



ಸಹ್ಯಾದ್ರಿ ವಿಜ್ಞಾನ ಕಾಲೇಜು, ಶಿವಮೊಗ್ಗ-577 203
(ಕುವೆಂಪು ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ಘಟಕ ಕಾಲೇಜು)

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Criteria -03

3.3.1. RESEARCH PAPERS PUBLISHED

DURING THE YEAR -2021

3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during the years 2021

Sl. No.	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Calendar Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal /Digital Object Identifier (doi) number		
							Link to website of the Journal	Link to article / paper / abstract of the article	Is it listed in UGC Care list
2021									
1	"In Silico Characterization of a Transcript Code Based Screening of Antimicrobial Peptide from <i>Trichogramma chilonis</i> ".	Sunil s v, O.Z.Kerima H S Santosh Kumar B T Prabhakar, S N Pramod P Niranjana	Biochemistry	International Journal of Peptide Research and Therapeutics	2021	1573-3904	https://link.springer.com/journal/10989	https://doi.org/10.1007/s10989-021-10295-9	YES(Scopus)
2	Characterization of isolated compounds from <i>Morus</i> spp. and their biological activity as anticancer molecules	Janakirama, A. R. S., S. M. Shivayogi, Jamuna. K. Satyanarayana, and Ramesh Chapeyil Kumanan	Biotechnology	Bioimpacts	2021	2228-5660	https://bi.tbzmed.ac.ir/	https://pubmed.ncbi.nlm.nih.gov/34336607/	YES(Scopus)
3	Bioactive Isolates of <i>Morus</i> Species as Antibacterial Agents and their in-silico Profiling	S.J. Aditya Rao., T.M. Venugopal , N.D. Jayanna , M. Paramesha and C.K. Ramesh	Biotechnology	Letters in Drug Design & Discovery	2021	1570-1808	https://benthamscience.com/journals/letters-in-drug-design-and-discovery/	https://www.eurekaselect.com/article/111183	YES(Scopus)
4	Anti-hyperlipidemic effects of citrus fruit peel extracts against high fat diet-induced hyperlipidemia in rats	Ramesh C K Dr. Pallavi M Nethravathi A M	Biotechnology	International Journal of Research in Pharmaceutical Sciences	2021	0975-7538	https://ijrps.com/index.php/home/index	https://ijrps.com/home/article/view/277	YES(Scopus)
5	Targeting HIF-1 α by newly synthesized Indolephenoxyacetamide (IPA) analogs to induce anti-angiogenesismediated solid tumor suppression	Dr. B T Prabhakar	Biotechnology	Pharmacological reports	2021	1734-1140	https://link.springer.com/journal/43440	https://link.springer.com/article/10.1007/s43440-021-00266-8	YES(Scopus)
6	Modulation of DNA damage response by targeting ATM kinase using newly synthesized di-phenoxy acetamide (DPA) analogs to induce anti-neoplasia	Dr. B T Prabhakar	Biotechnology	Pharmacological reports	2021	1734-1140	https://link.springer.com/journal/43440	https://pubmed.ncbi.nlm.nih.gov/34109572/	YES(Scopus)
7	Effectiveness of <i>Trichoderma</i> viride and <i>Phanerochaete</i> chrysosporium NCIM 1197 Pretreatment for Second Generation Ethanol Production from Areca Nut (<i>Areca catechu</i> L.) Husk by Separate Hydrolysis and Fermentation (SHF) Process	Naveen Kumar K.J., Thippeswamy B and Pradeepa. K	Biotechnology	Research Journal of Biotechnology	2021	0973-6263	https://www.scimagojr.com/journalsearch.php?q=12300154705&tip=sid&clean=0	https://worldresearchersassociations.com/Archives/RJBT/Vol(16)2021/March%202021/Effectiveness%20of%20Trichoderma%20viride%20and%20Phanerochaete.pdf	YES(Scopus)
8	Antineoplasticpharmacophorebenzophenone-1coumarin (BP-1C)targetsJAK2toinduce apoptosisinlungcancer	Dr. B T Prabhakar	Biotechnology	Apoptosis: an international journal on programmed cell death	2021	1360-8185	https://link.springer.com/journal/10495	https://link.springer.com/article/10.1007/s10495-021-01699-5	YES(Scopus)
9	Screening of photoconstituents, in-vitro Antimicrobial, Anthelmintic and anticancer activities of <i>Caralliabrachiata</i> (Lour) merr	Vagdevi H M	Chemistry	International Journal of Pharmaceutical Research	2021	0975-2366	http://www.ijpronline.com/	https://openurl.ebsco.com/EPDB%3Aged%3A11%3A15218667/detailv2?sid=ebsco%3Aplink%3Aascholar&id=ebsco%3Aged%3A153004766&crl=c	YES(Scopus)
10	An Efficient Three Component One-Pot Synthesis of -1,2,3,4-tetrahydro-4-oxo-6-(5-substituted 2-phenyl-1-H-indol-3-yl)-2-thioxopyrimidine-5-carbonitrile as Antimicrobial and antitubercular agents	PrabhakarWalmik	Chemistry	Asian Journal of Pharmaceutical and Clinical Research	2021	0974-2441	https://innovareacademics.in/journals/index.php/ajpr/issue/view/589	https://innovareacademics.in/journals/index.php/ajpr/article/view/39418	YES(Scopus)

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11	Third Grade Fluid Flow in a Microchannel Crammed with Permeable Media Liable to Non-linear Thermal Radiation	A Felicitia, Venkatesh P B J Gireesha, D O Soumya K M Eshwarappa	Mathematics	International Journal of Ambient Energy	2021	0143-0750	https://www.tandfonline.com/journals/taen20	https://doi.org/10.1080/01430750.2021.1965020	YES(Scopus)
12	Compressed Flow of Hybridized Nanofluid Entwined Between Two Rotating Plates Exposed to Radiation	Venkatesh P	Mathematics	Journal of Nanofluids	2021	2169-432X	http://www.aspbs.com/jon.htm	https://www.ingentaconnect.com/contentone/asp/jon/2021/00000010/00000002/art00003	YES(Scopus)
13	Germicidal Properties of Biosynthesised Gold Nanoparticles from Streptomyces sp. PRO 15	K.M. Prashanth and R. Onkarappa	Microbiology	Bioscience, Biotechnology Research Communications	2021	0974-6455	https://bbrc.in/	http://dx.doi.org/10.21786/bbrc/14.3.32	YES
14	Distribution of blood groups and haemoglobin percentage among the students of government science college, Chitradurga, Karnataka, India	Dr.K.L.Naik	Zoology	Uttar Pradesh journal of Zoology	2021	0256-971X	https://mbimph.com/index.php/UPJOZ/index	https://mbimph.com/index.php/UPJOZ/article/view/2261	YES
15	Determining the Morphometric traits of Apis dorsata worker bees Jogimatti forest and Chitradurga, Karnataka, India	Dr.K.L.Naik	Zoology	Uttar Pradesh journal of Zoology	2021	0256-971X	https://mbimph.com/index.php/UPJOZ/index	https://stm.bookpi.org/NVBS-V5/article/view/4602	YES
16	A study on butterfly biodiversity of Jogimatti forest, Chitradurga, Karnataka, India	Dr.K.L.Naik	Zoology	Uttar Pradesh journal of Zoology	2021	0256-971X	https://mbimph.com/index.php/UPJOZ/index	https://mbimph.com/index.php/UPJOZ/article/view/2157	YES
17	Comparative bio-efficacy of insecticides against shot-hole borer, Xylosandrus compactus eichhoff (coleopteran: Scolytidae) infesting robusta coffee	Dr.K.L.Naik	Zoology	Journal of Experimental Zoology, India	2021	0976-1780	https://connectjournals.com/pages/journaldetails/JEZ	https://connectjournals.com/pages/article/details/toe033684	YES
18	Seasonal Incidence Of Rice Leaf Folder, Cnaphalocrocis Medinalis (Guenee) In Shivamogga Region, Karnataka	Dr.K.L.Naik	Zoology	Journal of Experimental Zoology, India	2021	0976-1781	https://connectjournals.com/pages/journaldetails/JEZ	https://connectjournals.com/pages/article/details/toe033086	YES
19	Comparative Phenological studies of the genus Rhynchosia Loureiro and Stylosanthes Sw Hosadurga and Holalkere Taluks of Chitradurga District, Karnataka	Rachitha C J and Krishnaswamy K	Botany	Journal of Advances Scientific Research	2021	0976-9595	https://sciensage.info/index.php/JASR/index	https://sciensage.info/index.php/JASR/article/view/1628	YES
20	Studies on the Phenology of some terrestrial orchids of western Ghats India	Soumya Mahabaleshwara Hegde and Krishnaswamy K	Botany	Plant Science Today	2021	2348-1900	https://horizonpublishing.com/journals/index.php/PST/index	https://horizonpublishing.com/journals/index.php/PST/article/view/1233	YES(Scopus)
21	Phenology of the Genus Crotalaria L. (Fabaceae-Papilionoideae) of Holalkere, Hosadurga and Chitradurga Taluks of Chitradurga District, Karnataka, India	Rachitha C J and Krishnaswamy K	Botany	Plant Science Today	2021	2348-1900	https://horizonpublishing.com/journals/index.php/PST/index	https://horizonpublishing.com/journals/index.php/PST/article/view/1393	YES(Scopus)
22	Chemical composition and antimicrobial activity of essential oils of leaves of Raphanea wightiana	Manasa CR, Ravi Kiran S, Ravi Kumar BS and Krishnaswamy K	Botany	Journal of Advanced Scientific Research	2021	0976-9595	https://sciensage.info/index.php/JASR/index	https://sciensage.info/index.php/JASR/article/view/1625	YES
23	Palladium metal embedded on mesoporous graphene oxide as an efficient heterogeneous catalyst for Suzuki coupling reaction	Krishnamurthy G	Chemistry	Materials Today: Proceedings	2021	2214-7853	https://www.sciencedirect.com/journal/materials-today-proceedings	https://doi.org/10.1016/j.matpr.2021.03.162	YES(Scopus)

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24	Synthesis of benzoxazole Associated Benzothiazine-4-ones and their in-vitro and in-silico Antimicrobial, Antioxidant Activities	Vagdevi H M	Chemistry	Asian Journal of Chemistry	2021	0970-7077	https://asianpubs.org/index.php/ajchem/index	https://asianpubs.org/index.php/ajchem/article/view/33_1_24	YES(Scopus)
25	Entropy scrutiny of couple stress nano liquid flow with slip and convective conditions in an upright microchannel	B.J.Gireesha P.Venkatesh F.Almeida	Mathematics	Physica Scripta	2021	1402-4896	https://iopscience.iop.org/journal/1402-4896	https://iopscience.iop.org/article/10.1088/1402-4896/abde0e/meta	YES(Scopus)
26	Significance of increasing Lorentz force and buoyancy force on the dynamics of water conveying SWCNT and MWCNT nanoparticles through	G K. Ramesh G.R. Manohar P.Venkatesh B.J. Gireesha	Mathematics	Physica Scripta	2021	1402-4896	https://iopscience.iop.org/journal/1402-4896	https://iopscience.iop.org/article/10.1088/1402-4896/ac007a/pdf	YES(Scopus)
27	Thermal analysis through cylindrical porous fin having insulated tip: a hybrid nanomaterial approach	G K. Ramesh G.R. Manohar P.Venkatesh B.J. Gireesha N.A. Shah, J. Dong	Mathematics	Physica Scripta	2021	1402-4896	https://iopscience.iop.org/journal/1402-4896	https://iopscience.iop.org/article/10.1088/1402-4896/ac0ad9	YES(Scopus)
28	Photocatalytic Degradation of Erichrome Black-T and Evan's Blue Dyes Under the Visible Light using PVA Capped and Uncapped Ag doped ZnS nanoparticles	Krishnamurthy G.	Chemistry	Emergent Materials	2021	2522-574X	https://www.springer.com/journal/42247/aims-and-scope	https://link.springer.com/article/10.1007/s42247-020-00153-7	YES(Scopus)
29	Synthesis of reduced graphene oxide decorated with Sn/Na doped TiO ₂ nanocomposite: a photocatalyst for Evans blue dye degradation	Krishnamurthy G.	Chemistry	Emergent Materials	2021	2522-574X	https://www.springer.com/journal/42247/aims-and-scope	https://link.springer.com/article/10.1007/s42247-021-00206-5	YES(Scopus)
30	Optical and antibacterial evaluation of biofunctionalized Cu-ZnS nanoparticles	Krishnamurthy G.	Chemistry	Emergent Materials	2021	2522-574X	https://www.springer.com/journal/42247/aims-and-scope	https://link.springer.com/article/10.1007/s42247-020-00141-x	YES(Scopus)
31	Investigation on Co(II), Ni(II), Cu(II), and Zn(II) complexes derived novel N-(3-hydroxybenzoyl) thiophene-2-carbohydrazide: Structural characterization, Electrochemical Detection of Biomolecules, Molecular Docking and Biological evaluation	Malathesh Pari	Chemistry	Emergent Materials	2021	2522-574X	https://link.springer.com/journal/42247	https://link.springer.com/article/10.1007/s42247-021-00312-4	YES(Scopus)
32	Co-deposition of micro- and nano-sized SnO ₂ particles in the Zn-matrix composite coatings produced from a Zn-sulphate bath by electroplating	K Deepa, H T Purushothama, RO Yathisha	Chemistry	Chemical Data Collections	2021	2405-8300	https://www.sciencedirect.com/science/article/abs/pii/S2405830021000124	https://doi.org/10.1016/j.cdc.2021.100657	YES(Scopus)
33	Facile TiO ₂ NPs catalysed synthesis of substituted-4-hydroxy/methoxybenzylidene derivatives as potent antioxidant and anti-tubercular agents	S.H. Sukanya, Talavara Venkatesh*, S R Kumar, Y D Bodke	Chemistry	Chemical Data Collections	2021	2405-8300	https://www.sciencedirect.com/journal/chemical-data-collections	https://doi.org/10.1016/j.cdc.2021.100713	YES(Scopus)


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34	Design, Synthesis of indolyl-6-amino 3,4-dihydro-3-methylpyrano[2,3-c]pyrazol-5-carbonitrile derivatives antioxidant agents	Prabhakar W. Chavan	Chemistry	Der Pharma Chemica	2021	0975-413X	https://www.derpharmachemica.com/	https://www.derpharmachemica.com/abstract/design-synthesis-and-characterization-of-indolyl6amino-34dihydro3-methylpyrano23cpyrzolz5carbonitrile-derivatives-as-ant-74739.html	YES(Scopus)
35	Efficient L-Proline catalyzed synthesis of some new (4-substituted-phenyl)-1,5-dihydro-2H-pyrimido[4,5-d][1,3]thiazolo[3,2a]-pyrimidine-2,4(3H)-diones bearing thiazolopyrimidine derivatives and evaluation of their pharmacological activities	S H Sukanya, TalavaraVenkatesh*, S.J. AdityaRao, MuthipeedikaNibin Joy	Chemistry	Journal of Molecular Structure	2021	0022-2860	https://www.sciencedirect.com/journal/journal-of-molecular-structure	https://doi.org/10.1016/j.molstruc.2021.131324	YES(Scopus)
36	Dynamics of hybrid nanofluid through a semi spherical porous fin with internal heat generation	Venkatesh P	Mathematics	Partial Differential Equations in Applied Mathematics	2021	2666-8181	www.sciencedirect.com/science/article/pii/S2666818121000796	www.sciencedirect.com/science/article/pii/S2666818121000796	YES(Scopus)
37	The Gag Reflex: A Hurdle in Dentistry-Literature Review	Dr. Pallavi M	Biotechnology	Journal of Pharmaceutical Research International	2021	2456-9119	https://journaljpri.com/index.php/JPRI	https://journaljpri.com/index.php/JPRI/article/view/3736	YES
38	Comparative Study of Drug Likeness and Pharmacokinetic Properties of Synthetic Antiviral Drugs to that of Remdesivir. In-silico Approach	Dr. Pallavi M	Biotechnology	Journal of Pharmaceutical Research International	2021	2456-9119	https://journaljpri.com/index.php/JPRI	https://journaljpri.com/index.php/JPRI/article/view/6823	YES
39	Mega sporogenesis and development female gametophytes in Geodorum densiflorum (LAM) SCHLTR	Soumya Mahabaleshwara Hegde and Krishnaswamy K	Botany	The Journal of The Orchid Society of India	2021	0971-5371	https://orchidsocietyindia.org/journals/	https://orchidsocietyindia.org/wp-content/uploads/2022/05/Hegde-and-K-Krishnaswamy1_9_21.pdf	YES
40	Anatomical adaptation in roots of four Nervilia species (Orchidaceae)	Sowmya M H and Krishnaswamy K	Botany	Annals of Biology	2021	0097-0153	https://agribiop.com/about-us/annals-of-biology/	https://agribiop.com/anatomical-adaptations-in-roots-of-four-nervilia-species-orchidaceae/	YES
41	Analysis of soil physico-chemical properties on sunflower crop fields in Davangere region of Karnataka	Shaila M and Nafesa Begum	Botany	International Journal of Botany Studies	2021	2455-541X	https://www.botanyjournals.com/	https://www.botanyjournals.com/archives/2021/vol6/issue4/6-4-34	YES
42	Isolation and identification of some fungal pathogens from solanaceous vegetable crops of Chithradurga district, Karnataka	Sowmya G H Rajeshwari, N Ramesh Babu H.N	Botany	International journal of Botany studies	2021	2455-541X	https://www.botanyjournals.com/	https://www.botanyjournals.com/archives/2021/vol6/issue5/6-5-169	YES
43	Impact of conventional storage system on germination and storage fungi of paddy in Chikkamagaluru, Karnataka	T V Sunil Kumar, Rajeshwari, N Ramesh Babu H.N M Krishnappa	Botany	International journal of Botany studies	2021	2455-541X	https://www.botanyjournals.com/	https://www.botanyjournals.com/archives/2021/vol6/issue5/6-4-250	YES
44	Diversity and distribution of genus Habenaria wild (Orchidaceae) in Shimoga district, Karnataka India	S M Hegde and K Krishnaswamy	Botany	Journal Orchid Society of India	2021	0971-5371	https://orchidsocietyindia.org/journals/	https://orchidsocietyindia.org/wp-content/uploads/2022/05/Hegde-and-K-Krishnaswamy1_9_21.pdf	YES
45	Diversity of Saprophytic Orchids in some parts Central Western ghats region (Karnataka), India	S M Hegde and K Krishnaswamy	Botany	Journal of Orchid Society of India	2021	0971-5371	https://orchidsocietyindia.org/journals/	https://orchidsocietyindia.org/journals/	YES
46	Comparative anatomy of leaf in four Nervilia species (Orchidaceae) from Shimoga District Central Western ghats Karnataka	S M Hegde and K Krishnaswamy	Botany	ANVESAK	2021	0378-4568	https://www.spiesr.ac.in/Anvesak/About+the+Journal#	https://www.spiesr.ac.in/Anvesak/About+the+Journal#	YES


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47	Synthesis, Optical, Photocatalytic and Electrochemical Properties of Cobalt Doped ZnS Nanoparticles	G. Krishnamurthy, Prabhaker Walmik	Chemistry	Asian Journal of Chemistry	2021	0975-427X	https://asianpubs.org/index.php/ajchem/index	https://asianpubs.org/index.php/ajchem/article/view/33_10_29	YES (Scopus)
48	Biodiesel from freshwater algae; Effect of pH on oil production	Ranjith Y and Parameswara Naik T	Botany	International Journal of Botany Studies	2021	2455-541X	https://www.botanyjournals.com/	https://www.botanyjournals.com/assets/archives/2021/vol05issue3(6-3-175-481).pdf	YES
49	Synthesis, Characterization and Electrochemical Sensor based upon novel Schiff base metal Complexes derived from the drug flufenamic acid for the determination of uric acid and Their Biological applications.	Malathesh Pari	Chemistry	Biointerface Research in Applied Chemistry	2021	2069-5837	https://biointerfaceresearch.com/	https://www.biointerfaceresearch.com/wp-content/uploads/2020/12/20695837114_1139011403.pdf	YES
50	Evaluation of bio-agents against Ambrosia fungal symbiont associated with coffee shot-hole borer, Xylodendrus compactus Eichoff	Dr.K.L.Naik	Zoology	Journal of Mycopathological Research	2021	0971-3719	https://imskolkata.org/	https://imskolkata.org/pdf/june21_2/MPA2020a200ma200June202021.pdf	YES
51	Facile synthesis of some 5-(3-substituted-thiophene)-pyrimidine derivatives and their pharmacological and computational studies	S.H. Sukanya TalavaraVenkatesh, S J Aditya Rao, N. Shivakumara, Muthipeedika Nibin Joy	Chemistry	Chemica Techno Acta	2021	2411-1414	https://clar.univ.ru/handle/10995/30435	https://doi.org/10.15826/chemtech.2021.8.4.01	YES
52	Palladium metal embedded on mesoporous graphene oxide as an efficient heterogeneous catalyst for Suzuki coupling reaction	K S Jithendra Kumara, Ganga Naik Krishnamurthy, Usha Jinendra, Sachin Bhat	Chemistry	Materials Today Proceedings	2021	2214-7853	https://www.sciencedirect.com/journal/materials-today-proceedings	https://doi.org/10.1016/j.matpr.2021.03.162	YES(Scopus)
53	Synthesis of reduced graphene oxide decorated with Sn/Na doped TiO2 nanocomposite: a photocatalyst for Evans blue dye degradation	K S Jithendra Kumara, G Krishnamurthy, Prabhaker Walmik, Sanish Naik, R S Rani, Nagaraja Naik	Chemistry	Emergent Materials	2021	2622-574X	https://link.springer.com/journal/42247	https://doi.org/10.1007/s42247-021-00206-5	YES(Scopus)
54	Photocatalytic degradation of eriochrome black-T and evan's blue dyes under the visible light using PVA capped and uncapped Ag doped ZnS nanoparticles	K R Sumadevi, G Krishnamurthy, Prabhaker Walmik, R S Rani, Satish Naik, H S Naik, Nagaraja Naik	Chemistry	Emergent Materials	2021	2622-574X	https://link.springer.com/journal/42247	https://doi.org/10.1007/s42247-021-00153-7	YES(Scopus)
55	Oral therapeutic proteins: a review on current strategies, challenges, and development.	Prof. Ramesh C K Dr. Pallavi M Nethravathi A M	Biotechnology	Bulletin of Environment, Pharmacology and Life Sciences	2021	2277-1808	https://bepls.com	https://bepls.com/bepls_march2021_1a.pdf	NO
56	Traditional Seed Storage Practices in Shimoga District of Malnad Region, Karnataka, India	Rajeshwar N., Ramesh Babu H. N., Sowmya G. H	Botany	International Journal of Creative Research Thoughts	2021	2320-2882	https://ijcrt.org/	https://ijcrt.org/view/fulltext.php?doi_id=IJCRT2103586	NO
57	Terrestrial Orchid Diversity in sharavathi river valley of Shimoga District Karnataka, IN	Soumya Mahabaleshwara Hegde and Krishnaswamy K	Botany	Shanlax International Journal of Arts, Science and Humanities	2021	2582-0397	https://shanlaxjournals.in/journals/index.php/sjash	https://shanlaxjournals.in/journals/index.php/sjash/article/view/3927	NO
58	Phenology of the genus Indigofera L. (Fabaceae, Papilionoideae) of Holalkere and Hosadurga taluks of Chitradurga district, Karnataka, India	Rachitha C J and Krishnaswamy K	Botany	Shanlax International Journal of Arts, Science and Humanities	2021	2582-0397	https://shanlaxjournals.in/journals/index.php/sjash	https://shanlaxjournals.in/journals/index.php/sjash/article/view/3926	NO



In Silico Characterization of a Transcript Code Based Screening of Antimicrobial Peptide from *Trichogramma chilonis*

S. V. Sunil¹ · O. Z. Kerima¹ · H. S. Santosh Kumar² · B. T. Prabhakar³ · S. N. Pramod⁴ · P. Niranjana¹

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Abstract

Antimicrobial peptides (AMPs) from insects possess potent antimicrobial properties against various microbial related diseases. *Trichogramma chilonis* is a type of egg endoparasitoid wasp, well known as a biological control agent for pests that express various proteins to sustain and grown in host egg. In the present study, the bioinformatics analysis was attempted to identify *T. chilonis* transcript through sequence and phylogenetic analysis that clustered the transcript to Alo2 protein. Simultaneously the parasitoid egg homogenate was screened and subjected to antimicrobial property against pathogenic bacteria and fungal strains. Further, the similarity linkage clustering was identified the knottin motif at both sequence as well as structure level for Alo2. In silico physicochemical characteristics analysis of knottin motif has revealed approximate molecular weight of 6515.76 Da, theoretical Isoelectric point (pI): 7.55 and an aliphatic index: 63.06, instability index: 32.71, and grand average of hydropathicity (GRAVY): 0.547. Based on in silico results, Alo2 protein/knottin motif, was confirmed, which present in *T. chilonis* and the antimicrobial screening of *T. chilonis* protein homogenate exhibited significance growth inhibitory activity against gram positive, gram negative bacterial and fungal pathogens. The study results conclude that Alo2 protein resemble as an AMP that may express in the parasitoid egg as host defense protein and may involved to combat invading microbial pathogens and could regulate host defense mechanism during its development in host egg.

Keywords Antimicrobial peptide · *Trichogramma chilonis* · Transcriptome analysis · Comparative modeling

Abbreviations

μl	Micro liter
AI	Aliphatic index
AMP	Antimicrobial peptides
bp	Base pair
CFU/ml	Colony forming unit per milliliter
D	Dimensional
Fig	Figure
II	Instability index

Mg/ml	Milligram per milliliter
mM	Millimolar
nm	Nanometer
pI	Isoelectric point
<i>T. chilonis</i>	<i>Trichogramma chilonis</i>
TM protein	Transmembrane protein
v/v	Volume/volume
Wt/v	Weight/volume

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Characterization of isolated compounds from *Morus* spp. and their biological activity as anticancer molecules

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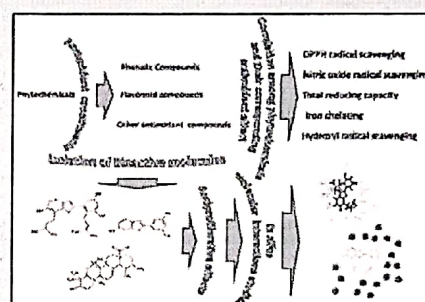
Abstract

Introduction: The genus *Morus* is well known for its medicinal benefits from time immemorial. The present work reported the health-promoting properties of the biologically active molecules present in different species of the genus *Morus*.

Methods: Different solvent extracts of the three plant species of *Morus* were investigated initially for their antioxidant effects, followed by *in vitro* anticancer studies against MCF7 and 3T3 cell lines along with their bioactive isolates viz. cathafuran-B, moracin-M, and ursolic acid. Further, *in silico* docking studies were performed for the isolated compounds to predict their probable mode of interaction with P38Map Kinase.

Results: The results indicated that all three species under study possessed remarkable antioxidant effects which are supported by a linear and positive correlation between different antioxidant activities. The *in vitro* cell antiproliferative test indicated that the cell survivability decreased with an increase in the concentration of extracts and compounds. Among the extracts, *M. laevigata* methanol extract showed 21.57, 6.27% of cell survival against MCF7 and 3T3 cell lines at 800 µg/mL concentration while among the isolated compounds, ursolic acid showed 8.46, 17.58% of cell survival at 200 µg/mL concentration. Among the three compounds docked, ursolic acid showed greater binding affinity towards the target protein in terms of its binding energy (-9.97 kJ/mol) compared to Cathafuran B (-8.35 kJ/mol) and Moracin M (-6.91 kJ/mol).

Conclusion: The study generated interesting results in terms of health benefits of *Morus* species by documenting their antioxidant and anticancer activities, thereby validating the folk claims of therapeutic benefits of mulberry.



Introduction

Overproduction of various forms of reactive oxygen species, such as oxygen radicals and non-free radical species is considered to be the main contributor to oxidative stress, which has been linked to several diseases like cancer, atherosclerosis, and tissue damage in rheumatoid arthritis.^{1,2} Plants are an exemplary source of medicines and edible plant parts are rich sources of natural antioxidants that possess the ability to protect the body from damage caused by free radicals induced oxidative stress.³ The preventive mechanisms of natural phytochemicals on tumor promotion range from the inhibition of genotoxic effects to increased antioxidants and anti-inflammatory

activity, inhibition of proteases and cell proliferation, protection of intracellular communications to modulate apoptosis and signal transduction pathways.⁴⁻⁶

Mulberry is medicinally the most important plant which belongs to genera *Morus*. Indigenous medicinal practitioners, for centuries, have used different parts of the mulberry plant for treating diseases and symptoms of many serious diseases like diabetes mellitus, atherosclerosis, and hypertension.⁷ Evidence has shown that large numbers of biomolecules of medicinal interest are present in the genus *Morus*, but extensive work is being carried out by targeting mainly *Morus alba*.^{1,8} The presence of phytochemicals vary in terms of species, varieties, within the different parts



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RESEARCH ARTICLE

Bioactive Isolates of *Morus* Species as Antibacterial Agents and their *in-silico* ProfilingS.J. Aditya Rao^{1,4}, T.M. Venugopal², N.D. Jayanna³, M. Paramesha⁴ and C.K. Ramesh^{1,*}

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Abstract: Background: The genus *Morus* is one of the rich sources of phytomedicine and considered a beneficial natural source for drugs with potential antimicrobial effect under the traditional system of medicine.

Introduction: In the present study, three bioactive compounds isolated from the leaves of two species of genus *Morus* and their antibacterial effect against selective pathogens were assessed.

Methods: The inhibitory effects of the three molecules isolated were assessed for their minimum inhibition concentration (MIC) and minimum bactericidal concentration (MBC) against selected pathogens. The *in-silico* studies provided the toxicity profile and the binding interactions with glucosamine-6-phosphate synthase for all the isolates.

Results: Among the three compounds tested, cathafuran-B showed a prominent bacteriostatic and bactericidal effect, which is supported by the results of *in-silico* analysis suggesting that cathafuran-B could be a potential glucosamine-6-phosphate synthase inhibitor.

Conclusion: The biomolecule isolated from less explored *Morus laevigata* exhibiting higher antibacterial effect among the compounds tested warranted opening a new prospect in phytomedicinal research for exploring its pharmacological properties and lowering the utilization load present on highly explored *Morus alba*.

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1. INTRODUCTION

For over three billion years, nature has been carrying out its own combinatorial chemistry [1] and plant chemicals have evolved in response to the needs and challenges of the plant environment [2]. Ethnobotanical and traditional usage of medicinal plants serves as a source of information for the isolation of active compounds as direct therapeutic agents (D-tubocurarine from *Chondrodendron tomentosum*), as the drug lead for semi-synthesis (diosgenin from *Dioscorea floribunda*), the model drug for new synthetic drugs (cocaine from *Erythroxylum coca*), for the synthesis of local anesthetics, and lastly as taxonomic markers for identification and classification [1, 3]. Mulberry leaves are one such exemplary source which are being consumed in Korea and Japan in different food products like noodles, cakes, and tea as nutraceuticals supplement and also to treat diabetes mellitus [4, 5].

Several new approaches have been adopted in the process of drug discovery, and computational methods have been implemented in the traditional methods of drug discovery [6]. In the preceding decade, several attempts have been made using *in-silico* toxicology and pharmacology in search of a potential drug candidate for synthetic as well as plant-derived compounds [7]. Improvements in isolation techniques, high-throughput screening, generation of large numbers of samples to meet the demands of pharmacology still remained the bottleneck in preclinical and clinical studies of the drug development pipeline [2, 8].

In search of a potent antimicrobial drug, molecular mechanisms in bacterial cells can be exploited and target molecules can be identified to inhibit a specific function. Glucosamine-6-phosphate synthase (GlcN-6-P) is one such enzyme involved in building macromolecules required for cell wall assemblies, such as chitin, mannoproteins, and peptidoglycan in fungi and bacterial cells. The role of Glucosamine-6-phosphate synthase is critical for the survivability of these microorganisms. So far, several inhibitors of both natural and synthetic origin have been reported with antibacterial

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Anti-hyperlipidemic effects of citrus fruit peel extracts against high fat diet-induced hyperlipidemia in rats

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ABSTRACT



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The anti-hyperlipidemic effects of ethanolic extracts of orange, pomello, lime, citron and sour orange fruit peels (250 and 500 mg kg⁻¹, i.p) were tested in high fat diet-fed rats. The ethanolic extracts of lime and sour orange peels (250 and 500 mg kg⁻¹, i.p) showed potent anti-hyperlipidemic effects, as evident by the decreases in total cholesterol (TC), triglycerides (TG), LDL-C, and VLDL-C, in addition to the increases in HDL-C levels. Besides, lime and sour orange peels (250 and 500 mg kg⁻¹) extract significantly decreased LDL-C/HDL-C ratio, while lime, sour orange and pomello peel extracts markedly decreased atherogenic index. Remarkably, lime peel extract followed by sour orange and orange at 500 mg kg⁻¹ dose improved hepatic architecture to near normal with less deposition of fat globules and fewer sinusoids. Altogether, lime and sour orange peel extracts were found to be effective against hyperlipidemic parameters such as TC, TG, LDL-C, VLDL-C, and TC/HDL-C and LDL-C/HDL-C ratios, and atherogenic index, in addition to the increased levels of HDL-C. Thus, lime and sour orange peel extracts could be natural supplement in the management of hyperlipidemia and associated diseases.

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INTRODUCTION

Hyperlipidemia leading to atherosclerosis, coronary heart diseases and cerebral vascular diseases has been ranked as one of the major risk factors for death worldwide (Nelson, 2013; Yu *et al.*, 2000). The diets rich in calories, saturated fats and cholesterol, genetic status and lifestyle contribute to hyperlipidemia. It is characterized by the elevated levels of fatty substances in the blood, including very-low-density lipoprotein (VLDL), low-density lipoprotein (LDL) and triglyceride (TG)-rich lipoprotein,

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Targeting HIF-1 α by newly synthesized Indolephenoxyacetamide (IPA) analogs to induce anti-angiogenesis-mediated solid tumor suppression

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Abstract

Background Hypoxic microenvironment is a common feature of solid tumors, which leads to the promotion of cancer. The transcription factor, HIF-1 α , expressed under hypoxic conditions stimulates tumor angiogenesis, favoring HIF-1 α as a promising anticancer agent. On the other hand, synthetic Indolephenoxyacetamide derivatives are known for their pharmacological potentiality. With this background here, we have synthesized, characterized, and validated the new IPA (8a–n) analogs for anti-tumor activity.

Methods The new series of IPA (8a–n) were synthesized through a multi-step reaction sequence and characterized based on the different spectroscopic analysis FT-IR, ¹H, ¹³C NMR, mass spectra, and elemental analyses. Cell-based screening of IPA (8a–n) was assessed by MTT assay. Anti-angiogenic efficacy of IPA (8k) validated through CAM, Rat corneal, tube formation and migration assay. The underlying molecular mechanism is validated through zymogram and IB studies. The in vivo anti-tumor activity was measured in the DLA solid tumor model.

Results Screening for anti-proliferative studies inferred, IPA (8k) is a lead molecule with an IC₅₀ value of 5 μ M. Anti-angiogenic assays revealed the angiopreventive activity through inhibition of HIF-1 α and modulation downstream regulatory genes, VEGF, MMPs, and P53. The results are confirmative in an in vivo solid tumor model.

B.T. Prabhakar and Shaukath Ara Khanum contributed equally.

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Modulation of DNA damage response by targeting ATM kinase using newly synthesized di-phenoxy acetamide (DPA) analogs to induce anti-neoplasia

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Abstract

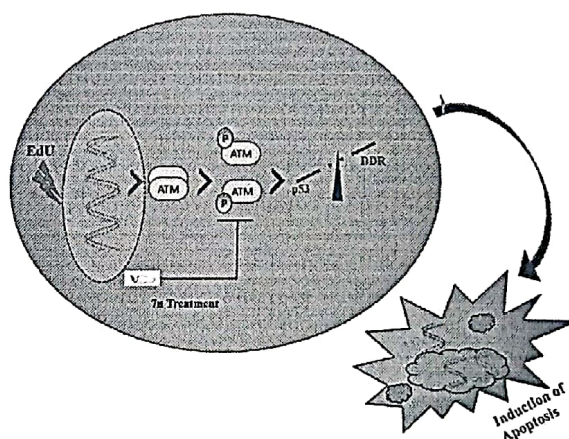
Background Imbalance and instability in the structure of the DNA have become major characteristics of cancer. In response to DNA damage, DNA damage response (DDR) protein, ataxia telangiectasia mutated (ATM), plays a pivotal role in the modulation of regulatory regions responsible for inhibition of apoptosis, thereby neoplastic progression.

Methods A new series of DPA (7a–t) were synthesized, characterized. Anti-proliferative studies to identify the lead compound were carried out by LDH and MTT assay. Apoptosis/DNA damage was measured through FACS, Annexin-v staining, TUNEL and Comet assay. Elucidation of molecular mechanism through immunoblot and further validation of the drug effect through in vivo approaches.

Results Initial in vitro anti-proliferative screening of Compounds DPA (7a–t) against multiple cancer cell lines identified Compound DPA (7n) as a potent cytotoxic molecule with IC_{50} value of 4.3 μ M. Down the line, in vitro and in vivo evaluation of Compound DPA (7n) inferred that it has apoptotic inducing potentiality. Further, evaluation of molecular mechanism inferred that Compound DPA (7n) effectively modulates ATM phosphorylation only, eventually altering downstream signalling pathways.

Conclusions Compound DPA (7n) emerged as a potent proapoptotic and anti-neoplastic agent by inhibiting ATM kinase activity both in vitro and in vivo. The conferring results ascertain that the drug could be developed as a new ATM kinase inhibitor with anti-cancer capacity.

Graphic abstract



Shaukath Ara Khanum and B.T. Prabhakar contributed equally.

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Effectiveness of *Trichoderma viride* and *Phanerochaete chrysosporium* NCIM 1197 Pretreatment for Second Generation Ethanol Production from Areca Nut (*Areca catechu* L.) Husk by Separate Hydrolysis and Fermentation (SHF) Process

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Abstract

Production of ethanol using cellulosic material as feedstock is crucial for sustainable fuel ethanol production. However, a production process based on cellulosic biomass involves several energy and cost intensive steps like storage of biomass, pretreatment, hydrolysis and fermentation. Areca nut husk waste is most abundant renewable energy source that may be considered as potential feedstock for ethanol production by microbial fermentation. The areca nut husk waste was initially subjected to microbiological pretreatment for obtaining reducing sugars. Cellulolytic fungi are more effective for enzymatic hydrolysis.

In fungal treatment, increase the reducing sugar concentration for maximum ethanol production. *Trichoderma viride* and *Phanerochaete chrysosporium* NCIM 1197 (TV+PC) are more effective fungi for biological treatment. Maximum ethanol production by *Saccharomyces cerevisiae* NCIM 3095, *Pichia stipitis* NCIM 3498, *Candida shehatae* NCIM 3500 and *Zymomonas mobilis* NCIM 2915 is obtained in all the parameters like temperature, pH and inoculum concentration. Hence, fungal pretreatment by cellulolytic fungi was more effective for ethanol production. Areca nut husk was revealed as a suitable substrate for ethanol production.

Keywords: Areca nut husk, Bioethanol, *Phanerochaete chrysosporium* NCIM 1197, *Trichoderma viride*, *Zymomonas mobilis* NCIM 2915.

Introduction

In order to reduce dependence on fossil fuels and thus alleviate associated economic and environmental concerns, biofuels derived from renewable and domestic sources have received extensive interest for displacement of fossil transportation fuels in many countries¹⁻³. Lignocellulosic biomass, mostly from agricultural and forestry sources, is rich in carbohydrates (55–75% dry basis) and widely available, thus providing attractive feedstock's for ethanol

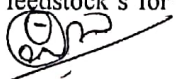
production^{4,5}. To maximally utilize carbohydrates in the biomass, a pretreatment process is needed to overcome the biomass recalcitrance and subsequently improve its accessibility to hydrolytic enzymes⁶⁻⁹.

Thermal/chemical pretreatment methods have been regarded as the current leading pretreatment technologies; however, they usually need expensive corrosion resistant reactors, processing large volumes of the waste stream, extensive washing of treated solids and detoxification of compounds inhibitory to ethanol-fermenting microorganisms. Thus, pretreatment still remains one of the most costly steps in cellulosic ethanol production and is a significant barrier to its commercialization^{7,10}.

Biological pretreatment, as a safe and environmental friendly method for lignin removal from lignocellulose, is attracting extensive interests¹¹⁻¹⁴. White-rot fungi are the most promising microorganisms used for biological pretreatment because of their abilities to selectively degradation of lignin¹⁵⁻¹⁷. Presently, lots of studies on pretreatments with various white-rot fungi have been reported. Many white-rot fungi were applied to pretreatment of wheat straw for enzymatic hydrolysis and it was found that about 30% of cellulose was converted to glucose

Areca nut (*Areca catechu* L.) is one of the most important commercial crops in India. India ranks first in areca nut production in the world. In India the cultivation of areca nut is mostly confined to Karnataka, Kerala and Assam in terms of total area under cultivation and production is around 83%. The area under areca nut is around 4 lakh hectares with a production of around 4.78 lakh tons in India. Karnataka stands first both in terms of area and production followed by Kerala and Assam. In Karnataka, around 2.15 lakh hectares are under areca nut cultivation^{18,19}. Areca nut popularly known as betel nut or supari is one of the most important plantation crops in Shivamogga district²⁰.

The area under areca nut cultivation has increased more rapidly in Shimoga district as compared with Dakshina Kannada and Uttara Kannada districts, Karnataka state, India. The area under Shivamogga district areca nut is 94, 077.50 hectares with a production of around 52,781 metric tons^{18,19}. The areca nut husk fibers are predominantly


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Anti-neoplastic phramacophore benzophenone-1 coumarin (BP-1C) targets JAK2 to induce apoptosis in lung cancer

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Abstract

Reigning of the abnormal gene activation associated with survival signalling in lung cancer leads to the anomalous growth and therapeutic failure. Targeting specific cell survival signalling like JAK2/STAT3 nexus has become a major focus of investigation to establish a target specific treatment. The 2-bromobenzoyl-4-methylphenoxy-acetyl hydra acetyl Coumarin (BP-1C), is new anti-neoplastic agent with apoptosis inducing capacity. The current study was aimed to develop antitumor phramacophore, BP-1C as JAK2 specific inhibitor against lung neoplastic progression. The study validates and identifies the molecular targets of BP-1C induced cell death. Cell based screening against multiple cancer cell lines identified, lung adenocarcinoma as its specific target through promotion of apoptosis. The BP-1C is able to induce, specific hall marks of apoptosis and there by conferring anti-neoplastic activity. Validation of its molecular mechanism, identified, BP-1C specifically targets JAK2^{Tyr1007/1008} phosphorylation, and inhibits its downstream STAT3^{Tyr705} signalling pathway to induce cell death. As a consequence, modulation in Akt/Src survival signal and altered expression of interwoven apoptotic genes were evident. The results were reproducible in an in-vivo LLC tumor model and *in-ovo* xenograft studies. The computational approaches viz, drug finger printing confers, BP-1C as novel class JAK2 inhibitor and molecular simulations studies assures its efficiency in binding with JAK2. Overall, BP-1C is a novel JAK2 inhibitor with experimental evidence and could be effectively developed into a promising drug for lung cancer treatment.

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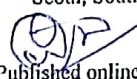
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Research Article

Screening of Phytoconstituents, in-vitro Antimicrobial, Anthelmintic and Anticancer Activities of Caralliabrachiata (Lour) merr

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ABSTRACT

The plant Caralliabrachiata (L) merr leaves and bark of the plant is still used by the rural people for medication. The aim of the work is to evaluate, presence of Phyto constituents, antibacterial, antifungal, anthelmintic, and anticancer activities of the leaves of the Caralliabrachiata (L) merr. The presence of phyto constituents were screened using standard experimental protocol. The antibacterial activity was carried out by Agar disc diffusion method, the Antifungal activity was done by the well diffusion method, the anthelmintic activity was carried against Indian earthworms Pheretima posthuma, and the anti cancer activity was carried out by Sulforhodamine B method. The following phyto constituents such as Alkaloids, terpenoids, Saponins, Carbohydrates, Reducing Sugars, Flavanoids, Coumarines, Tannins, Steroids and proteins are present in the different extracts of C.brachiata (L) merr plant. The ethyl acetate extract exhibited remarkable zone of inhibition against gram positive and gram negative bacterial strains. The ethanol extract exhibited potent antifungal and anthelmintic activities, the anticancer activity of the ethyl acetate extract of the caralliabrachiata (Lour) merr, was performed using Sulforhodamine B method. The ethyl acetate and the ethanol extracts exhibited considerable zone of inhibition against the bacterial strains A. tumefaciens (12 ± 0.4) as compared with the standard chloramphenicol (17 ± 0.01). The ethanol extract exhibited moderate zone of inhibition against Aspergillus flavus and Curvularia sp (7 ± 1.0 and 17.3 ± 0.88) as compared with the standard Fluconazole (10.6 ± 1.15 and 25.3 ± 1.45). Ethanol extract exhibited potent anthelmintic activity.

Keywords: Rhizophoreaceae, Agar disc diffusion, Pheretima posthuma, Breast cancer cell line, Sulforhodamine B assay.

INTRODUCTION

Plants are the essential component of the universe. The plants have been considered as an important source of medicine. In current scenario WHO estimated that 80% of the people from all over the world are interested towards traditional medicine. Medicinal plants are commonly known as the people's friend, providing the food, fuel and medicine. Medicinal plant resources are the major sources of Indian traditional and modern medicine.^{1,2}

The primary and secondary metabolites are being successfully used for the management of variety of diseases. The secondary metabolites like alkaloids, steroids, tannins, resins, phenols and flavanoids are undergoing the beneficiary physiological action on the body. C.brachiata, it belongs to the family of Rhizophoreaceae. It is a large tree grows up to 1300 m height. It usually grows throughout India. The fruits and seeds are edible. The plant leaves are used in the treatment

of sapraemia.³ The bark is traditionally used for treating 'itch, oral ulcer, inflammation of throat and stomatitis', anti-inflammatory, wound healing¹¹ and as an antimicrobials.¹²

MATERIALS AND METHODS

Collection of plant material

The plant C.brachiata, was collected from the region of Hosanagara (T), Shimoga (D), Karnataka. It was identified by the expert taxonomist. The voucher specimen is (KU/ SSC- 58/2017) deposited in the Department of Biotechnology, Sahyadri Science College, Shivamogga.

Extract preparation

The leaves of the plant were a shade dried and coarsely powdered, air dried and the powdered plant material was extracted with petroleum ether, ethyl acetate and ethanol successively in soxhlet apparatus and then the extract was filtered,

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AN EFFICIENT THREE COMPONENT ONE-POT SYNTHESIS OF 1,2,3,4-TETRAHYDRO-4-OXO-6-(5-SUBSTITUTED 2-PHENYL-1H-INDOL-3-YL)-2-THIOXOPYRIMIDINE-5-CARBONITRILE AS ANTIMICROBIAL AND ANTITUBERCULAR AGENTS

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ABSTRACT

Objective: The objective of the study was to synthesize of 1,2,3,4-tetrahydro-4-oxo-6-(5-substituted 2-phenyl-1H-indol-3-yl)-2-thioxopyrimidine-5-carbonitrile derivatives (1a-c).

Methods: The structures of all these unknown compounds have been confirmed with the help of physical and spectral techniques such as IR, ¹H, and ¹³C NMR and mass spectral data and these newly synthesized compounds were evaluated for *in-vitro* antimicrobial and antitubercular activities.

Results: Screening studies have demonstrated that the newly synthesized compound 4a exhibited promising antimicrobial and antitubercular properties.

Conclusion: The final results revealed that compound 4a exhibited promising antimicrobial and antitubercular properties when compared to the standard drugs.

Keywords: Indole, Thioxopyrimidine, Antimicrobial, Antitubercular activities.

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INTRODUCTION

Heterocyclic compounds have been proved to be the most useful ones due to their possible practical applications. Heterocyclic compounds exhibits wide range of biological activities such as antibacterial and antifungal activities [1-6]. One-pot multi-component organic reactions (MCOs) are important and attractive due to the formation of multi-bonds in one pot, high atom economy, mild and simplified conditions, facile execution, and generation of complex product from a single operation process to available starting materials. MCOs are now being tuned for synthesizing various heterocyclic compounds due to their diverse biological activities [7,8].

The indole derivative has been reported to possess a wide variety of biological activities, namely, anti-inflammatory [9,10], anticonvulsant [11], cardiovascular [12], antibacterial [13], cyclooxygenase-2 inhibitor [14], and antiviral [15]. The significant contribution of many derivatives of indole in the development of medicinal chemistry is well recognized. Serotonin, known for its vasoconstrictor principle [16], plays a vital role as a neurotransmitter and in psychosis. Pyridine is used as a pioneer for pharmaceuticals, agrochemicals, and it is used as organic solvent and reagent. It plays a key role in mobilize both chemical and biological systems. Compounds containing fused pyrimidine ring has attracted much attention of researcher due to their wide range of biological activities, particularly in cancer and virus research [16]. Furthermore, substituted pyrimidine at position-2 or -4 with an amino group is known as pharmacophores in several structure-based drug design approaches in medicinal chemistry [17].

In addition to this, various analogs of pyrimidines have been found to possess antibacterial [18], antifungal [19], antileishmanial [20], anti-inflammatory [21], and analgesic [22] activities. Many thienopyrimidines are found to exhibit a variety of biological activities, including anti-inflammatory [23], antimicrobial [24], and analgesic [25]

properties. In view of the above observations and in continuation of our research work on the synthesis of biologically active molecules [26-33]. In the present investigation, we planned to synthesize of indole and pyrimidine nucleus embedded in one frame (indolyl-pyrimidine) to get a more potent molecule and testing for anti-microbial and anti-cancer activities.

METHODS

All the reagents were obtained commercially and used by further purification using standard procedures. Melting points were determined by an open capillary method and are uncorrected. Purity of the compounds was checked by thin-layer chromatography (TLC) using silica gel-G coated Al plates (Merck) and spots were visualized by exposing the dry plates in iodine vapors. The IR (KBr pellet) spectra were recorded on a Perkin-Elmer (Spectrum ONE) Fourier-transform Infrared (FT-IR) Spectrometer. The ¹H and ¹³C NMR (dimethyl sulfoxide (DMSO)-d₆) spectra were recorded with a BRUKER NMR 500 and 125 MHz spectrometers, and the chemical shift values are expressed in ppm (δ scale) using tetramethylsilane as an internal standard. The mass spectral measurements were carried out by electron impact method on JEOL GC mate spectrometer at 70 eV. Elemental analyses were performed on flash EA 1112 series elemental analyzer.

General procedure for the synthesis of [5-Substituted 2-phenyl-1H-Indol-3-carboxaldehydes 1a-c] was prepared by the following literature method [34].

General procedure for the synthesis of 1,2,3,4-tetrahydro-4-oxo-6-(5-substituted 2-phenyl-1H-indol-3-yl)-2-thioxopyrimidine-5-carbonitrile (4a-c): Appropriate mixture of 5-substituted 2-phenyl indole-3-carboxaldehydes (1a-c) (0.01 mole), ethyl cyanoacetate 2 (0.01 mole), and thiourea 3 (0.01 mole) in ethanol (25 mL) containing and potassium carbonate (0.01 mole) was taken in round bottom flask, refluxed in water bath for 7-8 h. The reaction completion of was monitored by TLC


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Third Grade Fluid Flow in a Microchannel Crammed with Permeable Media Liable to Non-linear Thermal Radiation

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Abstract: This work unveils the impact of third-grade fluid flowing in microchannel placed vertically and packed by porous media. Walls facilitate injection/suction of concerned fluid. Slip and convective situations are employed. Active action of non-linear radiation and heat source are contemplated. Pressure gradient is the aspect that's responsible for the flow. The equations modeled consider the contribution of buoyancy forces on geometry with viscous dissipation. The outcomes of the customized equations for the above-narrated flow are assessed by the tactic of reducing the dimensions of equations to one. Owing to the flow and heat transport, entropy and Bejan number are effectually learned with the aid of the Runge Kutta Fehlberg method using graphical manifestation. The consequence of this scrutiny upholds that the rise of third-grade fluid parameter depletes the flow profile. Radiation parameter plummets temperature and entropy produced. The heat source parameter effect is reflected on thermal profile by boosting temperature.

Nomenclature:

a = distance between the plates (m);

A = pressure gradient parameter;

Bi = Biot number;

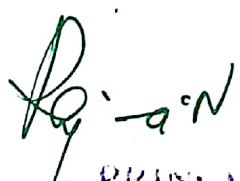
C_p = specific heat ($Jkg^{-1}K^{-1}$);

Ec = Eckert number;

E_g = characteristic entropy generation rate (JK^{-1});

g = gravitational acceleration (ms^{-2});


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Compressed Flow of Hybridized Nanofluid Entwined Between Two Rotating Plates Exposed to Radiation

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The existing work unveils the mixed convection squeezed flow of MHD hybridized nanofluid amid two plates of the channel that is rotating vertically depending upon time. The fluid is sucked/injected through the channel extremes. The hybrid nanofluid anticipated here is composed of Graphene oxide and Molybdenum disulphide with the hybrid base fluid comprised of water and ethylene glycol. The scrutiny is carried out in the presence of thermal radiation and heat source. The acquired equations are numerically computed with the aid of Runge Kutta Fehlberg 4-5th order method. The entropy behavior and Bejan number are examined utilizing graphs. The novelty of the work lies in perceiving which shape of nanoparticle has better tendency in escalating the heat transport and whip up the efficiency of the channel. The flow repercussion so obtained are emphasized for both hybrid and nano phase. On enlarging squeezing parameter, velocity escalates whereas for large values of rotating parameter velocity diminishes. The temperature is highest for blade structured and least for brick shaped nanoparticles. Heat generation/absorption parameter plays a crucial role in controlling the heating and cooling process. Higher value of this parameter augments the thermal profile. Bejan number is least for blade structured nanoparticles.

KEYWORDS: Squeezing Flow, Rotating Channel, Hybrid Nanofluid, Heat Source, Thermal Radiation.

1. INTRODUCTION

Biggest advancement in the ground of transfer of heat enhancement is the flow of nanofluid. The pitfall of low thermal capability of base fluid has given an idea of adding nano-sized particles to base fluid which enables them to be thermally potential. Two or more nano range particles in the fluid are of high potential and efficient in heat transfer enrichment. Rudraswamy et al.¹ gave away the outcomes for consequence of chemical reaction upon stagnation-point flow over a stretchable sheet placed in an inclined position. Bahiraei and Heshmatian² have given a note on characteristics of second law analyzed for hybrid nanofluid flow. They have shown that heat sinks can be cooled by enhancing velocity. Xu and Sun³ have considered the model of hybrid nanofluid flow in a microchannel. Sindhu and Gireesha⁴ have studied convective flow of hybridized

nanofluid through microchannel by considering nonlinear heat flux. They have established that the velocity satisfies $U_{(C_{10}, T_{(0)}, \theta_{(0)})} > U_{(C_{10}, T_{(1)}, \theta_{(1)})} > U_{(C_{10}, T_{(2)}, \theta_{(2)})}$. Ghadikolaei and Gholinia⁵ have conducted a study on influence of H_2 bond on hybrid nanofluid. They have unveiled that a strong hydrogen bonding magnifies the thermal profile. Kumar et al.⁶ have given an approach towards enhanced transfer of heat in hybridized ferro-magnetic nanofluid flow. They have shown that radiation parameter influences heat transfer enrichment.

The fluid is known to squeeze or compress when two plates are brought close to each other. Many studies are done on the squeezed flow significantly. Munawar et al.⁷ studied the compressing flow in a lower stretching porous channel. Freidoonimehr et al.⁸ analytically investigated the 3D squeezed flow of nanofluid in channel. Mahanthesh et al.⁹ characterized the 3D squeezed nanofluid flow entwined in a channel that rotates. Ghadikolaei et al.¹⁰ studied squeezing flow of C_{60} -CNTs in channel whose plates are stretchable. They have found the oscillating nature of the velocity field, due to the variations in the rotating parameter. Abdullah et al.¹¹ have conducted a

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Biotechnological Communication

Germicidal Properties of Biosynthesised Gold Nanoparticles from *Streptomyces* sp. PRO 15

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ABSTRACT

Nanotechnology involves the utilization and creation of nanomaterials that range up to 1 to 100 nm in size. The synthesis of nanoparticles using biological roots involves the usage of bacteria, fungi, actinomycetes, algae, enzymes, and plants. These synthesized nanoparticles show various activities which are of medical importance (i.e., Antimicrobial, Anticancer, Antioxidant, etc.). In the present investigation, the synthesis, characterization, and application of Gold Nanoparticles (Bio-GNPs) *Streptomyces* sp. PRO-15 was reported. The Cell-free extract of *Streptomyces* isolate was used as the reducing agent for facile, cost-effective, and eco-friendly synthesis of GNPs. The synthesis of gold nanoparticles was carried out by treating 1mM Gold chloride (HAuCl₄) solution with the Cell-free extract of *Streptomyces* isolate. Using UV-visible spectroscopy, the formation of GNPs was confirmed by measuring the peak ranging between 400-700 nm. The synthesized GNPs showed a sharp peak at 520 nm. The involvement of biomolecule in the stabilization of nanoparticles was confirmed with Fourier transform infrared spectroscopy (FTIR). The size of GNPs present in the colloidal solution was determined using Dynamic light scattering (DLS), with an average size ranging from 24.97nm. The Zeta potential of GNPs was noted to be -23.2 mV. The shape of the nanoparticles was determined using Scanning Electron Microscope (SEM). The germicidal activity of the synthesized gold nanoparticles was tested against pathogens like *Bacillus cereus* NCIM 2217, *Enterococcus faecalis* NCIM 5253, *Vibrio cholerae* MTCC 2906, *Salmonella typhi* NCIM 2501, and *Candida albicans* NCIM 3628, *Cryptococcus neoformans* NCIM 3541, and consequently, it may be used as a potential germicide in the treatment of the infection caused by germs.

KEY WORDS: ACTINOMYCETES, BIOSYNTHESIS, BIO-GOLD NANOPARTICLES (BIO GNPS), GERMICIDAL ACTIVITY.

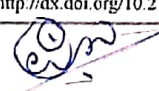
INTRODUCTION

Nanotechnology is a field of science that is rapidly growing in current scientific research, which involves the production and usage of nanoscale materials for different purposes of human life, like energy storage, cosmetics, clothes, optical devices, bactericidal, biological labeling, biosensors, and treatment of cancer. The term nanotechnology was first used in 1974 by Norio Taniguchi of Tokyo Science University (Vadlapudi and Kaladhar 2014; Hasan 2015). Nanoparticles are materials with sizes ranging from 1 to 100nm (Hasan 2015). Nanoparticles have distinctive chemical and physical properties, and the nanoscale (1-100 nm) plays a crucial

role in various aspects of pharmaceutical, medicine, and environmental technologies. Different physical and chemical methods are employed for the synthesis of nanoparticles with a particular size, shape (Natesan et al. 2020).

Physical method yields product with the complication of consuming high energy and generation of heat, chemical methods use the toxic chemical releasing hazardous chemicals as bi-products and are expensive (Babu et al. 2009; Natesan et al. 2020). To overcome this biological method of synthesizing nanoparticles provides a decent solution, which involves using microorganisms like bacteria, fungi, actinomycetes, enzymes, amino acids, and plants. The nanoparticles synthesized using biological roots are eco-friendly and cost-effective (Keshavamurthy and Rai 2021).

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DISTRIBUTION OF BLOOD GROUPS AND HAEMOGLOBIN PERCENTAGE AMONG THE STUDENTS OF GOVERNMENT SCIENCE COLLEGE, CHITRADURGA, KARNATAKA, INDIA

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author DSG designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NKL and RI managed the analyses of the study. Authors RK managed the literature searches. All authors read and approved the final manuscript.

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Original Research Article

ABSTRACT

Blood is the fluid with haemoglobin that circulates in the body to transports oxygen, carbon dioxide, nutrients and other products of metabolism. It is involved in the thermoregulation and distributes hormones along with other agents that are necessary for homeostasis. Determination of blood group is important as ABO and Rh blood grouping system is utmost important from human health. Nearly 25 types of blood groups are determined at present. Incompatibility between donor and recipient and pregnant women with her embryo may pose difficulties. Anaemia is a condition with low haemoglobin (Hb) in human blood (Hb less than 130 g/L) due to malnutrition which is high in rural and backward areas. Study was conducted on college students of age group 18yr to 21 to observe the distribution of blood groups and haemoglobin percentage level because the Chitradurga district is considered as backward area. Results of investigation revealed order of blood group as O>A>B>AB with high Rh+ factor and average haemoglobin percentage of 13.4g/dl in males and 11.68g/dl in females of selected age group.

Keywords: Blood; ABO groups; Rhesus factor; Haemoglobin; Chitradurga.

1. INTRODUCTION

ABO blood groups were discovered by Landsteiner in 1901 [1]. This ABO blood grouping of humans is the

oldest and most popular clinical parameter considered for transfusion after the discovery of Rhesus factor [2]. Blood group system of human is based on the surface antigens of erythrocytes. From physiological

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Determining the Morphometric Traits of *Apis dorsata* Worker Bees of Jogimatti Forest and Chitradurga, Karnataka, India

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DOI: 10.9734/bpi/nvbs/v5/2749E

ABSTRACT

Main objective of the present study was to collect morphometric data of honey bee particularly *Apis dorsata* worker present in Chitradurga and nearby Jogimatti forest. As a result, after collecting worker bees from two different areas in the Chitradurga District in central Karnataka, selected morphological traits of *A. dorsata* worker bees were examined. In the collected samples, 13 phenotypic characteristics were measured. The antenna, tongue, forewing, hindwing, foreleg, midleg, and hindleg lengths varied significantly between workers bees [P 0.05]. However, there was no significant variation in remaining morphological traits [P > 0.05]. Observations found a strong link between various morphological traits and the location of *A. dorsata* worker bees collected from the research locations, suggesting that morphometric differences may be used to discriminate intraspecific honeybee colonies. Morphometry, a simple and fundamental taxonomic method, offers the foundation for understanding honeybee biodiversity.

Keywords: *Apis dorsata*; worker bees; morphometry; Jogimatti; Chitradurga.

1. INTRODUCTION

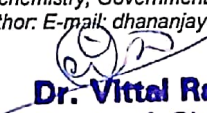
Honeybees are known for their eusocial nature with overlapping generations, cooperative brood care, and reproductive castes [1-3] along with pollinating vectors of various plants of the world [4-8] which are necessary for ecosystem functioning with their products of economic importance to humans. Nearly 20,000 bees are known, which originated in tropical regions long ago and have a cosmopolitan distribution [9-11] and are widely observed and studied [12,13]. At the moment, *A. florea*, *A. dorsata*, *A. cerana*, and *A. mellifera* are well known, with *A. dorsata* being the least studied. *A. dorsata* has a heavy body and builds a single, open-air comb or nest [measuring in metres] in trees, big rocks, and big buildings. They are known for their aggressiveness [14-16], nocturnal foraging behaviour [17,18], and are found in solitary nests or groups of several nests rarely exceeding 50 nests. *A. dorsata* being one of the major pollinator contributes heavily in pollinating most of the tropical plants and other crops and holds major share of honey produced in Nepal, India and other south-east Asian countries [19-22]. Morphometric characterization is the process of describing an organism based on phenotypic observation [23] which is an effective tool in taxonomy to identify, draw and establish relation or variation with others [24,25]. Morphological identification now became accurate and reproducible under the support of new techniques [26]. Basic morphometry focuses on lengths, angles, and areas of selected morphological structures and Ruttner [27] used traditional morphometry to distinguish bees taking more than 30 characters including colour, nature of wing, hair, size of the head, mandible and basitarsus. In honey bee taxonomy, morphological characteristics as well as sizes of cells are important and can be distinct. Bees can be differentiated by cubital index and by measuring the width of ten continuous cells [28,29]. This type of detailed studies and reports of *A. dorsata* are limited in

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A STUDY ON BUTTERFLY BIODIVERSITY OF JOGIMATTI FOREST, CHITRADURGA, KARNATAKA-INDIA

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author SGD designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author KR managed the analyses of the study. Author KLN managed the literature searches. All authors read and approved the final manuscript.

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Original Research Article

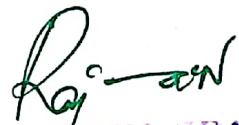
ABSTRACT

A pilot study was carried out to know the biodiversity of butterflies in the Jogimatti Forest of Chitradurga district, Karnataka, India during 2018. Butterflies from their aesthetic appeal, they are good pollinators, highly sensitive to any environmental fluctuation and they act as good bio-indicators of the health of their habitat. The survey revealed presence of 39 species of butterflies belong to 5 different families, dominated by Nymphalidae (44%), Pieridae (28%), Lycaenidae (13%) Papilionidae (10%) and Hesperidae (5%) With respect to species number and total 430 Nymphalidae (136) and Pieridae (178) butterflies are more. Present findings revealed Common mormon, Common emigrant, Plain tiger, Common cerulean and Indian cupid are the dominant butterfly species from their respective families. These results suggests that Jogimatti forest of Chitradurga district has a favourable environmental condition that accommodates butterfly diversity.

Keywords: Butterfly; biodiversity; indicator; floral species; scrub jungle.

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COMPARATIVE BIO-EFFICACY OF INSECTICIDES AGAINST SHOT-HOLE BORER, *XYLOSANDRUS COMPACTUS* EICHHOFF (COLEOPTERA : SCOLYTIDAE) INFESTING ROBUSTA COFFEE

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ABSTRACT : The Shot-hole borer (SHB), *Xylosandrus compactus* Eichhoff (Coleoptera: Scolytidae) is one of the serious pests of coffee with a higher infestation in robusta coffee than arabica. This study includes both laboratory and field experiments to assess the efficacy of five different insecticides for the control of SHB. In the laboratory, insecticides were evaluated at two different doses and the insecticide concentrations that generated the highest mortality percentage were subsequently tested in the field. Such, insecticides were sprayed on the SHB infested twigs in the field and the efficacy was assessed by percentage mortality on insect stages. The highest percent adult mortality at tunnel entry hole (92 %) was recorded for Chlorpyrifos 20 EC @ 3 ml/l and Chlorpyrifos 50 EC + Cypermethrin 5 EC @ 1.2 ml/l followed by Emamectin benzoate 5 SG @ 0.4 g/l (71%), Thiacloprid 21.7 SC @ 1 ml/l (70%) and Imidacloprid 17.8 SL @ 1 ml/l (64%). The study revealed that Chlorpyrifos 20 EC and Chlorpyrifos 50 EC + Cypermethrin 5 EC combination insecticides were effective in killing SHB adults at the entrance hole and these insecticides could be integrated as an IPM component in the management of SHB in the young robusta coffee plantations.

Key words : Bio-efficacy, coffee, insecticides, robusta, shot-hole borer.

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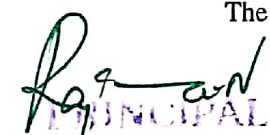
INTRODUCTION

Coffee is an important source of foreign exchange in India, as well as a prime agricultural commodity that employs millions of people engaged in its cultivation, processing and distribution. Pests and diseases, unseasonal rains and natural calamities are often a major limitation in generating increased yields, despite good productivity and quality. Among several pests recorded in coffee, Shot-hole borer (SHB), *Xylosandrus compactus* Eichhoff (Coleoptera: Scolytidae) is one of the economically important pests of robusta coffee in India. The SHB is believed to be native to tropical and subtropical Southeast Asia. This species is extremely polyphagous, invading over 225 agricultural and forest hosts, including coffee and a variety of ornamental plants (Vannini *et al.*, 2017 and CABI, 2020). Climatic factors, the presence of alternate hosts, and the lack of natural enemies favour the survival and development of SHB in the field (Egonyu *et al.*, 2017).

The female beetle makes a characteristic entry hole on fresh and succulent twigs and makes tunnels to establish its colony. Progenies feed only on ambrosial fungus that grows on the tunnel walls (Batra, 1985). As a result, the damage is caused by both the physical excavation and the inoculation of pathogens into the host plants (Hara and Beardsley, 1979). Females usually remain in tunnel entrance for most of the time and exhibit parental care to their progenies. After complete development, a new generation of adults emerges through the tunnel and infest succulent twigs. The SHB prevalence is normally low in the dry period, but it can be severe under thick shade as humidity favours the establishment of ambrosia fungus. The twigs with such tunnels dry out resulting in the loss of bearing wood, whereas, on thicker vertical twigs, even extensive infestations do not necessarily kill the branch (Anonymous, 2014).

The Scolytinae pests are often difficult to manage


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SEASONAL INCIDENCE OF RICE LEAF FOLDER, *CNAPHALOCROCIS MEDINALIS* (GUENEE) IN SHIVAMOGGA REGION, KARNATAKA

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ABSTRACT: A field experiment was conducted on the incidence of rice leaf folder; *Cnaphalocrocis medinalis* (Guenee) on rice variety JGL-1798 in Purle, Shivamogga. The leaf folder incidence was initiated from 32nd standard meteorological week (12.1%) during Kharif 2018 and reached to its peak level at 37th SMV (18.1%). Abiotic factors such as maximum temperature ($r=0.196$), minimum temperature ($r=0.54$), had non significant positive influence on leaf folder damage, whereas rainfall ($r=-0.209$) and morning ($r=-0.057$), evening ($r=-0.157$) relative humidity had negative non significant influence on leaf folder damage.

Key words: Weather parameters, *kharif*, JGL-1798, *Cnaphalocrocis medinalis*.

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INTRODUCTION

Rice (*Oryza sativa* L.) is the world's most important food crop and is the staple food for 50% of the global population (Barrion *et al*, 2007). Rice is grown under diverse growing conditions such as irrigated, rainfed low land, rainfed upland and flood prone ecosystem. The rice crop is subjected to attack by more than 100 insects, out of which about 20 species cause economic damage (Pathak and Dhaliwal, 1981). Among 20 major pests attacking rice, the leaf folder, *Cnaphalocrocis medinalis* (Guenee) alone contributed to 50% yield loss under severe infestation (Balasubramanian *et al*, 1973). Leaf folder are widely distributed in the rice growing tracts of 29 humid tropical and temperate countries in Asia, Oceania, Australia and Africa between 48°N, 24°S and 0°E to 172°W (Pathak and Khan, 1994). *Cnaphalocrocis medinalis* considered earlier as a pest of minor importance have increased in abundance in late 1980's and have become a major pests in many parts of the world (Ahmed *et al*, 2010). Leaf folder has been reported to attain the major pest status in some important paddy growing areas of India (Maragesan *et al*, 1987). Second instar larvae of leaf folder folds the leaves longitudinally and fasten leaf margins with stitches of threadlike silk, the larvae feed by scraping the green mesophyll from within the folded leaves, this results in linear pale white stipe damage to

the leaf, feeding greatly reduces the general vigor and photosynthetic ability of an rice plant (Pathak and Khan, 1994). The present investigation is proposed to observe the incidence of leaf folder in the rice ecosystem.

MATERIALS AND METHODS

The experiment was conducted in Purle, Shivamogga during *Kharif* season 2018 in order to monitor the incidence of leaf folder damage on rice variety JGL-1798, for this purpose field preparation was done and all post sowing recommended agronomical practices were followed. However, experimental field was kept free from insecticidal spray throughout the crop season in order to record the incidence of rice leaf folder.

The observations on the leaf folder incidence were made at weekly intervals till harvesting from five randomly selected spots consisting of ten hills. The observations were taken by counting the number of damaged leaves and total number of healthy leaves from randomly selected hills. The data so collected with reference to rice leaf folder damage was converted in to percent leaf folder using formula.

To study the occurrence of rice leaf folder in relation to weather parameters *viz.*, maximum temperature, minimum temperature, morning and evening relative humidity and rainfall were recorded during the course of investigation in their particular location


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COMPARATIVE PHENOLOGICAL STUDIES OF THE GENUS *RHYNCHOSIA LOUREIRO* AND *STYLOSANTHES* SW. IN HOSADURGA AND HOLALKERE THALUKS OF CHITRADURGA DISTRICT, KARNATAKA

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ABSTRACT

The Genus *Rhynchosia loureiro* and *Stylosanthes* Sw. are described in detail in the two thaluk of the Chitradurga district, Holalkere and Hosadurga, in terms of distribution, natural habitat, habit, and comparative phenology. From 2018 through 2020, phenological research were conducted, with data being recorded and thoroughly analysed. In the research area, the author has described all phenological aspects such as vegetative and reproductive phenophases on *Rhynchosia capitata* (Roth) DC., *Rhynchosia minima* (L.) DC. Var. *minima*, *Stylosanthes fruticosa* (Ratz.) Alst., and *Stylosanthes hamata* (L.) Taub.

Keywords: *Rhynchosia*, *Stylosanthes*, phenology, Hosadurga, Holalkere.

1. INTRODUCTION

Modern phenology is the study of the timing of recurring biological events in the world, the causes of their timing with regard to biotic and abiotic forces, the interrelation among phases of the same or different species [1]. Linnaeus (1751) gave first annual plant calendar of vegetative and reproductive phenology in his 'Philosophia Botanica'. Phenological changes such as early spring leaf unfolding, altered migration timing and changes in flowering onset and duration represent a major mode of ecological response to climate change [2]. The study of plant phenology provides knowledge about the patterns of the plant growth and development as well as the effect of the environment and selective pressures on flowering and fruiting behaviours [3].

Papilionaceae or Fabaceae, the largest family of the three families of the order Leguminales includes about 100 genera and 1083 species [4] in India. However, Sanjappa [5] estimated that there are about 1152 species under 179 genera in India. The legume family is a source of products and services from tropical timber to atmospheric nitrogen fixation. *Rhynchosia Loureiro* belongs to tribe Phaseoleae, subtribe Cajaninae in the Leguminosae. *Rhynchosia Loure*, a genus with approximately 230 species [6], *Stylosanthes* is an important genus with more than 80 species have been

described by IPNI in 2014 nine species of them are found economically important among them *S. fruticosa* and *S. hamata* are also considered as important [7].

2. MATERIAL AND METHODS

Hosadurga thaluk covers approximately 1450 square kilometres and is located between 13° 47' 52"N latitude and 76° 17' 4" E longitudes, while Holalkere thaluk covers approximately 1100 square kilometres and is located between 14° 03' 1.46"N latitude and 76° 10' 52.70" E longitudes. The forests range from dry deciduous to scrub, with an undulating chain of hills covered in red sand, deep black, and red loamy soils (Holalkere). Temperatures range from 15 to 37 degrees Celsius, with an average annual rainfall of 744 mm. In Hosadurga and Holalkere, the average rainfall is 602.8 mm and 463.4 mm, respectively. During the monsoon, the relative humidity is high, ranging from 70 to 75 percent [8].

The study area is periodically examined in all the seasons of a year for phenological assessment, which covers forest areas, aquatic places, waste lands, cultivated field and different plantations. Specifically, leafing, flowering and fruiting. Apart from this, leaf fall is also monitored and recorded carefully in month wise different phenophase. The plant specimens have been identified using state,

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RESEARCH ARTICLE

Studies on the phenology of some terrestrial orchids of Western Ghats, India

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ABSTRACT

The present paper describes the distribution, natural habitat and phenology of some terrestrial orchids in Shimoga district, Karnataka. The phenophases viz., leafing, flowering, fruiting, fruit dehiscence are observed for 25 orchid taxa belonging to 13 genera in Shimoga district. They are *Dienia ophrydis* (J. Koenig) Seidenf., *Disperis zeylanica* Trimen., *Epipogium roseum* (D. Don) Lindl., *Eulophia spectabilis* (Dennst.) Suresh., *Geodorum densiflorum* (Lam.) Schltr., *Habenaria crinifera* Lindl., *Habenaria elwesii* Hook f., *Habenaria furcifera* Lindl., *Habenaria grandifloriformis* Blatt. & Mc Cann., *Habenaria heymana* Lindl., *Habenaria longicorniculata* J. Graham., *Habenaria multicaudata* Sedgw., *Habenaria plantaginea* Lindl., *Liparis deflexa* Hook. f., *Liparis odorata* (Willd.) Lindl., *Malaxis versicolor* (Lindl.) Abeyw., *Nervilia concolor* (Blume) Schltr., *Nervilia crociformis* (Zoll. & Moritz) Seidenf., *Nervilia infundibulifolia* Blatt. & Mc Cann., *Nervilia plicata* (Andrews) Schltr., *Pecteilis gigantea* (Sm.) Raf., *Peristylus plantagineus* (Lindl.), *Peristylus spiralis* A. Rich., *Satyrium nepalense* D. Don, *Zeuxine longilabris* (Lindl.) Trimen. Phenology is the timing of plant life cycle events. Regular field visits were carried to observe the different life events. Most of the terrestrial orchids complete their life cycle in April to September or October month. The present research gives additional phenological aspects of terrestrial orchids in Shimoga district. Vegetative phenology is important to understand the ecology and instinct history of a plant species and may help to develop the conservation strategies of endangered species.

Introduction

The Orchidaceae is one of the largest families of flowering plants represented by 25000-35000 species distributed in 600-800 genera in the world (1). In India, Orchidaceae is represented by about 152 genera and 1300 species (2), in which 84 species in 30 genera are endemic to Western Ghats (3). Family Orchidaceae in the state of Karnataka is represented by 203 species belonging to 59 genera, of which 17 species are terrestrial orchids in Shimoga district (4). The Biodiversity rich Western Ghats represents 300 species out of which 84 species under 30 genera are endemic and 15 species are endangered (5).

The orchid plants show the wide distribution in varied, climatic, edaphic, topographical situations and proved their successful adaptability. Orchids are attracting the plant explorers and taxonomic workers in Karnataka (6-9). Observations were also on 15 terrestrial orchids in Shimoga district (10).

Orchids are mainly categorized into two types terrestrial and epiphytic forms, terrestrial orchids grow on the ground while epiphytic ones grow on tree

trunks or other substratum. Usually almost all orchids are associated with endophytic symbiotic fungus mainly in their roots. The terrestrial forms include those which inhabit the forest floor that is they grow under the shady environment. Terrestrial orchid are found to grow in various forest types such as scrub jungles, dry deciduous forests, moist deciduous forests, semi-evergreen as well as in evergreen forests. Orchids are distributed from sea level 1500 m altitudes with rainfall ranging from 60-300 cm. The maximum numbers of terrestrial orchids are found in evergreen and semi-evergreen forests of the Western Ghats.

Plant phenology is the timing of major events in the life history of the plant with reference to seasons (11, 12). The phenology study deals not only the vegetative and reproductive phase corresponding to the climate and seasonal changes of a particular area but also determines the degree of reproductive synchrony with other plant species (10, 13). The phenology is a key tool for the plant management, conservation of species, floral biology, estimation of reproductivity and regeneration (14, 17). Flowering

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CHEMICAL COMPOSITION AND ANTI-MICROBIAL ACTIVITY OF ESSENTIAL OIL FROM LEAVES OF *RAPANEA WIGHTIANA*Manasa C. R.¹, Ravi Kiran S.², Ravi Kumar B. S.³, Krishna Swamy K.*⁴¹Research Scholar, Sahyadri Science College, Kuvempu University, Shivamogga, Karnataka, India²Department of Biochemistry, Aurora's Degree and PG College, Hyderabad, Telangana, India³Department of Botany and Environmental Studies, A. V. K. College for Women, Hassan, Karnataka, India⁴Department of Botany and Seed Technology, Sahyadri Science College, Shimoga, Karnataka, India*Corresponding author: krishna_swamy_k@yahoo.co.in

ABSTRACT

The essential oil from leaves of *Rapanea wightiana* was obtained by hydrodistillation and the chemical composition was determined by GC and GC-MS. The main components identified in myrcene followed by spathulenol limonene Germacrene D and farnesol A major portion of oxygenated fraction of the oil was comprised by alcohols. Methyl eugenol, dihydrocarveol, borneol, isothujanol, isopulegol, nerolidol, spathulenol, β -bisabolol and farnesol. Subsequently the oil was evaluated for antimicrobial activity against two gram-positive and two gram-negative bacteria and four pathogenic fungi using agar disc diffusion technique. Further the minimum inhibitory concentration (MIC) was also determined. Among all the bacteria tested, *B. subtilis* was most susceptible at 100 μ g/ml with zone of inhibition of 26.3 mm. While, among all the fungal species tested, *A. niger* inhibited more effectively at 100 μ g/ml with a zone of inhibition of 23.2 mm. The results obtained suggests that the essential oil of this plant possess excellent antimicrobial properties where there is a need to explore this plant as an alternative bio-friendly natural antimicrobial agent.

Keywords: Essential oil composition, *Rapanea wightiana*, Monoterpene alcohols, Antimicrobial activity.

1. INTRODUCTION

The indiscriminate use of synthetic drugs as antibiotics, resistance has been developed by most of the microorganisms and this created number of clinical problems particularly in the treatment of infectious diseases. In the emergence of drugs resistance in human pathogenic organisms, there is a need to develop safe alternative antimicrobials for the treatment of infectious diseases. Volatile oils are much effective constituents of plants against gram positive and gram negative pathogenic bacteria like *Staphylococcus aureus*, *E. coli*, etc although the sensitivity differs with respect to exposure to various oils. Essential oils have been studied and they are known to have healing and infection-fighting properties for centuries but in recent years they have been analyzed to understand these effects. Essential oils have been traditionally employed for relief against lung infections, respiratory problems and also cold. Essential oils derived from medicinal and aromatic plants are complex mixture of natural compounds consisting volatile compounds with characteristic aroma and are being employed in various

perfumery and pharmaceutical industries. These essential oils have shown promising pharmacological effects and this attracted many researchers and scientists throughout the world to use as natural antimicrobial agents leading to the development of novel lead products for the treatment [1-3]. Various antimicrobial preparations have been developed for use as household antiseptic sprays and antimicrobial bandages [4-5].

Rapanea wightiana (*R. wightiana*) is a small tree and is widely distributed in western ghats. It grows up to 10m tall with greyish bark, lenticellate, blaze red. The young branchlets are glabrous with scars, leaves are simple, alternate, spiral, subverticillate; petiole 0.5-1 cm long, planoconvex in cross section, glabrous; lamina 4-8 x 1-2.3cm, elliptic-oblongate, apex obtuse, base attenuate, margin entire, transparent gland dotted and in lines, glabrous, coriaceous; midrib flat above; secondary nerves and tertiary nerves obscure. The plant has very good medicinal properties like it is used as an astringent and used in the treatment of respiratory problems, stomach, muscular and heart diseases. Therefore, the

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Palladium metal embedded on mesoporous graphene oxide as an efficient heterogeneous catalyst for Suzuki coupling reaction

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Abstract

A novel method for the synthesis of Graphene Oxide (GO) decorated palladium nanocomposite (Pd NC) as a highly efficient heterogeneous catalyst has been developed. The resulting GO-PdNC acts as a catalyst precursor for the Suzuki coupling reaction. The catalytic reaction was conducted by varying reaction conditions, like reaction temperature, time, solvent and the catalyst loading. The catalyst was reused for Suzuki reaction up to 5 reaction cycles. Spectral data of the catalytic product suggest that the purity, rate, yield and recycling of catalyst are more effective for the C-C coupling reaction.

Introduction

Graphene is a (2D) dimensional honeycomb lattice structure consisting of sp^2 hybridised carbon atoms. Because of its adequate structure, it exhibits many unique properties like optical, electronic and structural [1], [2], [3], [4]. Also, they exhibit high mobility of charge carrier, unique transport performance [5], having high mechanical strength [6],

Synthesis of Benzoxazole Associated Benzothiazine-4-ones and their *in vitro* and *in silico* Antimicrobial, Antioxidant Activities

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In present study, a series of 3-[(5-methyl-1,3-benzoxazol-2-yl)amino]-2-phenyl-2,3-dihydro-4H-1,3-benzothiazine-4-ones (6a-n) were synthesized and elucidated by elemental, FT-IR, ¹H & ¹³C NMR and LC-MS studies. The *in vitro* antibacterial screening against Gram-positive bacterial strains such as *B. subtilis*, *S. aureus*, *S. epidermidis* and Gram-negative bacteria such as *E. coli*, *P. aeruginosa* was carried in comparison with tetracycline as reference standard. Antifungal activities against different fungal strains namely *R. oryzae*, *A. niger*, *A. flavus*, *C. albicans* and *S. cerevisiae* have been evaluated by comparing with fluconazole as reference standard. Compounds 6b, 6c, 6d, 6e, 6f, 6g and 6h emerged as highly potent antimicrobial agents. The DPPH radical scavenging assay of the synthesized moieties showed good antioxidant potency comparable to standard ascorbic acid. The molecular docking simulation studies of all the title compounds in their active conformation analogues with target proteins (PDB ID 2XCT-antibacterial, PDB ID 1TYL-antifungal, PDB ID 2HCK-antioxidant) exhibited good binding interactions in top scoring poses. The pharmacokinetic properties prediction by ADMET descriptors and Lipinski's rule of five endorse the properties of newly synthesized compounds to a drug molecule. The results of the docking protocols were compatible with the *in vitro* studies which validates the potency of the molecules.

Keywords: Benzoxazole, Benzothiazine, Antimicrobial activity, Antioxidant activity, Molecular docking.

INTRODUCTION

The dramatic ascendance of the infections caused by microbes resistant to various drugs in the former few decades has turned into a deliberate health complication. Particularly, the advent of multiple drug resistant strains of Gram-positive bacterial pathogens like methicillin resistant *Staphylococcus aureus*, *Staphylococcus epidermidis* and also certain vancomycin resistant *Enterococcus* strains have been an everlasting challenge in the clinic [1-5]. To avert this critical problem, the elaboration of new varieties of the formerly known drug molecules is a substantive task. The organic moieties possessing benzoxazole scaffold as a core unit have significantly competent use in medicinal, bioorganic and optical fields, etc. Hence, these captivated remarkable attention of researchers for their profound bioorganic medicinal and pharmaceutical applications including the important biological activities such as antibiotic [6], antimicrobial [7-9], antiviral [10], topoisomerase

I and II inhibitor [11], multiple drug resistant cancer cell activities [12] and antioxidant activities [13]. Benzothiazines also establish a significant class of therapeutically interesting heterocyclic moiety and known for their applications as antifungal [14,15], antibacterial [16], antimicrobial [17], anticancer [18-20], cardiovascular [21] drugs, etc. Combating against microbial infections has brought about the advancement of a wide range of antibiotics, still there is an urgency to develop new antimycobacterial agents. Therefore, those antimicrobial agents have been under investigation till today.

The benzoxazole core structure was found to be active particularly against some Gram-positive bacteria by acting as a receptive ionophore [22-25] as well as the benzothiazines were also found to be good antimicrobial agents from the literature [14-17]. Herein, we planned to ally both the moieties together to accomplish new antimicrobial, antioxidant agents. In the present work, we designed and synthesized the new target compounds 3-(5-methylbenzo[d]oxazol-2-ylamino)-2,3-

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PRINCIPAL

Physica Scripta



PAPER

Entropy scrutiny of couple stress nanoliquid flow with slip and convective conditions in an upright microchannel

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Keywords: couple stress fluid, convective conditions, Bejan number, microchannel

Abstract

This article delves into the steady flow of couple stress nanoliquid by applying the magnetic field in conjunction with the resultant entropy produced in an upright microchannel which is immersed with Titanium-dioxide nano-sized particles with water being base fluid. Both the walls facilitate injection and suction of the fluid. The entropy generated and Bejan number is figured out by making use of velocity and temperature profiles. The coalesce sequel of nanoparticle volume fraction, magnetic field, linear thermal radiation and buoyancy force along with heat source/sink are taken into account. The equations governing the fluid flow are formulated under the impact of viscous dissipation and the numerical computations of the non-linear equations are made by using the shooting technique together with Runge-Kutta-Fehlberg fourth-fifth scheme. The effect of the viscous dissipation, Grashof number, Hartmann number and couple stress parameter on nanoliquid flow and thermal distributions are thrashed out and exposed graphically. The results indicate that peak values of couple stress parameter diminishes the velocity, temperature and entropy profile whereas amplifies the Bejan number. Also lower values of Hartmann number and nanoparticle volume fraction promotes the flow and higher values of heat source parameter and Peclet number exhibits augmentation in the thermal profile.

Nomenclature

A	couple stress parameter
a	distance (m)
B_0	magnetic field strength (Am^{-1})
Be	Bejan number
Bi	Biot number
Br	Brinkmann number
C_p	specific heat ($\text{Jkg}^{-1}\text{K}^{-1}$)
Ec	Eckert number
E_G	characteristic entropy generation rate (J K^{-1})
g	gravitational acceleration (m s^{-2})
Gr	Grashof number
h	convective heat transfer co-efficient ($\text{Wm}^{-2}\text{K}^{-1}$)
Ha	Hartmann number
K	mean absorption co-efficient (m^{-1});

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PAPER

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Significance of increasing Lorentz force and buoyancy force on the dynamics of water conveying SWCNT and MWCNT nanoparticles through a vertical microchannel

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Keywords: SWCNT-MWCNT/water, microchannel, Brinkman-Forchheimer model, heat source/sink, convective boundary condition

Abstract

Carbon nanotubes are used to achieve high heat transfer rates in a variety of engineering applications include thermal storage systems, electronic component cooling, high-performance building insulation, heat exchangers and drying technologies. Hence the aim of this article is to examine the addition of single walled carbon nanotubes (SWCNT) and multi-walled carbon nanotubes (MWCNT) to water in a vertical microchannel to improve heat transfer. The effects of MHD, slip, convective boundary condition and heat source/sink are incorporated. The Brinkman-Forchheimer flow model and type II hybrid nanofluid model is adopted. Converted dimensionless differential equations are solved numerically via Dsolve command with the aid of Maple. The simulation assessment is worked out by graphs. One of the main tasks of the analysis is to compare MWCNT/water and SWCNT-MWCNT/water. It is shown that the improvement of the heat source/sink parameter improves the temperature and the rate of heat transfer in MWCNT/water is higher than SWCNT-MWCNT/water. Also larger values of Lorentz force and buoyancy force decreases the drag coefficient.

Nomenclature

a	Distance
A	Pressure gradient parameter
B_0	Magnetic field strength
Bi	Biot number
Br	Brinkman number
c	Second-order empirical constant
C_f	Skin friction
C_p	Specific heat
Ec	Eckert number
f	Axial velocity
g	acceleration due to gravity
Gr	Grashof number
h_1, h_2	Convective heat transfer coefficient
k	Thermal conductivity
K_1	Porous media shape factor parameter
K_2	Second-order porous resistance parameter



PAPER

Thermal analysis through cylindrical porous fin having insulated tip: a hybrid nanomaterial approach

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Keywords: cylindrical fin, darcy law, insulated tip, hybrid nanomaterial, thermal radiation, nomenclature, variable parameter

Abstract

Two kinds of hybrid nanomaterial flow through cylindrical fin are examined under the presence of conduction, convection and radiation. Darcy law model is used to develop the heat equation. With the help of Maple, the non-dimensional thermal equation is numerically solved using the fourth and fifth order of Runge–Kutta Fehlberg. The impact of convection parameter, wet porous parameter, radiation parameter, power law index, ambient temperature and solid volume fraction are discussed through the graphs. It is found that higher values radiation parameter reduces the temperature whereas solid volume fraction enhances the temperature.

Nomenclature

b_2	Variable parameter,
C_p	specific heat,
f	radiation shape factor,
g	acceleration due to gravity,
h	heat transfer coefficient,
h_a	heat transfer coefficient at temperature T_a ,
h_D	uniform mass transfer coefficient,
i_{fg}	latent heat of evaporation,
K	permeability,
k	thermal conductivity,
k_r	thermal conductivity ratio,
$\dot{m}$	mass flow rate of the fluid,
m_0, m_1	constants,
m_2	wet porous parameter ($m_2 = m_0 + m_1$),
N_c	convection parameter,
N_r	radiation parameter,
p	power index of temperature—dependent h ,
q	heat transfer rate,
r_b	inner base radius of the fin,
r_i	outer (tip) radius of the fin,

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Photocatalytic degradation of Eriochrome black-T and Evan's blue dyes under the visible light using PVA capped and uncapped Ag doped ZnS nanoparticles

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Abstract

In this paper, ZnS, polyvinyl alcohol (PVA) capped Ag-doped ZnS (Ag:ZnS) and uncapped Ag:ZnS nanoparticles were prepared by the coprecipitation method and studied in detail their photocatalytic activity. The presence of functional groups in the synthesized particles is confirmed by FTIR spectra. Powder X-ray diffraction (XRD) indicated a cubic zinc blende structure and the particle size of ZnS is 4.14 Å, PVA-capped Ag:ZnS 3.48 Å, and uncapped Ag:ZnS 5.53 Å. The energy band gap is found to be in the range of 3.2 to 3.5 eV. The surface morphology of nanoparticles was observed and investigated by a scanning electron microscope (SEM) and EDX analysis. The photocatalytic degradation of Eriochrome black-T and Evan's blue dyes was successfully photo reduced by nanoparticles. The results indicated that these nanoparticles act as photocatalyst under the sunlight. The EBT and EB dyes were degraded more than 90 % in the presence of a capping agent (PVA). However, in the absence of PVA, 90% degradation occurs but the time of degradation becomes more. Thus, this technique can be the best technique for the safe degradation of water contaminated with textile matters.

Keywords Silver-doped zinc sulfide nanoparticles · Eriochrome black-T · Evan's blue dyes

1 Introduction

Nanoparticle researches have progressed rapidly and successfully in recent years mainly because of the unique properties of basic elements that are brought about by altering their property at an atomic and molecular level by virtue of these properties; nanoparticles have found many applications in many

fields such as medicine, cosmetics, agricultural, electronics, coatings, and plastics [1–3]. Nanoparticles provide a common platform for researchers interested in their origin and mode of reaction with substrates. Evaluation of biological activity of nanomaterials is useful to find their application towards organic chemicals as pollutants in the wastewater discharged from the industrial or domestic sources [4, 5]. The increased public concern needs to develop novel treatment methods. Much of the natural purification of the aqueous system caused by sunlight leads to the breakdown of organic molecules into simpler molecules [6, 7]. Now, the research is going on through the breakdown of larger sized toxic organic molecules into simpler size without any adverse effects on the environment and public health [8, 9].

Organic dyes are used in several industries like textiles, optoelectronic, and food and cosmetics. The exposure of organic waste effluents from the industries can greatly affect the environment and its removal is often challenging [10]. In general, chemical coagulation, precipitation, adsorption, and membrane filtration techniques are applied for dye removal, particularly from textile industries [11, 12]. Water

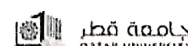
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Synthesis of reduced graphene oxide decorated with Sn/Na doped TiO₂ nanocomposite: a photocatalyst for Evans blue dye degradation

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Abstract

The major drawbacks associated with existed nanophotocatalyst are mild response, narrow spectrum range, hence speedy recombination of electrons, and holes subsequently less number of charge separation which leads to lower the overall efficiency of the catalyst. In order to overcome from this drawback, we have synthesized a nano-spherical shaped reduced graphene oxide NS-rGO (NC1) decorated with modified tin and sodium-doped titanium oxide nanocomposite NS-rGO@Sn/Na-doped-TiO₂ (NC2). The synthesized NC2 decreases the probability of recombination of electrons and holes which is the necessary requirement for any photocatalyst and is rather, more advantageous compared to the reported photocatalyst which have demerits of speedy recombination of electrons and holes. The newly synthesized NC2 is used as an efficient photocatalyst for Evans blue dye degradation. This photocatalyst exhibits significant progress on light absorption, narrow band gap, active charge collection, and separation. The photocatalytic degradation of NC2 showed high activity in a short duration of time. The geometry of the NS-rGO facilitates collection and transporting of electrons in an effective photocatalytic dye degradation process. The investigation may lead to the development of novel photocatalyst for the degradation of toxic dye which is discharged into sewage from various chemical industries.

Keywords Titanium dioxide (TiO₂) · Photocatalyst · Evans blue · Dye degradation · Tin-sodium doping

1 Introduction

Synthetic dyes are widely used in various branches of modern technology like textile industry [1], leather tanning industry [2, 3] paper production [4], food technology, agricultural research [5], light-harvesting arrays [6], photoelectrochemical cells [7], and hair color manufacturing industries [8]. The amount of dye produced in the world is estimated at around 10,000 tons per year. This huge amount of dye production causes an adverse effect on the environment and which leads

to serious health problems. Synthetic dyes showed a considerable diversification in their chemical structure. Many industries use a larger amount of chemical dyes such as azo, indigo, anthraquinone, triphenylmethyl, sulfur-containing dye, and phthalocyanine derivative dyes. In spite of its high prominence, overwhelming majority of synthetic azo dye derivatives are currently used in many industries. Notably, azoketohydrazone equilibria play a vital role in the easy breakdown of many of the azo dye systems.

Azo dyes, with one or more azo groups (–N=N–) connected to aromatic rings, is the largest, and most imperative class of synthetic organic dyes they show structural versatility and high chemical stability. As a result, they are commonly used in many applications which are estimated to be more than 50% of all the dyes in total [9]. From the textile industries, more than 15% of synthetic dyes are released directly into the streams [8]. The azo under the anaerobic conditions produce carcinogenic amines which cause therefore everlasting health concerns [10].

Evans blue is an azo dye; the two important methods developed for its degradation are (i) bioremediation technique, in which microorganisms are used for the decolorization of

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Optical and antibacterial evaluation of biofunctionalized Cu:ZnS nanoparticles

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Abstract

This article focuses on the surface stabilization of ZnS NPs doped with Cu²⁺ ions by casein with relatively different concentrations through microwave method. The surface attributes of the fabricated NPs were characterized by FTIR, XRD, TEM, HRTEM, and EDS measurement which showed the incorporation of Cu ions in doped ZnS NPs. Optical properties were studied using UV–vis and PL spectroscopy. XRD pattern showed zinc blend structure for both uncapped and capped. Absorption spectrum was an evidence for the strong confinement effect in the form of blue shift. Spherical shape with 8 nm (uncapped) and 3 nm (capped) were specified from TEM images. PL spectrum covered UV and visible regions with shift in the emission peak towards a shorter wavelength side. Biological activity of capped NPs was highly effective against various bacterial strains with enhanced luminescence property, which makes them to materialize as an innovative division of antibacterial agent.

Keywords ZnS nanoparticles · Cu doping · Casein · Photoluminescence · Antibacterial activity

1 Introduction

In the recent decades, the investigation of nanosized materials in the biological field is in advance due to their exceptional physico-chemical and optical properties [1, 2]. As the microbial agents are proving to be more resistant against the conventional drugs, it has become a challenging task for the development of a new class of drugs with efficient ability. A series of metal nanoparticles especially penny metals (Ag, Au, and Cu) have been reported as an efficient antimicrobial agent and also have been employed in health industries [3, 4]. Besides these materials, some other transition metals have emerged as alternative antimicrobial agents in different forms [5–7]. In contrast to II–IV semiconductor materials, zinc both in their O and S forms are safer in terms of toxicity, i.e., its nontoxic and

biocompatible, which makes them potential agent in the biological field [8]. Doped form of ZnO nanoparticles with transition and inner transition metals have been investigated in the biological field which proved to be an efficient antimicrobial agent [9]. A countable reports have been presented with respect to ZnS doped with d and f block elements towards the biological field [10, 11]. New inclination has been located as surface modification of nanoparticles which emerges as a new generation drug in medical field with enhanced photoluminescence property [12–21], especially the surface-modified Mn and Cu-doped ZnS nanoparticles with different modifier materialized as an alternative for the existing nanoparticles as antimicrobial agents [21, 22]. Recently, G. Stanic et al. [23] reported that Cu metals have the ability to strongly bind with different groups such as thiol, imidazole, amino, and carboxyl groups, which increases the cell permeability causing microbial cell death.

A great interest has been developed for the fabrication of surface-modified nanoparticles with biomolecules such as biotin, pepsin, casein, proteins, and biopolymers [9, 24, 25], which preserve the activity of the modified nanoparticles, and in addition, they also facilitates in pulling off better control over their size with improved luminescence property [8, 10]. Among these, biomolecules casein has gained large amount of interest in the research community for their application in food and drug system; there are merely partial studies

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Investigation on Co(II), Ni(II), Cu(II) and Zn(II) complexes derived from novel *N'*-(3-hydroxybenzoyl)thiophene-2-carbohydrazide: structural characterization, electrochemical detection of biomolecules, molecular docking and biological evaluation

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Abstract

A series of transition metal (Co(II), Ni(II), Cu(II) and Zn(II)) complexes of novel *N'*-(3-hydroxybenzoyl)thiophene-2-carbohydrazide ligand was synthesized and their structures were confirmed using ¹H, ¹³C NMR, IR, UV–visible, mass spectra, magnetic susceptibility, thermogravimetric analysis (TGA) and powder XRD techniques. The results obtained by the above mentioned techniques justified the promising bidentate coordination of the synthesized ligand and octahedral geometry was proposed to all the metal-coordinated compounds. In addition, with the help of cyclic voltammogram, the electrocatalysis ability of Co(II) HTC/GCE was examined utilizing different concentrations of dopamine (DA) and uric acid (UA). The Co(II)HTC/GCE sensor showed an excellent electrochemical performance with DA and UA at the concentration ranges 0.2 to 10 μM and 0.1 to 0.8 μM with detection limits (LOD) of 0.066 μM and 0.333 μM and sensitivities of 1.069 $\mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$ and 5.170 $\mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$ for DA and UA. Thus, the modified electrode exhibited better performance, extended shelf life, better reduplication and procreation. Further, bioefficacies of prepared ligand and its metal-coordinated compounds were examined against the bacteria (*Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, and *Bacillus subtilis*) and fungi (*Aspergillus niger* and *Candida albicans*) strains using standard procedures. Moreover, the ligand and its metal complexes were evaluated for the antioxidant and cytotoxic studies on four different strain of cells (MCF-7, HeLa, K-562, and Vero) where Co(II) and Cu(II)coordinated compounds revealed admirable cytotoxicity for MCF-7 and Hela cell lines. Lastly, molecular docking studies were performed on cancer receptors for the determination of binding mode of ligand and its transition metal complexes.

Keywords Transition metals · Spectral study · Electrochemistry · Biomolecules · Biological applications · Molecular docking · Cytotoxic

1 Introduction

In the previous two decades, the appearance and variety of hazardous diseases has expanded. This is due to the existence of drug-defiant unfeasible bacterial strains which has become very bothersome in the society. Hence in the present scenario, the necessity to develop advanced, sophisticated, and novel synthetic compounds with antimicrobial properties is considered a significant area of studies all over the globe [1]. Apart from antimicrobial infections, greater efforts have been invested by chemists and pharmacists to identify the molecules bearing anti-cancer properties. This is because cancer is considered the main source of mortality

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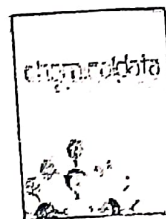
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Co-deposition of micro- and nano-sized SnO₂ particles in the Zn-matrix composite coatings produced from a Zn-sulphate bath by electroplating

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ABSTRACT

The Zn-coating and Zn-composite coatings were produced by electroplating technique. The Zn-composite coatings are generated with the co-deposition of SnO₂ microparticles and SnO₂ nanoparticles. The deposit characteristics of coated samples have been depicted by SEM photo-micrographs and contact angle study. The corrosion behavior of the prepared coated samples was evaluated by electrochemical tests such as polarization (Tafel) and electrochemical impedance spectroscopy (EIS). The bare Zn-coating shows a more negative E_{corr} value (-1.121 V vs SCE) whereas, Zn-nano SnO₂ composite coating exhibited less negative E_{corr} (-1.084 V vs SCE) compared to E_{corr} (-1.091 V vs SCE) of Zn-micro SnO₂ composite coating. Similarly, the R_p values of bare Zn-coating, Zn-micro SnO₂ composite coating and Zn-nano SnO₂ composite coating were found to be $92 \Omega \text{ cm}^2$, $907 \Omega \text{ cm}^2$, and $1919 \Omega \text{ cm}^2$, respectively. The studies revealed the increased corrosion resistance property of Zn-nano SnO₂ composite coating than Zn-micro SnO₂ composite coating.

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Specifications Table

Subject area	Physical Chemistry
Compounds	SnO ₂ micro and nanoparticles
Data category	Spectral, Electrochemical
Data acquisition format	SEM, EDAX, Tafel, EIS. Characterization of the data
Data type	Analyzed
Procedure	Description of procedure
Data accessibility	Data is with this article

1. Rationale

The steel articles were used in many engineering appliances such as automobile components, bridges, buildings, pipelines, plants etc, for various utilities. Mild steel is a most employed material in various industrial applications due to its good mechanical strength and malleability [1,2]. The major problem arises in appliances of mild steel is the rapid deterioration of surface structure of mild steel, which leads to a 'corrosion' phenomenon. Corrosion is a major issue in various industrial applications and it causes huge economic loss throughout the world [3,4]. The control of corrosion phenomenon

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Data Article

Facile TiO₂ NPs catalysed synthesis of substituted-4-Hydroxy/methoxy benzylidene derivatives as potent antioxidant and anti-tubercular agentsS.H. Sukanya^a, Talavara Venkatesh^{a,*}, Ravi Kumar S^b, Yadav D. Bodke^a^a Department of P.G. Studies and Research in Chemistry, Jnanasahyadri, Kuvempu University, Shankaraghatta, 577451, Karnataka, India^b Department of P.G. Studies and Research in Biotechnology, Jnanasahyadri, Kuvempu University, Shankaraghatta, 577451, Karnataka, India

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Knoevenagel condensation

Antioxidant activity

Anti-tubercular activity

Molecular docking study

ABSTRACT

In this work, we report a facile synthesis of a series of substituted-4-hydroxy/methoxy benzylidene derivatives (3a-i) via Knoevenagel condensation reaction of different active methylene compounds (1) with 4-hydroxy/methoxy benzaldehyde (2) under reflux condition in aq. EtOH using catalytic amount of TiO₂ NPs. The structures of all the obtained compounds were confirmed by analytical and spectroscopic methods and screened for their antioxidant and anti-tubercular activities. Antioxidant activity results revealed that, the compound 3e with IC₅₀ value 105.48 µg/mL showed very effective DPPH scavenging activity and compound 3h with IC₅₀ value 129.72 µg/mL exhibited most effective nitric oxide radical scavenging activity compared to the reference standard BHT and ascorbic acid respectively. From the results of anti-TB activity, compound 3b displayed a more sensitivity at 25 µg/mL. Furthermore, synthesized compounds were assessed for molecular docking studies on the target enzymes Human peroxiredoxin 5 and enoyl-ACP reductase and they were emerged as an active antioxidant and anti-TB agents with least binding energy -5.8 and -8.0 kJ mol⁻¹ respectively.

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Specifications Table

Subject area	Bioorganic Chemistry.
Compounds	Substituted-4-hydroxy/methoxy benzylidene derivatives
Data category	Spectral and Biological data
Data acquisition format	UV-visible, IR, NMR and Mass spectra
Data type	Analysed
Procedure	Series of substituted-4-hydroxy/methoxy benzylidene derivatives were synthesized through Knoevenagel reaction in presence of TiO ₂ NPs and characterized by spectroscopic analysis. Compounds were screened for their biological study.

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Design, Synthesis and Characterization of Indolyl-6-Amino 3,4-Dihydro-3-Methylpyrano[2,3-C]Pyrazol-5-Carbonitrile Derivatives as Antioxidant Agents

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ABSTRACT

The fused pyrazolo[2,3-c]pyrano and indole derivative are well known for their therapeutic properties. The present paper describes about the synthesis of pyrazolo[2,3-c]pyrano derivative linked to the indole nucleus (4a-c) were prepared using multi-component reaction (MCRs). All the newly synthesized compounds were characterized by spectral studies and also by C, H, and N analyses. Anti-oxidant activities were assessed by different methods. The analogs (4a) showed promising antioxidant properties.

Keywords: Indole, pyrazolo[2,3-c]pyrano, DPPH, FRAP activities

INTRODUCTION

The multicomponent reaction (MCRs) are one pot process in which at least three or more compound react together to form target product without separation and purification of intermediates, the main advantages of MCRs, in comparison with traditional multistep protocols, are high efficiency, experimental simplicity, low cost, avoidance of large quantity of waste, reducing labor cost, reaction times, and waste production [1]. As MCRs are one-pot one pot reaction, they are easier to perform than the multistep reactions. In addition, MCRs are eco-friendly, and often preceded with excellent chemo selectivities [2-3]. The design and development of multi-component synthetic strategies based on green principles and renewable and recyclable materials, using solvent free condition, green solvents and green or renewable catalyst, using conventional techniques to achieve an ideal synthesis. In addition, the combination of MCRs process with environmentally benign protocols, such performing organic reactions in water is a protocol that has becoming highly interesting for synthetic chemist [4]. Water emerged as a versatile solvent for organic reactions recently, because of special effects of water such as abundant, eco-friendly benign, hydrogen bonding in the transition state and high cohesive energy and also negative activation volume. The use of water as a natural and green solvent is emphasized in green chemical process [5,6]. For these reasons, we synthesis the compounds using MCRs in water are of prominent value in green chemistry and organic chemistry [7-9].

Heterocyclic compounds containing the 4H-pyran ring display significant roles in medicinal and synthetic chemistry, 4H-pyran has attracted the attention of many researcher involved drug discovery process [10-12], on the other hand pyranopyrazole compounds, oxygen and nitrogen ring fused heterocycles, are important group of heterocyclic compounds with natural and synthetic molecules [13]. They showed numerous biological activities such as antibacterial [14], antimicrobial [15,16], anticancer [17], anti-inflammatory and analgesic [18], fungicidal, bactericidal and herbicidal properties [19, 20]. Indole and its analogs constitute the active class of compounds possessing wide spectrum of biological activities. A number of indole derivatives have been reported to exhibit anti-inflammatory [21], Antihistaminic [22], Anticancer [23], antibacterial [24], antifungal [25], Anticonvulsant [26]. In view of these observations and in continuation of our research on the synthesis of biologically active molecules [27-31], the objective of this study is to synthesize title compounds in which pyrano[2,3-c]pyrazole derivatives linked to indole nucleus at position-3, the molecule which may exhibit enhanced biological activities.

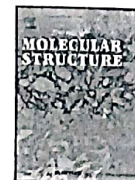
RESULTS AND DISCUSSION

Chemistry

Preparation of starting material 5-substituted 2-phenyl-1H-indol-3-carboxaldehydes using literature method [32]. A mixture of hydrazine hydrate,

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Efficient L-Proline catalyzed synthesis of some new (4-substituted-phenyl)-1,5-dihydro-2H-pyrimido[4,5-d][1,3]thiazolo[3,2a]-pyrimidine-2,4(3H)-diones bearing thiazolopyrimidine derivatives and evaluation of their pharmacological activities

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ADME-toxicology study

Molecular docking

ABSTRACT

In the present study, a simple and efficient protocol has been developed to synthesize a series of new (4-substituted-phenyl)-1,5-dihydro-2H-pyrimido[4,5-d][1,3]thiazolo[3,2a]-pyrimidine-2,4(3H)-dione derivatives (4a-g) through L-proline-catalyzed reaction of 2-amino-4-(4-substituted-phenyl)thiazole (1), substituted benzaldehyde (2), and barbituric/thiobarbituric acid (3) at a refluxed temperature in aqueous ethanol under mild and metal-free conditions. The obtained compounds were evaluated for *in vitro* cytotoxicity and anti-inflammatory effects. The *in silico* docking studies provided the probable interactions of synthesized compounds with P38 MAP kinase and MMP-9 proteins. The structures of all the synthesized compounds were confirmed using analytical and spectroscopic techniques. The *in vitro* cytotoxicity studies revealed the potential cytotoxic effects of the compounds 4f and 4g. The anti-inflammatory studies suggested the prominent anti-inflammatory effects of the compounds 4a and 4g. The SAR studies showed the importance of electron-withdrawing groups in enhancing the potency among the tested compounds. The results of *in silico* studies supported our findings from *in vitro* analysis in terms of drug-likeness of the synthesized compounds and their effective interactions with P38 MAP kinase and MMP-9 proteins envisaging their use as prominent therapeutic agents.

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1. Introduction

Multicomponent one-step reactions (MCRs) are upstanding as a valuable tool for synthesizing polyfunctional molecules with high competence over multistep synthesis. Globally, it has been explored as an efficient tool for preparing several active drugs [1]. MCRs offer many advantages as they avoid unnecessary expensive purification, high atom economy, toxic reagents, and solvents consumption [2].

Proline is a bifunctional chiral homogenous organocatalyst that is cost-effective, efficient, and readily available than any other catalyst [3]. L-Proline has both acidic (–COOH) and basic (–NH) functionality and catalyzes chemical transformations similar to enzyme

catalysis [4]. It is efficient in catalyzing various organic transformations [5], Knoevenagel-type condensation [6], Biginelli reaction [7], Mannich [8], Michael [9], Diels-Alder [10], α -amination reaction [11] and asymmetric Hantzsch reaction [12].

Heterocyclic compounds, mainly polyfunctionalized heterocycles (PFHs), are widespread in bioactive natural compounds and marketed pharmaceuticals, food and paints, agrochemicals, dyes and pigments, electrochemicals, optoelectronic, fluorescence sensors, and many other application-oriented resources [13–15]. Therefore, investigations on the synthesis of PFHs have received particular attention. Among the privileged class of various heterocyclic compounds, thiazole and pyrimidine are key moieties in medicinal chemistry. The significant pharmacological potential of these molecules includes antimicrobial, antioxidant, anti-tubercular, anti-inflammatory, antiviral, and anticancer properties [16,17].

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Dynamics of hybrid nanofluid through a semi spherical porous fin with internal heat generation

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ABSTRACT

Semi-spherical fins are widely considered to be one of the best thermal exchangers available. It is widely employed, including aero planes, chemicals and electronic kits and porous medium is an extensive application that includes drying efficiency enhancement, filtering insulations, hydraulic oils, reactor temperature control and solar collectors. With these applications in perspective, the current study uses Darcy's model to examine the performance of hybrid nanofluids flowing over a semi-spherical porous fin. Additionally, temperature dependent internal heat generating condition, natural convection and radiation effects are also taken into account. The nonlinear form of an ordinary differential equation (ODE) along with boundary conditions is resolved using RKF 45 method. The numerical results are obtained for various physical constraints and the impact of these constraints on fin surface temperature is discussed via graphs. The results show that increasing an internal heat generation parameter raises temperature, whereas the opposite is true for radiation and convective parameters. Furthermore, the temperature of the hybrid nanofluid is consistently higher than the temperature of the nanofluid.

1. Introduction

Optimizing the heat transfer, which arises in a wide range of industrial and thermal engineering applications, is one of the most crucial issues in the thermal distribution processes. In recent years, several engineers and researchers have attempted to solve this problem via several ways. One of the approaches utilized in industrial processes is to cool the fluid over a diverse geometry. Many researchers have investigated the various physical and chemical mechanisms of heat transmission of liquids through diverse geometries.¹⁻⁴ The rate of thermal distribution can be efficiently increased in engineering instruments by extending its surface area or by means of attaching a stretched surface, frequently called as Fin. Fins are commonly used in a variety of industrial sectors including cooling and heating, ice storage, automobiles, chemical manufacturing machinery and electronic chips. However, because the rate of convective heat transfer is affected by the temperature gradient, the fin's surface area, and the heat transfer coefficient, there is an increasing demand for fins with the best design. Commonly fins are available in many shapes. As a result, several researchers looked at the thermal analysis of plate, semi-circular, and Rhombus shape pin fins⁵⁻⁷ in order to find the best performing extended surface. Kiwan and Al-Nimr⁸ were the first to introduce the idea

of employing porous fins by presenting the Darcy model.^{9,10} Several authors consider semi-spherical fins which are like prior work on fins with non-uniform cross-section.

The thermal properties of a rectangular fin with its primary surface were examined by Kundu and Wongwises.¹¹ Huang and Wong¹² numerically examined the dynamic features of natural convection flow, which exhibits an equal rectangular fin balance, with a focus on the influence of fin length and fin height. Ismail et al.¹³ looked at three-dimensional liquid movement and thermal dispersion via a solid flat plate with perforated fins. The results of this survey will aid in the development of heat sinks with microprocessors that remove heat via electronic devices. The temperature and flow parameters of the non-Newtonian liquid into helical type fins inside a double piped heat exchanger surrounding the inner tube were discussed statistically by Mozafarie and Javaherdeh.¹⁴ Gorla and Bakier¹⁵ explored the impact of radiation and condensation of temperature in a rectangular fin. Motion of the fluid through porous fin resulting in solid-fluid interaction. Hoseinzadeh et al.¹⁶ studied the temperature characteristics qualities of a porous fin with a rectangular form using the Homotopy analysis approach, Homotopy perturbation methodology, and Collection method.

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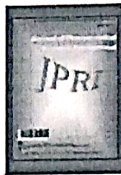
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The Gag Reflex: A Hurdle in Dentistry— Literature Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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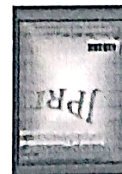
ABSTRACT

Gagging reflex poses a hurdle in numerous dental procedures. It causes discomfort for the patient, extended procedure time for the clinician, compromised quality of treatment and along with a lot of physiological discomfort for both. The normal gag reflex is protective in nature, but few individuals elicit extreme response, leading to problems during the treatment procedures. It is extremely important for the clinician to identify the cause and severity of the condition so that it can be decided whether the patient can handle standard treatment techniques or whether alternative methods must be considered. There is no universal solution for successfully managing the gagging patient. Various modalities can be used according to the doctor's assessment and patient's conditions in order to control the gag reflex so that the patient can be comfortable and cope with the dental treatment. A wide range of management solutions are available, and many cases need a

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Comparative Study of Drug Likeness and Pharmacokinetic Properties of Synthetic Antiviral Drugs to that of Remdesivir: In-silico Approach

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Authors' contributions

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MEGASPOROGENESIS AND THE DEVELOPMENT OF FEMALE GAMETOPHYTE IN *GEODORUM DENSIFLORUM* (LAM.) SCHLTR.

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Abstract

Geodorum densiflorum, a terrestrial orchid, grows in the shade of dense moist deciduous forests, evergreen forests, and grasslands of Western Ghats. During the present study, megasporogenesis and development of female gametophyte in this species showed that ovary was inferior and unilocular with many ovules borne on the parietal placenta. The ovules were anatropous, bitegmic, and tenuinucellate. The development of the female gametophyte confirmed to the monosporic 8-nucleate type in *G. densiflorum*.

Introduction

ORCHIDACEAE is one of the largest, highly evolved, wide spread families of flowering plants. Orchidaceae constitute a total 40% of monocotyledons taxa (Smussen, 1985). The family comprises about 21,484 species distributed in 60-800 genera (Govaerts et al., 2017). Abraham and Vatsala (1981) recorded 150 species under 70 genera from South India, in which 176 species are from Karnataka (Krishna Swamy et al., 2004; Udupa et al., 2011). Orchids are economically highly important species; their ornamental nature attracts the horticulture and floral industry (De and Pathak, 2020; Janakiram and Baskaran, 2018; Lawrence, 1951; Prakash and Pathak, 2020b; Thammasiri, 2020). The extraordinary economic and morphological diversity of orchids is accompanied by a remarkable range of pollinators and pollination systems (Gaskett, 2011; Pal et al., 2019; Prakash and Pathak, 2020a). Orchids have been used since ages for curing various diseases like dysentery, tuberculosis, malaria, hypertension, inflammation, obesity, asthma, depression, heart problem, bone fractures, uterine diseases, lung and liver diseases (Balkrishna et al., 2020; Kumar et al., 2018; Kumar et al., 2019; Kumari and Pathak, 2020; Prakash and Pathak, 2019). Orchids exhibit great diversity in the development and organization of the male and female gametophyte, suspensor, and embryo (Gurudeva, 2014, 2016a,b, 2018, 2019). Schnarf (1931) and Swamy (1943) has given a detailed review of the embryological investigation on orchids. Information about the reproductive biology of a large number of taxa in the India is, however, meagre.

Previous studies on the reproductive biology of orchids were made by Swamy (1943, 1949); the author made

a significant contribution to the embryo sac development in the Orchidaceae. Abe (1967, 1973, 1977) conducted research on a large number of orchids and suggested new investigations in the field of embryology. The orchid reproductive strategy, with the formation of numerous tiny seeds, is achieved by the elimination of some traits in the early plant embryogenesis (Kolomeitseva et al., 2021). Kimura (1968) observed 8-nucleate embryo sac in *Cypripedium debile* and Prakash and Aow (1973) reported monosporic 8-nucleate embryo sac in *Spathoglottis plicata*. Mohana Rao and Sood (1979 a,b) studied embryology of *Habenaria densa* and *Satyrium nepalense* and observed monosporic embryo sac development. Arekal and Karanth (1980) have found a bisporic type of gametophyte in *Zeuxine longilabris*. Sood and Mohana Rao (1988) investigated embryology of the diandrous orchid, *Cypripedium cordigerum* and observed anatropous, bitegmic, tenuinucellate ovule and 6-nucleate bisporic female gametophyte. Krishnaswamy et al. (2005) observed monosporic 8-nucleate embryo sac development in *Habenaria grandifloriformis* and *Platanthera susannae*. The development of bisporic 8-nucleate type of embryo sac in *Calanthe triplicata* was confirmed by Krishna Swamy et al., 2005.

Presently, *Geodorum densiflorum* (Lam.) Schltr., an endangered orchid has been investigated to study the megasporogenesis of the female gametophyte. Plant usually grows in the grassland and shade of moist to deciduous forest at elevations of 1700 m amsl. It has a wide range of distribution throughout tropical and subtropical Asia and West Pacific. The plant has spherical underground pseudobulb with 2-5 leaves, leaves are leathery, thin textured, and petiolate in nature. The plant blooms during April-May. The inflorescence showing

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Scanned with Oken Scanner

Anatomical Adaptations in Roots of Four *Nervilia* Species (Orchidaceae)SOUMYA MAHABALESHWAR HEGDE* AND K. KRISHNASWAMY¹Department of Botany, Kuvempu University, Shimoga-577 201 (Karnataka), India
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ABSTRACT

The present study analyzed the characteristics in roots of Terrestrial Orchidaceae member i. e. *Nervilia aragoana*, *Nervilia infundibulifolia*, *Nervilia crociformis* and *Nervilia plicata* for their anatomical characteristics as per ecological point of view. The anatomical characters serve as a tool for the genus systematic. The plants were collected from different regions from Shimoga district including different forest types. Materials were fixed in FAA solution. Transverse sections were obtained by free hand sections to observe the anatomical characteristics in four different species of *Nervilia* and analyzed for the anatomical adaptations in different species. The prominent characteristics of the terrestrial *Nervilia* group presented simple and uniseriate epidermis and endodermis with less developed Casparian strips. Cortex cells had simple parenchymatous filled with mycorrhiza association. Number of vascular cylinders varied among species and xylem phloem were easily distinguishable. Anatomical characters were common in all *Nervilia* species, though evolved with the number of adaptations to different environmental conditions for survival in different types of vegetation.

Key words : Orchidaceae, anatomical characters, terrestrial orchids, adaptations**INTRODUCTION**

The Orchidaceae is one of the largest and widespread families of flowering plants, with highly evolved and specialized plant characters. The Orchidaceae have about 25,000-35,000 currently accepted species, distributed in about 600-800 genera (Leila *et al.*, 2015; Prashant Kumar, 2016). Eastern Himalaya and the Western Ghats are the richest orchid habitats in India. The Western Ghats is considered as one of the most important biogeographic zones of India and also a major tropical evergreen-forested region that possesses enormous biodiversity (Darsha and Jayashankar, 2020). Recent researches show about 1300 species distributed in 151 genera in India. More than 46% of the known species of orchids are endemic to the Western Ghats. In Karnataka, orchidaceae family is represented by about 203 species and 59 genera. Although its flowers present a relatively uniform structure, the organization of vegetative parts are notably variable among species, such features allow the family to thrive in different environments and increase the number of its different growth forms. The orchid family initially consisted as terrestrial species during the evolutionary process, the

orchids have become adapted to distinct environments, so they can be classified into epiphytes, terrestrial, saprophytes or lithophytes (Zhang *et al.*, 2020). These environmental variations contribute to structural alternations in vegetative organs (Ramudu and Khasim, 2020). The terrestrial species absorb their nutrients directly from the soil and may present three kinds of roots : (1) one adapted to absorption and fixation; (2) tuber adapted to nutritive substance and storage and (3) one specialized in storage, absorption and fixation. The orchid tubers can survive during the dry season and nourish the plant when it is necessary.

Nervilia is commonly known as shield orchids. Plants are widely distributed across most of the areas. Plants are terrestrial, perennial, deciduous, sympodial herbs with an oval to almost spherical tuber having short adventitious roots. One or two flowers are borne on erect, fleshy and leafless flowering stem. When flowering the plants lack leaves but a single erect or ground-hugging leaf develops after the flower has fully opened. The leaves are usually wrinkled or crumpled with distinct, fan-like veins. The flowers are often short-lived, lasting for only a few days. The sepals and petals are similar, but the labellum is

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Analysis of soil physico-chemical properties on sunflower crop fields in Davangere region of Karnataka

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Abstract

Sunflower (*Helianthus annuus* L.) is a photosensitive crop and is therefore grown in Kharif, Rabi and spring seasons. Rabi season is recommended for cultivation of sunflower. The crop has most important agronomic characteristics, such as resistance to drought and cold, with wide adaptability to different soil and climatic conditions. In the present study the physicochemical assessment of soil samples were collected randomly from the rhizosphere soil of Davangere region was carried out. Rhizosphere is a dynamic changing environment that differs from bulk soil both in physical and chemical properties. The physicochemical analysis of soil is based on the various parameters such as Soil texture, Soil moisture, p^H , Moisture content, Electrical conductivity, Micro and macro nutrients in the rhizosphere soil samples were analysed. Six soil samples were collected from the different places of all the taluks of Davangere district results shows that, the values of p^H range from 6.89 to 7.88, p^H was found to vary from neutrality to slightly alkaline. The values of EC indicated that all samples of the soils are non-saline. The soil studies can be considered as good sources of essential nutrients and this information will help farmers to solve the problems related to soil nutrients and amount of which fertilizers to be used to increase the yield of Sunflower crop.

Keywords: macronutrients, micronutrients, physicochemical, rhizosphere, sunflower

Introduction

Soil is a thin layer on the surface of earth and it constitutes the minerals, organic matter gases, decaying plant and animal matter etc. Soil play a crucial role in delivering a variety of ecosystem it also act as a medium that can supports plant growth and it modulates water, nutrients and pollutant transport (Vaneet Kumar *et al.*, 2016). Soil characterization is to evaluate the fertility status of the soils of an area or region is an important aspect in context of sustainable agricultural production. The Productivity of agricultural soil depends largely on its physicochemical properties. The soil condition is important because it is a universal medium for plant growth, which supplies essential nutrients to the plants. The several elements known to be essential for plant growth, macronutrients (N, P, and K) and micronutrients (Zn, Fe, Cu, Mn) are important soil elements that control the soil fertility (Srinivasan and Poongothai 2013). Sunflower (*Helianthus annuus* L.) is a photosensitive crop and is therefore grown in Kharif, Rabi and spring seasons. Rabi season is recommended for cultivation of sunflower. Kharif season is may not be suitable for its cultivation because grain filling/harvesting will coincide with heavy rainfall. The crop requires a cool climate during germination and warm climate during flowering stages. The seedlings tolerate frost and drought. It can tolerate temperature. It requires an annual rainfall of 500 – 1000 mm. Sunflower can be grown on a wide range of soils and tolerates a moderate p^H range and some salinity. It thrives best on deep loam soils with good drainage and irrigation facilities. The optimum range of soil pH for this crop is 6.5 to 8.5. Sunflower is a major source of vegetable oil in India and the world. India is a leading producer of this oil-seed crop. The productivity of sunflower in terms of seed yield, oil and protein output varies widely depending on multifarious factors such as agro climatic condition of the

locality, inappropriate choice of cultivar, land preparation, timely sowing, moisture deficit situation, nutrient imbalance, degraded status of growing medium especially soil, lack of improved agronomic crop management practices, varying planting pattern, etc. Insufficient and/or imbalanced fertilization including micronutrients has been identified as one of the critical situation in oilseed productivity. Soils deficient in micronutrients are not capable of nourishing crop plant successfully and therefore low yield and quality of crops are obtained (Abbas, 2013). Zn is an essential plant nutrient element plays significant role in RNA and protein synthesis in plants. Zinc deficiency reduces net photosynthesis, inter nodal length of stem, increasing chlorosis and necrotic spots in the leaves and severely reduce yield (Alloway, 2008). Boron deficiency is the second most dominant problem, which is involved in the reduction of sunflower production (Tahir *et al.*, 2014). Rhizosphere is a dynamic changing environment that differs from bulk soil both in physical and chemical properties. In this sense, plant root exudates selectively influence the growth of microorganism that colonize the rhizosphere when altering the chemistry of soil aggregates and currently rhizospheric microbial populations change the composition and quantity of root exudates through their effect on plant nutrition. The study of soil physicochemical parameters is an important for Crop growth and soil management. The Physicochemical properties such as Soil texture, Soil moisture, p^H , Moisture content, Electrical conductivity, Micro and macro nutrients in the soil were analysed. The investigation is undertaken because Davangere is comprises different agro climatic zone and it is the most agreeable and healthy climatic condition for growing the crops. In Davangere region now a day, large number of fertilizers are used instead of manures due to this the crop productivity increases speedily but the quality of the soil decreases. So it



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Isolation and identification of some fungal pathogens from Solanaceous vegetable crops of Chitradurga district, Karnataka

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Abstract

The present work deals with the isolation and identification of pathogenic fungi. The fungal isolates were *Fusarium oxysporum*, *Fusarium solani*, *Fusarium incarnatum*, *Caryospora cassicola*, *Colletotrichum gloeosporioides*, *Alternaria spp.*, *Cladosporium cladosporioides*, *Mucor flavus*, *Trichoderma spp.* and *Aspergillus Niger*. These were isolated from Solanaceous vegetable crops like chilli, tomato and brinjal and were identified on the basis of colony morphology and microscopic examination on PDA medium. The morphological characteristics of these fungal elements showed various kinds of spores which was identified up to genus/species level. Out of 10 isolated fungi, all were pathogenic except *A. Niger* and *Trichoderma spp* which are saprophytes.

Keywords: isolation, identification, fungal pathogen, vegetable crops

Introduction

Vegetables are most important components of human food since they provide proteins, Vitamins, Carbohydrates and some other essential macro and micro nutrients required by the human body. Fungal diseases cause huge losses to vegetables during cultivation, transportation and storage. Phytofungal pathogens cause serious problems for the agricultural crops including vegetables. The plant is highly affected by adverse climatic conditions. The warm and cool climatic conditions provide an ideal condition for the development of many foliar, stem and soil-borne plant diseases. Fungal diseases are a major limiting factor for vegetable that cause serious yield reduction leading to severe economic losses (Pavankumar *et al*-2018). In addition, many also produce mycotoxins, which are harmful to humans and livestock and causes a number of diseases like rusts, smuts, rots and downy mildew. Plants are infected by different kinds of microbial pathogens and the required inoculum for infection is present in the soil, water and air, in addition to plant host. Whatever may be the source of inoculum, the susceptible plant species or crop varieties may exhibit clear visible local symptoms in or on the tissues where infection is initiated. If the pathogen is able to find favourable conditions for further development, systemic symptoms are induced in tissues or organs far away from the point of pathogen entry into the plant. When the symptom of infection is not expressed externally, it is termed as latent infection. Some fungal pathogens infecting unripe fruits do not induce any visible symptom as they remain dormant. Detection of microbial pathogens refers to the process of establishing the consistent presence of a particular target organism(s) within the plant or in its environments, irrespective of the development of visible symptoms in the plant suspected to be infected by the pathogen(s) in question. Diagnosis, on the other hand relates

to the identification of the nature and cause of the disease Problem under investigation (Digambar and Sahera-2016) [2]. Chitradurga district falls in central eastern parts of the state and covers a total geographical area of 8388 sq. kms. The district is divided into 6 Taluks, namely Chitradurga, Hiriya, Hosadurga, Holalkere, Chalakere and Molakalmuru. It lies in the central dry agro climatic zone. The average temperature during the summer reach up to 42°C and minimum during winter can be 12°C. Major part of the land is utilized for the agricultural purpose which includes Rabi, kharif and other agricultural plantation. The water bodies cover an area of 384.9 sq. km which is comparatively low area with agricultural land, hence the people of this district depends on rainfall for growing the crops.

The vegetable crops are attacked by many fungal, viral, bacterial, nematodal and some other diseases leads to loss in quality and yield. Out of these diseases fungi causes more loss in field condition and post-harvest condition (Salau and Shehu-2015) [6]. Present investigation aims at identification of the fungi from the plants showing symptoms and were identified based on their morphological characters.

Materials and Methods

Study site and sample collection

Field survey was done in major vegetable growing regions of Chitradurga District from September to November 2020 to estimate the fungal diseases. A purposive and randomized sampling method is used for survey and collection of samples (Zainab and Shinkafi-2016) [8]. The fungal pathogens were able to infect various plant organs such as roots, stems, leaves, flowers and fruits. The infected part shows visible characteristic symptoms like spots, blights, wilts, rots etc. Plant parts with visible symptoms were collected from different vegetable crops in the field

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Impact of conventional storage system on germination and storage fungi of paddy in Chikkamagaluru, Karnataka

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Abstract

Practice of suitable method of storage benefited to maintain the highest germination ability even to the duration of six months up to 90%. Paddy stored for a year good in quality for consumption and flour. Conventional structures recorded were constructed with locally available plant wood, bamboo, mud, coconut jute. As insect protector plant leaf, sugarcane, paddy husk was selected which been in use traditionally. Storage fungi infestation rate was found increased more in 9 to 12 months storage time. Insect's damage was more in Panatha, although this structure had good protection against rodents and cold. SB and sand method test results was calculated and analyzed for samples, stored for three different storage period in three different storage structures.

Keywords: conventional storage, paddy germination, paddy fungi, storage fungi, paddy storage

Introduction

Rice (*Oryza sativa* L.) the name represent more than twenty species in the grass family. Twenty percent of the world's population consumes rice as food in daily routine in 2012 by Kim *et al.*, (2012) [9] but now in matter of nine years it increased to half of the world population (Kaur and Gill 2020) [7]. Production and consumption happen more in Asia (Cho *et al.*, 2016) [3]. Antioxidants of rice valuable in controlling the threat of diabetes (type2), cardiovascular problem and cancer (Kaur and Gill 2020) [7]. Starch is one of the major component of rice (kalita *et al.*, 2017) [7]. By Starchy endosperm activity paddy can germinate in low oxygen level even when submerged (Lee 2009) [9] this ability promoted for its cultivation globally. Quality and quantity of agriculture produce can be sustained to long period by following suitable storage method. Effectiveness of particular storage practice showed its impact on stored product. Eco-friendly storages were beneficiary to stored seeds, humans and nature. Farmers financial balance depend upon good, low cost and long lasting storages (Hengsadekul and Nimityongskul 2004) [6]. Evading of chemicals or high-tech storage system and artificial treatment for drying and cooling will decrease the storage cost (Adhikarinayake *et al.*, 2006) [1]. Quality of stored content has to be maintained for complete utilization of total produced. To avoid influence of non chemical storage method, its better switch to conventional structures which build by using plant materials, cement and mud. By following these structures farmer will become self dependent, cost can be minimized and increase farmers earnings during off season also (Wasala *et al.*, 2016) [13]. These conventional structure was found in Chikkamagaluru region are so eco-friendly and very much sustainable for many years even during adverse environment conditions. This study was conducted on paddy samples stored in these structures for different time period to know their impact.

Collected paddy samples were analyzed for its viability by using Standard Blotter (SB) method and also observed common storage fungi. It was observed in result paddy stored were viable with good percentage and less affected by storage fungi. Consumption rate of this paddy was up to remarkable level and even for sowing. Chikkamagaluru region is one of the more rain fall region of Karnataka, even with these conditions mentioned conventional storage methods are very effective and safer.

Materials and method

Field work

Personal visit lead us to derive about paddy stored structure in chikkamagaluru region of Karnataka. We were interacted many farmers in many villages across. Found huge number of farmers who following conventional storage from several generations. The technology of construction had been passing from generation to generation some important regularly practicing structures were recorded and collected the seed samples.

Conventional storage structures observed

Sustainable conventional storage structures recorded are

1. circular bamboo chamber named kanaja constructed by bamboo, by preparing small strips of few inches with two to three meters in length were fabricate as wall of the chamber, finally turn into cylinder like structure, required size cylinder can be made normally we observed had the of capacity 5-6 tons.
2. Rectangular storage made by using cement and brick called Panatha was one of the very common systems followed by many farmers. Wall of the chamber constructed by brick and cement and plastered by cement or mud. The size of Panatha generally up to 6-8 feet.
3. Jute bag prepared by coconut jute in different sizes -25, 50, 100 & 200kg

DIVERSITY AND DISTRIBUTION OF GENUS *HABENARIA* WILLD. (ORCHIDACEAE) IN SHIMOGA DISTRICT, KARNATAKA, INDIA

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Abstract

The present paper deals with the study of genus *Habenaria* (Orchidaceae) in Shimoga district of Karnataka and reports its 12 species in the region. The research was carried out from the period of January 2018-January 2021; the distribution, phenology aspects, and biological status of the species was assessed in the district. Extensive field surveys were carried out periodically in different parts of the district, including hilly region, and grasslands for the purpose. *Habenaria* species was found to be abundant in grasslands and hilly regions, as compared with other forest types in Shimoga district. Changes in the rainfall pattern and anthropogenic activities highly affect the diversity of the plants.

Introduction

ORCHIDACEAE IS a monocot family that includes terrestrial, saprophytic, lithophytic, and epiphytic species (Arditti, 1977; Pridgeon *et al.*, 1999). It is one of the largest families amongst monocots and the second largest flowering plant family with 28,484 species in 800 genera (Govaerts *et al.*, 2017). Abraham and Vatsala (1981) recorded 150 species under 70 genera from South India. The recent estimate suggests the occurrence of as many as 320 orchid species in South India (Bhat, 1999); of these, 176 species are reported from Karnataka (Krishnaswamy *et al.*, 2004a; Udupa *et al.*, 2011). The most interesting feature of the orchid flowers is their striking resemblance to various forms of the animals like a bee, moth, butterfly, spider, dove, even humans *etc.* (Pal *et al.*, 2019; Prakash and Pathak, 2020a). They are floriculturally significant due to the varied colour and range of sizes and shapes of their flowers (De and Pathak, 2020; Janakiram and Baskaran, 2018; Prakash and Pathak, 2020b).

Orchids are associated with an endophytic symbiotic fungus, mainly in their roots (Manoharachary, 2019). Terrestrial orchids mainly grow on the floor of the forest and grasslands.

Habenaria Willd. is a terrestrial orchid genus of about 800 species, widely distributed throughout the tropical, subtropical, and temperate regions of the world. Amongst these, 60 species are reported from India. About 25 species of *Habenaria* are found in Peninsular India. In Karnataka, 26 species of *Habenaria* were observed (Krishnaswamy *et al.*, 2004b). In India, it is represented by 17 species in Western Himalaya (Jalal and Jayanthi, 2015) and some of these are well known

for their therapeutic properties (Balkrishna *et al.*, 2020; Chauhan, 1990; Devi *et al.*, 2018; Kumar *et al.*, 2018; Kumar *et al.*, 2019; Kumari and Pathak, 2020; Prakash and Pathak, 2019; Vij *et al.*, 2013). In *Habenaria*, prominently paired tuberoids with a small third tuberoid is also seen (Pande *et al.*, 2010). In *Habenaria* species, flowers are highly attractive. The species can be easily identified when in bloom, but the vegetative characteristics (number and size of tubers and leaves, stem height) overlap in many of these. Terrestrial orchid diversity remains largely understudied. Therefore, during the present investigation, diversity and distribution of genus *Habenaria* Willd. in Shimoga District, Karnataka, India was studied.

Material and Methods

Study Area

Shimoga district is a part of Malnad region of Karnataka and is also known as the *Gateway to Malnad*. There are seven talukas namely Soraba, Sagara, Hosanagara, Shimoga, Shikaripura, Thirthalli, and Bhadravathi (Fig. 1); the district is situated between the latitudes 13°27' and 14°39' N and between the longitudes 74°38' and 76°04' at a mean altitude of 640 m amsl. Peak Kodachadri hill at an altitude of 1343 m amsl is the highest point in the district. Shimoga district is rich in diversity of flora and fauna. The District covers evergreen, semi-evergreen, deciduous, scrub forest, and grasslands.

Data Collection

The survey was undertaken in Shimoga district during the year January 2018-January 2021. Different types of vegetation were found (evergreen forest, deciduous

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PRINCIPAL

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**COMPARATIVE ANATOMY OF LEAF IN FOUR *NERVILIA* SPECIES (ORCHIDACEAE)
FROM SHIMOGA DISTRICT, CENTAL WESTERN GHATS, KARNATAKA.**

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ABSTRACT

The present study compared leaves of Terrestrial Orchidaceae member i.e four different species of *Nervilia* (*Nervilia concolor* (Blume) Schltr., *Nervilia infundibulifolia* Blatt & Mc Cann, *Nervilia crociformis* (Zoll & Moritz) Seidenf, *Nervilia plicata* (Andrews) Schtr), analyzing the anatomical and morphological characteristics from an ecological point of view. The plants were collected at different region from Shimoga district. Material was fixed in FAA solution. Transverse sections were obtained by freehand sections. The prominent characteristics of the terrestrial *Nervilia* group presented homogenous mesophyll, covered by uniseriate epidermis and covered by thin cuticle; leaf vascular region is inconspicuous in all four species. Anatomical characters were common in four different *Nervilia* species, have evolved with the number of adaptations to different environmental conditions during the evolutionary process.

Keywords: Leaf anatomy, *Nervilia* sp, Anatomical Character, Terrestrial Orchids.

1. INTRODUCTION

The Orchidaceae is one of the largest and widespread families of flowering plants. The Orchidaceae have about 28,000 currently accepted species, distributed in about 763 genera of which 20% are terrestrial orchids. Although its flowers present a relatively uniform structure, the organization of vegetative parts are notably variable among species [1]. Such features allow the family to thrive in different environments, and increase the number of its different growing forms [2]. During evolutionary process, the orchids have become adapted to distinct environments, so that they may be classified into epiphytes, terrestrial, saprophytes or lithophytes [3]. These environmental variations contribute for structural alternations in vegetative organs [1]. Typically orchids occupy big selection of habitats to satisfy their requirements of light, temperature and water [4-6]. Studies in vegetative anatomy were utilized in the classification of orchidaceae member. Anatomical data is mainly utilized in orchid taxonomy [7]. Orchid anatomical studies were carried out by [8-11]. *Nervilia* Comm. ex Gudich. Is a group of terrestrial orchid genus comprising about 70 species distributed in most of the countries [12-14].

Nervilia are commonly known as shield orchids. Plants were widely distributed across most of the areas. Plants are terrestrial, perennial, deciduous, sympodial herbs with an oval to almost spherical tuber and has some short adventitious roots. One or two flowers are borne on an erect, fleshy, leafless flowering stem. When flowering the plants lack leaves but a single erect or ground hugging leaf develops after the flower has fully opened, short flowering phase is temporally separated from the leafing phase [15]. The leaves are usually wrinkled or crumpled with distinct, fan like veins. The flowers are often short lived lasting for only a few days. The sepals and petals are similar, but the labellum is prominent and often composed of three lobes.

LEAF Orchids have simple leaves with parallel veins. The leaves are varied in size, shape and general appearance. Most of the times leaf characters help in identification of species. Generally the structure, shape, and size of orchid leaves depend on the habitats in which they grow. Identification of genus *Nervilia* is bit tricky when this species is in leaves four different species of *Nervilia* are identified with the help of their leaf characters [16]. *Nervilia concolor* (Blume) Schltr. Petiole 7-10cm long, leaf blades are not lying flat on the ground. *Nervilia infundibulifolia* Blatt. & Mc Cann petiole are 3-6cm long, leaf blade lying flat on the ground, greenish yellow in colour locally common in shades.

PRINCIPAL

DIVERSITY AND DISTRIBUTION OF GENUS *HABENARIA* WILLD. (ORCHIDACEAE) IN SHIMOGA DISTRICT, KARNATAKA, INDIA

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Abstract

The present paper deals with the study of genus *Habenaria* (Orchidaceae) in Shimoga district of Karnataka and reports its 12 species in the region. The research was carried out from the period of January 2018-January 2021; the distribution, phenology aspects, and biological status of the species was assessed in the district. Extensive field surveys were carried out periodically in different parts of the district, including hilly region, and grasslands for the purpose. *Habenaria* species was found to be abundant in grasslands and hilly regions, as compared with other forest types in Shimoga district. Changes in the rainfall pattern and anthropogenic activities highly affect the diversity of the plants.

Introduction

ORCHIDACEAE is a monocot family that includes terrestrial, saprophytic, lithophytic, and epiphytic species (Arditti, 1977; Pridgeon *et al.*, 1999). It is one of the largest families amongst monocots and the second largest flowering plant family with 28,484 species in 800 genera (Govaerts *et al.*, 2017). Abraham and Vatsala (1981) recorded 150 species under 70 genera from South India. The recent estimate suggests the occurrence of as many as 320 orchid species in South India (Bhat, 1999); of these, 176 species are reported from Karnataka (Krishnaswamy *et al.*, 2004a; Udupa *et al.*, 2011). The most interesting feature of the orchid flowers is their striking resemblance to various forms of the animals like a bee, moth, butterfly, spider, dove, even humans *etc.* (Pal *et al.*, 2019; Prakash and Pathak, 2020a). They are floriculturally significant due to the varied colour and range of sizes and shapes of their flowers (De and Pathak, 2020; Janakiram and Baskaran, 2018; Prakash and Pathak, 2020b).

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for their therapeutic properties (Balkrishna *et al.*, 2020; Chauhan, 1990; Devi *et al.*, 2018; Kumar *et al.*, 2018; Kumar *et al.*, 2019; Kumari and Pathak, 2020; Prakash and Pathak, 2019; Vij *et al.*, 2013). In *Habenaria*, prominently paired tuberoids with a small third tuberoid is also seen (Pande *et al.*, 2010). In *Habenaria* species, flowers are highly attractive. The species can be easily identified when in bloom, but the vegetative characteristics (number and size of tubers and leaves, stem height) overlap in many of these. Terrestrial orchid diversity remains largely understudied. Therefore, during the present investigation, diversity and distribution of genus *Habenaria* Willd. in Shimoga District, Karnataka, India was studied.

Material and Methods

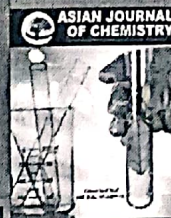
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Data Collection

The survey was undertaken in Shimoga district during the year January 2018-January 2021. Different types of vegetation were found (evergreen forest, deciduous

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Synthesis, Optical, Photocatalytic and Electrochemical Properties of Cobalt Doped ZnS Nanoparticles

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Poly(vinyl pyrrolidone) capped and uncapped Co:ZnS nanoparticles have been synthesized by co-precipitation method. These synthesized nanoparticles were characterized using spectral techniques and the optical and photoluminescence properties of nanoparticles were also studied. Poly(vinyl pyrrolidone) capped nanoparticles has been studied for the electrochemical sensing of various biomolecules. The Co:ZnS modified glassy carbon electrode (GCE) proved to be effective nanoparticles composite electrode to detect biomolecules electrochemically with a wide linear detection range of 0.2 to 1.6 $\mu\text{mol/L}$. Also a low detection limit (LOD) of 0.06 $\mu\text{M/L}$ and excellent sensitivity of 4.366 $\mu\text{A } \mu\text{M}^{-1}$ has been obtained. It is observed that the particle size of nanoparticles is affected by the capping agent. It is therefore the modified electrode has become a good electrode material with a greater stability without leaching. The optical band gap was determined by UV-visible spectra and the value is found to be in the range of 3.75 to 4.00 eV. The photocatalytic activity on Eriochrome black T dye in the visible region using nanoparticles has been determined. It was found that the capped nanoparticles are more effective in photocatalytic degradation due to low energy consumption and safe recovery of it after catalytic performance from polluted water.

Keywords: Co-doped ZnS nanoparticles, Eriochrome Black-T, Dopamine, Uric acid, Sensors.

INTRODUCTION

In the past decade, studies on particles with small size have received attention. The thermal, optical and mechanical properties of nanoparticles are different from those of their bulk counterparts [1,2]. Additionally, nanosize particles exhibit excellent electrochemical and catalytic properties [3,4]. For stained water, dye degradation is the standard method employed to determine the photocatalytic activity of photocatalysts, including energy consumption and safety. Thus, nanoparticles present potential applications in various commercial fields, such as wastewater treatment plants, paint industry, refrigerator coatings, electrical industry and detergents, etc. [5-7]. The physico-chemical properties, such as small size and optical properties, of the nanoparticles of zinc oxide render them promising candidates for different medical applications [8-10].

These applications include imaging and drug delivery techniques. In various commercial sectors, ZnS nanoparticles most frequently employed. The energy of a wide bandgap increases the photocatalytic activity. The catalytic properties are used in industries, such as waste water treatment plants, cosmetics, paint and textile industries [11,12]. Through the exchange of holes and electrons in particles, light absorption by ZnS nanoparticles causes reactive oxygen species formation [13,14]. Radicals can degrade or destroy the organic matter, hence, can result in the ecological disturbance [15]. Photocatalytic activities chiefly rely on surface properties, including particle size, shape and morphology [16,17]. Modifying surface properties can change the particle photocatalytic efficiency. Different approaches involving capping with inorganic and organic compounds and doping using transition metals are employed to improve the photocatalytic characteristics of nano-

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Biodiesel from fresh water algae: Effect of pH on oil production

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Abstract

In this investigation algal oil was used as a raw material for biodiesel production. The decreasing fossil fuel resources cause both insufficiency in providing demand and increase in prices and it triggers the structural change in energy production and resources. In this context, the innovations in encouraging the use of renewable energy sources will make it possible to manage the passage from an unsustainable structure to a more sustainable structure. The necessary conditions for the world oil supply can be said to enter into a new era with the increasing demand pressure. In this study naturally occurring fresh water algal samples were collected from different sites of Shivamogga. Algae was identified as *Oedogonium grande* and *Spirogyra varians*, inoculated into the selective media, which favor the growth of algae oil was extracted from dried algal samples and pH were analyzed. These results indicate that biodiesel can be produced from *Oedogonium grande* and *Spirogyra varians*.

Keywords: biodiesel, transesterification, *Oedogonium grande*, *Spirogyra varians*, glycena, biomass

Introduction

An innovative and attractive life style of human is fulfilled by primary energy source fossil fuel. The energy demand lies higher due to increasing population and industrialization. The world may face the challenges like rising prices of petroleum fuel, energy security, deforestation and growing global warming. Hence researcher seriously focused on the renewable energy sources as key solution for replacement of fossil fuel (Dayananda C. *et al.*, 2007). The bioenergy is becoming increasingly relevant as a possible and potential alternative to fossil fuel. Biofuels are liquid or gaseous fuels produced from biomass resources and used in place of, or in addition to diesel and other fossil fuel for transport, stationary, portable and other applications. Biofuels are derived from renewable biomass resources like agriculture, forests and aquatic environment (Weissman, J.C. and D.M. Lillien 1992). These sources are taken in good consideration as feedstock producer for making the biofuel such as biodiesel, bioethanol, bio-oil and biogas. The utilization of renewable biomass energy in large extent provides sustainable development which link to global stability, economic growth, innovation in local market, reduces Green House gas emission and meeting the energy needs of vast rural population to get quality of life (Sanjaykumar N. D., *et al.*, 2013).

Biodiesel is an alternative liquid fuel for diesel engines that is produced by transesterification of vegetable oil or animal fat sources. Biodiesel is made by chemically reacting oil or animal fat with alcohol in presence of catalyst producing fatty acid alkyl ester along with co-product glycerin. According to National Biodiesel Board, biodiesel is as a mono-alkyl ester (Schneider, D 2008).

Energy is one of the major inputs for the economic development of the country. In the case of the developing countries, the energy sector assumes a critical importance in view of the ever increasing energy needs requiring huge investment to meet them. All energy used by human which originates from the radiant energy emitted by the sun,

geothermal energy from the interior of earth; tidal energy originating from the gravitational pull of the moon; and nuclear energy (Meher *et al.*, 2006). Solar energy source is the thousands time larger than the other like fossil fuel reserves. The long availability is not the only criterion to judge an energy source. The way it is requiring to convert into other forms, help to meet our needs, environment and health issue at local, regional and global level (Bangboye A.I. and Hansen A.C. 2008).

Biodiesel is not a new concept, in 1912, Rudolf Diesel used the straight vegetable peanut oil in diesel engine. It is reported that there is no requirement in the modification of diesel engine. The various feedstock used for biodiesel production such as soybean oil, Pongamia, jatropha oil, coconut oil, and waste vegetable oil, currently algae which use for production of biodiesel (Subha Rao N.S. 1997).

Biofuel has wide applications such as, it is used in railway engine, in aircraft, as heating oil, diesel generator. Biodiesel can be used in pure form or may be blended with petroleum diesel at any concentration in most of injection pump engines. Biodiesel has different solvent properties than petrodiesel hence it require to change fuel filter on engines heaters shortly use of biodiesel blend (Subha Rao N.S. 1997).

Biodiesel has promising lubricating properties and it possess low sulfur content than diesel fuel. The efficiency of biodiesel depends on its blend, quality, and load conditions under which fuel burnt. The quality of biodiesel fuel has set by the American Society for Testing Materials standard. Biodiesel fuel provides economic stability as well as energy security. The National Biodiesel Board reported that, in 2011 biodiesel production supported 39,027 jobs and more than \$2.1 billion in household income. Many countries have their own independent policies regarding taxation and rebate of biodiesel use, import and production to reduce oil dependency and to increase use of renewable energies. According to Renewable Fuel Standards Program Regularity Impact Analysis, reported that soy oil biodiesel results 57% reduction in greenhouse gases compared to

Synthesis, Characterization and Electrochemical Sensor Based Upon Novel Schiff Base Metal Complexes Derived from the Non-Steroidal Anti-inflammatory Drug, Flufenamic Acid for the Determination of Uric acid and their Biological Applications

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Abstract: The current trend in coordination chemistry is the design and synthesis of new Schiff base transition metal complexes for therapeutic, diagnostic, and catalytic applications. For decades, it has been observed that special attention is being paid to the chemistry of Schiff base metal complexes because of their wide range of applications. Therefore the present paper involves the synthesis of Schiff base ligand by altering the functional group of the drug, Flufenamic acid. From that Schiff base ligand, four complexes, i.e., Co(II), Cu(II), Ni(II), and Zn(II) have been prepared (SB metal complexes). The synthesized SB metal complexes have been characterized using several spectral and analytical techniques. All the metal complexes show non-electrolytic behavior suggested by molar conductance measurements. Spectral studies suggest that all four metal complexes exhibit octahedral geometry. The modified SB-Co complex/GCE showed a greater electro-catalytic activity and lower potential towards the oxidation of uric acid (UA). The response of UA was linear over the concentration ranging from CV is 0.5–1.8 $\mu\text{mol/L}$, sensitivity for 131.85 $\mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$ and detection limit for 0.16 μM (S/N=3). The modified GCE showed very good sensitivity along with good repeatability and reproducibility for the determination of UA. The pure drug, Schiff base ligand, and metal complexes, were also screened for anti-inflammatory and antibacterial activities. The observed results prove that the metal complexes exhibit greater activity than that of the original drug.

Keywords: Flufenamic drug; Schiff base ligand; metal complexes; cyclic voltametry; uric acid; anti-inflammatory activity; antibacterial activity.

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1. Introduction

Owing to the multidimensional applications in the dictum of main branches of science, coordination chemistry is one of the liveliest research fields in chemistry. In bioinorganic chemistry, a leading discipline at the interface of chemistry and biology, there has been a great exploration due to coordination compounds. The reason coordination chemistry has been considerably enriched so rapidly is mainly due to the synthesis and characterization of many Schiff base metal complexes containing sulfur, nitrogen, and oxygen as donor sites. Ligands containing sulfur, nitrogen, and oxygen as donors have been found to be useful as potential

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Evaluation of bio-agents against Ambrosia fungal symbiont associated with coffee shot-hole borer, *Xylosandrus compactus* Eichhoff

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Shot hole borer (SHB), *Xylosandrus compactus* Eichhoff (Coleoptera: Scolytidae) is a pest of concern especially in robusta coffee attacking young and succulent twigs. The infestation causes damages to coffee plant through disruption of flow of nutrients in the young branches leading to crop loss. The Ambrosia fungus and SHB have a strong symbiotic relationship and are the only food source for developing grubs. The successful development of SHB colony mainly depends on the establishment of the fungal symbiont Ambrosia fungus. Arresting the establishment of fungal symbiont in the tunnels of twigs is the key steps which will directly affect the life cycle/developmental stages of the SHB. In this view efforts have been made to evaluate various biocontrol agents against the symbiotic fungus. Six native strains of biocontrol agents viz., *Beauveria bassiana*, *Metarhizium anisopliae*, *Lecanicillium lecanii*, *Trichoderma harzianum*, *Bacillus subtilis*, and *B. cereus* were screened against the Ambrosia fungus *in-vitro* by following dual culture technique. The *in vitro* study revealed that, *T. harzianum* and *B. subtilis* were found to be the most efficient antagonist compared to other tested bioagents.

Key words: Antagonist, Ambrosia fungus, bio-agents, coffee, shot hole borer

INTRODUCTION

Coffee is one of the major plantation crop grown predominantly in the southern states (Karnataka, Kerala and Tamil Nadu) and to a limited extent in the North-Eastern states of India. There are two commercially cultivated species of coffee viz., arabica coffee (*Coffea arabica*) and robusta coffee (*Coffea canephora*). Coffee eco system provides a congenial habitat for various valuable species of soil micro-flora fauna, insects, birds and mammals. More than a hundred insect pests have been reported on coffee, but only a few are economically significant.

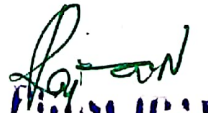
Shot Hole Borer (SHB), *Xylosandrus compactus* Eichhoff (Coleoptera: Scolytidae) is a highly polyphagous and an emerging pest of concern for robusta coffee that destroys young and succulent twigs.

Due to the disruption of sap flow and severity of infestation, the leaves turn yellow and the affected

succulent twigs gradually dry out, leading to loss of bearing wood (Anonymous, 2014). SHB infests more than 225 plant species from about 62 families (CABI, 2020). SHB is known to have a symbiotic relationship with Ambrosia fungus and the development of SHB colony within the twigs depends mainly on the growth of fungus, as it is the only source of food for the grubs of beetles. The female beetle disperses in search of a suitable place to infest the twigs, carrying fungal spores in a specialized structure called mycangium. The presence of *Ambrosiella xylebori* in association with *X. compactus* on robusta coffee in India has been confirmed. The ambrosia fungi are in the order Endomycetales (especially Endomycopsis and Ascoidae) and Deuteromycota (especially *Monilla* and *Ambrosiella*). The hyphae of the fungi enter through the twigs, while surface of the tunnels and galleries are filled with a coating of conidiophores and yeast-like sprout cells that bud from conidia. The yeast like cells constitutes the ambrosial stage on which the beetles feed. This symbiotic relationship between the beetle and fungus is obligate, as neither the Ambrosia fungi nor the beetles are found without the other in nature.

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Facile synthesis of some 5-(3-substituted-thiophene)-pyrimidine derivatives and their pharmacological and computational studies

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Abstract

A series of 5-(3-substituted-thiophene)-pyrimidine derivatives (3a-d) were synthesized *via* Knoevenagel condensation reaction in aqueous ethanol using H₂O₂:HCl as a catalyst. Their pharmacological effects were evaluated. Analytical and spectroscopic methods confirmed the structures of the target molecules. The antibacterial activity studies revealed that compounds 3b and 3d exhibited the most effective zone of inhibition against bacterial strains *E. coli* and *S. aureus*, respectively. The *in vitro* cytotoxicity was carried out by MTT assay against MCF-7 cell line. The results showed the excellent selectivity for all four compounds, among which the compound 3a exhibited remarkable cytotoxicity with a minimum cell viability range of 23.68 to 44.16%. The interaction of compounds with calf thymus DNA was determined using UV-absorption spectroscopy. The results confirmed that all the synthesized compounds interacted strongly with CT DNA through electrostatic or groove binding. *In silico* ADME-toxicology studies indicated that all the molecules under investigation are non-toxic with good oral bioavailability. The drug-likeness score indicated that they are suitable as drug-leads. *In silico* molecular docking the specified compound 3b bounds with GlcN-6-P and P38 MAPk with a minimum binding energy of -7.9 and -6.4 kcal/mol, respectively. DFT study demonstrated that the compound 3d was chemically and biologically more reactive due to less energy gap.

Keywords

biological studies
DNA binding
ADME-toxicology study
SAR study
molecular docking and DFT studies

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1. Introduction

Heterocyclic compounds play a predominant role in medicinal chemistry and synthetic organic chemistry due to their massive biological importance. The synthesis of nitrogen and sulphur containing fused heterocyclic compounds with multi-structures in one molecule has attracted the attention of medicinal chemists and researchers due to their multifaceted pharmacological activities [1-2]. Among them, pyrimidine and thiophene have been recognized as key scaffolds owing to their important biological

significances and interesting therapeutic properties including anti-tubercular [3], anticancer [4], anti-HIV [5], antibacterial [6], antifungal [7], antitumor [8], also used as potent EGFR inhibitor [9, 10], protein kinase inhibitors [11-14] and 5-HT₇ receptors [15].

Moreover, the heterocyclic compounds increase the strength of the molecules by forming hydrogen bonds with DNA. Hence, the interactive study of heterocyclic moieties with DNA is essential for estimating their anticancer activity and elucidates the viable mechanism of their action. Therefore, DNA binding is considered as an essential ex-



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Palladium metal embedded on mesoporous graphene oxide as an efficient heterogeneous catalyst for Suzuki coupling reaction

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Sachin Bhat ^c  

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Abstract

A novel method for the synthesis of Graphene Oxide (GO) decorated palladium nanocomposite (Pd NC) as a highly efficient heterogeneous catalyst has been developed. The resulting GO-PdNC acts as a catalyst precursor for the Suzuki coupling reaction. The catalytic reaction was conducted by varying reaction conditions, like reaction temperature, time, solvent and the catalyst loading. The catalyst was reused for Suzuki reaction up to 5 reaction cycles. Spectral data of the catalytic product suggest that the purity, rate, yield and recycling of catalyst are more effective for the C-C coupling reaction.

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Synthesis of reduced graphene oxide decorated with Sn/Na doped TiO_2 nanocomposite: a photocatalyst for Evans blue dye degradation

Original Article | Published: 24 April 2021

Volume 4, pages 457–468, (2021) [Cite this article](#)



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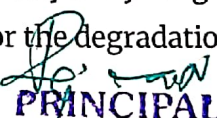
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Abstract

The major drawbacks associated with existed nanophotocatalyst are mild response, narrow spectrum range, hence speedy recombination of electrons, and holes subsequently less number of charge separation which leads to lower the overall efficiency of the catalyst. In order to overcome from this drawback, we have synthesized a nano-spherical shaped reduced graphene oxide NS-rGO (NC1) decorated with modified tin and sodium-doped titanium oxide nanocomposite NS-rGO@Sn/Na-doped- TiO_2 (NC2). The synthesized NC2 decreases the probability of recombination of electrons and holes which is the necessary requirement for any photocatalyst and is rather, more advantageous compared to the reported photocatalyst which have demerits of speedy recombination of electrons and holes. The newly synthesized NC2 is used as an efficient photocatalyst for Evans blue dye degradation. This photocatalyst exhibits significant progress on light absorption, narrow band gap, active charge collection, and separation. The photocatalytic degradation of NC2 showed high activity in a short duration of time. The geometry of the NS-rGO facilitates collection and transporting of electrons in an effective photocatalytic dye degradation process. The investigation may lead to the development of novel photocatalyst for the degradation of toxic dye which is discharged into sewage from various chemical industries.


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Photocatalytic degradation of Eriochrome black-T and Evan's blue dyes under the visible light using PVA capped and uncapped Ag doped ZnS nanoparticles

| Original Article | Published: 07 January 2021

| Volume 4, pages 447–456, (2021) [Cite this article](#)



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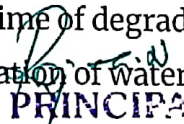
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Abstract

In this paper, ZnS, polyvinyl alcohol (PVA) capped Ag-doped ZnS(Ag:ZnS) and uncapped Ag:ZnS nanoparticles were prepared by the coprecipitation method and studied in detail their photocatalytic activity. The presence of functional groups in the synthesized particles is confirmed by FTIR spectra. Powder X-ray diffraction (XRD) indicated a cubic zinc blende structure and the particle size of ZnS is 4.14 Å, PVA-capped Ag:ZnS 3.48 Å, and uncapped Ag:ZnS 5.53 Å. The energy band gap is found to be in the range of 3.2 to 3.5 eV. The surface morphology of nanoparticles was observed and investigated by a scanning electron microscope (SEM) and EDX analysis. The photocatalytic degradation of Eriochrome black-T and Evan's blue dyes was successfully photo reduced by nanoparticles. The results indicated that these nanoparticles act as photocatalyst under the sunlight. The EBT and EB dyes were degraded more than 90 % in the presence of a capping agent (PVA). However, in the absence of PVA, 90% degradation occurs but the time of degradation becomes more. Thus, this technique can be the best technique for the safe degradation of water contaminated with textile matters.


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Oral therapeutic proteins: a review on current strategies, challenges, and development

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ABSTRACT

Oral therapeutic proteins represent an extinguish class of macromolecules that could be used as pharmaceutical agents due to their proven pharmacological properties. These exist as an array of compounds with variable structures and functions. Oral therapeutic proteins could be used as an efficient replacements of chemotherapeutics as they originate from biological sources, hence project the minimal risk of adverse and toxic effects. Due to the complex structure of proteins their functional modification proves to be an obscure process, where the risk of losing the pharmacological potential is present. In addition, delivery systems also play a significant role in the treatment and subsequent pharmacological effect. In the vista, oral delivery proves to be feasible due to the protein structure related issues being faced in other delivery systems like parenteral, nasal, ocular, and trans-mucosal etc. However, oral delivery method too is facing the hurdles of its own kind. Proteins ingested are susceptible to the physicochemical parameters of gastrointestinal tract, where they get denatured. Also, they sometimes get acquainted with immune response if the host body treats them as abnormal and foreign. Oral proteins mainly face three kinds of barriers namely biochemical, mucus, and epithelial barrier. However, the research has been managed to enhance the oral protein delivery, despite the presence of these barriers. Apart from structural modifications to proteins, absorption enhancers, enzyme inhibitors, mucoadhesive polymeric systems, and particulate carrier systems are also used to overcome these barriers. Furthermore, few systems like microparticles, microspheres, nanoparticles, lipid-based delivery systems, polymeric nanoparticles, and inorganic nanoparticles have also been used. This review focuses the current perspectives and challenges faced in the field of oral therapeutic proteins. It also emphasizes on the methods being followed in the current scenario to enhance the pharmacological efficiency of oral therapeutic proteins.

Key words: Oral therapeutic proteins, drug delivery systems, oral delivery, barriers, nanoparticles

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INTRODUCTION

Proteins and peptides are important building blocks of all living organisms and have emerged as a very promising class of therapeutic entities in recent times [1]. Protein therapeutics can also be assembled based on their molecular types that comprise antibody-based drugs, anticoagulants, blood factors, bone morphogenetic proteins, engineered protein scaffolds, enzymes, Fc fusion proteins, growth factors, hormones, interferons, interleukins, and thrombolytics. Sometimes they are also categorized on molecular mechanism of their activity for example mAbs which bind non-covalently to target, enzymes which interact covalently, serum albumin which exerts its activity without specific interactions and so on [2, 3].

Blohm *et al.* identified therapeutic proteins as proteins or polypeptides that are potentially appropriate as a therapeutic drug that can be used in treatment because of their native role in the human body. These may be mutagenesis or proteolysis-prepared derivatives, hybrid proteins, protein aggregates or other molecular conjugates [4, 5]. Although the rationale behind functional properties of therapeutic proteins has been defined, novel insights could always be found as a part of incessant research on pathogenic diseases like diabetes and cancer [6, 7]. The use of therapeutic proteins in the treatment of diseases has many benefits over traditional drugs because they perform a highly complex and diverse range of body



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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TRADITIONAL SEED STORAGE PRACTICES IN SHIMOGA DISTRICT OF MALNAD REGION KARNATAKA, INDIA

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ABSTRACT:

Traditional knowledge is the accumulated knowledge, skills and technology of the local people which is derived from the local interaction of human beings and their environment. The study was conducted at different taluks of Shimoga district, Malnad region. The objective was for documenting the storage practices adopted by the people of malnad region. Documentation was done by direct interview and discussions made with the local people. In this paper seed storage practices followed and traditional seed storage structures were documented.

Keywords: Storage structure, Malnad Region, Traditional storage structure

INTRODUCTION:

Seed storage may be defined as the preservation of viable seed from the time of collection in the field of agriculture until they are required for sowing, consumption or any other purposes. India produces about 259.32 million tonnes of food grains annually. About 60-70 % of food grains are stored by the farmers for their own consumption (Prakash *et. al.*, 2016). The Indian farmers prefer to store food grains in traditional ways using different types of storage structures made by locally available materials. While big farmers keep food grains in the storage facilities provided by government agencies like Food Corporation of India. (Prashant and Rama -2014)

The traditional methods of grains storage and preservation dates back to time immemorial which were developed in the communities and passed on from generation to generation. One fourth of developing countries, farmers keep their products at the village level. The traditional storage system is considered to be effective or give satisfaction in which they continue improving so as to sustain grains from damage. Grains can be stored indoors, outdoor or at the underground level in structures ranging from those of mud to modern bins. The storage containers are built from a variety of locally available materials differing in design, shape, size and



Terrestrial Orchid Diversity in Sharavati River Valley of Shimoga District Karnataka (India)

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Abstract

Sharavati is a river which originates and flows entirely within the state of Karnataka in India. Sharavati river valley is the one of the most beautiful valley in the Western Ghats. Extensive field surveys during 2018-2020, revealed the occurrence of 25 species of orchids under 13 genera in river basin region in Shimoga district. *Habenaria* with 9 species is the largest genus in the river basin region, followed by *Nervilia* with 3 species; *Malaxis*, *Peristylus* are 2 species each and the remaining genera by a single species each. The habit, distribution, phenology and population status of terrestrial orchid species is presented in this paper. Efforts have also been initiated for their conservation at Sharavati river valley region in Shimoga district Karnataka.

Keywords: Sharavati river valley, *Habenaria* sp, Shimoga, Western Ghats

Introduction

The Orchidaceae is one of the largest and widespread families of flowering plants, with highly evolved and specialized plant character. The Orchidaceae have about 25,000-35,000 currently accepted species, distributed in about 600-800 genera (Arditti, 1977; Dressler, 1981). Eastern Himalaya and Western Ghats are the richest Orchid habitats in India. Recent researches shows about 1300 species distributed in 151 genera in India (Medhi et.al.2012). According (Rao, 1998) more than 46% of the known species of orchids are endemic to Western Ghats. In Karnataka Orchidaceae family represented by about 203 species and 59 genera (Krishnaswamy et.al.,2004a). Although its flowers present a relatively uniform structure, the organization of vegetative parts are notably variable among species (Dressler, 1993), such features allow the family to thrive in different environments, and increase the number of its different grow forms (Pabst and Dungs, 1975). Cooke (1901-1908), Gamble (1915-1936) and Hooker (1872-1897) have also mentioned several orchids in Karnataka. Prashant, (2016) observed 15 terrestrial orchids in Shimoga district. Orchids are mainly categorized into two types terrestrial and epiphytic forms, terrestrial orchid grow on

Phenology of the Genus *Indigofera* L. (Fabaceae-Papilionoideae) of Holalkere and Hosadurga Taluqs of Chitradurga District, Karnataka, India

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Abstract

Importance of phenology has increased in view of global climate change. Reproductive phenology is responsible for success in seed production and thereby perpetuation of a species. Phenological studies were not given much importance, especially in the region of Holalkere and Hosadurga of Chitradurga district of Karnataka state. Hence, attempt was made to study the phenological aspects of the genus *Indigofera* L. of sub family papilionoideae in the study area. The phenophases viz., leafing, flowering and fruiting and leaf fall are observed for 10 recorded species of the genus *Indigofera*. The regular Phenological period of the majority of genus was studied, variation in the phenophases of some small herbs and undershrubs was noticed with respect to its ecology. This investigation gives phenological database of the economically important genus *Indigofera* of the study area. This database can be also utilized, besides this importance, in future, in planning and management of conservational measures in the region.

Keywords: Phenology, *Indigofera*, Papilionoideae, Holalkere, Hosadurga

Introduction

Indigofera in greek means indigo dye which is famous for the natural blue colours obtained from the leaflets and branches of this herb (Soladaye et al. 2010.).

The genus *Indigofera* L. With 750 species is the third largest genus in the sub family Papilionoideae (Nwankwo and Ayodele, 2017.). The species are native mainly to tropical and subtropical regions of the world. The genus is one of the nine genera which are members of the tribe galegae (Soladaye et al. 2010.).

The highest *Indigofera* diversity is found in Africa and Madagascar (550 species), Asia (150 species) and Australia (50 species) (Henta furashi et al.2020.), However, In India the genus *Indigofera* is represented by approximately 60 species and 10 varieties, of which 15 species and seven varieties are endemic (Vibha chauban et al.2013.).

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Taxonomic Diversity and Distribution of Trees and their Regeneration Status in Sringeri Forest Range, Western Ghats, Karnataka

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Abstract

The present study reveals about the diversity and distribution of tree species in Sringeri Range. About 97 species belong to 73 genera and 42 families. Major number of species show medicinal values and economically important.

Keywords: Western Ghats, Karnataka, Sringeri Range, Tree Species

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. The diversity of the land, the life form and the complexities have generated lot of interest among people since ages. In India, there is a great need for a thorough inventory of our plant resources is undisrupted, particularly when we see all around extensive disruption of natural forests due to large scale mining operations, constructions of dams, roads and various other developmental projects. The destruction of forests has resulted in a pronounced imbalance in the effectiveness of precipitation, maintenance of water table and percentage of humidity and transpiration (Simhanet al., 1981).

Trees are the most important constituent of forests. It plays a major role in elucidating the patterns of distribution of biodiversity. These distributions are governed by biotic and a biotic factors (Ghateet al., 1998; Upadhyay&Upadhyay, 2012). According to forester's and ecologist's a tree is defined as a woody plant that reaches diameter of 10cm (30cm girth) or more at the breast height (130cm above ground) (Chuyonget al., 2011). Trees provide basic requirements of human beings in the form of air, food, timber, plywood, paper, fuel wood, medicine and also give aesthetic value. The trees populations



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Vol. 9, Issue 4, Part a (2021)

GC-MS identification of bioactive components of leaf extract of *Sida acuta* (BURM. F)

Author(s): Nalini TJ, Keshamma E, Ramesh Babu HN, Rajeshwari N and Sridhar BT

Abstract: Present study was designed to conduct with main purpose to determine bioactive components of aqueous (aq.) leaf extract of *Sida acuta* by GC-MS analysis and characterization. In the present study identified 9,12,15-Octadecatrienoic acid ethyl ester (Z, Z, Z), 4-hydroxy-e-methylacetophenone, 1,3-Propanediol, 2-(hydroxymethyl)-2-nitro, 9,12,15-Octadecatrienoic acid ethyl ester (Z, Z, Z), alpha-tocopherol & beta-D-mannoside, l-(+)-Ascorbic acid 2,6-dihexadecanoate, 3-Deoxy-d-mannonic lactone, Hexadecanoic acid and 2-hydroxy-1-(hydroxymethyl) ethyl ester as predominant compounds present in the aq. leaf extract of *Sida acuta* through GC-MS analysis and characterization. In conclusion, all parts of the *Sida acuta* are used for therapeutic purposes, but the leaves are the most widely used and hence, further in-vitro and in-vivo research investigations are recommended to evaluate the pharmacological activities prevailing compounds identified in aq. leaf extract of *Sida acuta*.

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VARIATION IN THE ELECTRICAL CONDUCTIVITY BETWEEN MORINGA OLEIFERA AND SANTALUM ALBUM

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ABSTRACT:

Wood is essentially composed of cellulose, hemicelluloses, lignin, proteins, phenolics, water and mineral salts. Cellulose is responsible for the conductivity of electricity. The electrical conductivity depends upon the specific gravity, length of the wood piece, temperature and proportional water content. When stem is fresh, the Resistivity is less and conductivity is more when it is dried vice-versa process occur. In the present study Resistivity and Conductivity of Drum stick (*Moringa oleifera*) and Sandal wood (*Santalum album*) were studied by using conductivity meter and compared.

Keywords: Conductivity, Resistivity, Drumstick and Sandal wood

INTRODUCTION:

Conductivity is a measure of the ability of a given substance to conduct an electric current, equal to the reciprocal of the substance. It can be denoted as ' σ '.

The SI unit of conductivity is Siemens per meter (S/m). Conductivity measurements are used routinely in many industrial and environmental applications as a fast, inexpensive and reliable way of measuring the ionic content in a solution. Conductivity is traditionally determined by measuring the 'AC resistance' of the given material or solution between two electrodes. Generally, conductivity is the rate at which matter or energy can pass through a given material. A material with a high level of electrical conductivity, for instance, would easily accommodate the movement of an electric charge.

Hydro electric conductivity describes the rate at which water can move through the porous elements of a surface. It is an important consideration for assessing the permeability of soils, rocks and plant layers. Such studies provide critical information for watershed management, agriculture and flood prevention. Hydro electrical conductivity also is used as a model to study the behavior of aquifers and subterranean water deposits.

The sap from various plant organs and made measurements of the electrical conductivity of the plant juices so obtained by means of Kohlrausch's well known method. His conclusions were that the plant juices are good conductors and that generally the specific conductivity of the sap increases progressively from the root upwards to the shoot. The juice was afterwards incinerated and the ash so obtained diluted to the original volume of the juice; the conductivity of the resulting liquid was then measured. Therefore, it able to show that the specific conductivity is a rough measure of the relative amounts of mineral substances and water present in the juice. (Ludek et al-2006)

Original Research Article

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GC-MS Identification of Stem Extract of *Sida acuta* (Burm.f)

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ABSTRACT

Keywords

Sida acuta, Stem, GC-MS, Antimicrobial, Antifungal, Anti-inflammatory

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Extracts of *Sida acuta* can be effectively employed as antimicrobial agents specifically antifungal to control growth and colonization on commercially important plants like Sorghum species. Furthermore, stem part of *Sida acuta* plant has less studied and hence, it is important to isolate phytoactives from stem extract of *Sida acuta*. Hence, the present study was designed to conduct with main objective to determine bioactive components of aqueous (aq.) stem extract of *Sida acuta* by GC-MS analysis. The fresh stem parts of *Sida acuta* collected was subjected aqueous extraction by successive extraction with water. In the present study we identified 9, 12, 15-Octadecatrienoic acid, ethylester, (Z, Z, Z), gamma-Sitosterol, 1-(+)-Ascorbic acid 2, 6-dihexadecanoate, 9, 12-Octadecadienoic acid (Z, Z), 4-Hydroxy-2-methylacetophenone, 1, 3-Propanediol, 2-(hydroxymethyl)-2-nitro, Stigmasterol and Trilinolein as predominant compounds present in the aq. stem extract of *Sida acuta* through GC-MS analysis and characterization. In conclusion, this is the preliminary study wherein we identified eleven bioactive compounds in aq. stem extract of *Sida acuta* and hence, further *in-vitro* and *in-vivo* research investigations are recommended to evaluate the pharmacological activities of prevailing compounds identified in aq. stem extract of *Sida acuta*.

Introduction

Since the beginning of human civilization, medicinal plants have been used by mankind

for their nutritional and therapeutic values. Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated


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THE EFFECT OF LIGHT ON OIL PRODUCTION FROM FRESH WATER ALGAE

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ABSTRACT

The utilization of renewable biomass energy in large extent provides sustainable development which link to global stability, economic growth, innovation in local market, reduces green house gas emission and meeting the energy needs of vast rural population to get quality of life. In this investigation algal oil was used as a raw material for biodiesel production. The decreasing fossil fuel resources cause both insufficiency in providing demand and increase in prices and it triggers the structural change in energy production and resources. In this context, the innovations in encouraging the use of renewable energy sources will make it possible to manage the passage from an unsustainable structure to a more sustainable structure. The necessary conditions for the world oil supply can be said to enter into a new era with the increasing demand pressure. In this study naturally occurring fresh water algal samples were collected from different sites of Shivamogga. Algae was identified as *Oedogonium spp* and *Spirogyra spp.*, inoculated into the selective media, which favor the growth of algae oil was extracted from dried algal samples and pH were analyzed. These results indicate that biodiesel can be produced from *Oedogonium spp.* and *Spirogyra spp.*

Keywords: Biodiesel, transesterification, *Oedogonium spp.*, *Spirogyra spp.*, glycerin, biomass.

INTRODUCTION

Biodiesel is an alternative liquid fuel for diesel engines that is produced by transesterification of vegetable oil or animal fat sources. Biodiesel is made by chemically reacting of oil or animal fat with alcohol in presence of catalyst producing fatty acid alkyl ester along with co-product glycerin. According to National Biodiesel Board, biodiesel is as a mono-alkyl ester (Schneider, D 2008).

Energy is one of the major inputs for the economic development of the country. In the case of the developing countries, the energy sector assumes a critical importance in view of the ever increasing energy needs requiring huge investment to meet them. All energy used by human which originates from the radiant energy emitted by the sun; geothermal energy from the interior of earth; tidal energy originating from the gravitational pull of the moon; and nuclear energy (Meher et al., 2006). Solar energy source is the thousands time larger than the other like fossil fuel reserves. The long availability is not the only criterion to judge an energy source. The way it is requiring to convert into other forms, help to meet our needs, environment and health issue at local, regional and global level (Bangboye A.I. and Hansen A.C. 2008).



Medicinal Plant Resources of Shivamogga, Karnataka

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ABSTRACT

The present study deals with the documentation of aromatic plant resources in Shivamogga district of Karnataka. The peoples of this area have a very good knowledge about the usage of these plants. Elder peoples of this area have common knowledge and easy cure for many common ailments and prepare different types of medicines from different plant parts. India is rich in medicinal and aromatic plants and play an important role in the country's agricultural sector due to quantitative and qualitative advantages. These plants can help small-scale farmers to strengthen their livelihoods and capacity to build successful and sustainable activities. A total of 40 aromatic plant species belonging to 33 genera and distributed over 22 families were recorded in the present study area.

KEYWORDS: Medicinal value, Shivamogga district, Traditional Knowledge.

I. INTRODUCTION

The knowledge of medicinal plants has been accumulated in the course of many centuries based on different medicinal systems such as Ayurveda, Unani and Siddha. In India it is reported that traditional healers use 2500 plant species and 100 species of plants serve as regular sources of medicine (Pei, 2001). In recent years, there has been a tremendous range of interest in the medicinal plants especially those used in traditional systems of medicines. Drugs obtained from plant are believed to be much safer and exhibit a remarkable efficacy in the treatment of various ailments (Siddiqui, et.al. 1995). the folk medicinal traditions play a reflecting and prominent role in human and environment interaction (Chopra and Nayar, 1956). It is estimated that 70 to

80% of the people worldwide rely chiefly on traditional health care system and largely on herbal medicines (Farnsworth et.al. 1985, 1991, Shengii 2002, Shanley and Luz, 2003; Hiremath et al., 2010).

About 1000 years ago healers in the Aztec and Maya Indian cultures of Mexico and Central America were experimenting with natural curing substances and exploited at least 132 medicinal herbs for the treatment of specific ailments (Evans, 2004; Berdan, 2005; Ashish Kumar and Jnanasha, 2016).

Essential oils are isolated from Aromatic plant materials by various distillation process. Whereas, other volatile isolates are obtained by solvent extraction. Aromatic plants contain odorous,



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Adsorption of Methylene blue by MgNiO_2 Nano Photocatalyst

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ABSTRACT: The amount of wastewater generated is increasing day by day, hence the contamination and exhaust of freshwater resources have left us with no option but to treat the wastewater for reuse. Many methods used to treat the methylene blue dye involve biological, physical and chemical technologies but adsorption plays an important role in water treatment, due to its low cost, ease of application, and efficiency. In this paper, effective and rapid adsorptive removal of methylene blue dye has been studied experimentally using optimized MgNiO_2 adsorbent. Nano-photocatalyst MgNiO_2 powder was synthesized by solution combustion method and characterized with analytical techniques like powder X-ray diffraction (PXRD), Energy-dispersive X-ray spectroscopy (EDX) & Powders morphology was analyzed by Scanning electron microscopy (SEM). The effect of various adsorption parameters like adsorbate concentration (5-25) mg L⁻¹, solution pH (3-11), adsorbent dosage (0.005-0.025) g, contact time (0-30) min on the extent of removal of methylene blue dye was studied in detail. The results show that the use of effective, low-cost and easily available MgNiO_2 photocatalyst for the decomposition of pollutants in water under natural sunlight.

KEYWORDS: Adsorption, Dye, Methylene blue, Sunlight, MgNiO_2 , Nanoparticle.

I. INTRODUCTION

The wastewater generated in textile, leather, pulp, painting, paper, printing, photographs and cosmetic industries are associated with different coloring agents (dye) which enhances the COD, BOD and TOC of water. Besides they impart dark color to the water, which makes it toxic then it poses a great threat to the lives of the living organisms and the environment. The amount of wastewater generated is increasing day by day, hence the contamination and exhaust of freshwater resources have left us with no option but to treat the wastewater for reuse [1]. But the degradation of dyes is difficult due to complex aromatic structure which makes higher resistance towards ambient circumstances (bio, thermal, photodegradation). One of the important dye is the Methylene Blue dye [3,7-bis(Dimethylamino)-phenazinium chloride Tetramethylidone chloride], have chemical formula ($\text{C}_{16}\text{H}_{18}\text{N}_3\text{S}_3\text{H}_2\text{O}$), is a heterocyclic aromatic compound. Many methods used to treat the methylene blue dye involve biological, physical and chemical technologies but the adsorption plays an important role in the water treatment, due to its low cost (especially the natural adsorbent use), ease of application, and efficiency [2].

The present work reports the effects of different operational parameters on the degradation of dye and the adsorption of methylene blue (MB) by MgNiO_2 nanoparticles as photocatalyst under sunlight radiation have been studied.

II. EXPERIMENTAL METHODS

A. Preparation and Characterization of Nano catalyst

The MgNiO_2 nan catalyst was prepared by solution combustion method using magnesium nitrate, nickel nitrate and citric acid. Initially, a stoichiometric amount of magnesium nitrate, nickel nitrate and citric acid was dissolved in a minimum quantity of de-ionized water. The resulting mixture was kept under continuous stirring at a

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Synthesis, characterization, DFT studies, antibacterial, cytotoxic and molecular docking studies of 3-chloro-1-[(6-nitro-1, 3-benzoxazol-2-yl) amino]-4-phenylazetidin-2-one derivatives

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Abstract

3-chloro-1-[(6-nitro-1, 3-benzoxazol-2-yl) amino] is a novel heterocyclic compound. IR, ¹H-NMR, ¹³C-NMR spectroscopic methods, and chemical analysis were used to discover -4-phenylazetidin-2-one derivatives. The 6-311++G (dp) basis set was used to optimise the molecular geometry of the synthesised compounds utilising the Density Functional Theory (DFT/B3LYP) approach in the ground state. The electrical and charge transport characteristics of synthesised compounds were used to determine the highest occupied Molecular Orbitals (HOMOs) and lowest unoccupied Molecular Orbitals (LUMOs). Frontier molecular orbitals, in addition to molecular electrostatic potential (MEP) (FMOs). On peripheral blood mononuclear cells (PBMCs), the cytotoxic activity of produced derivatives was examined, and the results were promising. The antioxidant activity of DPPH was investigated *in vitro*, with promising results. Furthermore, antibacterial assays with gram me positive and gram me negative bacteria strains, in combination with *in silico* docking interactions, suggest that the inhibitor has a high binding affinity for 2MGN, as evidenced by the ligand-receptor interaction.

Keywords: benzoxazole, schiff base, DFT, cytotoxicity, molecular docking

Introduction

Diseases caused by fungi and bacteria are the still major problems to the public health in spite of rapid progress in medicinal chemistry. Especially in following bacteria, drug resistance like methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin resistant *Enterococci* (VRE) is of major concern. Benzoxazole derivatives have shown various biological activities such as antibacterial, antifungal [1-3], antimycobacterial [4], antitumor [5], HIV-1 reverse transcriptase [6] and topoisomerase I inhibitory activities. A benzoxazole derivative, calcimycin, is an ionophorus carboxylic polyether antibiotic obtained from *Streptomyces chartreusis* (NRRL 3882). It was found with the contrast of Gram-positive bacteria including some *Micrococcus* and *Bacillus* strains [7]. Routiennocin, which is a spiroketalionophore antibiotic and isolated from a strain of *Streptomyces chartreusis* possessing a benzoxazole ring is initiated molecular structure found in Gram-positive bacteria.

2-Azetidinones, commonly known as β -lactams, are well-known heterocyclic compounds among the organic and medicinal chemists. The activity of the famous antibiotics such as penicillins, cephalosporins and carbapenems are attributed to the presence of 2-azetidinone ring in them. Recently, some other types of biological activity besides the antibacterial activity have been reported in compounds containing 2-azetidinone ring such biological activities include antimicrobial, anti-tubercular, carbonic anhydrase inhibitors, local anaesthetics, anti-inflammatory, anthelmintic, anticonvulsant, hypoglycemic

agents activity in the view of these observations, here we are presenting some target molecules of benzoxazole associated with Azitidine nucleus.

Materials and Methods

The chemicals and solvents were purchased from Sigma-Aldrich Co. (Durga chemicals, Mangalore, India). Silica gel HF254 chromatoplates (0.3 mm) were used for TLC and the mobile phase was chloroform/methanol (10:0.5) for compound 1. Melting point was recorded on a digital melting point apparatus instrument. The FT-IR spectrum was recorded using KBr pellets on a DR/Jasco FT-IR 6300 spectrometer. NMR spectra were recorded on a Varian Mercury 400 MHz NMR spectrometer (Manipal University, India) in CDCl₃ and dimethylsulfoxide (DMSO-d₆).

Tetramethylsilane (TMS) was used as an internal standard. The mass spectra were recorded on a Waters ZQ Micromass LC-MS spectrometer (Manipal University, India). Materials used in the microbiology study were: Mueller-Hinton Agar (Merck), Mueller Hinton Broth (Merck), Sabouraud Dextrose Agar (Merck), 96-well microplates, Transfer pipette, ampicillin, DMSO (Durga chemicals, Mangalore, India). Standard strains were: *Staphylococcus aureus* (ATTC-6538), *Bacillus cereus* (ATTC-11778), *Bacillus subtilis* (ATTC-6633), *Staphylococcus epidermidis* (ATTC-12228), *Pseudomonas aeruginosa* (ATTC-9027), *Salmonella typhimurium* (ATTC-23564) and *Escherichia*


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Some biological aspects of cyprinid fishes, *Pethia ticto*, *Systomus sarana* and *Puntius sophore* from India: An overview

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Abstract

The biology of cyprinid Fishes viz., *Pethia ticto*, *Systomus sarana* and *Puntius sophore* in the fresh water habitats of India is reviewed based on published literature. These fishes are the popular ornamental fishes in India. These fishes has beautiful undulating structure during slow swimming activity The biological aspects of fish includes length-weight data, condition factor, food & feeding habits, fecundity, age determination, sexual category, reproductive biology, haematological and immunological aspects. The present review study is aimed at enhancing the information concerning to the biology of fishes and to make possible formulation of suitable managing measures towards a balanced exploitation and managing in lotic and lentic aquatic ecosystems.

Keywords: biological profile, fresh water fishes, *Pethia ticto*, *Systomus sarana*, *Puntius sophore*, India

Introduction

Pethia ticto is a type of 'barb' found in aquariums. There is a silvery white dazzling body with a black mark on the caudal peduncle. The maximum size is around 10 cm (Talwar and Jhingran, 1991) [52]. Aquarium enthusiasts appreciate them because of their diverse dietary habits and robust nature. They are more demanding due to sexual dimorphism and seasonal colour changes throughout the breeding season. This fish found in lentic and lotic water bodies with muddy bottoms. Crustaceans, insects, and plankton are their favorite foods. About 150 eggs are laid in a batch with about 20 batches at a time. They are generally found in Asia, Pakistan, India Nepal, Bangladesh and Myanmar (Abir Lal Dutta *et al.*, 2013) [2].

The tropical freshwater fish *Systomus sarana* belongs to the minnow family. This olive barb can be used as a food fish as well as an ornamental fish. The fish's generic status is still unclear, fluctuating between *Barbodes* and *Puntius*. The *Systomus sarana* is a widely distributed species with no known major concerns. There is no evidence to support the assumption that this species is in decline; it is even listed as endangered in Bangladesh. It is now classified as Least Concern due to its widespread distribution and apparent lack of threats. However, before a re-evaluation, the species must be properly researched (Dipanjani Kashyap *et al.*, 2021) [16].

Puntius sophore is a freshwater cyprinid of Indian sub-continent which has popularity as a food fish because of its high dietary benefit alongside presence of good quantify of protein, micronutrients and nutrient. As of late it has made its entrance in decorative fish exchange and has been accounted for to been sent out as native fancy fish from India. Because of heavy fishing and anthropogenic exercises this fish species is currently confronting danger in regular condition (Sandipan Gupta, 2015) [42].

Small native fish species are particularly important sources of large scale and micronutrients. Because these small native fish species are consumed whole or without loss of

supplements due to cleaning or plate waste (Roos *et al.*, 2007) [41], their commitment to micronutrient ingestion is Higher than that of large carp fishes. Nutrients are found to be higher in these fishes than arge carps (Roos *et al.*, 2007; Thilsted *et al.*, 1997) [41, 53]. Science information is crucial for the proper administration of the species.

Yet, so far no such combined report is accessible on biological aspects of these two cyprinid fishes. Keeping this in see, the current review report has been arranged to summarize the lacunae of data which ought to be concentrated to help its future fishery.

Methodology

Data collection

Secondary data was collected by referring monographs, journals, thesis, books and web references as worked out by the different researchers of India. The collected data is compiled and written in the form of review text.

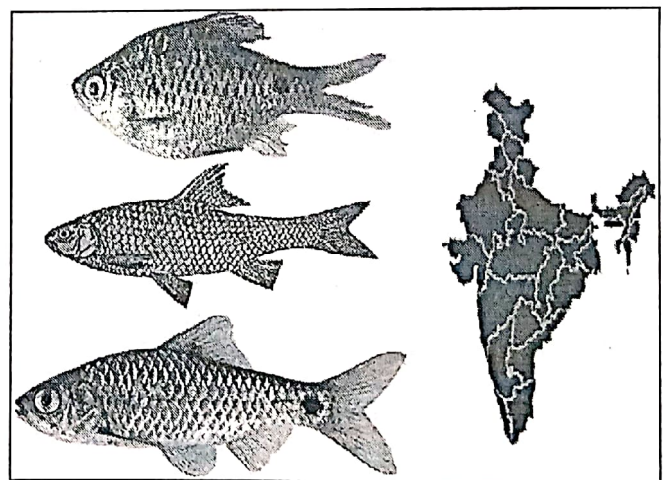


Fig 1: India map and views of *Pethia ticto*, *Systomus sarana* and *Puntius sophore* fishes



RESEARCH ARTICLE

Induced Breeding of Fringed Lipped Peninsula Carp, *Labeo fimbriatus* at Bhadra Fish Seed Farm, Karnataka: A Case Study

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ABSTRACT

The present study deals with the induced breeding of *Labeo fimbriatus* at Bhadra fish seed farm of Karnataka. Hypophysation is a scientific approach to the modern fish breeding procedure where riped brood fishes are stimulated to release the eggs by pituitary or any other synthetic hormone to breed in captive condition. In this study, Ovotide to be used for induced breeding of Kemmenu, *Labeo fimbriatus*. A total of 4 sets of female fishes were used for induced breeding with application of ovotide in August and September 2008 at Bhadra fish seed farm, Karnataka. The fertilization rate ranged from 88-93% and hatching rate varied from 75-88% respectively. A total of 1.45 to 7.36 lakh eggs were released. Number of spawns ranged from 1,00,000 to 5,00,000 with a survival rate of 68-77%.

Keywords: Induced breeding, Kemmenu, Ovotide hormone, Bhadra fish seed farm.

INTRODUCTION

Labeo fimbriatus is a cyprinid fish and it is the native from Pakistan, India, Nepal, Bangladesh and Myanmar. It is categorised as Least Concern as per the IUCN Red List of threatened species globally (Dahanukar, 2011). Fish reproduction is a periodic phenomenon and is managed with the aid of using environmental (exogenous) in addition to internal (endogenous) regulatory mechanism. The act of breeding happens below most desirable environmental situations which are beneficial to the survival of the younger ones. Environmental stimuli are detected with the aid of using sensory organs, relayed to brain that triggers endogenous mechanism into action. Endogenous mechanism is mediated thru cascade of numerous neurotransmitters and hormones secreted with the

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Limnological study of Hosahalli Pond in Shivamogga district, Karnataka

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Abstract

The present study deals with the physico-chemical parameters and biotic communities of Hosahalli pond of Shivamogga district, Karnataka during January to June 2021. In this study, 64 species of phytoplankton, 11 species of zooplankton, 07 species of hydrophytes, 04 species of aquatic insects/ beetles, 03 species of molluscans and 01 species each of annelid worm, rhizopoda and parasitic ciliates are recorded. The water temperature ranged from 22 to 28°C and the pH of the Hosahalli pond water was slightly acidic to slightly alkaline in nature. DO values varied from 2.4 to 4.6 mg/l. While, BOD level fluctuated between 7.0 and 8.8 mg/l. Carbon dioxide value varied 10.9-28 mg/l. However, chloride content of the water deviated from 90.2 to 112.6mg/l. The total hardness ranged from 90 to 116 mg/l. The results have revealed that the Hosahalli pond is contaminated due to human conflict, entry of domestic waste and agricultural runoff from the nearby area.

Keywords: Hosahalli Pond, biotic communities, water quality, contamination

Introduction

Limnology is the learning of fresh water habitat. The biotic components may be heterotrophic, autotrophic or decomposers, the aquatic ecosystem is further divided into fresh water and marine water ecosystem. Fresh water ecosystem is further sub-divided into lotic and lentic ecosystem. Lentic ecosystem that includes lakes, ponds, tanks, reservoirs, beels, jheels etc.

The physico-chemical study of water help in understanding the structure and function in relation to its habitats. Abundance of particular element might suggest the type of organism that may be found as well as indication of ecologically unfavorable ecosystem which can have negative or positive impact on the population i.e. high concentration of nitrate or phosphate is indicative of eutrophication (Patil Shilpa *et al.*, 2012; Sayeswara and Ashashree, 2018) [14, 16].

Abiotic compounds are the number of inorganic substances like carbon, hydrogen, nitrogen, sulphur, phosphorous, carbon dioxide and water, organic compounds like proteins, carbohydrates, lipids, amino acids etc. Biotic components are the living components, it includes producers. Phytoplankton are the microscopic autotrophs, which fix solar energy. Phytoplankton play an important role in the biosynthesis of organic matter (primary production) in aquatic ecosystems, which directly or indirectly serve all the living organisms of a water body as food.

Consumers are the heterotrophic living creatures, which burn-through makers as their food. Primary consumers are the herbivorous creatures rely on autotrophs organic entities like infinitesimal plant eaters or zooplankton, molluscans, bugs, Cyclops and daphnia and so forth secondary consumers are the essential flesh eating, which relies on herbivorous creatures for food. Eg: creepy crawlies, fishes, frogs, crabs etc. Tertiary consumers are 2nd grade of savage. They feed upon plants or animals (secondary consumers) in this way they are called omnivorous. Top

consumers are 3rd grade of rapacious, which feed upon essential, auxiliary and tertiary shoppers. Decomposers incorporates heterotrophic microorganisms like microbes, parasites, what separate the natural complex food from dead makers and buyers into basic inorganic mixtures made accessible to the producers.

The main objectives of the current study is to know the physico-chemical parameters of the studied pond and also to know the biotic components of the Hosahalli pond.

Materials and Methods

Study area

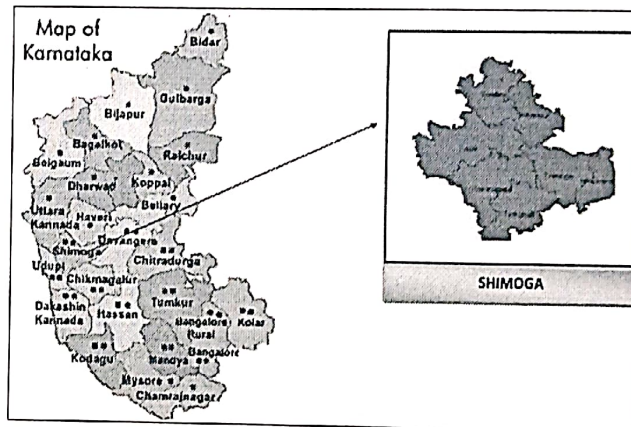


Fig 1: Study area map

Hosahalli pond is an perennial one and is located between 13° 52' N latitude and 75° 34' inches E longitudinal and is situated 5.3 km away from Shivamogga. The gross area of the Hosahalli pond is about 95 acres but the water spread area is about 70 acres. The depth of this pond is around 6 feet. This water body is located in Hosahalli area of Shivamogga district. The water is used for domestic purposes like washing clothes, vehicles and domestic

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Biodiesel Production from Marine Macro algae of Karwar Region, Karnataka

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ABSTRACT

The demand for energy is increasing in the world due to the rapidly growing global population and urbanization. Throughout history, mankind has used wood as a source of producing energy. After the industrial revolution, the main source of energy shifted to fossil fuels. The accurate amounts of the world's total fossil fuel reserves are not known. Furthermore, the increase in crude oil prices and the pollution caused by petroleum-based energy sources have created serious environmental problems, e.g. global warming. Such concerns about fossil fuels have led to the utilization of alternative energy sources. The primary alternative sources of energy systems that can replace fossil fuels are water, wind, solar energy, and biomass. Currently biomass is gaining a great deal of attention in terms of supplying the world's energy demands. Due to its availability and environmentally friendly nature such as causing no net increase in carbon dioxide levels and producing very low amounts of sulfur, biomass energy is believed to contribute one half of the total energy demand in industrial countries by 2050. In this concern we collect two species of macroalgae from Majali coast of Karwar, Karnataka. The collected algal samples were identified, dried and subject to extract oil by ground method by using hexane as solvent. The extracted oil is converted into biodiesel using transesterification processes and estimates the fatty acid methyle ester content by using GC-MS.

Key Words: Marine Macro algae, Biodiesel, Transesterification

INTRODUCTION

Algal biomass offers an innovative contribution to the challenge of providing sustainable bioenergy resources. Algae have high productivities, can be cultured on non-arable land and can utilise waste-streams as a nutrient source. Their rapid growth through photosynthesis provides for the capture and recycling of carbon dioxide, and algal biomass provides for bioenergy generation through a diversity of processes including direct combustion, gasification, saccharification and fermentation, and thermochemical processing (Demirbas, 2011). However, the major focus for research, development and commercialisation is the cultivation of algae for the production of oil-based products. While algal oils have applications as biodiesel, through the transesterification of lipids to replace fossil-derived fuels, and as feedstock for industrial chemicals, the main emphasis is on high



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