

In the present scenario, the design of novel compounds has emerged as one of the foremost necessary areas of antibacterial and antifungal studies due to resistance of dangerous bacteria and fungi to the currently available antimicrobial drugs, which is increasingly becoming a serious concern worldwide and on the other hand, cancer is still considered as the second leading cause of mortality in both developing and developed countries. Therefore, these days the exploration of new and robust antimicrobial agents and creation of novel and effective chemotherapeutics is highly essential and intriguing task for chemists and pharmacists [1,2].

In addition, obesity is currently considered as a principle lifestyle disorder in most countries which can be the reason for numerous severe diseases and it is predominant at an disturbing rate as well. As of now, orlistat is the main FDA-clinically endorsed drug for obesity treatment which is utilized to lower fat absorption by playing the role as a potent

PL (pancreatic lipase) inhibitor in the small intestine. In spite of the encouraging results of orlistat for treating obesity, it is related with specific undesirable gastrointestinal side effects. Thus, there is a requirement for novel, durable and safe PL inhibitors with lesser side effects [3,4].

Furthermore, among all the different heterocycles, isatin (1H-indole-2,3-dione), an indole derivative is a naturally occurring compound in majority of plants and is a remarkable class of heterocycles that act as biologically active compound. Isatin and its derivatives have wide variety of pharmacological effects and also compounds of isatin own SARS protease, anti-smallpox, kinase activator and inflammatory activities. These biological functions confirmed isatin as a basis for the design and synthesis of chemical compounds. Besides, metal complexes of isatin derived ligands have captured abundant consideration these days due to their diagnostic and therapeutic properties [5,6].

Heavy metals like Hg^{2+} , Pb^{2+} and Cd^{2+} are regarded as one of the troublesome contaminants because of their harmful and non-

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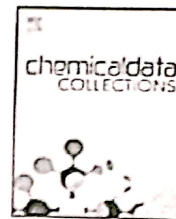

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Synthesis and characterization of CuO-NiO nanocomposite for dye degradation and electrochemical sensing of dopamine

ARTICLE INFO

Keywords

CuO-NiO NC
Methylene Blue
Photocatalytic degradation
Dopamine electrochemical sensing

ABSTRACT

In this study, CuO-NiO nanocomposite (NC) was synthesised via simple combustion method. The prepared NC was characterized by XRD, FTIR, UV-Visible, PL, EIS, SEM, TEM and EDAX. XRD data is matched with the standard JCPDS 5-661 and 78-429, which correspond to CuO and NiO respectively. FT-IR spectrum exhibits the existence of metal-oxygen bonding in CuO-NiO NC. Optical energy band gap of CuO-NiO NC was found to be 3.12 eV. PL spectrum excited at 329 nm shows an emission peak at 490 nm. The photodegradation of CuO-NiO NC on MB dye was examined under UV light irradiation. CuO-NiO NC acts as a good photocatalyst compared to individual metal oxide NP. At low concentrations of dopamine, CuO-NiO NC exhibits very good electrochemical sensing. The analytical profile of composite electrode shows long linear range, sensitivity and LOD of $1.0\text{--}6.0\ \mu\text{M}^{-1}\text{L}^{-1}$, $0.179\ \mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$, and $0.033\ \mu\text{mol/L}$.

1. Introduction

As a consequence of human activities, exceptional acceleration of industrial and technical growth, water sources are being contaminated. Among these, human activities urbanization, industries and excessive use of pesticides, severe environmental pollution particularly to aquatic life was observed [1]. The exclusion of effluents from industries has seriously affected the water pollution. The inclusion of dyes in water sources is spoiling aquatic and human life. Hence in the last few decades, different techniques have been adopted to remove pollutants from water sample. Advanced oxidation processes (AOPs) are the heterogeneous photocatalysis and the methods that are most frequently used. AOP generally accompanied by producing highly efficient oxidant radicals that are capable to target organic pollutants and break them to smaller components, ultimately decomposing into carbon dioxide and water [2]. Among the several AOP techniques, the most common kind of heterogeneous catalysis is well-known environmentally friendly process, with great efficiency and low-cost advantages. This technique can degrade various types of pollutants under UV-visible light exposure [3]. Nanomaterials due to their characteristic size, surface area and shape have attracted an attention from the modern era confronts. Semiconducting transition metal oxides, such as TiO_2 , NiO , ZnO , and CuO , are exposed to radiation in this process, have proven very effective catalyst towards the water treatment from organic dyes [4].

A semiconducting metal oxide produces positive holes in its valence band (Vb) and photogenerated electrons (e^-) in its conduction band (Cb) at sufficient photon energy [5]. The hole has sufficient positive potential to activate adsorbed hydroxyl radicals ($^{\bullet}\text{OH}$) or water on the catalyst's surface. Meanwhile, the photoelectron created has the power to transform dissolved oxygen into superoxide ion radical ($^{\bullet}\text{O}_2^-$) [6]. These strong oxidants can destroy pollutant molecules in solution. Recombination of e^-/h^+ couples diminishes the efficiency of heterogeneous photocatalysis significantly [7]. One of technique adapted to takeout this limitation is the combination of two semiconductors with appropriate assembling in their (Cb) and (Vb). Alternatively, potentials of Cb and Vb of semiconductors should be suitable for easy release of charge connecting them [8]. In this instance, the more positive (Cb) of the second semiconductor can be reached by photogenerated electrons in the first semiconductor's (Cb). This significantly lowers e^-/h^+ recombination,

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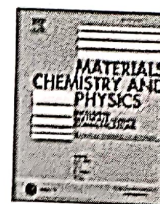
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In situ growth of $\text{BiVO}_4\text{-Bi}_2\text{O}_3$ p-n heterojunction nanocomposite via facile green combustion method: Efficient photocatalytic activity under visible light, photoluminescence and biosensing applications

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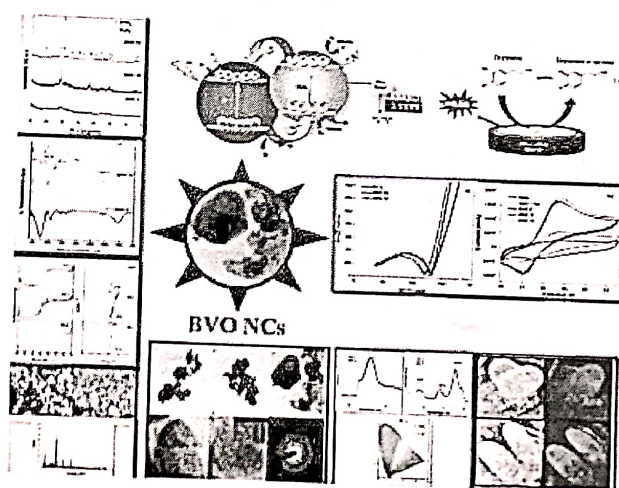
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HIGHLIGHTS

- Novel p-n junction $\text{BiVO}_4\text{-Bi}_2\text{O}_3$ nanocomposite were synthesized by facile green combustion method.
- $\text{BiVO}_4\text{-Bi}_2\text{O}_3$ NCs has the advantage of generating latent fingerprints and have advantageous in criminal investigations.
- $\text{BiVO}_4\text{-Bi}_2\text{O}_3$ NCs shows superior photocatalytic activity towards Rose Bengal dye under visible light irradiation.
- $\text{BiVO}_4\text{-Bi}_2\text{O}_3$ NCs act as electrochemical sensor for Dopamine detection.

GRAPHICAL ABSTRACT



ARTICLE INFO

Keywords:
Green synthesis
P-n heterojunction
Photocatalysis
Rose bengal
Dopamine

ABSTRACT

The easiest and simplest green combustion approach was successfully used to synthesize the pn Heterojunction $\text{BiVO}_4/\text{Bi}_2\text{O}_3$ nanocomposites (NCs) with efficient visible light activity. Different stoichiometric ratios of butea monosperma leaf powder were used as the green fuel. Using XRD, SEM, EDAX, FTIR, UV-visible, and PL spectroscopy, the phase and surface structure, composition, and optical properties of synthesized NCs are characterised. In comparison to other ratios, it was found that the 1:1.5 ratio of $\text{BiVO}_4/\text{Bi}_2\text{O}_3$ NCs exhibits good photocatalytic performance for the degradation of rose bengal dye. The outcome demonstrated that the formation of a p-n heterojunction between p-type Bi_2O_3 and n-type BiVO_4 is responsible for the improved

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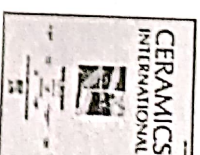
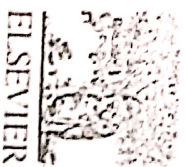
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Green synthesis of polyoxometalate $\text{Cu}_3\text{Mo}_2\text{O}_9$ nanoparticles for efficient degradation of organic dyes under visible light irradiation and their photoluminescence

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ARTICLE INFO

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Keywords:
Butea monosperma
 Combustion
 $\text{Cu}_3\text{Mo}_2\text{O}_9$
 Photoluminescence
 Photocatalytic degradation

ABSTRACT

Well-constructed photocatalysts with efficient catalytic activity have attracted much attention due to their efficient visible-light absorption and superior charge separation capability. Visible-light responsive $\text{Cu}_3\text{Mo}_2\text{O}_9$ nanoparticles are synthesized utilising a simple and environmentally friendly green combustion process with rhombic crystal structure of $\text{Cu}_3\text{Mo}_2\text{O}_9$ NPs corresponding to space group $P6_3$ (62). Furthermore, the synthesized NPs were characterized using FTIR, UV-DRS, PL, SEM and TEM studies. It was found that the direct energy band gap was 2.29 eV. Through photodegradation in the presence of visible light, the dye-sorted photocatalyst exhibited excellent results. The sorbents have also been examined for recycling, and it has been observed that they maintain their effectiveness even after multiple successive runs. These substances therefore appear to have potential as efficient industrial dye wastewater remediation. Moreover, the high intensity emission in the green zone is amply confirmed by the photoluminescence emission spectra and CIE coordinates. The latent fingerprints (LFP) are visible with the application of the powder dusting process. The synthesized CMO nanoparticles exhibit ridge patterns that are well-resolved and useful for identifying unique LFP.

1. Introduction

The most essential and significant resource for life is clean water, but the biggest obstacle to getting it is water pollution. The two main contaminants of water are dyes and some organic materials [1]. Wastewater is primarily contaminated by businesses that produce pesticides, insecticides, fertilizers, textiles, leather goods, photography, printing, and painting [2]. These contaminants in water put humans, aquatic life, and microbes at risk for negative environmental effects. Because of its toxicity and potential for cancer, it poses a threat to ecosystems [3]. Sedimentation, adsorption, chemical precipitation, and certain biological techniques are among the techniques used to remove pollutants; however, they have certain drawbacks.

In context with this, heterogeneous photocatalysis has drawn a lot of

interest as a non-destructive and effective technique for turning bioreistant organic pollutants in wastewater into CO_2 , H_2O , and other by-products [4]. Advanced oxidation techniques like photocatalysis are very effective and economical. Stable and environmentally benign photocatalysts have made their way into semiconductors in nanoscale forms. It has been demonstrated that TiO_2 , ZnO , CuO , Fe_2O_3 , CdS , CeO_2 , and MoO_3 nanoparticles (NPs) are appropriate photocatalysts for the elimination of organic water contaminants [5]. The logical design of new photocatalysts that can be stimulated by visible and even near-infrared radiation and advanced materials with good photocatalytic performance has been more popular in recent years due to the demand for environmental remediation solutions, namely for the degradation of organic pollutants present in water [6,50,51].

$\text{Cu}_3\text{Mo}_2\text{O}_9$ NPs have become one of the most promising materials

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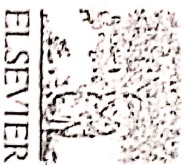
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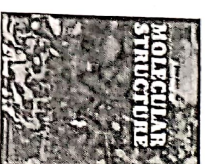


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Facile green synthesis of Zn doped MoO₃ nanoparticles and its photocatalytic and photoluminescence studies

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Moruya leucogii
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Photoluminescence
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ABSTRACT

In the field of nanoscience, the use of plant components for the synthesis of nanoparticles (NPs) is currently gaining popularity and has several advantages over physicochemical methods. *Moruya leucogii* (MR) leaf powder was used as the green fuel in the effective synthesis of the Zinc-doped molybdenum trioxide (Zn-MoO₃) NPs by the green combustion method. The green synthesized NPs were characterized using XRD, FTIR, SEM, EDAX, UV-Vis and Photoluminescence (PL) spectroscopy techniques. The XRD pattern revealed the presence of an orthorhombic phase. The PL spectrum revealed the presence of an energy band gap value of the samples found to be between 2.9 and 3.1 eV. The prepared NPs emit cyan light. Latent fingerprint analysis has revealed more distinct patterns in the near UV region (365 nm) and is useful in forensic investigations. The Rose Bengal (RB) dye degradation experiments are carried out under UV light exposure. Zn-MoO₃ NPs have greater degradation efficiency than pure MoO₃ NPs. Up to 99 % dye degradation is achieved in 150 min. After 3 photocatalysis cycles, the recycling test detects only an 8% decrease in photocatalyst efficiency. The obtained results proved that Zn-doped MoO₃ NPs are the most suitable photocatalyst for RB degradation.

1. Introduction

Wastewater treatment, pollution, and energy scarcity are the most critical problems for current and next generations. The global problem of water pollution is caused by the discharge of pollutants from sewage, industrial waste, fertilizers and pesticides. Notable contaminants of water include heavy metals, microorganisms, and organic pollutants. The use of chemically and physically strong synthetic dyes in large quantities in fabric production is also aromatic, coloured, ionizing substances and they must be resistant to the action of water, acid and alkalies. Both cationic and anionic organic dyes are available. The textile industry is the primary user of anionic dyes. While cationic dyes are used in different industries such as paper, medicine, etc.

In recent years the scarcity of water supplies has placed more emphasis on the removal of environmental pollutants such as phenol, organic dyes, heavy metals, bacteria and nitro-aromatic compounds from wastewater. Synthetic organic dyes pose a major threat to water quality due to their robust structure, excellent colour stability and ease

of release into the environment. These dyes are released into water bodies causing an increase in the Biological Oxygen Demand [1]. Xanthene dyes are the most commonly used type of dye among all the other types. A class of dyes known as xanthene dyes is identified by the presence of an aromatic group-containing xanthene nucleus serving as a chromophore. These dyes are widely used in the printing, dyeing, and textile industries as colourants. However, it has been observed that these colours are cytotoxic, mutagenic, genotoxic, and cytostatic. RB is a significant xanthene dye that is utilized extensively in the photochemical, textile, and dyeing industries. In addition to being poisonous, Rose Bengal inhibits leucine aminopeptidase [20]. One of the pollutants that has been heavily utilised in the textile industry is rhodamine B dye. Numerous goods, including stamp pad inks, paints, leather, ball pens, carbon sheets, dye lasers, crackers, and explosives, are also made with it. An extremely stable and non-biodegradable colourful cation is being produced by the dissociation of this weakly basic nitrogenous molecule. These vibrant cations penetrate reservoirs of surface and groundwater, causing profound changes to the aquatic environment. Human and

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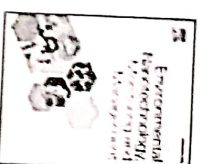
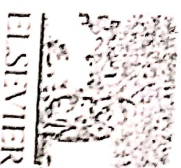
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Butea monosperma aided green synthesis of α -MoO₃ nanoparticles: Biosensing and photocatalytic activity towards hazardous dyes and rangoli colorants

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 Electrochemical sensing

ABSTRACT

Increasing environmental pollutants and the need for efficient photocatalytic and biosensing materials have led to the development of novel green synthesis methods. In this study, MoO₃ nanoparticles (NPs) were successfully synthesized by using green chemistry approach. In that respect, *Butea monosperma* leaf powder was used as a novel fuel. Structural parameters, optical properties, shape and morphology of MoO₃ NPs are examined using XRD, FTIR, UV-Vis spectrophotometer, Photoluminescence (PL), SEM - EDAX and TEM analysis. The use of MoO₃ NPs as a dusting agent in fingerprint applications results in improved fingerprint visibility, which is useful in forensic investigation. In this study, we modified the GCE electrode surface with MoO₃ NPs to develop a highly sensitive dopamine (DA) sensor. Electrochemical impedance spectroscopy (EIS), cyclic voltammetry (CV), and differential pulse voltammetry (DPV) were used to investigate the electrochemical behaviour and electrocatalytic property of the MoO₃ NPs. The synthesized NPs have excellent performance for detection of highly sensitive biologically active DA. The sensor exhibits a low detection limit of 0.45 μ M. Additionally, it shows good stability, simplicity, and selectivity for the rapid detection of DA. MoO₃ NPs shows good photocatalytic activity under UV light for the degradation of important textile industries dye such as methylene blue (MB) and harmful rangoli colors which are available in local shops of Tumkur, Karnataka. The photocatalyst exhibits a remarkable 97 % degradation efficiency for MB dye. Columnar studies ensure the effective generation of $\cdot$ OH radicals on the surface of the photocatalyst, leading to the degradation of organic dyes. Additionally, the MoO₃ NPs reusability was examined, and even after four cycles, the level of photocatalytic activity did not drop much. Therefore, it is a potential photocatalyst for the processing of organic colours.

1. Introduction

Environmental issues has becoming more important in recent years due to the release of toxic industrial pollutants into water, air, soil and notably water pollution is a serious problem that needs to be addressed. Due to the extensive use of various organic dyes in several industries, as well as wastewater discharge into water systems directly, much emphasis has been placed on the treatment of contaminated water (Guan et al., 2020). A major problem for portable water is, it is contaminated with toxic and carcinogenic organic dyes from printing and textile industries (Rathinam and Abigan, 2018). Consequently, there has been considerable research focus on effective strategies to

overcome these barriers. Hence it is needed to remove or decompose organic waste dyes and colors present in water. Some of the commercially available rangoli (kolam) colours are toxic in nature because they contain harmful chemicals. They can be widely used in india during the festivals, such as holi. When it rains, the colors left in the sand are carried towards water sources and cause water pollution. Numerous techniques, such as membrane filtration, sedimentation, chemical treatment, adsorption, ozonation, and electrolytic degradation have been developed for water remediation but all these methods have their limitations.

Dopamine (DA) is a well-known member of the catecholamine family, which performs important functions along with other brain

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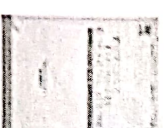
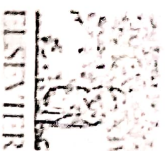
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Short communication

Facile green synthesis of Ni/NiO/MoO₃ nanocomposite for Photocatalytic, chromium (VI) Reduction, electrochemical dopamine (DA) and humidity sensor applications

M.V. Naveen ^a, T.L. Soundarya ^b, Y.T. Ravikiran ^c, G. Krishnamurthy ^a, Anitha ^a 
G. Nagaraju ^d  

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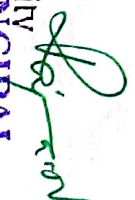
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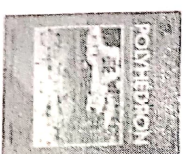
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Abstract

Many researchers concentrated their efforts on chemical method for the synthesis of metal oxide nanocomposite (NCs). This article focused on developing a rapid method to prepare Ni/NiO/MoO₃ NCs using leaf powder of Butca monosperma as a novel green fuel. Synthesised NCs were characterised using XRD, FT-IR, UV-Visible, Photoluminescence spectroscopy, SEM-EDAX, and TEM analysis. XRD pattern prove the orthorhombic structured MoO₃ nanoparticles (NPs), rhombohedral structure of Ni/NiO NCs and observed the average crystallite size of 25 nm. The band gap of Ni/NiO/MoO₃ NCs was found to be 2.9 eV and TEM analysis revealed irregularly shaped morphologies. Results of photocatalytic dye-degradation of methylene blue dye under various conditions proven the good photocatalytic activity. Additionally, Ni/NiO/MoO₃ NCs shows 60% toxic chromium (VI) reduction. Ni/NiO/MoO₃ NCs were successfully employed for the electrochemical detection of dopamine, showcasing good sensing performance. It is also an ideal material for humidity


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Facile synthesis of $\text{Cu}_2\text{S-NiS}_2$ nanocomposite with highly active visible light photocatalyst for dye removal and biological evaluation

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ARTICLE INFO

ABSTRACT

Earth abundant metal sulphides such as Cu_2S and NiS_2 are potential materials to be used as photocatalysts because of their advantageous optical and biological aspects in this research, a low-cost, high-speed, one-step combustion production of novel $\text{Cu}_2\text{S-NiS}_2$ nanocomposite (NCs) was successfully developed. They are integrally characterized and evaluated as photocatalysts for dye degradation and biological uses. The synthesized NCs were characterized by XRD, FTIR, SEM, TEM, EDAX, UV-Visible and PL. XRD data is well matched with JCPDS 03-1071 and 72-574 which correspond to Cu_2S and NiS_2 nanoparticles (NPs) respectively. FT-IR spectrum exhibits the existence of metal-sulphur bonding in $\text{Cu}_2\text{S-NiS}_2$ NCs. The optical energy band gap of $\text{Cu}_2\text{S-NiS}_2$ NCs was found 2.30 eV. Under visible light irradiation, the photocatalytic activity of $\text{Cu}_2\text{S-NiS}_2$ NCs on rose bengal dye was investigated. $\text{Cu}_2\text{S-NiS}_2$ NCs is more efficient photocatalyst than individual metal sulphide NPs. Also, an important aspect of this study was the exploration of the antimicrobial, antioxidant and antimetabolic properties of pure NPs and $\text{Cu}_2\text{S-NiS}_2$ NCs. The results from the biological screening exposed the fact that the $\text{Cu}_2\text{S-NiS}_2$ NCs demonstrated significantly higher pharmacological activities in comparison to pure NPs.

1. Introduction

The promise of photocatalytic degradation to mitigate global energy and environmental challenges has made it an important area of research [1]. Industrial operations generate increasing amounts of wastewater, which frequently causes serious environmental issues. Wastewater from numerous industrial operations frequently contains harmful organic dyes that cannot be treated directly by microbial agents. There are numerous commercially available dyes, each with about 700,000 tons of these dyes are produced and released into wastewater. To decolorize and detoxify dyes, a variety of techniques including adsorption, degradation, oxidation, and catalytic reduction have been developed. All of these by disadvantages including high energy costs, operational risks, and secondary contamination. The use of NPs for the recovery and purification of different contaminants has been documented in numerous recent studies [2]. Somewhat successful photocatalytic techniques involve using a photocatalyst to help separate the photogenerated charge carrier and supply redox sites at various locations [3]. As a result,

developing a safe, nontoxic, and energy efficient procedure to decolorize or detoxify colours in aqueous solution under mild circumstances is very desirable [4].

Several attempts have been made to create semiconductor photocatalysts with great performance. The nanostructured metal sulphides have drawn an enormous interest in different fields because of their distinctive, magnetic, optical and catalytic performances [5]. Numerous reports and studies have been done on metal sulphide substances such as manganese sulphide, zinc sulphide, molybdenum sulphide, nickel sulphide, copper sulphide, silver sulphide, and iron sulphides [6]. In terms of earth abundant resources, copper and nickel sulphides are more advantageous among the metal sulphides, creating a variety of phases including Cu_2S , Cu_3S_4 , Cu_5S_8 , NiS , Ni_3S_2 , Ni_3S_4 and Ni_3S_2 that are appropriate as substitute materials for various applications. Nano-structured copper sulphide (Cu_2S) and nickel sulphide (NiS_2) has interesting electronic, optical, catalytic, magnetic and biological applications [6].

Cu_2S and NiS_2 NPs are the potential semiconducting material for catalytic applications due to its low cost, nontoxicity, and chemical

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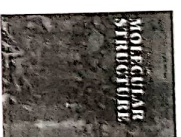
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Electrochemical determination of glucose and H_2O_2 using Co(II) , Ni(II) , Cu(II) complexes of novel 2-(1,3-benzothiazol-2-ylamino)-N-(5-chloro-2-hydroxyphenyl)acetamide: Synthesis, structural characterisation, antimicrobial, anticancer activity and docking studies

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ABSTRACT

A novel ligand, 2-(1, 3-benzothiazol-2-ylamino)-N-(5-chloro-2-hydroxyphenyl)acetamide (BCA) and its Co(II) , Ni(II) , Cu(II) complexes have been synthesised. The ligand and their complexes have been characterised by ^1H , ^{13}C , NMR, IR, UV–visible, mass spectra, TGA and P-XRD studies. The spectral data indicate that the ligand is tridentate and produce distorted octahedral geometry around the metal ion. The electrocatalytic ability of $[\text{Co(BCA)}_2]\text{Cl}_2/\text{GCE}$ (modified electrode) under different concentrations of glucose and H_2O_2 were verified with cyclic voltammetry studies (CV). The modified electrode worked as a good sensor with glucose and H_2O_2 at the concentration 0.4 to 2 μM and 0.2 to 0.8 μM with limit of detection (LOD) of 0.133 μM and 0.0666 μM respectively. This electrode exhibit the sensitivity of 1.89 and 2.8784 $\mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$ for glucose and H_2O_2 respectively. Thus, the modified electrode performed better, had a longer shelf life and produced more reduplication and procreation. The established procedure was used to examine the bio efficiency of the synthesised ligand and its metal-coordinated compounds against bacteria and fungi. In addition, BCA and its metal compounds were tested for antioxidant and cytotoxic effects on three different cell strains (P53, HeLa and Hep-G2). The Co(II) and Cu(II) complexes exhibited excellent cytotoxicity for P53 and HeLa cell lines. Further, the molecular docking studies on cancer receptors were done to investigate the binding efficiency of metal complexes.

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1. Introduction

A significant portion of deaths globally are caused by infectious diseases. One of the biggest threats to modern global health is antimicrobial resistance, whose prevalence is growing everywhere. Antimicrobial resistance in bacteria decrease antibiotic effectiveness and raises the mortality rates related to bacterial infections [1]. Metal based antibacterial compounds have unique mechanisms of action that offer an advantage in the treatment of bacterial illnesses resistant to conventional antibiotics. Cancer remains the second deadliest illness in the world and the leading cause of mortality in both developed and developing countries [2]. However, there is an urgent need for innovative anticancer medications with

high efficacy, low toxicity to non-cancerous cells and specific targets of action. To overcome the difficulties, it is essential to develop or create anticancer therapeutics that is both safer and more effective [3].

Benzothiazole are bicyclic ring system with numerous applications. Benzothiazole and their metal complexes showed a wide spectrum of biological activities such as anti-tubercular, anti-allergic, anti-inflammatory and fungicidal activities [4,5]. 2-substituted benzothiazoles have become a widely used core structure in a variety of therapeutic applications since; many of their pharmacological properties have been reported. The determination of glucose concentration is very important in clinical, biological and chemical tests as well as in food processing. Diabetic's patients are necessary to take regular measurements of blood glucose levels for a normal life. As a result, it's required to create sensitive, selective, reliable and low cost glucose sensors [6,7]. Hy-

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SYNTHESIS, STRUCTURAL ELUCIDATION AND BIOLOGICAL STUDIES ON 3d-METAL COMPLEXES OF THE HETEROCYCLIC LIGAND 3-{2-[4-(4-CHLOROPHENYL)-1, 3-THIAZOL-2-YL] HYDRAZINYLDENE}-1, 3-DIHYDRO-2H-INDOL-2-ONE

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Abstract

The present work elaborates the synthetic, structural and biological properties of the 3d-metal complexes of the ligand 3-{2-[4-(4-chlorophenyl)-1, 3-thiazol-2-yl] hydrazinyldene}-1,3-dihydro-2H-indol-2-one. The various spectrochemical techniques were employed to propose the structure of the ligand and its metal chelates. By electronic and magnetic susceptibility measurements the octahedral geometry was proposed for Cu(II) and Co(II) complexes, square planar geometry for Pd(II) and tetrahedral structure for Zn(II) complex. The molar conductivity results suggested the non-electrolytic nature of the metal chelates. The antimicrobial and antitubercular investigations revealed the appreciable efficacy against the tested microbes. Furthermore, the cytotoxic studies reveal that the metal complexes showed enhanced protection against the cancer cell lines.

Keywords: Isatin derivatives, transition metal complexes, antimicrobial and anticancer activities.

1. Introduction

As we seen from the today's situation of serious impact of the pathogens on to the human life has become main task for the chemists. Even though there are plenty of drugs available for the treatment of deadly diseases, it is failed to analyse their dramatic changes in their structures with respect to the drug action on the pathogens. In order to overcome these impending challenges, chemists are enormously trying their best effort to solve these medical problems [I-VII]. Among those, cisplatin is the best example to explore anticancer us properties of the metal based drugs. The metal ions (especially transition metal chelates) are able to explore excellent biochemical properties than the drugs bearing simple heterocyclic systems. Cisplatin, an effective anticancer drug and an effective medical model to cure different types of tumours and had a greater influence to many of the chemist to search for the metal based drugs. The selection

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etc

BIOLOGICAL IMPORTANCE OF THE PYRIMIDINE NUCLEUS IN RECENT YEARS: A COMPREHENSIVE REVIEW

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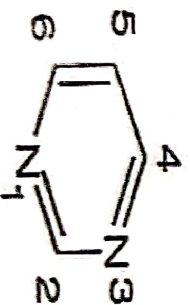
Abstract

Pyrimidine nucleus showed clinical and biological applications. Pyrimidine scaffold has been found in many of the important synthetic drug molecules which gave a valuable idea for treatment and binds with high affinity to the multiple receptors helpful in developing new useful derivatives. Pyrimidine derivative possess various types of biological activities i.e., antiviral, anti-inflammatory, anti-cancer, anti-HIV, antioxidant, antimicrobial, anti-tubercular activities, etc. This review created interest among researchers to synthesize a variety of pyrimidine derivatives. Literature data revealed that the pyrimidine derivatives have exhibited diverse biological activities and also have immeasurable potential to be explored for newer therapeutic possibilities.

Keywords: pyrimidine, anti-inflammatory, anti-cancer, anti-malarial, antioxidant, anti-tubercular, antimicrobial activities.

Introduction

Heterocyclic Compounds, pyrimidine in particular have recently seen increased interests in researchers due to their therapeutic benefits and also shows many biological activities¹. After Scheele isolated uric acid in 1776, fused pyrimidine chemistry started. Pyrimidine is a heterocyclic aromatic organic compound containing two nitrogen atoms at positions 1 and 3 of the six- member ring similar to pyridine.



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SYNTHESIS, SPECTRAL STUDY OF NOVEL 4-[(E)-(2-NITROPHENYL)DIAZENYL]-1,3-THIAZOL-AMINE (NTA/C₆H₇N₅O₂S) AND ITS COORDINATED METAL [CO(NTA)₂.(H₂O)₂] AND [NI(NTA)₂.(H₂O)₂] COMPLEXES; ANTIOXIDANT ACTIVITY STUDY

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Abstract

In this study, the novel azo-dye 4-[(E)-(2-nitrophenyl)diazenyl]-1,3-thiazol-amine (NTA/C₆H₇N₅O₂S) and its coordinated metal salts [Co(NTA)₂.(H₂O)₂] and [Ni(NTA)₂.(H₂O)₂] were synthesized. Further, geometry and its physico-chemical character of the compounds characterised via FT-IR, elemental analysis, UV-Vis, mass spectra, ¹HNMR and thermogravimetric spectral analysis; the all spectral data suggested tetrahedral geometry for synthesised Co (II) and Ni (II) complexes along with PXRD evidence. Ligand and its [Co(NTA)₂.(H₂O)₂] and [Ni(NTA)₂.(H₂O)₂] compounds were tested against in-vitro antioxidant properties. The [Co(NTA)₂.(H₂O)₂] act as a good antioxidant agent. In this connection, we designed a new efficient drug performance in biological properties and actively participates against foreign diseases in body.

Key word: Azo-dye, Metal complexes, TGA, Antimicrobial, Antioxidant.

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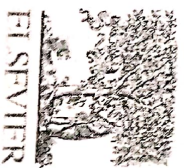
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1. INTRODUCTION

Azo dyes are the great interest among the nitrogen containing synthetic compounds which have greater tendency to coordinate with transition metals to form coordination complexes [1]. The reaction of primary amine with a coupling compound is one of the most widely used methods to prepare azo dye. Azo dyes are important class of organic colorants consists of at least a conjugated chromophore (R-N=N-R). The azo group are largest and most versatile class of dyes. In which R and R' are usually aryl. This chromophoric system is associated with two or more heterocyclic rings. The colour properties of organic dye depend on both the presence of chromophore group and crystallographic arrangement of the molecule in the solid state [2].

These ligands can be easily prepared by daizonium and coupling reactions. The complexes of transition metal ions contribute a diverse and rich field of research. These complexes received much attention because of their applications in biology, medicine and industry [3]. Coordination compounds of azo received much importance due to their ability to mimic complex molecules involved in vital biological process such as oxygen transport, electron transfer, catalysis etc., This is because metal chelation is involved in many important biological process [4]. This chelation is taking place between a variety of metal ions and a wide range of ligands in biology. The 2-nitroaniline and 2-aminothiazole moiety have recognised these compounds are now in good demands as optical and coupling organic



Synthesis, characterization of 4-{(E)-[2-hydroxy-3-[(Z)-1,3-thiazol-2-ylidiazene]naphthalen-1-yl]}methylidene]amino}benzoic acid and its transition metal complexes; biopharmaceutical activities and electrochemical detection of ciplactin

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Keywords:
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ABSTRACT

A Schiff base derivative, 4-{(E)-[2-hydroxy-3-[(Z)-1,3-thiazol-2-ylidiazene]naphthalen-1-yl]}methylidene]amino}benzoic acid (ENB) and some of its transition metal complexes were synthesised. The structure of the ENB and its complexes were characterised by NMR, FT-IR, mass spectra, TGA, UV-visible, PXRD and ESR techniques. Physico-chemical data suggest an octahedral geometry nature. Molecular docking for all the synthesised compounds has been performed to predict the binding affinity. The [Ni(ENB)₂] exhibited excellent binding score of -284.32 kcal/mol *in vitro* cytotoxicity activities on lungs cell line A459 exhibited significant IC₅₀ values and the results indicated that [Co(ENB)₂] is a stronger antioxidant agent. Electrochemical detection of bioactive drug ciplactin using a modified electrode, MWNT-[Co(ENB)₂]/GCE showed an excellent sensing ability with a long linear range 10-90 μmol/L, sensitivity 0.4765 μAμM⁻¹cm⁻² and its LOD is 3.353 μmol/L in PBS pH 7. Further, the modified electrode has more stability and less leaching property in the detection system.

1. Introduction

Literature reveal that the azo schiff base derivatives exhibit an excellent biochemical properties. A systematic investigation of this class of compounds revealed that the chelate can be traced in a number of well-established drugs antitumor [1] antibacterial, antioxidant, anti-inflammatory [2], anticonvulsant [3], antiviral, antitumor, DNA-binding, photoluminescence and other applications. The azo dyes were used in dye and pigment industries, chemo-sensors, curative agents, as metal foil, as indicators and in the manufacture of protective eye glasses and optical storage devices [4,5]. Thiazolyl Schiff base derivatives have a broad spectrum of biological efficiency due to them to theoretical and experimental forms [6]. The azomethine (C=N) linkage in schiff bases is important in elucidating the mechanism of transamination and resamination reactions in biological system. Especially, in medicinal and pharmaceutical chemistry the schiff-base ligand coordinated with metal chloride are enhanced their biological properties [7,8]. Metals in complexes exhibits distinct drug properties e.g., cisplatin as

a anticancer drug. In view of this, chemists were tried to develop an alternative metal complexes containing Ag(I), Pd(II), Au(III), Cu(II), Ni(II) and Pt(IV) etc. which showed some promising results [8–11].

Cancer cause when changes in DNA structure occur [12]. Cancer is one of the critical health issues of the human life system [13]. In this region successive invention of an anticancer agents like cisplatin, carboplatin and oxaliplatin have boosted up in the improvement of alternative metal-based anticancer drugs [14]. The effectiveness of these drugs is restricted because of major medical drawbacks such as undesirable side effect, high toxicity and including limited efficiency in multidrug resistance. Therefore, the design of new metal-based chemotherapeutic agents is a vital importance. Recent literature showed that many azo schiff base and their transition metal complexes used as anticancer drugs against various cancer cell line such as A549, Hella, SHP-77, HCL-1 and LC-2 [13,14]. Moreover, the inherent properties of metals like hydrogen bonding, van der Waal's interactions and hydrophobicity contributes greatly towards the enhancement of the binding capacity of metal complexes and increase the cytotoxicity of

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Synthesis and Characterization of Biopotent Transition Metal Complexes of Schiff Base 2-((1)-1-(2-(1,3-Benzothiazol-2-yl)hydrazinylidene)ethyl)-6,10b-dihydro-3H-benzol[7]chromen-3-one and their Biological Evaluation

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The transition metal(II) complexes ($M = \text{Co}/\text{Zn}/\text{Pd}$) were synthesized by using a newly synthesized Schiff base ligand 2-((1)-1-(2-(1,3-benzothiazol-2-yl)hydrazinylidene)ethyl)-6,10b-dihydro-3H-benzol[7]chromen-3-one (L_1) by conventional method. The structure of the compounds were determined by physical and analytical techniques like UV-visible, FT-IR, ^1H and ^{13}C NMR and mass spectroscopic techniques and the crystallinity and inter-planar distance of the complexes were confirmed by XRD. The electron density in HOMO and LUMO was determined by DFT studies. The studies of electronic spectra and measurements of magnetic susceptibility suggest that Co(II) complex shows an octahedral geometry, Pd(II) complexes show square planar geometry and $\text{Zn(II-Cl}_2\text{)}$ complex shows tetrahedral geometry. The molar conductivity results suggested the non-electrolytic nature of the metal(II) complexes. The synthesized compounds was tested against antibacterial activity for Gram-positive and Gram-negative bacteria. The molecular docking study demonstrated that the ligand and its metal(II) complexes possess antibacterial and anticancer properties, and the results showed that the compounds were effective against the microorganisms that were examined. Furthermore, the results found that metal(II) complexes provided enhanced immunity against cancer cell lines.

Keywords: Transition metal chelates, Schiff bases, Antimicrobial activities, Molecular docking studies.

INTRODUCTION

The present drug discovery for the curative purposes mainly focuses on the incorporation of transition metal ions into the heterocyclic system [1,2]. By altering their surrounding structure, metal ions enhance their capabilities through the use of heterocyclic moiety. The heterocyclic chelates having certain metals like zinc, cobalt, etc. have greater medicinal properties as like in metal-proteins which are present in oxygen carrier, involving electron transport reactions or in oxygen storage [3]. The electron density increases with the number of heterotons in the ligand, which in turn enhances the lyophilic nature of the metal chelates and diminishes the cell wall of pathogen [4,5]. Based on the aforementioned information, two significant hetero-structures have been chosen for the current study, namely

coumarin and benzothiazole. Moreover, Schiff bases originated from the heterocyclic system are effective towards numerous diseases causing from bacterial, fungal, viral and other toxic infections [6,7]. Many of the works proved the efficacy of these systems in the development of metal-based drugs. Particularly, the metal complexes having Schiff base ligand derived from benzothiazole nucleus are used as antibacterial [8], antifungal [9] antimicrobial [10] anti-inflammatory, anticancer [11] and antioxidant agents [12].

By observing all these important landmarks in the development of metal chelates, herein an effort is made to synthesize transition metal complexes bearing Schiff base ligand and characterized by various physico-chemical techniques. The biological activities were carried out to investigate the effectiveness of the synthesized metal(II) complexes. Further, the theo-

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Synthesis and characterization of CuO-NiO nanocomposite for dye degradation and electrochemical sensing of dopamine

ARTICLE INFO

Keywords

CuO-NiO NC
Methylene blue
Photocatalytic degradation
Dopamine electrochemical sensing

ABSTRACT

In this study, CuO-NiO nanocomposite (NC) was synthesised via simple combustion method. The prepared NC was characterized by XRD, FTIR, UV-Visible, PL, EIS, SEM, TEM and EDAX. XRD data is matched with the standard JCPDS 5-661 and 78-429, which correspond to CuO and NiO respectively. FT-IR spectrum exhibits the existence of metal-oxygen bonding in CuO-NiO NC. Optical energy band gap of CuO-NiO NC was found to be 3.12 eV. PL spectrum excited at 329 nm shows an emission peak at 490 nm. The photodegradation of CuO-NiO NC on MB dye was examined under UV light irradiation. CuO-NiO NC acts as a good photocatalyst compared to individual metal oxide NP. At low concentrations of dopamine, CuO-NiO NC exhibits very good electrochemical sensing. The analytical profile of composite electrode shows long linear range, sensitivity and LOD of $1.0\text{--}6.0\ \mu\text{M}^{-1}\text{L}^{-1}$, $0.179\ \mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$, and $0.033\ \mu\text{mol/L}$.

1. Introduction

As a consequence of human activities, exceptional acceleration of industrial and technical growth, water sources are being contaminated. Among these, human activities urbanization, industries and excessive use of pesticides, severe environmental pollution particularly to aquatic life was observed [1]. The exclusion of effluents from industries has seriously affected the water pollution. The inclusion of dyes in water sources is spoiling aquatic and human life. Hence in the last few decades, different techniques have been adopted to remove pollutants from water sample. Advanced oxidation processes (AOPs) are the heterogeneous photocatalysis and the methods that are most frequently used. AOP generally accompanied by producing highly efficient oxidant radicals that are capable to target organic pollutants and break them to smaller components, ultimately decomposing into carbon dioxide and water [2]. Among the several AOP techniques, the most common kind of heterogeneous catalysis is well-known environmentally friendly process, with great efficiency and low-cost advantages. This technique can degrade various types of pollutants under UV-visible light exposure [3]. Nanomaterials due to their characteristic size, surface area and shape have attracted an attention from the modern era confronts. Semiconducting transition metal oxides, such as TiO_2 , NiO , ZnO , and CuO , are exposed to radiation in this process, have proven very effective catalyst towards the water treatment from organic dyes [4].

A semiconducting metal oxide produces positive holes in its valence band (Vb) and photogenerated electrons (e^-) in its conduction band (Cb) at sufficient photon energy [5]. The hole has sufficient positive potential to activate adsorbed hydroxyl radicals ($\text{OH}\cdot$) or water on the catalyst's surface. Meanwhile, the photoelectron created has the power to transform dissolved oxygen into superoxide ion radical (O_2^-) [6]. These strong oxidants can destroy pollutant molecules in solution. Recombination of e^-/h^+ couples diminishes the efficiency of heterogeneous photocatalysis significantly [7]. One of technique adapted to takeout this limitation is the combination of two semiconductors with appropriate assembling in their (Cb) and (Vb). Alternatively, potentials of Cb and Vb of semiconductors should be suitable for easy release of charge connecting them [8]. In this instance, the more positive (Cb) of the second semiconductor can be reached by photogenerated electrons in the first semiconductor's (Cb). This significantly lowers e^-/h^+ recombination,

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OPEN Two-phase simulation of entropy optimized mixed convection flow of two different shear-thinning nanomaterials in thermal and mass diffusion systems with Lorentz forces

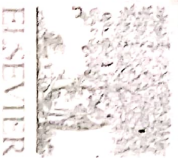
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This research compares the momentum, thermal energy, mass diffusion and entropy generation of two shear thinning nanofluids in an angled micro-channel with mixed convection, nonlinear thermal radiation, temperature jump boundary condition and variable thermal conductivity effects. The RK45 approach was used to solve the Buongiorno nonlinear governing model. The effect of different parameters on the flow, energy, concentration, and entropy generating fields have been graphically illustrated and explained. The hyperbolic tangent nanofluid has a better velocity than the Williamson nanofluid. The Williamson nanofluid has higher thermal energy and concentration than the hyperbolic tangent nanofluid in the microchannel. The Grashof number, both thermal and solutal, increases the fluid flow rate throughout the flow system. The energy of the nanofluid is reduced by the temperature jump condition, while the energy field of the nanofluid is enhanced by the improving thermal conductivity value. The nanofluids concentration rises as the Schmitt number rises. The irreversibility rate of the channel system is maximized by the variable thermal conductivity parameter.

List of symbols

P	Pressure term, $(kg \cdot m^{-1} \cdot s^{-2})$
n	Power law index
g	Gravitational force, (m/s^2)
B_0	Magnetic effect, $(tesla)$
C_p	Heat capacitance, $(J/kg/K)$
k	Variable thermal conductivity
D_b	Thermal conductivity, $(W \cdot m^{-1} \cdot K^{-1})$
	Brownian motion co-efficient

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Significance of TiO_2 - water nanofluid, buoyant strength and ohmic heating in the enhancement of microchannel efficiency

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ARTICLE INFO

ABSTRACT

Keywords:
Microchannel
Nanofluid
Nonlinear thermal radiation
Entropy generation
Bejan number

The present study investigates the influence of buoyant strength on magnetohydrodynamic flow of Titanium dioxide (TiO_2) water based nanofluid in a vertical microchannel with convective boundary and velocity slip conditions. Additionally, exponentially dependent heat source, Joule heating and viscous dissipation are considered to explore the flow and heat transfer fields. The buoyant forces are used to enhance fluid mixing and heat transmission by carefully planning the microchannel shape and fluid characteristics. Therefore, the numerical study investigates the effect of entropy generation on channel efficiency and discusses interesting results on micro-channel efficiency. To solve the nonlinear dimensionless differential equations, the Runge-Kutta-Fehlberg fourth-fifth (RK4-5) order numerical approach in conjunction with shooting methodology is employed. The obtained parameters are examined and analyzed graphically with regards to their effects on flow, thermal, local entropy generation and Bejan number profiles. Results reveal that, the velocity profile shows a rising character with increasing Grashof and Brinkman numbers. On the other hand, when the volume fraction of nanoparticles drops, the temperature profile shows a declining trend. This finding suggests that nanoparticle concentration may be carefully controlled and manipulated to improve microchannel efficiency. Lowering the system's entropy generation improves the channel efficiency.

Br	Brinkman number	Pe	Peclet number
β	thermal expansion co-efficient (K^{-1})	η, τ_2	convective heat transfer co-efficient of left and right plate (W/m^2K)
K	mean absorption coefficient	ν	dimensionless velocity
σ	electrical conductivity (S/m)	ϕ	volume fraction of the nanoparticles
θ_0	uniform suction/injection velocity (m/s)	Rd	radiation parameter

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Research Article

Generalised Couette flow of nanoliquid among two concentric channels with particles injection

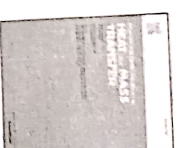
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Abstract

In the presence of nanoparticle injection, buoyancy power, constant pressure gradient, variable viscosity coefficient, magnetic field, mass diffusivity of thermophoresis, and Brownian motion, the hydrodynamic nanoliquid conducted with electric current flows through the gap between two concentric cylindrical channels of infinite length. The focus of this article was on generalised Couette flow that is flow in which the outer channel plate moves at a uniform velocity while still being subjected to a pressure gradient. Here we use the RKF45 numerical method and the shooting technique to solve dimensionless momentum, energy, and concentration equations. How the obtained parameters controlled on flow rate, temperature and concentration of the fluid have been



Comparative analysis of thermal behaviour in functionally graded material fin under convective-radiative heat transfer: Homotopy perturbation method

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ARTICLE INFO

ABSTRACT

Keywords:
Homotopy perturbation method (HPM)
Fully wet longitudinal fin
Functionally graded material
Moving fin
Convection

In this study, the thermal characteristics of a fully wet, moving longitudinal fin made from linear Functionally Graded Material (FGM) is explored. The fin response to convective-radiative heat transfer is examined through three distinct FGM scenarios namely, a Homogeneous material (HM), Functionally Graded Material I (FGM I) having greater thermal grading near the base, and Functionally Graded Material II (FGM II) having increased thermal grading towards the tip. The derived energy equation is a second-order nonlinear ordinary differential equation is solved using the Homotopy Perturbation Method (HPM) compared with results found in the existing literature. The fin thermal profile has been graphically analysed for the thermal conductivity grading parameter (β), Peclet number (Pe) and other pertinent parameters. It is found that the temperature distribution along the fin is highest for the FGM II fin and lowest for the HM fin, with the FGM I fin displaying intermediate values. Efficiency of the fin (η) is discovered to be lowest in the case of HM fin structures followed by FGM I and FGM II fin structures at the base and vice versa at the tip. The results show significant potential of HPM which benefits the manufacture and design of FGM fin structures.

1. Introduction

A fin is an essential engineering tool for effectively managing heat transfer across surfaces, making it highly versatile in numerous industries. Its adaptability in terms of mass, size, and shape has led to its widespread use in areas such as reactor core cooling, electronics, solar collectors, and more. Given its extensive industrial application, researchers are constantly seeking innovative methods to enhance fin performance and predict its mechanical response to both anticipated and unforeseen variations in operational conditions.

The fin material plays a crucial role in the heat exchange process. Gorla and Bakier [1] formulated the energy equation for a convective porous fin in a radiative environment, affirming the substantial impact of radiative heat loss on the base heat transfer rate. Khan and Aziz [2] investigated the transient heat transfer in convecting longitudinal fins composed of functionally graded materials, revealing that linear, quadratic, and exponential variations in thermal conductivity substantially improve both the steady-state and transient thermal performance of the fins. Das and Ooi [3] developed an algorithm using an inverse

analysis technique to predict parameter ranges for achieving specific temperature requirements. Atouei et al. [4] analytically computed the spatial temperature distribution for a semi-spherical fin structure. The research utilized least squares and collocation methods to evaluate the influence of temperature-sensitive properties on the propagation of heat within the fin.

Studies have delved into alternative geometries for fin structures to accommodate the diverse requirements of various applications. For instance, Turkyilmazoglu [5] conducted a comparison of the efficiency of trapezoidal fins against traditional rectangular fins in dynamic environments. It was found that in some cases, trapezoidal fins were more efficient than rectangular ones. Pasha et al. [6] utilized the differential transformation method to study a variety of fin structures under changing conditions, including shapes such as convex, triangular, concave, and rectangular in straight fin designs.

Fallah et al. [7] applied the radial basis function approximation method to analyse the heat transfer and temperature distribution in a moving fin, revealing that changes in thermal conductivity, sink temperature, and Pe number significantly affect its temperature profile amidst conduction, convection, and radiation. Giresha et al. [8]

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Impact of trilybrid nanofluid on the transient thermal performance of inclined dovetail fin with emphasis on internal heat generation

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Abstract The current study focuses on examining the transient thermal performance of a dovetail fin structure that is completely immersed in a trilybrid nanofluid and is formulated by the combination of MW/CNT, Ag, and Cu nanoparticles with the hybrid base fluid $C_2H_5O_2 - H_2O$. The fin's porous medium is modelled using Darcy's law to simulate the interaction between the fluid and the solid. The resulting nonlinear partial differential equation is converted into a non-dimensional form and resolved using the finite difference method (FDM) to understand the physical implications of the model. Factors like surface convection (Nc), radiation (Nr) and internally generated heat (Q) have been considered in assessing the fin's heat exchange. This investigation highlights the impact of variables such as tip tapering, dimensionless time, inclination angle, full wet condition, porosity, internal heat generation, and ambient temperature on the fin's thermal profile. The efficiency of the fin structure is graphically explored and discussed. Compared to mono and binary hybrid nanofluids, the trilybrid nanofluid demonstrates superior thermal response and notably the introduction of the trilybrid nanofluid significantly enhances the fin's efficiency. Dovetail fin conjunction with the trilybrid nanofluid provides superior heat transfer rate because increase in the surface area is the major finding of this study. These findings are crucial for improving heat transfer in various industrial settings. Moreover, this advancement holds the potential to revolutionize cooling and heating processes in sectors like automotive and aerospace engineering.

List of symbols

C_p	Specific heat at constant pressure (J/kgK)
K	Permeability (m^2)
L	Length of the fin (m)
C	Fin taper ratio
Le	Lewis number
G	Generation parameter
M	Thermogeometric parameter
Nc	Convection parameter
Nr	Radiative parameter
T	Local fin temperature (K)
T_a	Ambient temperature (K)
T_b	Base temperature (K)
X	Dimensionless length
b_2	Variable parameter (1/K)
g	Acceleration due to gravity (m/s^2)
h	Heat transfer coefficient (W/m^2K)
h_a	Heat transfer coefficient at temperature T_a (W/m^2K)
h_d	Uniform mass transfer coefficient (kg/m^2s)
i_{fs}	Latent heat of water evaporation (J/kg)
k	Thermal conductivity (J/kg)
n_1	Wet parameter

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Transient thermal behavior and efficiency in fully wet porous longitudinal fin: The influence of shape-dependent hybrid nanofluid and internal heat generation

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ABSTRACT

The main focus of this study is to analyze the transient heat transfer characteristics of a convective–radiative longitudinal porous fin fully wetted in hybrid nanofluid along with internal heat generation. The Darcy formulation is considered for analyzing the velocity of the fluid passing through the fin and the Rosseland approximation determines the radiation heat flux. The hybrid nanofluid is obtained by immersing GO and MoS₂ nanoparticles in the hybrid base fluid C₂H₆O₂ - H₂O. Furthermore, three different shapes of nanoparticles namely spherical, platelet, and blade have been selected for the investigation. The derived nonlinear partial differential equation is nondimensionalized and solved numerically by employing the finite difference method. The effect of shape factor, nanoparticle volume fraction, dimensionless time, wet porous parameter, radiation–conduction parameter, heat generation parameters, and other relevant parameters on the transient thermal analysis of the fin structure has been graphically analyzed and discussed. Furthermore, the transient thermal fin efficiency has been modeled and its variation with the significant parameters has been examined. One of the major outcomes is that efficiency increases with nanoparticle volume fraction. The examination has resulted in a novel outcome that the presence of hybrid nanofluid enhances the fin efficiency and also the high fin efficiency is achieved in the presence of blade-shaped nanoparticles. The findings of the investigation play a prominent role in the heat transfer enhancement of industrial processes.

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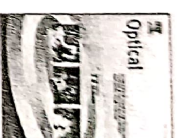
Fin efficiency; fully wet longitudinal fin; heat generation; hybrid nanofluid; natural convection; porous fin; radiation–conduction; shape effect

1. Introduction

Excessive heat production is a common issue in many engineering applications posing a threat to the performance and functionality of thermal components. This excessive heat can potentially harm the performance and functionality of these systems. Hence, it's essential to use effective cooling methods to maintain their reliability. Among various methods, fins or extended surfaces are crucial for enhancing heat transfer efficiency. Kraus *et al.* [1] extensively documented the progress in this particular technology. Given their importance in the industrial world, experts continuously search for ways to enhance their efficiency and adapt them to evolving requirements.

Gorla and Bakler [2] examined the heat transfer dynamics in straight fins with a rectangular profile, focusing on radiative heat losses. Aziz and Bouaziz [3] delved into the heat creation

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Research Article

Comprehensive investigation of borate-based glasses doped with BaO: An assessment of physical, structural, thermal, optical, and radiation shielding properties

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ARTICLE INFO

ABSTRACT

Keywords:
Borate-based glasses
XRD patterns
Structural properties
Physical properties
Radiation shielding

This paper presents a comprehensive investigation of borate-based glasses doped with BaO, assessing their physical, structural, optical, and radiation shielding properties through experimental and theoretical analyses. XRD patterns reveal the amorphous nature of the prepared glass samples. Density and molar volume values, and FTIR spectra indicate the impact of BaO concentration on the glass matrix, affecting structural properties. Thermal analysis via TGA/DSC reveals improved thermal properties with the substitution of B₂O₃ with BaO. UV-visible absorption spectroscopy shows a decrease in energy band gap with rising BaO content, suggesting potential non-bridging oxygen formation. Mass attenuation coefficient (μ_m) values exhibit an exponential decay trend with photon energy, influenced by photoelectric absorption, Compton scattering, and pair creation. The glasses prepared had, in general, a better μ_m values compared to that of concretes and other glass compositions containing barium oxide. Experimental and theoretical (XCOM) results for mean free path (MFP) and half-value layer (HVL) demonstrate close agreement, validating the accuracy of the experimental data. Both MFP and HVL increase with energy and decrease with BaO addition, emphasizing the potential for these glasses in radiation shielding applications.

1. Introduction

While radiations such as gamma rays, X-rays, and neutrons find widespread applications in scientific research, medical diagnostics, agriculture, and engineering, their prolonged exposure induces harmful effects on both humans and environment [1–3]. Research identifying radiation shielding materials has shown that concretes, alloys, lead bricks, and polymers can be utilized for gamma-radiation shielding, but their use is limited by issues such as opacity, susceptibility to cracks, and

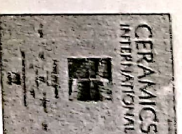
water permeability [4,5]. Alternately, glass materials because of their distinct advantages such as high transparency to visible light, thermal stability, hardness, a low melting temperature, and ease of production, have shown great promise as radiation shields. Among various glass formers, including tellurite, phosphate, silicate, and borate, borate-based glasses exhibit exceptional solvent performance for metal oxides along with their inherent glass properties [6–8]. Furthermore, their fabrication can occur at lower melting temperatures owing to the glass network's capability to form tetrahedral units BO₄ (Non-Bridging

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A multifaceted study of B_2O_3 -BaO-PbO- WO_3 glasses doped with Bi_2O_3 : Insights from physical, thermal, structural, mechanical and optical analyses towards improved shielding properties

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ABSTRACT

Radiation shielding materials are essential for balancing the benefits and risks of ionizing radiation. In this prospective, we have prepared a series of glasses with composition $(70-x)B_2O_3$ - $15BaO$ - $10PbO$ - $5WO_3$ - $2Bi_2O_3$ (where $x = 0, 5, 10, 15, 20$ mol %) for varying concentrations of Bi_2O_3 using melt-quenching method. Their physical, thermal, structural, mechanical, optical, and radiation shielding properties were evaluated. XRD scans confirm the amorphous nature of prepared glasses. As Bi_2O_3 content increases from 0 to 20 mol%, the density of the glasses rises from 3.155 to 4.578 g/cm³. Thermal studies show enhanced properties when substituting B_2O_3 with Bi_2O_3 . FTIR studies reveal the presence of BO_3 , BO_4 , BiO_3 , and BiO_6 structural units in the glasses. Mechanical properties, evaluated by Makishima-Mackenzie model, decrease as Bi_2O_3 concentration rises. Optical absorption studies suggest decreasing band gap energy (2.908–2.254 eV for indirect transitions), implying the possibility of the non-bridging oxygen formation. In the context of radiation shielding, mass attenuation coefficients (MAC) of the produced glasses were determined both experimentally and by using the Phy-X/PSD program, and their agreement validates the accuracy of the experimental findings. Additionally, various other shielding parameters such as linear attenuation coefficient (LAC), half value layer (HVL), tenth value layer (TVL), mean free path (MFP), and effective atomic number (Z_{eff}) have been evaluated and interpreted. The results indicate that the substitution of Bi_2O_3 directly impacts the shielding ability of the glasses. The BB1-20 glass sample, containing 20 mol% of Bi_2O_3 , emerges as the superior candidate for shielding, showing the highest MAC (0.1284 and 0.0986 cm²/g at the energies 0.511 MeV and 0.662 MeV respectively), LAC, and Z_{eff} along with minimum HVL, TVL, and MFP values. Comparison of MAC values with standard shielding materials confirms the potential of the produced glasses for gamma shielding applications, highlighting their promising structural and optical properties.

1. Introduction

Recent advancements in radiation technology have led to its widespread utilization across various fields such as medicine, agricultural

research, power production and space technology. Given their high penetrating power and ability to ionize molecules, gamma radiations present a considerable risk to both people and the environment in regions where radiation is employed [1–3]. Consequently, the

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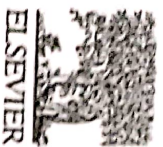
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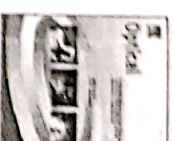
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Research Article

Synergistic optimization of physical, thermal, structural, mechanical, optical and radiation shielding characteristics in borate glasses doped with Bi₂O₃

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ABSTRACT

Keywords:
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This paper presents the effect of Bi₂O₃ on physical, thermal, structural, mechanical, optical, and radiation shielding properties of borate based glasses having a composition (60-x)Bi₂O₃-25Na₂O-13BaO-3CaO-xBi₂O₃ (x = 0, 5, 10, 15, and 20 mol%). XRD analysis confirms the amorphous structure of the prepared glasses. As Bi₂O₃ content increases from 0 to 20 mol%, density of the glasses increases from 2.729 to 3.896 g/cm³, and molar volume rises from 30.947 to 42.017 cm³/mol. The glass transition temperature (T_g) of the samples decreased with Bi₂O₃ content. FTIR analysis reveals the presence of BO₃, BO₂, and BO₄ structural units in the prepared glasses. Optical absorption studies indicate a decrease in band gap energy from 3.006 to 2.573 eV for indirect transitions implying non-bonding oxygen atom formation and this inference is supported by both physical and FTIR results. The elastic parameters, derived from Makhadmeh-Makhadmeh model decreased with increased Bi₂O₃ concentration suggesting a reduction in mechanical properties. The mass attenuation coefficient (μ_m), determined through experimental measurements and using Phy-X/PSD software, yielded closely aligned values. Other shielding parameters such as half-value layer (HVL), mean free path (MFP), and effective atomic number (Z_{eff}) were also calculated. The glass containing 20 mol% Bi₂O₃ exhibited a significant gamma-ray shielding potential due to its high μ_m value, (0.1260 cm²/g at 0.511 MeV and 0.0960 cm²/g at 0.662 MeV) and Z_{eff} together with low HVL and MFP. A Comparative analysis of the μ_m values for the present glasses and that of other glasses containing Bi₂O₃ is also presented.

1. Introduction

The application of ionizing radiation is a feature of a multitude of technology sectors including industry, energy generation, agriculture, and medical applications. However, exposure to radiation types like gamma rays, X-rays, and neutron radiation can pose significant risks to the environment and living beings due to their harmful nature [1,2]. The most effective approach to mitigate the effects of these radiations is through a process called shielding, which aims to decrease their intensity [3]. Lead (Pb) and concrete are commonly utilized materials for the purpose of providing shielding. The usage of lead is limited by

factors such as toxicity, limited mechanical strength, and lack of durability [4]. The concrete, on the other hand, is an affordable material but has drawbacks of being impermeable to visible light, lack of mobility, moisture sensitive, and susceptible to crack development when exposed to high-energy radiation photons [5,6].

Over the years, glass has become pertinent as an alternative radiation protection material owing to its sole characteristics like high transparency, gamma-ray absorbency, ease of preparation and good homogeneity [5,7]. Borate-based glasses are in particular focus because of their high transparency, excellent chemical durability, low melting point, elevated thermal stability, and cost-effectiveness [7,8]. On doping

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A Review on Natural Fiber Composites and Its Applications

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ABSTRACT

The high demand for environmental friendly materials from natural resources gains attention from last decades. Synthetic materials can be replaced by the natural fibers which lead to prepare the cost effective, bio-degradable, toxic free materials. In this paper, we were focusing on a detailed review of the different types of natural fibers and their physical properties and compositions, chemical and surface treatments. We summarize major findings from the literature and the treatment effects on the properties of the natural fibers are being highlighted.

Key Words: Natural Fibers, Mechanical Properties, Chemical Treatment, Composites.

1. INTRODUCTION

The present world is facing a problem on usage of plastic which are non biodegradable, toxic and harmful to the world. To eradicate this difficulty natural fibers are the best option. Natural fibers are playing a vital role in the process of replacement of plastics. Due to the vital advantages of natural fibers namely cost effective and surplus in nature, blending with matrix makes its effective in the case of thermal, physical, chemical and mechanical properties to be used for applications.

Natural fiber:

Natural fibers are elongated substances produced by the plants and animals that can be spun into filaments, thread or rope. They can be used as a component of composite materials, where the orientation of fibers

impacts the properties. Natural fibers may be classified according to their sources as cellulosic (from plants), protein (from animals) and minerals. Plants fibers may be seed hairs, such as cotton; bast fibers, such as linen; leaf, such as sisal; and husk fibers, such as coir from the coconut. Animal fibers include wool, hair, fur and secretions, such as silk. The only important mineral fibers are asbestos; but due to its associated health problems, it is of little economic consequence present days. Among them, plant fibers are popularly used to reinforce composites (Thi Thu et.al 2018).

Plant Fibers:

- Seed Fiber: The seeds and fruits of plants are attached to hairs or fibers or encased in husk that may be fibrous. These fibers are collected from the



A Comprehensive Review On Natural Fiber Based Super Capacitors

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ABSTRACT

The demand for renewable energy sources worldwide has gained tremendous research attention over the past decades. Energy storage and delivery technologies such as supercapacitors can store and deliver energy at a very fast rate, offering high current in a short duration. The past decade has witnessed a rapid growth in research and development in super capacitor technology. Super capacitor (SC) is proposed to be one of the most effective and reliable electrochemical energy storage devices, because it can provide reasonably high power density and specific energy density, including the high stability and long cycle lifetime of fast charge/discharge process. This paper aims to provide a comprehensive review of SC applications and their developments. Accordingly, a detailed literature review was carried out. The structure, working principle, and materials of SC are given in detail to be analyzed more effectively in this paper.

Key Words: Super capacitor, power density, specific energy density, Energy storage, Pseudo-capacitors, Hybrid capacitors.

1. INTRODUCTION

Rising global population and the global energy crisis has led to concerns regarding electrical energy generation and consumption. There is therefore a need for an alternative energy storage device that has a higher capacity than the current technologies. The storage of electrical energy has been exclusively based on batteries and capacitors. Batteries have been the most utilized and preferred candidate, owing to high energy capacity coupled with insubstantial power evolved.

However, when substantial energy is required at high power, capacitors remain the suitable device to date. Despite their benefits, both batteries and capacitors are

inadequate for storing high energy and power density required for effective consumption and performance of renewable energy systems. (M.I.A.Abdel Maksoud et al 2020). Energy storage and delivery technologies such as supercapacitors can store and deliver energy at a very fast rate, offering high current in a short duration. Supercapacitors are categorized as an electrochemical storage device, sometimes called an ultra-capacitor. They can store and deliver energy at a very fast rate offering high current in a burst. Hence, they have found applications in electric vehicles, uninterruptible power supplies (UPS), and memory backups in IT systems. They also have virtually unlimited cycle life,



Mechanical and Thermal Properties of Agave Fibre Surface Treatment of Epoxy Composite Samples Selected from Shivamogga District of Karnataka

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ABSTRACT

Natural fibre composites are considered to have a great potential to use as a reinforcing material in polymer matrix because of their good strength, stiffness, low cost, environmental friendly and biodegradable. In the present study, mechanical and thermal properties of agave fibre composites were evaluated. Here agave fibres are used as natural fibre reinforcement and epoxy resin as matrix. Agave fibre were treated with 10% KOH. Composites were prepared using hand layup technique. Mechanical properties of untreated and treated fibre composites were analyzed by flexural strength, impact strength and thermal properties by TGA and DSC were determined and results were reported. The alkali treated agave fibre composites exhibited better strength and thermal stability than untreated composites.

1. INTRODUCTION

Natural fibres, as reinforcement, have recently attracted the attention of both the academic sector and the industry as one of the best engineering materials. They are environmentally friendly, fully biodegradable, abundantly available, renewable, cheap, and have a low density. Plant fibres are light compared to glass, carbon, and aramid fibres. The biodegradability of plant fibres contribute to a healthy ecosystem. The rapid growth of industry and socio-economic developments require better utilisation of the available materials with desired properties. In this modern era, composite materials have emerged due to their strength, stiffness, density, lower cost, and improved sustainability[1]. A number of automotive components previously made with glass

fibre composites are now being manufactured using environmentally friendly materials. The flexibility that can be achieved with composite materials is immense. Natural vegetable fibres consist of cellulose, lignocelluloses, pectin, and hemicelluloses, depending on the vegetable species. Worldwide, despite the availability of modern synthetic fibres, vegetable fibres remain in great demand and compete with wool, silk, and synthetics for quality resistance, durability, colour, and lustre.

India, being a tropical country, is blessed with plenty of renewable resources obtained from the plant kingdom. In the plant kingdom, one of the abundant sources of natural vegetable fibre is agave. Agave fibres are characterised by low density, high tenacity, and low



Green Synthesis of Fe_3O_4 , ZnO & $\text{Fe}_3\text{O}_4\text{-ZnO}$ NP's Stabilized by a Lemon Fruit (Citrus limon) Peel Extract for Antioxidant Activity

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ABSTRACT

Now a days, nano materials have replaced all other materials in every field because of their unique physical and chemical properties, which facilitate extraordinary applications. That's why finding the most convenient way for the synthesis is very important, so in the process, researchers found the simplest way for the synthesis to be the "Green method or biological method". It is the most rapid, simple, cheap, and eco-friendly way among all the chemical and physical methods [1]. In this present work, the Fe_3O_4 , ZnO , and $\text{Fe}_3\text{O}_4\text{-ZnO}$ NPs were synthesised by the Green method using lemon fruit peel extract as a stabilizing agent [2]. The synthesised NPs were characterised by UV-VIS, FTIR, XRD, TGA, and SEM techniques. And further, the antioxidant activity of all prepared NPs [3] was studied.

Keywords: Green Synthesis: Metal Oxide NP's, Antioxidant property

1. INTRODUCTION

NPs are those whose at least one dimension should be smaller than 100nm. By virtue of their larger surface area, they have unique physical and chemical properties [4], and their nanosize facilitates cellular and molecular-level biological interactions [5]. In recent decades, nanotechnology has occupied most all fields. Especially metal oxide NPs have drawn greater interest as they have shown remarkable applications to various fields such as the medical field, pharmaceuticals, diagnosis, anticancer, antibiotics, drug delivery, cell therapy, tissue engineering, hyperthermia, etc. [6]. In agriculture fields [7], in sensing fields to sense poisonous gases [8], and as a catalyst in waste water

treatment [9]. In the research field, efforts are going on to enhance solubility, bioavailability, stability, suppress toxicity, and improve pharmacological activity [10]. Due to their wide range of applications, determining the most convenient method for the synthesis of NPs is very important. As such, we have physical, chemical, and biological methods for synthesis, but physical and chemical methods are generally expensive, require much energy, and use toxic and hazardous chemicals, the residuals of which pose a threat to the environment [11]. To overcome these limitations and disadvantages, synthesis recently introduced a biological method (green synthesis), which is simple, low-cost, eco-friendly, and requires less time and energy [12].



ORIGINAL ARTICLE

Determination of thermal insulating properties of cenosphere powder-filled areca husk fibre reinforced epoxy composites

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Abstract Natural fibre-reinforced composites have great potential for engineering applications due to their environmental suitability, low density, and economic viability. In the present study, using hand layup method, cenosphere-filled areca husk fibre (untreated and alkali-treated) reinforced composites were prepared and experimental investigations were carried to determine crystallinity by X-ray diffraction and chemical composition by Fourier transform infrared spectroscopy. The hardness of the composites was tested by the Shore D hardness test. The thermal properties of the composites were determined by thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC), and the thermal conductivity of the specimen was investigated by Lee's disc method. Among different combinations of composites, 41.3% of crystallinity was found for alkali-treated areca fruit husk fibre reinforced composites through X-ray diffraction. Scanning electron microscope images have clearly shown the proper bonds between areca fruit husk fibres, cenosphere, and matrix material used, and detailed study is carried out in the

present work. Composite samples with 0.84-mm fibre length (shorter length) have exhibited the improved hardness as compared to 2-mm fibre length incorporated composite. A detailed study showed that the areca husk fibre reinforced composites present a good thermal insulating property.

Keywords Natural fibre composites · Areca husk fibre · Cenosphere · Thermal conductivity

Introduction

Recently, the word eco-friendly has gained great global attention as people become more concerned about contributing to environmental protection. These days, people are well aware that they want to produce less waste and reduce their ecological footprints on the planet. Eco-friendly materials are "biodegradable", "recyclable", "renewable", and "Sustainable". Products with the label "Eco-friendly" are gaining market share at a rapid pace. In this regard, natural fibres are an excellent replacement for synthetic fibres, as they can be reinforced with polymer composites for various applications (Pervaiz and Sain 2003; Varghese et al. 2020; Vijayan et al. 2020; Vinod et al. 2020). Natural fibres can be extracted from plants, animals, and minerals (Patel and Parsania 2018; Saba et al. 2014). The utilisation of these natural fibres in composites led to great improvements in the mechanical, thermal, and physical characteristics of the composites.

The Areca nut tree is cultivated on a large scale in various parts of the world, such as humid tropical forests from the islands of the Philippines, Malaysia, and some parts of Africa and India, across Southeast Asia to Melanesia. It provides sufficient raw materials for many

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Optical, structural and conductivity properties of ferrous sulfate doped polyaniline

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RESEARCH PAPER

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A preliminary checklist of avifauna in Hullathi Section of Ranebennur Blackbuck Sanctuary, Haveri District, Karnataka, India

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Article published on February 11, 2023

Key words: Birds, Checklist, Ranebennur wildlife sanctuary (RWLS), Hullathi section

Abstract

The Ranebennur wildlife sanctuary is located in Ranebennur Taluk of Haveri District, Karnataka. The sanctuary is declared on 17-6-1974 as per Government of Karnataka Notification No.AFD-58-PWL-74 with an area of 119 Sq.km (30,464 acres). This sanctuary mainly concerned with the conservation of Black bucks and Great Indian Bustard. Due to habitat loss GIB are not sighting since from 1998 and the sanctuary inhabits a wide variety of fauna and flora. The entire survey was comprehensively carried out by walking along the fixed paths for documentation of avifauna. Depending on the movement and occurrence, birds were classified as resident, resident migratory, local migratory, winter migratory and summer migratory depending on the frequency of sightings, birds were classified as: common, uncommon, rare and fairly common. The present study aims to estimate the avifaunal diversity in Hullathi section of Ranebennur wildlife sanctuary. The study revealed the occurrence of 104 species of birds in Hullathi section respectively. Among them Black-headed Ibis (*Threskiornis melanocephalus*), were listed in the near threatened category (IUCN, 2012). The result also showed that the agriculture land, wetland area and surrounding vegetation are favorable environmental conditions suitable for the migratory, resident as well as the threatened species of birds. These are protected under the provisions of schedule IV of Indian Wildlife Protection Act, 1972. The spotting of these threatened bird species highlights the importance of study area as an important feeding, staging and wintering ground for birds.

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Avian Species Diversity in Different Habitats of Shivamogga, Karnataka, India

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ABSTRACT

Background: Avifaunal diversity and its abundance measures the quality of the ecosystem. Diversified landscapes were assumed to furnish more niches or supportive resources which in turn helps to increase diversity of avifauna. **Aim:** To assess the diversity of avifauna and its status in different habitats of Shivamogga taluk. **Materials and Methods:** Field exploration for assessing the bird diversity was undertaken in the four different habitats of Shivamogga Taluk. Point count method and line transects was used for gathering data on abundance and diversity of birds in all the four different habitats. **Results:** The present study was conducted in the study site for a period of one year. A total of 6,866 individual birds of 137 species representing 53 families and 18 orders was observed and 4 Near Threatened species and 3 Vulnerable species was recorded from the study area. Significant variation in avian species richness was observed from the four study sites ($F=10.36$, $p<0.0001$, $df=5$). Fisher alpha indices which consider both richness and abundance was higher in Site 1 (18.36) and lowest was observed Site 2 (11.32). The order Passeriformes dominated the bird community with 26 families and 57 species. Seven foraging guilds were observed in the study area. Insectivorous birds with 46 species were found to be dominant. Principal Component Analysis (PCA) was used to find the positive correlation between the Near threatened, Vulnerable species and the study sites. **Conclusion:** These findings implicate that the study area has a good number of avian species diversity. Each habitat has its own specialist species. Avian species richness was found to be higher in forest ecosystem while the dominance and abundance was more in Agrarian ecosystem. Alpha diversity was measured to comprehensively evaluate the quality of the different habitats.

Keywords: Vulnerable species, Foraging Guilds, Fisher alpha indices, Specialist species, PCA.

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INTRODUCTION

Birds are the most common inhabitants of the ecosystem and they have been contemplated as an indicator species of a particular environment.^[1] The diverseness and the abundance of avifauna measures the quality of the ecosystem. Birds play a dominant role as pest controlling agents of agricultural crops, predators of rodents, pollinating agents, scavengers and seed dispensers. Bird, thus form principal component of the environment

and important for ecological balance. Protection and maintenance of avifaunal diversity is important in maintaining species diversity of plants and animals. They are an integral component of biological diversity and have colossal aesthetic, lucrative and ecological values.^[2] Population studies has been used to evaluate long term changes in bird community structure and also to assess both the quality of the habitat and the response of birds to both natural and anthropogenic changes.^[3] Diversified landscapes were assumed to furnish more niches or supportive resources which in turn helps to increase diversity of avifauna. Recent studies illustrated that higher biological diversity assists species viability and also a key indicator of human contentment.^[4,5] Species richness is directly proportional to the availability of food, atmospheric conditions, evolutionary history and predation pressure.^[6] As the south Asia has a

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**Assessment of Physico-Chemical parameters of the Vanivilasa
Sagara Reservoir, Chitradurga District, Karnataka**¹Keerthi P and ^{2*}Ashashree H.M¹Research Scholar, Department of Zoology, Sahyadri Science College, Kuvempu University,
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Abstract

One of the most crucial and common elements in the environment is water. All life on Earth depends on water for its survival and development. Only Earth has over 70% water on it at this time. Minerals and nutrients abound in water, which is vital to human life. The physical and chemical biology of a reservoir determines the quality of the water, which encompasses all elements of the water that affect its application. The main objective of this study is to know the physico-chemical parameters of the Vanivilasa Sagara reservoir which provides water to many of the surrounding regions such as cities, towns, and villages which are primarily dry regions of the Deccan area of central Karnataka. The present study was performed at Vanivilasa Sagara Reservoir. Water samples were estimated for the physicochemical parameters, by selecting the three sites from April 2022 to March 2023. The important physicochemical parameters like Temperature, pH, DO, CO₂, Total hardness, Total alkalinity, Electrical Conductivity, Transparency, and Temperature were analyzed according to APHA. The present investigation showed that temperature, pH, Total Hardness, Total Alkalinity, and Chloride, were within the permissible limit at all three different sites. Also, the Physico-chemical parameters of Vanivilasa Sagara reservoir showed that water quality is free from pollution. Hence, this reservoir water is considered non-polluted and suggests that it is suitable for irrigation, pisciculture, and other purposes.

Key words : Physico-chemical Parameters, Vanivilasa Sagara reservoir, Unpolluted.

Water is one of the most significant and prevalent elements in the environment⁸.

Water is necessary for the existence and growth of every living being on Earth.



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Zooplankton occurrence in purle pond of Shivamogga district, Karnataka

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Abstract

One of the most crucial ecological parameters in assessing water quality is zooplankton diversity. They are thought to be potential indicators of water quality because they are very sensitive to changes in the environment. The purpose of this study is to examine the species composition of the zooplankton in Purle Pond of Shivamogga taluk over the course of a one year from January to December 2022. Diversity indices like the Shannon-Weiner Index and the Simpson Index were used to calculate these zooplankton. There were 32 species of zooplankton recorded in this study, including four groups of zooplankton: Ostracoda, Copepoda, Rotifera, and Cladocera. Cladocera has 11 species that belong to 8 genera, Rotifera has 10 species that belong to 6 genera, Copepoda has 8 species that belong to 7 genera, and Ostracoda has 3 species belong to 3 genera. Following Cladocera are Rotifera, Copepoda, and Ostracoda species. Cladocera was found to have the highest percentage of zooplankton species, followed by Rotifera, Copepoda, and Ostracoda. The Simpson Index was between 0.80 and 0.94, and the Shannon-Weiner Index was between 2.22 and 2.58. The pond's Shannon-Weiner and Simpson indices indicated moderate water productivity and good diversity. This helps in the planning of successful fisheries management and increases the pond's productivity.

Keywords: Purle pond, zooplanktons, diversity, groups, cladocera, diversity indices

Introduction

According to Gannon and Stemberger (1978) [5], zooplankton communities have a lot of potential value as indicators of water quality because they are so sensitive to changes in the environment. Eutrophication affects the structure and composition of zooplankton communities, so these communities can be used as indicators of an ecosystem's changing trophic status (Bhati and Rana, 1987) [3]. Since eutrophication influences both the composition and productivity of zooplankton, adequate knowledge of zooplankton communities and their population dynamics is essential for a better understanding of life processes in a freshwater body (Bhora and Kumar, 2004; Sreedhara Nayaka, 2018) [4, 14].

Zooplankton has long been used as an indicator of eutrophication (Webber *et al.*, 2005; Vandysh, 2004) [18, 17]. The summer has a greater abundance of zooplanktonic fauna, while, the rainy season has lower abundance. Changes in the environment are primarily to blame for the zooplankton's fluctuation (Sunkad and Patil, 2004; Sheeba and Ramanujan, 2005; Sreedhara Nayaka, 2018) [15, 12, 14]. The conditions of a tank's water quality are influenced by both natural processes and human actions. The physical and chemical elements of an aquatic organism's environment, as well as the relationships between them, are inseparable. Life in aquatic habitats is first influenced by flow and water chemistry, which are closely linked to seasonal variations.

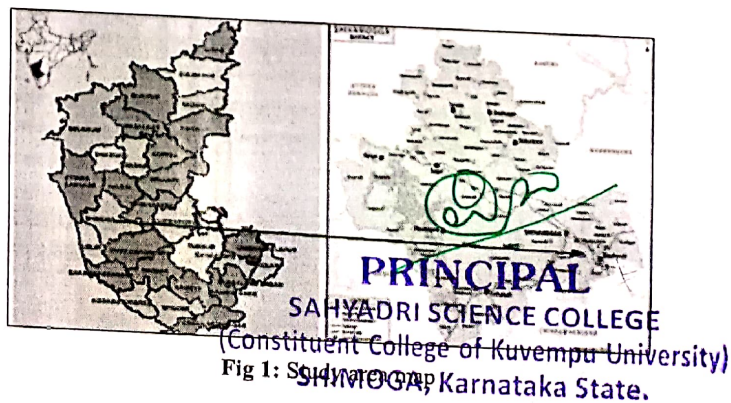
In order to meet the ever-increasing requirements of humans for drinking water, agriculture, and industry, the demand for freshwater has increased exponentially over time. In the tropics and subtropics, rivers are the most important sources of drinking water among the various natural agents at work. However, in the beyond 40 to 50 years, there has been an uncommon decrease in the nature of water in numerous streams of world ensuing to different sorts of anthropogenic exercises (Ramesh and Shashikanth Majagi, 2016) [10]. Soils' physicochemical properties are influenced by a combination

of natural and human-caused factors operating at various spatial and temporal scales (Vandana *et al.*, 2011) [16]. The purpose of this investigation is to determine the species composition and variations in Purle Pond's zooplankton diversity.

Materials and Methods

Study Area

Figure 1 depicts location of Purle pond. This pond is used all the year because it gets water from the Tunga canal and waste water from the surrounding township. This water body is situated just beside Subbaiah medical college and hospital. The pond has a total surface area of 55 hectares, of which 43 hectares are covered by water with an average depth of 6 feet. The water from this pond is used for things like washing clothes, vehicles and household animals (Sayeswara *et al.*, 2010) [11] among other things. and for pisciculture as well. The Karnataka of Shivamogga is the home to numerous ponds. One of the larger ponds in the city is Purle Pond. The human population is dense around this. The majority of the population falls into the lower and middle classes, and their standard of living is either low or moderate. The water in the pond is diluted, resulting in moderate pollution.





Comparative studies on the physiology of Bagrid cat fish, *Mystus cavasius* in Tunga and Bhadra rivers, Karnataka

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Abstract

The present study deals with the comparative study on physiology (GSI, HSI, protein content of ovary, testis and liver) of *Mystus cavasius* in Tunga and Bhadra rivers, Karnataka was studied during July to October 2017. In Tunga river, the GSI values increases was almost linear during September there was marked fall in GSI value and continued to be low during remain period. The GSI value is maximum in August and September indicates that for is engaged in spawning activity from August to September. Higher values of HSI was found in October and minimum during July. The HSI value is more in male than find then also observed his was high at beginning of the gonadal development their after the value decreased to low level in mature stage. Monthly variation in protein content of the testies and ovary shows the inverse relationship in both the rivers i.e. increases the protein content in testes and over as during in July on the contain the liver and muscle protein decreases during July indicates their inverse relationship. The protein content in ovary, muscle and liver is more in female compared to male testis, muscle and liver. The biochemical contents are higher in females because they contain large weight and length than male. In Bhadra river, GSI value was maximum in July for female and October for male and minimum in August for males and October for females. Higher values of HSI was found during the resting and preparatory month of July in both the sexes. The minimum HSI was found during September (Female) and October (Male) months. The HSI value is more in male than female due to beginning of the gonadal development their after the value decreased to low level in mature stage. In males, protein content in liver, testes and muscles ranged from 1.10-1.41, 1.03-1.99 and 2.20-4.14. However, in females protein content in liver, testes and muscles ranged 1.21-1.31, 1.07-1.93 and 3.45-5.53. GSI and HSI varies during the reproductive cycles. Liver is strongly correlated to vitellogenic activity. Changes in the HSI indicates that liver undergo more or less parallel changes in weight. HSI and GSI also exhibit that the liver supports to spermatogenic and organic activity.

Keywords: GSI, HSI, Physiology, *Mystus cavasius*, Tunga and Bhadra rivers

Introduction

In the world about 22,000 species of fish have been recorded of which 24.73% belongs to fresh water, 6.5% back water and 65.45% of marine ecosystem. India has huge inland water resource interview of 29,000 km of rivers. India is home for more than 10% of global fish diversity.

Mystus cavasius is widely distributed siloroid fish found throughout the India and Burma in rivers canals, irrigation, channels, ponds and inundated field. It belongs to family Bagridae, *Mystus cavasius* is a commercially important fishery along Bhadra river. This genera comprises same species *Mystus seenghala*, *Mystus tengara*, *Mystus montanus* etc. These fishes are differ from each other. The economic value of any fish depends upon relationship between its length and weight. The ratio of length to weight of fish is known to be a useful index to demonstrate the well being of the fish. It plays a vital rave in the fishery. It helps in establishing the yield and also in comforting, one variable into the other as is often required in during monitoring field operations.

The method of studying spawning season is to followed seasonal changes in gonadal weight in relation to body weight expressed as the GSI. Gonad undergo regular seasonal cyclic changes in weight practice in female indicates the spawning season. It is one of important parameter of fish biology. It gives the detail idea regarding the fish reproduction and reproductive stages of the species and helps in ascertaining breeding period of fish. Studying seasonal changes in liver weight decreases relation to body

weight expressed as the HSI. Liver undergo regular seasonal cyclic changes in weight in both male and female indicate the spawning season. It is also one of the important parameter of biology.

The biochemical composition of fish tissues is of great interest to assess the specificity in the nutritional value of fish and their physiological needs at different life stages. Several researchers have studied the disruptive effects of maturation and spawning on the chemical composition of fish (Appa Rao, 1967 ^[1]; Pandey *et al.*, 1976 ^[21]; Piska & Prasad, 1991 ^[22]; Kiran & Puttaiah, 2005) ^[16]. The seasonal bio-chemical variations correlation tests, ovaries, muscle and liver have not been given much attention of *Mystus cavasius* of the rivers. Hence, keeping in view of the commercial importance of fish, an attempt have been made to study the storage and utilization of liver contents for testicular growth spermatogenesis and oogenesis.

The main objectives of the present includes identifying character of *Mystus cavasius*, study the protein content in the liver, gonads and muscles. Also to study the GSI and HIS and length and weight relationship of the *Mystus cavasius*.

Materials and Methods

Study area

The Tunga river is in Karnataka state of Southern India (Fig 1 and 1A). The river is originated from Western Ghats at a place called (Constituent College of Kaveri river University) through two districts Shivamogga and Shimoga SHIMOGA, Karnataka State.

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