



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 -2019

3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during the years 2019

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		
							Link to website of the Journal	Link to article / paper / abstract of the article	Is it listed in UGC Care list
2019									
1	Vimentin and Non-Muscle Myosin IIA are Members of the Neural Precursor Cell Expressed Developmentally Down-Regulated 9 (NEDD9) Interactome in Head and Neck Squamous Cell Carcinoma Cells	Semelakova M, Grauzam S, Prabhakar BT , Tiedeken J, Coaxum S, Neskey DM, Rosenzweig SA	Biotechnology	Translational Oncology	2019	1936-5233	https://www.sciencedirect.com/journal/translational-oncology	https://doi.org/10.1016/j.tranon.2018.09.006	YES (Scopus)
2	A Systems Biology Approach to Identify The Key Targets Of Curcumin And Capsaicin That Down Regulate Pro-Inflammatory Pathways In Human Monocytes	Bs Sharath, Kandagalla S, H Malojirao V, G S Pk, B T Prabhakar , Hanumanthappa M	Biotechnology	Computational Biology and Chemistry	2019	1476-9271	https://www.sciencedirect.com/journal/computational-biology-and-chemistry	https://doi.org/10.1016/j.compbiolch.2019.107162	YES (Scopus)
3	Synthesis, Molecular Docking, And Apoptogenic Efficacy of Novel Heterocycle Analogs to Target B-Cell Lymphoma 2/X-Linked Inhibitors of Apoptosis Proteins to Regress Melanoma	Zabiullazabiulla, Vikas H. Malojirao, Yasser Hussein Eissa Mohammed, PrabhuThirusangu, B. T. Prabhakar , Shaikath Ara Khanum	Biotechnology	Medicinal Chemistry Research	2019	1054-2523	https://www.springer.com/journal/44	https://link.springer.com/article/10.1007/s00044-019-02357-x	YES (Scopus)
4	Synthesis of Coumarin Analogs Appended with Quinoline And Thiazole Moiety And Their Apoptogenic Role Against Murine Ascitic Carcinoma	Prashanth T, AvinBrv, Thirusangu P, Ranganatha VI, Prabhakar B T , Sharath Chandra Jnn, Khanum Sa	Biotechnology	Biomedicine and Pharmacotherapy	2019	0753-3322	https://www.sciencedirect.com/journal/biomedicine-and-pharmacotherapy	https://doi.org/10.1016/j.biopha.2019.108707	YES (Scopus)
5	Antibacterial Potential of Caesalpinia Bonducella Extracts and Their Isolated Phytoconstituents: In Vitro And in Silico Analysis	Kumar, S R S , Shastri, S.L., Venkatesh, R., Pradeepa, K. , Krishna	Biotechnology	Journal Of Applied Biology And Biotechnology	2019	2347-212X	https://jabonline.in/	https://jabonline.in/admin/php/uploads/367_pdf.pdf	YES (Scopus)
6	DNA Binding, Molecular Docking and Antimicrobial Evaluation Of Novel Azo Dye Ligand And Their Metal Complexes	Krishnamurthy G.	Chemistry	Journal of Inorganic and Organometallic Polymers and Materials	2019	1574-1451	https://www.springer.com/journal/10904	https://link.springer.com/article/10.1007/s10904-019-01394-8	YES (Scopus)
7	Electrochemical Behaviour of 5-Methoxy-5,6-Bis(3-Nitrophenyl)-4,5-Dihydro-1,2,4-Triazine-3(2H)-Thione In Presence of Salicylaldehyde On Zinc Cathode With Surface Morphology And Biological Activity	Krishnamurthy G.	Chemistry	Asian Journal Of Green Chemistry	2019	2588-5839	http://www.ajgreenchem.com/	https://doi.org/10.22034/AJGC/2020.2.3	YES (Scopus)
8	Comparitive Phenological study of the Genus Rhynchosistylis and Stylosanthes in Holalkere, Hosadurga and Chitradurga Taluks of Chitradurga District, Karnataka, India	Rachitha C J and Krishnaswamy K	Botany	Journal of Advanced Scientific Research	2019	0976-9595	https://scisage.info/index.php/JASR/index	https://www.researchgate.net/publication/358890400	YES

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9	Electrochemical Investigation of Uric Acid using MWCNTs-Decorated Novel Substituted Cobalt(II) Phthalocyanine Modified GCE	Malathesh Pari and Kallam Ramareddy Venugopala Reddy	Chemistry	Analytical and Bioanalytical Electrochemistry	2019	2008-4226	https://www.abechem.com/	https://openurl.ebsco.com/EPDB%3Agcd%3A5%3A26407157/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A139461237&url=c	YES (Scopus)
10	Synthesis, Spectral and Electrochemical Investigation of Azo-Bridged Metallophthalocyanine Polymer	Malathesh Pari, Venugopala Reddy	Chemistry	Analytical and Bioanalytical Electrochemistry	2019	2008-4226	https://www.abechem.com/	https://openurl.ebsco.com/EPDB%3Agcd%3A7%3A26407095/detailv2?bquery=IS%202008-4226%20AND%20VI%2011%20AND%20IP%204%20AND%20DT%202019&page=1&sid=ebsco:ocu:record	YES (Scopus)
11	Electrochemical determination of Chlorpromazine using ICysteine modified carbon paste electrode	Purushothama, Y Arthoba Nayaka, P Manjunatha, RO Yathisha, MM Vinay, KV Basavarajappa	Chemistry	Chemical Data Collections	2019	2405- 8300	https://www.sciencedirect.com/journal/chemical-data-collections	https://doi.org/10.1016/j.cdc.2019.10.0268	YES (Scopus)
12	An electrochemical study of Atenolol using Patton and Reeder's modified pencil graphite electrode as an electrochemical sensor	Purushothama H. T., Y. Arthoba Nayaka, Basavarajappa K. V., Yathisha R. O., Manjunatha P. and Vinay M. M.	Chemistry	International Journal of Environmental Analytical Chemistry	2019	0306-7319	https://www.tandfonline.com/journals/geac20	https://doi.org/10.1080/03067319.2019.1667989	YES (Scopus)
13	Pencil graphite electrode based electrochemical system for the investigation of antihypertensive drug hydrochlorothiazide: An electrochemical study	HT Purushothama, Y Arthoba Nayaka	Chemistry	Chemical Physics Letters	2019	0009-2614	https://www.sciencedirect.com/journal/chemical-physics-letters	https://doi.org/10.1016/j.cplett.2019.136718	YES (Scopus)
14	Electrochemical Determination of Propranolol using Reduced Graphene Oxide Modified Carbon Paste Electrode	Hanumasagara Thimmappa Purushothama, Yanjerappa Arthoba Nayaka	Chemistry	Analytical & Bioanalytical Electrochemistry	2019	2008-4226	https://www.abechem.com/	http://abechem.ir/No.%2011-2019/2019,%2011(11),%201575-1589.pdf	YES (Scopus)
15	Comparative anticorrosion performance of electrochemically produced Zn-NiO and Zn-NiO-ZrO ₂ composite coatings on mild steel	K.Deepa And T.V. Venkatesha	Chemistry	Surface Engineering and Applied Electrochemistry	2019	1068-3755	https://link.springer.com/journal/11987	https://link.springer.com/article/10.3103/S1068375519030050	YES (Scopus)
16	Sarcoxylon compunctum (Jungh.) Cooke. A new record to Western Ghats of India	Nandan Patel K J Krishnappa M, Krishna V	Botany	Journal of Mycopathological Research	2019	0971-3719	https://imskolkata.org/	https://imskolkata.org/pdf/jan_19.pdf	YES
17	Synthesis DNA Photo Cleavage Molecular Docking and Anticancer Studies Of 2-Methyquinoline G	Krishnamurthy G.	Chemistry	Chemical Biology Letter	2019	2347-9825	http://pubs.iscience.in/journal/index.php/cbl	http://pubs.iscience.in/journal/index.php/cbl/article/view/858	YES
18	Medicinal importance of usneoid lichens in Western Ghats, southern, India	Rajeshwari N., Archana R. M., Vinayaka K.S. and Ramesh Babu H.N.	Botany	Plant Archives	2019	2581-6063	http://www.plantarchives.org/	http://www.plantarchives.org/19-2/2540-2542%20(5335).pdf	YES

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19	Determining the fruit yield of <i>Jatropha curcas</i> L. Accession in hilly zones and southern transition zone of Chickmagalur and Shivamogga Districts, Karnataka, India	Ramesh Babu H.N., Rajeshwari N and Nithisha S.A.	Botany	Plant Archives	2019	2581-6063	http://www.plantarchives.org/	http://www.plantarchives.org/PDF%20SUPPLEMENT%202019/209_1226-1228.pdf	YES
20	Distribution of Bioactive Compounds in Usneoid Lichens from Western Ghats.	Archana R.M., Rajeshwari N. and Vinayaka K.S.	Botany	Plant Archives	2019	2581-6063	http://www.plantarchives.org/	http://plantarchives.org/19-2/2163-2168%20(5336).pdf	YES
21	Synthesis, spectral characterization and biological studies of Cu (II), Co (II) and Ni (II) complexes of azo dye ligand containing 4-amino antipyrine moiety	N Venugopal, G Krishnamurthy, H S Bhojyanaik, P Murali Krishna	Chemistry	Journal of Molecular Structure	2019	0022-2860	https://www.sciencedirect.com/journal/journal-of-molecular-structure	https://doi.org/10.1016/j.molstruc.2019.01.031	YES(Scopus)
22	Synthesis, DNA photocleavage, molecular docking and anticancer studies of 2-methyl-1, 2, 3, 4-tetrahydroquinolines	P J Bindu, Ravikumar Naik, K M Mahadevan, G Krishnamurthy	Chemistry	Chemical Biology Letters	2019	2347-9825	https://growing-science.com/ccl/ccl.html	https://pubs.science-in-journal/index.php/cbl/article/view/358	YES
23	Novel bioactive azo-azomethine based Cu (II), Co (II) and Ni (II) complexes, structural determination and biological activity	N Venugopal, G Krishnamurthy, H S Bhojyanaik, M Giridhar	Chemistry	Journal of Molecular Structure	2019	0022-2860	https://www.sciencedirect.com/journal/journal-of-molecular-structure	https://doi.org/10.1016/j.molstruc.2019.04.022	YES(Scopus)
24	Evaluation of Antimicrobial, Anthelmintic and Antioxidant Activities Of <i>Hopea Ponga</i> (Dennst) Bark	Vagdevi H M	Chemistry	International Journal of Pharmaceutical Sciences and Research	2019	2320-5148	https://ijpsr.com/	https://ijpsr.com/ba-article/evaluation-of-antimicrobial-anthelmintic-and-antioxidant-activities-of-hopea-ponga-dennst-bark/	NO
25	Synthesis and characterization of 2-substituted-4-(naphtha[2,1-b]furan-2-yl)-2,3-dihydrobenzo[b][1,4]thiazepine for antibacterial activity	Latha K P	Chemistry	Research Journal of Life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences	2019	2454-6358	http://rjlbpc.com/	http://www.rjlbpc.com/article-pdf-downloads/2019/27/538.pdf	NO
26	Spectral, DFT Calculations, Biological and Molecular Docking Studies of 2-[(Thiophen-2-Ylsulfanyl) Methyl]-1H-Benzimidazole Based Metal (II) Complexes	Yuvaraja TCM	Chemistry	International Journal of Scientific Research and Reviews	2019	2279-0543	http://www.ijrr.org/	https://www.ijrr.org/pdf/1605.pdf	NO
27	Improved and efficient protocol for direct regeneration from cotyledonary node of groundnut (<i>Arachis hypogaea</i> L.)	Ramesh Babu H.N., Rajeshwari N, Kiran G, Raddy P.C. and Sujatha M.	Botany	World Journal of Pharmaceutical and Life sciences	2019	2454-2229	https://www.wjpls.org/	https://www.wjpls.org/admin/assets/article_issue/41072019/1564536650.pdf	NO
28	Lichen genus <i>Usnea</i> in Karnataka	Rajeshwari N., Archana R.M. and Vinayaka K.S.	Botany	International Journal of Research in Ayurveda and Pharmacy	2020	2229-3566	https://www.ijrap.net/index.php	https://ijrap.net/admin/php/uploads/2326.pdf	NO

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							Link to website of the Journal	Link to article / paper / abstract of the article	Is it listed in UGC Care list
29	Physical Properties of Foxtail Millet (<i>Setaria italica</i> L.): Variety HMT-100-1.	Shashikalabai B. and Rajeshwari N.	Botany	International Journal of Tropical Agriculture	2019	0254-8755	https://serialsjournals.com/index.php?route=common/home	https://serialsjournals.com/index.php?route=product/product/volumearticle&issue_id=559&product_id=295	NO
30	Processing and value addition of minor millets	Rajeshwari N and Shashikalabai B	Botany	International Journal of Tropical Agriculture	2019	0254-8755	https://serialsjournals.com/index.php?route=common/home	https://serialsjournals.com/index.php?route=product/product/volumearticle&issue_id=559&product_id=295	NO
31	Comparative leaf anatomy of some species of Habenaria Wild (Orchidaceae)	Sowmya M. H. and Krishnaswamy K	Botany	International Journal of Research and Analytical Reviews	2019	2349-5138	http://ijrar.com/	https://www.ijrar.org/papers/IJRAR2002665.pdf	NO
32	Phenology of Papilionoideae members of Dummi village, Holalkere taluk, Chitradurga district, Karnataka	Rachitha C.J. and Krishnaswamy K	Botany	International Journal of Research and Analytical Reviews	2019	2348-1269	http://ijrar.com/	https://ijrar.org/viewfull.php?p_id=IJRAR19K8492	NO
33	Trans-esterification of Algal oil to produce Algal Biodiesel.	Ranjith Y and ParameswaraNaik T	Botany	International Journal for Modern Trends in Science and Technology	2019	2455-3778	http://www.ijmtst.com/index.html	http://www.ijmtst.com/volume5/issue11/25.IJMTST051183.pdf	NO
34	<i>Sarcoxydon compunctum</i> (Jung.) Cooke. A new record to Western Ghats of India.	Nandan Patel K J., Krishnappa M. and Krishna V	Botany	Journal of Mycopathological Research	2019	0971-3719	https://imskolkata.org/	https://imskolkata.org/pdf/jan_19/8%20K.J.%20NANDAN%20PATEL.pdf	NO
35	Fish Diversity In Umbleybylu Narasimha Rajapura, Backwater Of Bhadra Reservoir, Karnataka, India.	H M Ashashree, K L Naik, H A Sayeswara	Zoology	International journal of scientific research and Review	2019	2279543X	http://www.ijssr.org/	https://docslib.org/doc/6285400/fish-diveristy-in-umbleybylu-and-narasimha-rajapura-back-water-of-bhadra-rservoir-karnataka-india	NO
36	Production of Algal Biodiesel from Fresh water Algae - <i>Oedogonium</i> Spp.	Ranjith Y and ParameswaraNaik T	Botany	Journal of Information and Computational Science	2019	1548-7741	http://www.joics.org/	https://www.cabidigitallibrary.org/do/pdf/10.5555/20183312441	NO
37	Documentation of macrofungi in Thirthahalli region of Kamataka a case study	Nafeesa Begum and Kiran B.R.	Botany	International Journal of Innovative Knowledge Concepts	2019	2454-2415	https://portal.issn.org/resource/ISSN/2454-2415	https://www.semanticscholar.org/paper/Documentation-of-Macro-Fungi-in-Thirthahalli-Region-Kiran-Begum/f0ae09bdc1b772c86d24675f58c33dffe3e04a5?utm_source=direct_link	NO
38	ವಸಾಹತುಶಾಹಿ ಚಿಂತನೆ ಮತ್ತು ಗೂಗಿ ವಾತಿಯಾಗೋ	Dr. H M Nagarjuna	Kannada	ಅಭಿಜಾತ ಕನ್ನಡ	2019	2347-4017	offline	Offline	NO
39	ಕನ್ನಡ ಶಾಹಿತ್ಯಕ್ಕೆ ವಚನಕಾರರ ಕೊಡುಗೆ	Dr. H M Nagarjuna	Kannada	ಬಸವ ಪಥ	2019	2348425X	offline	Offline	NO

PRINCIPAL

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Vimentin and Non-Muscle Myosin IIA are Members of the Neural Precursor Cell Expressed Developmentally Down-Regulated 9 (NEDD9) Interactome in Head and Neck Squamous Cell Carcinoma Cells¹

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Prabhakar Betadthunga^{†,‡}, Jessica Tiedeken[†],
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Abstract

Here we demonstrate an interaction between neural precursor cell expressed, developmentally-downregulated 9 (NEDD9) and the cytoskeletal proteins vimentin and non-muscle myosin IIA (NMIIA), based on co-immunoprecipitation and mass spectrometric sequence identification. Vimentin was constitutively phosphorylated at Ser56 but vimentin associated with NEDD9 was not phosphorylated at Ser56. In contrast, NMIIA bound to NEDD9 was phosphorylated on S1943 consistent with its function in invasion and secretion. Treatment of cells with the vimentin-targeting steroidal lactone withaferin A had no effect on vimentin turnover as previously reported, instead causing NEDD9 cleavage and cell death. The NMIIA-selective inhibitor blebbistatin induced cells to form long extensions and attenuated secretion of matrix metalloproteinases (MMPs) 2 and 9. While the site of vimentin interaction on NEDD9 was not defined, NMIIA was found to interact with NEDD9 at its substrate domain. NEDD9 interactions with vimentin and NMIIA are consistent with these proteins having roles in MMP secretion and cell invasion. These findings suggest that a better understanding of NEDD9 signaling is likely to reveal novel therapeutic targets for the prevention of invasion and metastasis.

Translational Oncology (2019) 12, 49-61

Introduction

Tumor cell invasion and metastasis to distant organ sites represents the primary cause of mortality and morbidity for most cancer patients. In particular, metastasis is the final step leading to patient death from most solid tumors, including head and neck squamous cell carcinoma (HNSCC). Overexpression of Neural precursor cell expressed developmentally downregulated 9 (NEDD9) is associated with increased invasion and metastasis in multiple cancer sites and a mouse model of melanoma [1]. Indeed, it has been suggested that elevated NEDD9 expression levels may serve as a biomarker for tumor aggressiveness [2]. Consistent with this view, we [3]

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¹ Disclosure of Potential Conflicts of Interest: The authors have no conflicts of interest to declare.

² These two authors made equal contributions to this manuscript.

Received 4 September 2018; Revised 8 September 2018; Accepted 8 September 2018

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1936-5233

<https://doi.org/10.1016/j.tranon.2018.09.006>

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Research Article

A systems biology approach to identify the key targets of curcumin and capsaicin that downregulate pro-inflammatory pathways in human monocytes

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Prabhakar B.T.^b ✉, Manjunatha Hanumanthappa^{a,c} ✉

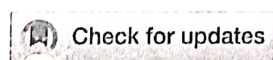
^a Department of PG Studies and Research in Biotechnology and Bioinformatics, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shivamogga, Karnataka, 577451, India

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Received 27 June 2019, Revised 25 October 2019, Accepted 7 November 2019, Available online 9 November 2019, Version of Record 18 November 2019.

? What do these dates mean?



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Highlights

- A new robust systems biology approach was applied to identify target proteins (bottleneck) in monocyte VEGF signaling pathway.
- Evaluated the role of PMA and VEGF induced abnormal regulation of bottleneck proteins viz. ICAM1, Flt-1 and NF-κB in THP-1 cell lines.
- Drug target identified using systems biology approach was evaluated for

Raj-an

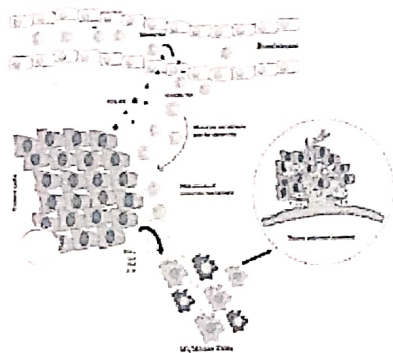
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Abstract

VEGFR1 (Flt-1), is a high-affinity tyrosine kinase receptor of VEGF found primarily on vascular endothelial cells. Recently, Flt-1 has shown to be expressed in human monocytes. However, the key intracellular signaling pathway mediated by Flt-1 receptor has been yet to be identified in monocytes. In this regard, using a robust systems biology approach, the key druggable target(s) involved in inflammatory angiogenesis mediated through VEGFR1 signaling was identified. Furthermore, experimental validation of key drug targets is conducted using PMA- and VEGF- stimulated human monocyte THP-1 cell lines. The key network pathways and corresponding disease modules were analyzed to identify the important biological processes perturbed in diseases. Using topological analysis, ICAM1 was identified as putative regulator of monocytes migration into tumor-micro environment. And these targets were examined by treating with curcumin and capsaicin molecules. Our results showed that these two molecules inhibited the over expression of targets such as ICAM1, Flt-1, and NF- κ B in the VEGFR1 signalling pathway by reducing THP-1 chemotaxis. Besides, Curcumin and Capsaicin down-regulated expression of pro-inflammatory cytokines TNF- α , IL-6, and CXCL8/IL-8 and up regulated the expression of IL-10, a sign of lowered M1/M2 ratio relating to abrogation of inflammation.

Graphical abstract



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Introduction

Inflammatory angiogenesis is regulated by formation of new blood microvessels known as neo-angiogenesis from pre-existing ones (Folkman, 1972). Although many factors and pathways are known to mediate micro vessels recruitment into the tumor site, vascular endothelial growth factor (VEGF) is one of the most studied and predominant angiogenic stimulators (Ferrara, 2000). VEGF plays a critical role in ischemic diseases such as cancer, rheumatic arthritis, and cardiovascular disease through diverse mechanisms (Isner and Asahara, 1999). The family of VEGF and its receptor systems (VEGFR1/Flt-1; VEGFR2/KDR) primarily act on two cell types: viz., endothelial cells and monocytes (Ferrara et al., 2003). The specificity of VEGF to its receptor

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Synthesis, molecular docking, and apoptogenic efficacy of novel N-heterocycle analogs to target B-cell lymphoma 2/X-linked inhibitors of apoptosis proteins to regress melanoma

Zabiulla Zabiulla¹ · Vikas H. Malojirao² · Yasser Hussein Eissa Mohammed¹ · Prabhu Thirusangu³ · B. T. Prabhakar² · Shaukath Ara Khanum¹

Received: 14 February 2019 / Accepted: 8 May 2019 / Published online: 4 June 2019
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Abstract

The novel series of piperidine conjugated benzophenone analogs with amide link **11a–l** were synthesized in a multistep process. The structures of these compounds were confirmed by IR, ¹H, ¹³C, NMR, and mass spectra and also by elemental analyses. The newly synthesized molecules were screened for selectivity against cancers of different origin through cell based assay system using B16F10, A375, A549, HepG2, ACHN, and MCF7 cells. The results postulated that compound **11f** with two bromo groups at the para position in rings A and E and two methyl groups at ortho position in rings B and D evokes target specific action against melanoma highlighting the importance of substituted groups. Down the line studies further inferred compound **11f** evokes the apoptotic cellular event leading to cell death. Investigation of eventual mechanism revealed that compound **11f** turned out to be a dual inhibitor of B-cell lymphoma-2 and X-linked inhibitors of apoptosis causing the up regulation of Bax and Bad. Further, the antiproliferative effects were mimicked in murine melanoma with similar mechanisms. Molecular docking experiments further confirmed that compound **11f** possessed a superior affinity for of B-cell lymphoma-2 and X-linked inhibitors of apoptosis through strong hydrogen bonds. The study implies the identification of compound **11f** with selective target against melanoma by inducing apoptogenic effect, which could be the future hope for the treatment of skin cancer.

Keywords Benzophenone · Piperidine · Melanoma · Apoptosis · of B-cell lymphoma-2 · X-linked inhibitors of apoptosis

Introduction

Skin cancers are by far the most common malignancy of humans and millions of cases detected each year (Gupta et al. 2016). The growing incidence of cutaneous malignancies has heralded the need for multiple treatment options. Although many therapeutic strategies available in the modern era, new research and fresh innovation are still required to reduce morbidity and mortality and urgent approaches for skin cancer may pass through new compounds. One of the most effective ways to combat skin cancers is through early diagnosis and administration of effective treatment with target specific drugs. Further, follow up and efficient monitoring will allow physicians to detect relapsing diseased condition.

Apoptosis, a normal physiological form of cell death, is critically involved in the regulation of cellular homeostasis. In normal physiological condition, the fate of the cells depends on the cellular microenvironment. Any

Supplementary information The online version of this article (https://doi.org/10.1007/s00044-019-02357-x) contains supplementary material, which is available to authorized users.

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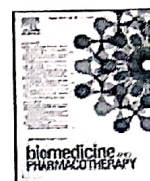

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Biomedicine & Pharmacotherapy

journal homepage: www.elsevier.com/locate/bioph

Synthesis of coumarin analogs appended with quinoline and thiazole moiety and their apoptogenic role against murine ascitic carcinoma

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ARTICLE INFO

Keywords:

Coumarin
Thiazole
Quinoline
Antiproliferation
In vitro
In vivo

ABSTRACT

The synthesis and antiproliferative effect of a series of quinoline and thiazole containing coumarin analogs 12a-d and 13a-f respectively, on mice leukemic cells was performed. The chemical structures of newly synthesized compounds were confirmed by IR, ¹H NMR, ¹³C NMR and mass spectral analysis. The result indicates that, 7-methoxy-2-oxo-2H-chromene-3-carboxylic acid [4-(4-methoxy-phenyl)-thiazol-2-yl]-amide (13f) showed potent activity against EAC and DLA cells in MTT (15.3 μM), trypan blue (15.6 μM) and LDH (14.2 μM) leak assay with 5-fluorouracil as a standard. Further, the anti-neoplastic effect of the compound 13f was verified against Ehrlich ascites tumour by BrdU incorporation, TUNEL, FACS and DNA fragmentation assays. Experimental data showed that compound 13f induces the apoptotic cell death by activating apoptotic factors such as caspase-8 & -3, CAD, Cleaved PARP, γ-H2AX and by degrading genomic DNA of cancer cells and thereby decreasing the ascitic tumour development in mice. Besides, compound 13f was also subjected for docking studies to approve the *in vitro* and *in vivo* studies. The data revealed that the compound 13f has very good interaction with caspase 3 protein by binding with amino acid Arg 207 through hydrogen bond.

1. Introduction

Cancer cells have progressed hallmark mechanisms to escape from death. One of the hallmarks in the advancement of cancer cells is an ability to overcome and acquire resistance to adverse conditions and thereby become immortal [1]. Cancer cells escapes from the apoptosis because of the disturbance of spatiotemporal behavior of signaling cascades in cancer cells and down regulation of tumour suppressor genes and over expression of oncogenes [2]. Impairment of this native defense mechanism of a cancer cell, promotes aberrant cellular proliferation and the accumulation of genetic defects, ultimately resulting in tumorigenesis, and frequently confers resistance towards the drug [3]. Many researchers have gained their interest in developing anticancer agents by killing the cancer cells, mainly mediated through the activation of apoptosis [4,5].

Coumarins are one such set of candidates for the apoptosis targeted therapy and it has gained much attention for its ability to preferentially kill cancer cells. Structurally, coumarins, also known as benzopyran-2-

ones and it is known to be a good class of naturally occurring compounds that possess promising therapeutic perspectives. Due to diversity in their structural complexity, these, ranging from simple substituted coumarins to polysubstituted polycyclic/fused coumarins gained a great attention due to their wide range of biological properties [6–9], usually associated with low toxicity [10,11]. Furthermore, their cancer chemo preventive properties have been recently emphasized [6,12]. The apoptosis and differentiation induced activities of coumarins extend to several different cell line models *in vitro*, and they appear to be the most promising in terms of cancer treatment [13]. On the other hand, quinoline and thiazole derivatives play an important role in showing anticancer activity [14–17]. In the light of these facts, and as a continuation of our previous reported work [18–20], we planned to synthesize a novel series of coumarin analogs bearing a quinoline 12a-d and thiazole moiety 13a-f, in order to study their structure activity relationship and to screen for a potent apoptogen against carcinoma. These results were also further supported by *in silico* studies [21,22].

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<https://doi.org/10.1016/j.bioph.2019.108707>

Received 20 November 2018; Received in revised form 18 February 2019; Accepted 19 February 2019
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Antibacterial potential of *Caesalpinia bonducella* extracts and their isolated phytoconstituents: *In vitro* and *in silico* analysis

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ARTICLE INFO

Article history:

Received on: July 30, 2018

Accepted on: August 29, 2018

Available online: April 05, 2019

Key words:

Caesalpinia bonducella,
Antimicrobial activity,
Molecular docking study

ABSTRACT

The antimicrobial activity of *Caesalpinia bonducella* extracts such as CLC, CLE, CSC, and CSE and the phytoconstituents such as β -Sitosterol (LC3) isolated from CLC and methyl (4*E*)-5-{2-[(1*E*)-buta-1,3-dien-1-yl]-4,6-dihydroxyphenyl} pent-4-enoate (SC2) isolated from CSC were evaluated on gram-positive and gram-negative bacteria. The extracts and isolated compounds were found to have moderate-to-significant bacterial inhibition. The significant activity was observed in the inhibition of *Pseudomonas aeruginosa* by CLC extract (16.10 ± 1.10 mm), whereas the isolated phytoconstituent SC2 showed the highest inhibition (16.50 ± 0.58 mm). Further, the isolated compounds were subjected to molecular docking studies of the bacterial DNA Gyrase. The *in silico* study showed the docking energy of -6.4 and three hydrogen bonding. This *in vitro* and *in silico* analysis of extracts and isolated phytoconstituents of *C. bonducella* helps to understand and evaluate the therapeutic efficacy to cure infectious diseases and also supports the traditional medicinal claim as an antibiotic.

1. INTRODUCTION

One-third of global mortality is due to the infectious diseases because multidrug resistance pathogens are in escalation. Due to the restricted access to proper medicine and side effects caused by synthetic drugs, in many countries, people are still using herbal plants to treat the most prevalent infections (WHO, 2010) [1,2]. Hence, many studies have, therefore, been conducted to reveal the active phytoconstituents in such herbal plants. The present investigation is focusing on a threatened medicinally important legume species *Caesalpinia bonducella* (Roxb.). *C. bonducella* is classified under the family of Caesalpiniaceae. Commonly, it is called as Fever Nut and Bonduc Nut [3]. Leaves, seeds, stem, bark, nuts, and roots are used as herbal medicines. It is found in hotter parts of India, especially in Karnataka, and in the Western Ghats of India. In the conventional system of Indian medicine, Ayurveda, *C. bonducella* (Roxb.) is largely used for its antiperiodic, antipyretic, anti-inflammatory, anthelmintic, and antimalarial properties. It is also described to have antioxidant, antibacterial, antitumor, and antidiabetic activities [4].

The *C. bonducella* extracts and isolated phytoconstituents were screened for antibacterial activity against strains of the most common

pathogenic Gram-positive bacteria, namely *Bacillus subtilis*, and Gram-negative bacteria, namely *Pseudomonas aeruginosa* and *Escherichia coli*. The *in silico* analysis was done by docking the isolated phytoconstituents with bacterial DNA gyrase. DNA gyrase is an enzyme that influences all metabolic processes involving DNA by regulating negative supercoiling of bacterial DNA and is essential for replication. Inhibition of gyrase subunit affects breakage and rejoining of DNA and blocks relaxation of supercoiled DNA, thereby affecting metabolic pathways, transcription, and replication [5,6]. The *in silico* analysis was carried out in support to the *in vitro* antibacterial activity of extracts and isolated phytoconstituents of *C. bonducella*.

As to study the detailed antibacterial potential of extracts, phytoconstituents, and therapeutic efficacy to cure infectious diseases and also to authenticate the traditional medicinal claim of *C. bonducella*, this objective was taken and has been carried out accordingly. In the present investigation, effort has been made to authenticate the traditional value of *C. bonducella* against antimicrobial activity of extracts and phytoconstituent by *in vitro* and *in silico*.

2. MATERIALS AND METHODS

2.1. Extraction and Isolation of Phytoconstituent

The leaves and stem bark of *C. bonducella* were collected from Shimoga, Karnataka, during October, and the plant material was authenticated by Prof. Y L Krishnamurthy, Department of Applied Botany, Kuvempu University (Voucher Specimen No: KUAB301).

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DNA Binding, Molecular Docking and Antimicrobial Evaluation of Novel Azo Dye Ligand and Their Metal Complexes

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Received: 24 October 2019 / Accepted: 16 November 2019
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Abstract

In the present work, the synthesis of novel azo dye ligand 6-hydroxy-4-methyl-2-oxo-1-propyl-5-[(E)-1,3-thiazol-2-ylidiaz-enyl]-1,2-dihydropyridine-3-carbonitrile (L) and its Cu(II), Co(II) and Ni(II) transition complexes were prepared. The newly formed compounds were characterized by elemental analysis, UV-Vis, FT-IR, ¹H NMR, LC-MS, TGA and magnetic susceptibility measurement. The molar conductance indicates that all the metal complexes are non-electrolytic in nature. Based on spectral data indicate square planar geometry was deduced for Cu(II) and Ni(II) complexes, Co(II) complex has tridentate chelation of ligand and produce an octahedral geometry around the metal ion. Additionally, the computational study has been performed using density functional theory (DFT) calculation was used to study the electronic structure of synthesized ligand and their complexes. The in vitro antimicrobial activity of the azo dye ligand and its complexes was tested against Gram +ve bacteria (*Bacillus subtilis*), Gram -ve bacteria (*Escherichia coli*), yeast (*Candida albicans*) and fungus (*Aspergillus flavus*). All the complexes showed enhanced biocidal activity compared to the free ligand. Moreover, azo dye ligand and its metal complexes have been studied for their antioxidant activity. The DNA-binding activity of metal complexes (1a–1c) was studied by electronic absorption spectroscopy and fluorescence spectroscopy. All the complexes bound to CT-DNA through an intercalation mode. Additionally, all the metal complexes act as good cleavage agents against the pBR322 DNA. The computer-aided molecular docking studies of metal complexes with the receptor of GlcN-6-P synthase showed that metal complexes are potent drugs for the target enzymes.

Keywords Azo dye · Metal chelates · TGA · DFT · DNA binding · Molecular docking

1 Introduction

Nitrogen and sulfur bearing heterocyclic compounds have widely studied due to their diverse biological properties and their role as pharmacophores of great historical significance

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s10904-019-01394-8>) contains supplementary material, which is available to authorized users.

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[1–3]. Azo dyes are the potential class of organic compounds bearing one or more azo (–N=N–) chromophoric group, which possess unique numerous properties containing molecular aggregation, optical data storage, CD, DVD and Blue-ray discs. In addition to that, they are engaged in various fields such as dying in textile fibers plastics, leather, metal foil food, cosmetics, toys and plastic, biological and clinical investigations and even the organic synthesis [4–6]. Thiazolylazo dyes are obtained from 2-aminothiazole are significant because they can form various types of coordination compounds due to several electron rich donor centers with unusual geometrical structural, electronic features and chemical properties, owing to their high sensitivity and selectivity thiazolylazo dyes has been extensively studied [7–10]. Metal complexes of sulphur-nitrogen chelating ligands are received significant attention due to their fascinating physico-chemical properties and marked bioactivity. In addition to that the metal complexes having thiazole system exhibit a wide range of potential medicinal applications, including antibacterial, anticancer, antifungal,

Published online: 26 November 2019

Springer

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Original Research Article

Electrochemical behaviour of 5-methoxy-5,6-bis(3-nitrophenyl-4,5-dihydro-1,2,4-triazine-3(2H))-thione in presence of salicylaldehyde on zinc cathode with surface morphology and biological activity

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ARTICLE INFORMATION

Received: 21 January 2019
Received in revised: 26 February 2019
Accepted: 3 March 2019
Available online: 12 May 2019

DOI: 10.22034/AJGC/2020.2.3

KEYWORDS

Electrolysis
Surface morphology
Organic electro-synthesis
Cathode

ABSTRACT

This paper presents an innovative, green and organic electro synthesis in order to prepare Schiff base product by the reduction of 5-methoxy-5,6-bis (3-nitrophenyl-4,5-dihydro-1,2,4-triazine-3(2H))-thione followed by the condensation on zinc cathode in aqueous alkaline ethanol media in the presence of salicylaldehyde at room temperature. The main characteristic of this proposal is the electro-reduction and electro-condensation. The bulk electrolysis at constant potential was performed in a three-electrode undivided cell in order to prepare Schiff base. In this sense, good yields and easy purification were achieved. Results indicate that the reduction produced high current in the cell and succeeded a green chemistry process. Products were characterized by IR, NMR (^1H , ^{13}C), and SEM.

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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 taluks 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* (Retz.) 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 taluk covers approximately 1450 square kilometres and is located between 13° 47' 52"N latitude and 76° 17' 4" E longitudes, while Holalkere taluk 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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Full Paper

**Electrochemical Investigation of Uric Acid using
MWCNTs-Decorated Novel Substituted Cobalt(II)
Phthalocyanine Modified GCE**

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Received: 24 July 2019 / Received in revised form: 17 October 2019 /

Accepted: 19 October 2019 / Published online: 31 October 2019

Abstract- The present work is very simple and sensitive method for cyclic voltammetry, differential pulse voltammetry and chrono amperometry (CA). Uric acid sensor was developed at (DBCMAT-CoPcs) 2,4-dibromo-6-{{cyclohexyl(methyl)amino}methyl}aniline-tetra substituted on cobalt phthalocyanine modified GCE. The novel synthesized catalyst confirmed with various spectroscopic techniques. The modified DBCMAT-CoPc/GCE showed a high electrocatalytic activity and lower potential towards the oxidation of uric acid (UA). The response of UA was linear over the concentration ranging from (CV 0.1–1.8; DPV 0.2–2.8; CA 0.05–0.8 $\mu\text{mol/L}$), sensitivity for (CV 131.85; DPV 22.634; CA 2.509 $\mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$) and detection limit for (CV 0.03; DPV 0.066; CA 0.016 μM) (S/N=3). The CVs and DPV techniques shows the same peak potential (+370 mV) and fabricated sensor exhibited its special advantages such as low working potential, sensitivity along with good repeatability and reproducibility for the determination of uric acid.

Keywords- Cobalt phthalocyanine, Cyclic voltammetry, Differential pulse voltammetry, Amperometry, Uric acid, Chemically modified electrode


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Full Paper

Synthesis, Spectral and Electrochemical Investigation of Azo-Bridged Metallophthalocyanine Polymer

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Received: 22 December 2018 / Received in revised form: 20 March 2019 /

Accepted: 25 March 2019 / Published online: 30 April 2019

Abstract- Title compounds were synthesized by a very simple method by the polymer condensation of the tetracarboxylic metal phthalocyanine with 4-[(Z)Phenyldiazenyl benzene-1,3-diol]. The Proposed method is an excellent method for the synthesis for azo-bridged coupling polymer phthalocyanine. This complex shows very good solubility in many organic solvents like ethanol, THF, DMF and DMSO. The synthesized compounds were subjected for radical scavenging ability using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) and using standard Butylated hydroxyanisole. The compound (4) shows the best scavenging ability among the other tested compound compared to the standard. The electrochemical redox property of the azo-bridged polymer of tetracarboxylic copper phthalocyanine was explored using GCE in buffer solution (pH 4.0). Using Amperometry technique a highly selective and simultaneous determination of DA and AA has been explored at the modified GCE. Amperometric peak currents of dopamine and Ascorbic acid increased linearly with their concentration at the range of 2 μM to 140 $\mu\text{mol L}^{-1}$ and 0.5 to 400 $\mu\text{mol L}^{-1}$, with LOD 0.66 $\mu\text{M/L}$ and 0.165 $\mu\text{M/L}$ and slope was 03 $\mu\text{A}\mu\text{M}^{-1}$ and 8.833 $\mu\text{A}\mu\text{M}^{-1}$ with a correlation coefficient of 0.9998 and 0.9953. No significant interference for the determination of ascorbic acid and dopamine was detected at 0.4 V during an addition of various compounds.

Keywords- Soluble metallophthalocyanines, azo-bridged coupling polymer, Spectral studies, Dopamine, Ascorbic acid


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Full Paper

**Electrochemical Determination of Propranolol using
Reduced Graphene Oxide Modified Carbon Paste
Electrode**

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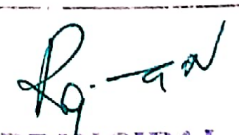
Received: 25 September 2019 / Received in revised form: 15 November 2019 /

Accepted: 17 November 2019 / Published online: 30 November 2019

Abstract- In present work, a cardiovascular drug, propranolol (PROP) has been investigated using reduced graphene oxide modified carbon paste electrode (rGO-CPE). A simple, selective and sensitive method has been developed using cyclic voltammetry (CV), differential pulse voltammetry (DPV), square wave voltammetry (SWV) and electrochemical impedance spectroscopy (EIS). At pH-7.0 in 0.1 M phosphate buffer solution (PBS) PROP shows excellent electrooxidation process on rGO-CPE. The EIS data provides charge transfer resistance behaviour at carbon paste electrode (CPE, 96.6 k Ω) and rGO-CPE (46.7 k Ω), which shows the increased electron transfer process at rGO-CPE. The linear calibration curves were obtained in the concentration range of 0.1–2.5 μ M (for DPV) and 0.1–5.0 μ M (for SWV), respectively. The lower limits of detection values were found to be 0.4×10^{-8} M and 0.2×10^{-9} M, respectively. The effect of pH, scan rate, electrode kinetics, electroactive surface area, sensitivity and selectivity on the determination of PROP has been studied. The modified electrode rGO-CPE has been successfully employed for the determination of PROP present in pharmaceutical sample.

Keywords- Cyclic voltammetry, Carbon paste electrode, Electrochemical impedance spectroscopy, Propranolol, Square wave voltammetry

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13

2019



ARTICLE

An electrochemical study of Atenolol using Patton and Reeder's modified pencil graphite electrode as an electrochemical sensor

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ABSTRACT

An electrochemical sensor has been developed using Patton and Reeder's reagent which is electropolymerised on pencil graphite electrode (PR-PGE) for the selective and sensitive determination of Atenolol (ATN). The cyclic voltammetry, differential pulse voltammetry and electrochemical impedance spectra were used to check the analytical applicability of the proposed sensor for the investigation of ATN. To achieve better electrochemical response, the parameters such as pH, scan rate and electron transfer kinetics were determined. Under optimum experimental conditions, the linear calibration curve shows concentration linear range of 0.1–1.8 μM and the limit of detection 4.9×10^{-8} M. The proposed sensor shows better selectivity towards the determination of ATN in presence of organic and inorganic interfering species. The analytical performance of the PR-PGE has been studied successfully by determining ATN present in the pharmaceutical sample.

ARTICLE HISTORY

Received 13 August 2019
Accepted 9 September 2019

KEYWORDS

Atenolol; cyclic voltammetry;
differential pulse
voltammetry;
electrochemical impedance
spectroscopy

1. Introduction

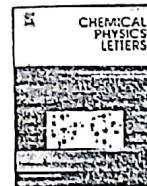
β -Blockers are most widely used as antihypertensive and also for the treatment of glaucoma. Atenolol (ATN) (4-(2-hydroxy-3-isopropylaminopropoxy) phenylacetamide, Scheme 1) is one of the β_1 -selective adrenoceptor antagonist without any partial agonist or membrane stabilising activity [1]. It is used to treat cardiac arrhythmia, myocardial infarction, angina pectoris, alcohol withdrawal, migraine prophylaxis, tremors and hyperthyroidism [2,3]. ATN shows low lipid solubility and it does not cross the blood–brain barrier easily. Its absorption in gastrointestinal tract is low and oral bioavailability will be around 50%. Small amount of absorbed portion of ATN is metabolised and most of it is excreted in the urine [4]. When ATN administered to hypertensive patients, the pharmacodynamic study shows reduction in both systolic and diastolic blood pressure by about 15%. Usually, the dose of 100 or 200 mg of ATN shows maximum effect but the effective result was observed in the third day of therapy. In comparison with other β -blockers, ATN shows a reduction in blood pressure frequently by lowering the heart rate (15–20%) and cardiac output (20%) [5]. Higher doses of ATN may lead to some serious consequences such as bradycardia, sinus pause, lethargy, congestive heart failure, disorder of respiratory drive, wheezing, hypotension, bronchospasm

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Research paper

Pencil graphite electrode based electrochemical system for the investigation of antihypertensive drug hydrochlorothiazide: An electrochemical study

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HIGHLIGHTS

- For the first time a combined electrode system (TyB-GGG) was introduced.
- Good electrocatalytic performance of TyB-GGG towards the analyte determination.
- Present method replaces the reference electrode and also liquid junction potential.
- TyB-GGG successfully employed for the analysis of Hydrochlorothiazide (HTZ).

ARTICLE INFO

Keywords:

Combined electrode system
Electrochemical method
Hydrochlorothiazide
Pencil graphite electrode
Square wave voltammetry
Trypan blue

ABSTRACT

A Trypan Blue modified combined pencil graphite electrode system (TyB-GGG) has been employed for the electrochemical investigation of Hydrochlorothiazide (HTZ). The linear calibration curves were obtained in the concentration range of 0.5–7 μM (for DPV) and 0.1–5 μM (for SWV), respectively. The detection limits were found to be 0.1327 μM and 0.0320 μM , respectively. The electrodes resistance has been studied using electrochemical impedance spectroscopy (EIS). The modified electrode TyB-GGG has been successfully employed for the determination of HTZ present in pharmaceutical sample.

1. Introduction

The conventional voltammetric system constitutes reference (Ag/AgCl or calomel electrode), counter (platinum), and working (pencil graphite/carbon paste/boron-doped diamond/glassy carbon etc.) electrodes which inter related to give complete circuit and help in determining the electroactive species (analyte). The inert counter electrode probes current from external circuit through the cell and doesn't involve in any chemical change during the electrolysis. On working electrode the reaction of interest occurs in which the redox behaviour of analyte is explored. Similarly, the reference electrode maintains the constant potential so that the potential of molecule of interest has been studied easily. The first three electrode system was introduced by A. Hickling in 1942 and he named it as Potentiometer [1].

For such electrode systems various reference electrodes were used to investigate the electroactive molecule. The reference electrodes such as saturated calomel electrode and Ag/AgCl electrodes were most commonly used in electrochemical analysis. Non-polarizability is a characteristic feature of such reference electrodes which inhibits the overpotential. But these electrodes show some of the drawbacks such as

disintegration of the electrode material, downscaling, leakage of the reference solution and contamination at the junction of salt bridges [2]. Liquid junction potential in these electrodes leads to the kinetic, static and stirring errors and also these electrodes are not suitable for non-aqueous solution because it varies potential from 10 to 100 mV [3,4]. Various solid state reference electrodes have been developed to overcome such problems such as solid Ag/AgCl with perfluorocarbon coated electrode [5], Ag/AgCl ink screen printed onto platinum on silicon electrodes [6], and Ag/AgCl with solidified KCl melt electrodes [7]. But these electrodes pose lengthy preparation procedure, difficulties in polishing and reusability.

The pencil graphite electrode (PGE) has got more prominence among various electrodes such as glassy carbon electrode, carbon paste electrode, gold electrode, and boron doped diamond electrode. This is because of the high electrical conductivity, electrochemical reactivity, sensitivity, low-cost, ease of modification, disposability and commercial availability [8,9]. Various pencil graphite leads are independent of hardness and have lower resistance than 5 Ω [10]. PGE shows larger potential window compared to other carbon based electrodes and it can be extended to more negative values compared to gold or silver

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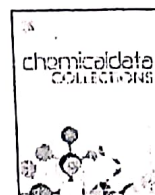
Received 5 August 2019; Received in revised form 25 August 2019; Accepted 26 August 2019

Available online 30 August 2019

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Data Article

Electrochemical determination of Chlorpromazine using L-Cysteine modified carbon paste electrode

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ARTICLE INFO

Article history:

Received 19 June 2019
Revised 16 August 2019
Accepted 22 August 2019
Available online 25 August 2019

Keywords:

Chlorpromazine
Carbon paste electrode
Electrochemical impedance spectroscopy
L-cysteine
Square wave voltammetry

ABSTRACT

The L-Cysteine modified carbon paste electrode (Cys-CPE) has been employed for the electrochemical determination of Chlorpromazine (CPM). The anodic behaviour of CPM was investigated by cyclic voltammetry (CV), differential pulse voltammetry (DPV) and square wave voltammetry (SWV). The Cys-CPE showed enhanced electrochemical conductivity and ease of electron transfer towards the oxidation of CPM in the potential range of 0.2 V to 1.2 V in 0.1 M phosphate buffer solution (PBS). Electrochemical impedance study (EIS) showed the charge transfer resistance at CPE (241.4 Ω) and Cys-CPE (219.5 Ω). Under the optimum experimental conditions the anodic peak current increased linearly with concentration of CPM in the range of 1–35 μ M (for DPV) and 0.8–3.4 μ M (for SWV), respectively. The detection limit for DPV and SWV were respectively found to be 0.0119 μ M and 2.436 nM. The proposed method was successfully employed for the determination of CPM present in pharmaceutical samples.

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Specifications Table

Subject area	Physical Chemistry and Analytical Chemistry
Compounds	Chlorpromazine, L-Cysteine
Data category	Electrochemical
Data acquisition format	Voltammograms, differential pulse voltammetry, square wave voltammetry, Characterization of the data.
Data type	Analyzed
Procedure	Description of procedure
Data accessibility	Data is with this article

1. Rationale

Chlorpromazine (CPM), (2-chloro-10-(3-dimethylaminopropyl) phenothiazine), is a phenothiazine derivative drug which is widely being used in the treatment of bipolar disorder, schizophrenia, manic depressive illness and also for controlling excitation [1,2]. CPM is also used to treat nausea and vomiting, and also for the relief of restlessness and apprehension before surgery [3,4]. It is easily bound to plasma proteins (92–97%), principally to albumin [5,6]. CPM acts on the blood-brain barrier, and concentration of the drug in the brain is higher than those in plasma [7]. It is well known that the minimum

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<https://doi.org/10.1016/j.cdc.2019.100268>

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Comparative Anticorrosion Performance of Electrochemically Produced Zn–NiO and Zn–NiO–ZrO₂ Composite Coatings on Mild Steel

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Received February 9, 2018; revised November 7, 2018; accepted November 9, 2018

Abstract—Zinc composite coatings of Zn–NiO and Zn–NiO–ZrO₂ were produced by electrodeposition on mild steel using a Zn-sulphate bath. The homogeneous dispersion of the metal oxide nanoparticles for composite coating was achieved by magnetic stirring of the bath solution for about 6 h. The surface characteristics were examined by scanning electron microscopy supported by energy dispersive spectroscopy. The hydrophobic nature of the deposits has been determined by contact angle images of the deposits. The comparative corrosion resistive property of Zn, Zn–NiO and Zn–NiO–ZrO₂ deposits was investigated by using a corrosion medium of 3.65% NaCl solution. The corrosion resistance performance of the coatings was analyzed by the Tafel polarization and electrochemical impedance spectroscopy.

Keywords: Zn-composite coating, electroplating, scanning electron microscopy, Tafel, electrochemical impedance spectroscopy

DOI: 10.3103/S1068375519030050

INTRODUCTION

Steel is a major component in most of the manufacturing fields such as automobile, chemical and oil-gas industries and also in marine applications due to its great mechanical stability, low cost and ease of availability [1, 2]. Eventhough, steel has good mechanical strength; it has a critical issue that which is go through the corrosion easily in marine environments because of salinity and humidity. The steel surface undergoes deterioration and may loss in the form of rust [3, 4]. Corrosion of steel is an unwanted natural process therefore efforts have been made to control this effect by the application of protective coatings thereby making the maintenance of steel articles and its service life longer [5, 6]. Zinc coatings on steel substrates have been extensively used as suitable protection. A thin layer of a zinc (Zn) coating generated through electroplating on a steel substrate provides maximum corrosion protection under harsh atmosphere. Although a zinc surface acts as a corrosion barrier for a steel substrate, gradually the service life of the coating reduces due to white rust corrosion of zinc. It can be minimized by chrome passivation which enhances the service life of zinc coatings considerably but chromium salts are highly hazardous to the surrounding environment [7–9]. Thus the Zn-coating

service life enhancement was essential and has been achieved through the application of a good zinc-composite coating on the steel surface. Many investigations focused on ceramics [10–12], metal carbides [13, 14], polymers [15–17] and metal oxides nanoparticles [18–20] as composite materials for coatings, the substances that are good anticorrosive agents.

Among all other reinforcing agents, metal oxide nanoparticles found great interest in Zn-composite coatings due to their better corrosion performance than conventional zinc coatings. The ease of preparation and availability of metal oxide nanoparticles made them a huge range of usage in the fabrication of composites. Various metal oxide nanoparticles like CeO₂ [21], ZnO [22], TiO₂ [23], V₂O₅ [24], NiO [25], ZrO₂ [26] etc., have been used in metal coatings as bath additives to generate metal composites. The ease of incorporation and homogeneous dispersion of nanoparticles in plating bath solutions allows obtaining good stable coatings with higher anticorrosive and mechanical properties compared to those of pure zinc coatings [27, 28]. During last years, mixed metal oxides have received great attention in metal-composites preparation because of their advanced chemical and physical properties compared to those of their constituent oxides. The wear and corrosion behaviour


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J. Mycopathol. Res. 56(4) : 273-274, 2019; (ISSN 0971-3719)
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University of Calcutta, Kolkata 700 019, India

SHORT COMMUNICATION

Sarcoxylon punctum (Jungh.) Cooke. A new record to Western Ghats of India

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Received : 17.10.2018

RMs Accepted : 19.11.2018

Published : 28.01.2019

Western Ghats of India received greater importance because of the rich biodiversity. Xylariaceae is one of the largest families among Ascomycota, during exploration of Xylariales members in central Western Ghats regions of Karnataka, India, a gigantic Xylariaceae member was observed, studied and characterized on the basis of morphology and anatomical characters and identified as *S. punctum*.

Key words: Ascomycota, diversity, saprophytic, Xylariaceae

Xylariaceae of Ascomycota comprises of 85 genera and more than 1300 species across the globe (Patel and Krishnappa, 2017). These members were having variation in their morphology and anatomical characters (Suwannasai *et al.* 2012), they are major saprophytes, weak pathogens also rarely found on termite nests and as Coprophilous (Patel *et al.* 2018). These members play important role in litter decomposition in forest. Western Ghats region of peninsular India characterized by variation in their geography and rich biotic resources including macro fungal diversity. This region covers an area of 16000 km² and lies in between 8°20' - 20° 40' N and 73°-77° E (Ramachandra *et al.* 2012). It covers Gujrat, Maharashtra, Goa, Karnataka, Kerala and Tamilnadu states (Radhakrishnan and Rajmohana, 2012). Many researcher have worked on the macro fungi in this region but Xylariaceae members were still not studied completely, this species record forms an addition to the fungi of Western Ghats of India.

Frequent field survey were conducted to explore the Xylariaceae members in central Western Ghats regions of Karnataka, India, during July to September 2018. A gigantic Xylariaceae member was recorded in the Jambekoppa forest region of Shivamogga district, Karnataka, India. Photographs were taken in their natural habitat

using Nikon 3300 Digital SLR camera, geographical ranges were recorded using Garmin 650 GPS system, and field notes were taken with respect to their morphological characters and collected without causing any damage to sporocarp and brought to laboratory for further analysis. Anatomical and morphological studies were made using Olympus CH20i binocular and Olympus SZ Stereo microscope, hand sections were used for the studying anatomical characters like Perithecia, ascus, asci and ascospores. The name of the taxa was authenticated and confirmed by using <http://www.mycobank.org> and <http://www.indexfungorum.org/names/names.asp>.

Taxonomic description

Sarcoxylon punctum (Jungh.) Cooke, Grevillea 13 (68): 107 (1885) [MB#118870]
=*Hypoxylon punctum* (Jungh.) Fr., Nova Acta Regiae Societatis Scientiarum Upsaliensis 1: 114 (1851) [MB#204305]
=*Xylaria compuncta* (Jungh.) Berk. Hooker's Journal of Botany and Kew Garden Miscellany 6: 204 (1854) [MB#184640]
=*Sarcoxylon compuncta* (Jungh.) Cooke (1885) [MB#236026]
=*Penzigia compuncta* (Jungh.) Sacc. & Paol. Attidell' Istituto Veneto Scienze 6: 387-428 (1888) [MB#245471]
Stromata solitary or fused sometime found in cluster, hemispherical to globose stroma with a

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Chemical Biology LETTERS

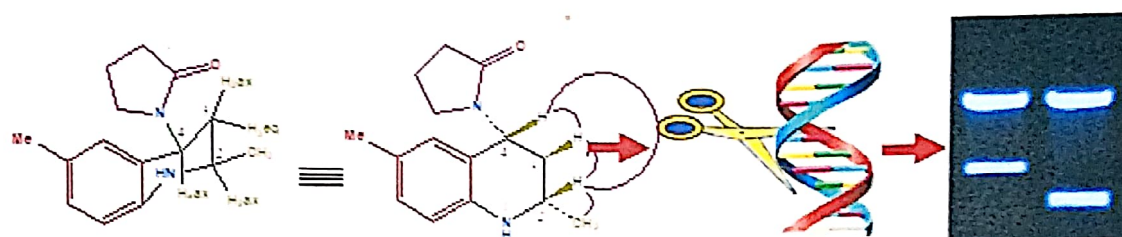
ISSN 2347-9825

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Synthesis, DNA photocleavage, molecular docking and anticancer studies of 2-methyl-1,2,3,4-tetrahydroquinolines

P.J. Bindu, Ravikumar Naik, K.M. Mahadevan, G. Krishnamurthy

Abstract

2-Methyl-1,2,3,4-tetrahydroquinolin-4-ylpyrrolidin-2-ones (**3a-h**) were synthesized by one pot multicomponent aza Diels-alder reaction between *N*-arylimines with two molecules of *N*-vinyl-2-pyrrolidinone in presence of Sm(III)nitrate as catalyst in acetonitrile solvent at room temperature stirring. The photocleavage studies with 2-methyl-1,2,3,4-tetrahydroquinolin-4-ylpyrrolidin-2-ones (**3a-h**) revealed that almost all derivatives exhibited effective photocleavage of pUC19 DNA at 365 nm. The anticancer activities of newly synthesized compounds (**3a-h**) were more potent than doxorubicin on MCF7 cells. The docking of PBR receptor (1EQ1) protein with newly synthesized THQs (**3a-h**) exhibited well established bonds with one or more amino acid the receptor active pocket.

Keywords

Sm(III)nitrate; tetrahydroquinolin; DNA-Drug; photodynamic therapy; singlet oxygen;

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MEDICINAL IMPORTANCE OF USNEOID LICHENS IN WESTERN GHATS, SOUTHERN INDIA

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Abstract

Usnea Adans. is a large genus in the family Parmeliaceae with about 451 species that are widely distributed in polar, temperate and tropical regions of the world. The genus is recognized based on the fruticose thallus, branches with cartilaginous central axis and the presence of Usnic acid in the cortex. India is represented by the 60 species of *Usnea* among them 38 are recorded from the Western Ghats. *Usnea* has been used to treat various illnesses in addition to its historical use as dyes, cosmetics, preservatives and deodorants. Among the 38 species of *Usnea* in Western Ghats, 15 species are known to have medicinal values, in various traditional medicines in different part of the world. The secondary metabolites like Usnic acid, salazinic acid, stictic acid, diffractic acids produced by lichens are unique with respect to those of higher plants. Whole thallus is used in the preparation of medicines. *Usnea longissima* is used as an ingredient in the medicinal for bone settings, *U. ghattensis* is known for its antioxidant and anti microbial activity. The study aims at the medicinal value of less known group of plants and role of their bioactive compounds.

Key words : *Usnea*, medicinal lichens, Parmeliaceae

Introduction

Lichens are unique group of organisms showing symbiotic association between algae and fungi. These lichens have been used as a house hold item since ancient days. The medicinal uses of lichens have been recorded from different cultures in Europe, India, China, Tanzania, USA, South Africa, Nepal, Philippines, West Malaysia, Spain, Brazil, Argentina, Korea, Tibet, Russia, Japan, Mangolia, Canada, Libia, Ireland (Prateeksha *et. al.*, 2016). Shipal in Atharveda is the first record of the use of lichen as medicine. In Ayurveda, the Indian medicinal system, it has been widely used in the name of Charila. The Indian subcontinent harbours a rich lichen flora with 2,450 species (Awasthi, 2000). Lichens collected from the different part of India have been used indigenously and exported for many purposes such as food, fodder, medicines, cosmetics, perfumes and dyes.

Western Ghats harbours 949 lichen taxa, belonging to 929 species, 20 varieties, 150 genera and 54 families which is around 45% of the total lichens in India, highest

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for any lichenogeographic region in the country (Nayaka and Upreti, 2006). The genus *Usnea* is represented by 38 species in Western Ghats (Mesta *et al.*, 2015).

There are about 800 secondary metabolite identified from lichens and these are unique with respect to those produced by higher plants (Huneck and Yoshimura 1996). These secondary metabolites are useful chemical characteristics in lichen taxonomy (Hegnauer 1962). The slow growth and harsh environmental conditions are responsible for the production of secondary metabolite in lichens. The secondary metabolites have been produced to protect from herbivores (Lawrey, 1989). The secondary metabolite are responsible for the use of lichens in different fields such as medicinal, decorative, food, brewing, spices, dyeing, cosmetic and perfumery properties.

Among the lichens those belonging to the genus *Usnea* are used in medicines from ancient ages. Many species of *Usnea* are used as medicine from ancient ages. *Usnea* are used as an ingredient of medicines by ethnomedicinal practitioner in India and also in the world (Upreti and Chatterjee, 2007). The most commonly used

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DETERMINING THE FRUIT YIELD OF *JATROPHA CURCAS* L. ACCESIONS FOUND IN HILLY ZONE AND SOUTHERN TRANSITION ZONE OF CHIKKAMAGALURU AND SHIVAMOGGA DISTRICTS OF

KARNATAKA, INDIA

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Abstract

Jatropha curcas L. is the more vigorous candidate for biodiesel production. The current work focuses on systematic measuring of fruit yield of *J. Curcas* per meter of live fence. The present work area is delineated into two zones- 1. Southern Transition Zone (STZ), 2. Hilly Zone (HZ). 31.00±5.240 is the mean number of fruits per meter of live fence. Within HZ 20.667±10.676 was the mean value obtained. Variation found within the HZ for this parameter was significant at 5 % level. The Mean Value of over 30 fruits per meter of live fence for Southern Transition Zone was recorded in STJCA1, STJCA5 and for Hilly Zone in STJCA4, STJCA8. The soil samples of areas of the respective accessions (SA1, SA5, SA4, and SA8) showed optimum to high Organic carbon and Nitrogen availability. On the other hand low Mean yield of less than 10 fruits per meter of live fence was observed in STJCA10 and STJCA6. The soil samples of the areas belonging to these two accessions showed low Organic carbon and Nitrogen availability. Compared to accessions of HZ, STZ accessions showed better fruit yield with less Annual Rainfall. This indicates *Jatropha curcas* being drought resistant crop could do better in general in semi arid regions compared to wet climate.

Key words – *Jatropha curcas*, STZ, HZ, STJCA1-STJCA12, yield, organic carbon, Nitrogen.

Introduction

During 15th century, the Portuguese introduced the *Jatropha* to Asian and African continents. *Jatropha curcas* L. is a drought resistant shrub/tree belonging to the family Euphorbiaceae (Heller *et al.*, 1996). In recent past *J. curcas* L. has been considered as a potential biodiesel crop in more than 50 countries. The reason being *Jatropha* biodiesel oil conforms to the International standards (Bamgboye and Hansen, 2008). According to (Fairless, 2007) there are more than 2.5 million hectares of *J. curcas* planted in India and China alone. Even after such interest being shown in the large-scale cultivation of *J. curcas*, characterization and conservation of genetic resources remain poor (Halilu *et al.*, 2011). Therefore in the present study attempts are made for to characterize *J. curcas* germplasm by estimating the fruit yield of accessions found in Chikkamagaluru and Shivamogga districts of Karnataka, India.

Materials and Method

Study Area: The study area selected includes taluks of Chikkamagaluru and Shivamogga districts (Table 1) which broadly falls under Southern Transition Zone (STZ) and Hilly Zone (HZ). The field trip was undertaken from the month of June to September, 2017.

Fruit Yield per meter of live Fence

As per Rekha *et al.* (2013) the Fruit set had the highest positive direct path towards seed yield/plant. In our study we had adopted modified method of [6] for measuring the yield of hedge crop - *Jatropha curcas*. The yield was measured by counting the number of ripened fruits per meter of live fence. A measuring tape was laid along the fence and for every one meter counting was done (Henning, 1996). The measuring was done thrice during the peak season i.e. June to September. Meanwhile soil samples of the respective collection sites were collected and later sent to Leaf Analysis Laboratory, Bioscience Centre, Horticulture Department, Government of Karnataka, Shivamogga for analysis.

The data's related to weather was obtained from the website maintained by Karnataka State Natural Disaster Monitoring Centre, A registered society of Government of Karnataka (Table 1). The data's pertaining to results was subjected to ANOVA using software XLSTAT 2017.5.47365 version.

Results and Discussion

Fruit yield per meter of live fence (Table 2) –

STJCA1, STJCA3, STJCA5 and STJCA11 all belonged to Southern Transition Zone (STZ). Within

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DISTRIBUTION OF BIOACTIVE COMPOUNDS IN USNEOID LICHENS FROM WESTERN GHATS

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Abstract

Lichens form an important floral community, playing an important role in ecological succession. The Western Ghats harbour a number of plant resources including lichens, mosses and other lower plants. Among the lichen species, those belonging to *Usnea* have been used medicinally for ages. The present study is focusing on the chemical substances present in the Usneoid lichens from the Western Ghats. The study area mainly contains compositions of vegetations like evergreen, semi-evergreen, moist deciduous, dry deciduous and scrub forests. We have collected 38 species of *Usnea* lichens from Western Ghats. The collected *Usnea* lichens were found to be spread between 500- 3000m of altitude. All the collected lichens are subjected to colour test, Thin Layer Crystallography and microcrystallography. We have identified 13 different secondary metabolites from collected 37 species of lichens. Among them Usnic acid is common to all the species. Apart from that strictic acid and salazinic acid is present in majority of the species.

Key words : *Usnea*, Forest, Salazinic, Crystallography.

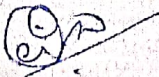
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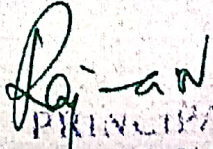
Lichens are the combination of a mycobiont (fungus) and photobiont (algae). The organism consists of thalli made of fungal tissue in which the algal cells are situated. Hence it can grow photosynthetically. Lichens are the earliest colonizer of terrestrial habitats on the earth (Taylor *et al.*, 1995), and they are distributed in all form of environments from arctic to tropical regions and from plains to highest mountains. The fungal partner may contain characteristic secondary compound (Ahmadjian, 1993). These secondary metabolites are unique with respect to those of higher plants. Lichens produce diverse range of secondary metabolites; depsides, despidoines, pulvinic acid. These compounds have attracted because of their antiviral, antibiotic, antioxidant, antitumor, allergenic and plant growth inhibitory activities (Muller, 2001; Boustie and Grube, 2005). Over 800 lichen metabolites have been identified so far (Huneck and Yoshimura, 1996). Of all thallophytes, lichens have been most extensively characterized with respect to their chemistry, and their metabolites are useful chemical

characteristics in lichen taxonomy (Hegnauer, 1962). Some metabolites may also be produced by the fungus or the algae partner, while others are exclusively produced by synergistic action of both partners in lichens. The large concentrations of mainly phenolic compounds that are accumulated in the thallus are typical of lichens. These secondary metabolites have been produced to protect these organisms from herbivores (Lawrey, 1989). From ancient days lichens have used for various purposes, in particular as dyes, perfumes and in ethnomedicines. Lichens were used by various ethnic groups from the time of early civilization. The lichens were utilized for different purposes on account of their nutritive, medicinal, decorative, brewing, distilling, dyeing, cosmetic and perfumery properties. These different uses are substantiated by the complex lichen secondary metabolism, producing secondary compounds known as "Lichen substances".

Among the lichen, those belonging to *Usnea* are used in medicines from ages. Many species of *Usnea* are used as an ingredient of medicines by Ethnomedicinal practitioners in India and also in the world (Upreti and Chatterjee, 2007). *U. pictoides* shows inhibitory activity

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Synthesis, spectral characterization and biological studies of Cu (II), Co (II) and Ni (II) complexes of azo dye ligand containing 4-amino antipyrine moiety

N. Venugopal ^a, G. Krishnamurthy ^a , H.S. Bhojyanaik ^b, P. Murali Krishna ^c

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Highlights

- Novel bioactive azo dye ligands and its metal complexes of 4-amino antipyrine.
- The structural features of the compounds were characterized by various spectroscopic techniques.
- The ESR spectra of Cu (II) complexes confirm an octahedral geometry.
- All the studied metal complexes displayed significant pharmacological properties.

Abstract

A series of biologically active azo dye ligands, **HL**¹ and **HL**² have been synthesized by conventional diazo-coupling reaction at 0–5 °C. The synthesized azo dye ligands were utilised for metallization with different metal salts like Cu (II) Co (II) and Ni (II) in 1:1 stoichiometric ratio as ligand: metal. The structural features of the synthesized compounds were established by spectral (FTIR, ¹H NMR, ¹³C NMR, LC-MS, UV-vis, ESR, powder XRD) elemental analysis, magnetic susceptibility and molar conductivity studies. On the basis of physicochemical and spectroscopic data, the octahedral geometry is assigned for all the metal complexes. The molar conductivity measurement proved that all the complexes are non-electrolytic in nature. Thermal decomposition confirmed the existence of lattice and the coordinated water molecule in the complex. The binding studies of all the synthesized complexes against CT-DNA suggest that the intercalation binding mode. A DNA nuclease activity exhibited that all compound cleaved pBR322 DNA in an efficient manner. Consequently, the anticancer activities of the new complexes were tested against A-549 (lung carcinoma), MDA-MB 231 (breast adenocarcinoma) and HEK293 (normal embryonic kidney) cells were assessed by MTT assay.

Introduction



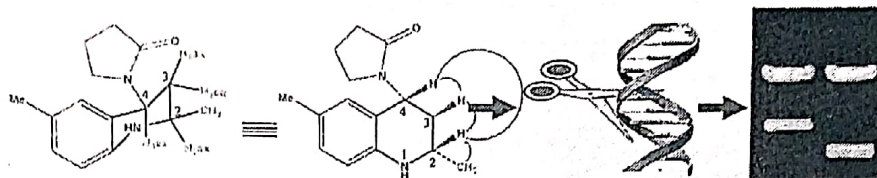
Synthesis, DNA photocleavage, molecular docking and anticancer studies of 2-methyl-1,2,3,4-tetrahydroquinolines

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Submitted on 12-Dec-2018, Accepted and Published on 14-June-2019

ABSTRACT



2-Methyl-1,2,3,4-tetrahydroquinolin-4-ylpyrrolidin-2-ones (3a-g) were synthesized by one pot multicomponent aza Diels-alder reaction between *N*-arylimines with two molecules of *N*-vinyl-2-pyrrolidinone in presence of Sm(III)nitrate as catalyst in acetonitrile solvent at room temperature stirring. The photocleavage studies with 2-methyl-1,2,3,4-tetrahydroquinolin-4-ylpyrrolidin-2-ones (3a-g) revealed that almost all derivatives exhibited effective photocleavage of pUC-19 DNA at 365 nm. The anticancer activities of newly synthesized compounds (3a-g) were more potent than doxorubicin on MCF-7 cells. The docking of PBR receptor (1EQ1) protein with newly synthesized THQ's (3a-g) exhibited well established bonds with one or more amino acids in the receptor active pocket.

Keywords: Sm(III)nitrate, 2-methyl-1,2,3,4-tetrahydroquinolin-4-ylpyrrolidin-2-ones, pUC-19 DNA Photocleavage, Anticancer activity

INTRODUCTION

DNA cleavage by synthetic nucleases is of current interests for their potential utility in the photodynamic therapy (PDT) of cancer.¹⁻⁴ During the past decades, PDT has emerged as a new modality of cancer cure due to its non-invasive nature and for its selectivity in which the photo-irradiated cancer cells are selectively damaged leaving the unexposed normal cells intact.¹⁻⁴ The mode of action of the synthetic organic PDT

agents is to generate cytotoxic singlet oxygen (¹O₂) upon photoactivation cause cellular photodamage during the PDT process. Some of the metal-based PDT agents largely depend on their high quantum yield of singlet oxygen generation which is often difficult to achieve thus making them unsuitable for phototherapeutic applications and also some of them showed side effects.¹⁻⁴ These problems could be circumvented using synthetic organic based PDT agents which could be suitably designed to cause cellular photodamage in addition to the generation of singlet oxygen species.

Functionalized tetrahydroquinolines are attractive small organic molecules that can be applied as pharmaceuticals and agrochemicals, as well as useful synthetic blocks in the preparation of several alkaloids.⁵⁻⁷ For these reasons, the tetrahydroquinoline scaffold is considered to be privileged, and the development of new efficient and convenient synthetic approaches to these heterocyclic molecules remains an active research area. The tetrahydroquinolines and its products are widely featured in commercial drugs and other useful materials.

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Cite as: Chem. Biol. Lett., 2019, 6(1), 8-13.
urn:nbn:sciencein.cbl.2019v6.97

©ScienceIn Publications ISSN: 2347-9825
http://pubs.sciencein.cbl

Chemical Biology Letters

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Chem. Biol. Lett., 2019, 6(1), 8-13

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Novel bioactive azo-azomethine based Cu (II), Co (II) and Ni(II) complexes, structural determination and biological activity

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ARTICLE INFO

Article history:

Received 15 January 2019

Received in revised form

5 March 2019

Accepted 4 April 2019

Available online 16 April 2019

Keywords:

Metal chelates

FT-IR

TGA-DTG

DNA interaction

Cytotoxicity

ABSTRACT

A novel bioactive azo-azomethine tridentate ligand N'-[(E)-[2-hydroxy-3-methoxy-5-[(E)phenyldiazenyl]phenyl]methylidene]pyridine-3-carbohydrazide (HL) and its Cu(II), Co(II) and Ni(II) complexes were synthesized and their structure determined by elemental analysis, spectroscopic studies (FTIR, ¹H NMR, ¹³C NMR, LC-MS, UV-vis, ESR, and powder XRD) and magnetic susceptibility measurements. The molar conductivity measurement proved that all the complexes are non-electrolytic in nature. On the basis of physicochemical and spectroscopic data, the octahedral geometry is assigned for all the metal complexes. The thermal decomposition curve indicated the existence of lattice water molecule. The binding studies of all the synthesized complexes against CT-DNA suggest that the intercalation binding mode. A DNA nuclease activity exhibited that all complexes cleaved pBR322 DNA in an efficient manner. Consequently, the cytotoxic activity of the compounds was screened against A-549 (lung carcinoma), MDA-MB 231 (breast carcinoma) and normal HEK293 (human embryonic kidney cells) cell lines using MTT assay.

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1. Introduction

Over the last few decades, remarkable step have been taken in designing of transition metal chelates of azomethines, which are utilized in an extensive range of biological and clinical applications along with remedial drug against cancer cells [1]. Cancer is becoming a leading cause of premature lethal death in most of the developed as well as developing countries [2]. To examine the clinical application of transition metal based tumour drugs one important point is minimization the undesirable side effect of the drug [3]. Cisplatin, carboplatin, and oxaliplatin (with many severe side effects) were major tumour drugs for some decades thus developing novel metal-based complexes with less-toxicity and target specific in an active area of research [4]. The deoxy-ribonucleic acid (DNA) plays an essential role in the replication of cells and storage of genetic information [5]. DNA is the primary intercellular target for many tumour drugs in clinical use and important to understand the binding of metal ion to DNA through both covalent and non-covalent interactions [6]. Three known non-

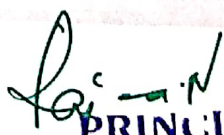
covalent binding modes of small molecule to DNA are intercalative binding, groove binding and external electrostatic binding [7]. Among these, intercalative binding mode is most important and coherent to the anticancer activity the metal ion [8].

The pyridine-anchored hydrazone moiety have recognised significant interest due to the presence of donor atom like nitrogen and oxygen has achieved dazzling coordination capacity and diverse pharmacological activities [9–11]. In addition, the phenolic aldehyde compounds like vanillin are well known and perform a class of molecule which show a comprehensive biological property [12,13]. An added privilege of using 2-hydroxy-3-methoxy-5-[(E)-phenyldiazenyl] benzaldehyde over vanillin is the position of hydroxyl group, this group is present at ortho position can readily deprotonate and coordinate with metal centre [14]. Hence, an immense number of Cu(II), Co(II) and Ni(II) complexes of azo-dye Schiff bases have been extensively studied due to their diverse antifungal, antibacterial, anti-tuberculosis, anticonvulsant and anticancer activities. Thus, the design of new chemotherapeutic drug is now engaging the consideration of medicinal chemists which reduce the toxicity [15–17]. Furthermore, the interaction of compounds with double helix DNA has been widely studied, due to the site of specific binding and many significant applications in cancer therapy. These coordination compounds were also

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Received on 31 July 2018; received in revised form, 18 October 2018; accepted, 20 October 2018; published 01 April 2019

EVALUATION OF ANTIMICROBIAL, ANTHELMINTIC AND ANTIOXIDANT ACTIVITIES OF *HOPEA PONGA* (DENNST.) BARK

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Keywords:

Antimicrobial, Anthelmintic, Antioxidant, *Hopea ponga*, DPPH, ABTS, *Pheretima posthuma*

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ABSTRACT: The present work involves the extraction of phytochemicals from the bark of the medicinal plant *Hopea ponga*, with various solvents and evaluation of their antimicrobial, anthelmintic and antioxidant activities by following standard methods. The antioxidant capacity of the plant extracts was measured by their ability to scavenge free radicals such as (a) DPPH (2,2-diphenyl-1-picrylhydrazyl), (b) ABTS (2,2'-azinobis-(3-ethylbenzenothiaziline-6-sulfonate), (c) FRAP (Ferric Reducing Antioxidant Power) (d) Hydrogen peroxide assay. The methanol extract exhibited, high antiradical activity against DPPH, ABTS with an IC₅₀ value of 19.48 µg/ml, 25.22 µg/ml, respectively, higher content of phenols (195.11 ± 2.14 mg expressed as mg of Catechol equivalents/100 mg dried extract and highest anthelmintic activity among all tested extracts. The ethyl acetate extract exhibited high antiradical activity against hydrogen peroxide with an IC₅₀ value of 38.00 µg/ml and exhibited significant activity against *Streptococcus aureus* with a maximum inhibition zone of 35.93 ± 0.12 mm for 1000 mg/ml. The present study suggests that the methanol extract may contain active compounds, which have effective antimicrobial, anthelmintic and antioxidant activity.

INTRODUCTION: Plants have become the basis of traditional medicine system throughout the world for thousands of years and continue to provide mankind with new remedies. Also, plant-based drugs remain an important source of therapeutic agents because of their availability, relatively cheaper cost and non-toxic nature, when compared to modern medicine¹. The use of antibacterial compounds to treat infection leads to the evolution of microbes resistant to existing drugs.

The emergence of resistance to the major classes of antibacterial agents is recognized as a serious health concern. The search for antibacterial agents with a new mode of actions will always remain as an important and challenging task. Plants based antimicrobial have enormous potential; they are effective in the treatment of infectious diseases while simultaneously mitigating many of the side effects that are often associated with antimicrobials².

Helminth infections are among the most widespread infections in humans, distressing a huge population of the world. Although the majority of infections due to helminths are generally restricted to tropical regions and cause an enormous hazard to health and contribute to the prevalence of undernourishment, anemia, eosinophilia and pneumonia³.

QUICK RESPONSE CODE	DOI:
	10.13040/IJPSR.0975-8232.10(4).1838-47
The article can be accessed online on www.ijpsr.com	
DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.10(4).1838-47	

SYNTHESIS AND CHARACTERIZATION OF 2-SUBSTITUTED-4-(NAPHTHO [2,1-*b*]FURAN-2-YL)-2,3-DIHYDROBENZO[*b*][1,4]THIAZEPINE FOR ANTIBACTERIAL ACTIVITY

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ABSTRACT: A series of 2-substituted-4-(naphtho[2,1-*b*]furan-2-yl)-2,3-dihydrobenzo[*b*][1,4]thiazepine **6(a-h)** were designed and synthesized. The substitutions are aliphatic, aromatic and heteroaromatic compounds. All the synthesized derivatives were characterized by using IR, Mass Spectral and ¹H-NMR Spectral studies. All the series of molecules were screened for their diverse antibacterial activity in relative percent inhibition, minimum inhibitory concentration and minimum bactericidal concentration. All compounds in this series **6(a-h)** showed potent antibacterial activities.

KEYWORDS: Naphtho[2,1-*b*]furan, antibacterial activity, minimum inhibitory concentrations, minimum bactericidal concentration.

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1. INTRODUCTION

Heterocyclic compounds play a vital role in organic chemistry, especially in the field of medicinal chemistry. More than half of the naturally occurring compounds and a high proportion of drugs contain heterocycles. Organic and medicinal chemistry is becoming very essential chemistry, explores the role of chemists towards isolation, characterization and synthesis of new compounds that can be used as medicine for the prevention, treatment and cure of certain diseases.

Amongst the various oxygen heterocycles, five membered heterocyclic systems, i.e., furan have been investigated to large extent. Furan ring when fused with carbocyclic systems such as benzene and naphthalene gives condensed heterocycles like, benzofurans and naphthofurans. Naphthofurans possess a broad range of biological activities, which are the constituents of important natural products [1-3]. The literature survey revealed that derivatives of naphtho[2,1-*b*]furan synthesized have been found to exhibit a wide range of biological and pharmacological activity [4-7].

The complexes of naphtho[2,1-*b*] furan exhibit a wide range of biological activities including antimicrobial, anthelmintic, analgesic and anti-inflammatory activities [8]. The derivatives of naphtho[2,1-*b*]furan synthesized have been found to possess wide spectrum of pharmacological and biological activities [9-10]. It is general observation that, introduction of nitro group sometimes enhances biological profile of the compounds to some extent. The nitro derivatives of naphtho[2,1-*b*]furan have been reported to exhibit antipyretic [11], analgesic [12], antihypertensive [13], antiviral [14], anti-inflammatory [15], antiparasitic [16], antimicrobial [17], anticancer activity [18] and some were shown to be mutagenic in bacteria [19]. Hence the literature survey reveals that, varieties of naphtho[2,1-*b*]furan derivatives exhibit prominent pharmacological and biological activity. This prompted us to undertake the synthesis of naphtho[2,1-*b*]furan derivatives (**Scheme-1**) and to evaluate the

International Journal of Scientific Research and Reviews

Spectral, DFT Calculations, Biological and Molecular Docking Studies of 2-[(Thiophen-2-Y/sulfanyl)methyl]-1H-Benzimidazole Based Metal (II) Complexes

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ABSTRACT

The metal complexes of Co(II), Ni(II), Cu(II) and Zn(II) derived from 2-[(thiophen-2-y/sulfanyl)methyl]-1H-benzimidazole (BT) were synthesized. The bonding mode and geometrical structures of the BT and its metal complexes were attained by different analytical and spectral methods. All the complexes adopt the bidentate mode of coordination and displays the octahedral geometry, except Cu(II) complex exhibits distorted octahedral geometry, X-ray diffraction (powder pattern) data suggest that nano-crystalline phase for BT, Co(II) and Cu(II) metal complexes. The DFT calculation was applied to optimize geometric structures of the ligand BT, Co(II), Ni(II) and Cu(II) complexes. Using DFT-based optimization of structures, bond length, bond angle, HOMO-LUMO, energy gaps were theoretically calculated at the B3LYP/LANL2DZ level of theory. The anti-lipase activity has been carried out, in which Ni(II) and Zn(II) exhibits potent enzyme inhibition against chicken pancreatic lipase enzyme. Moreover, the BT and all complexes were studied with respect to their DPPH antioxidant activity, showed excellent activity and it is correlated with in-silico docking studies by using antioxidant inhibitor 1,2-dithiane-4,5-diol (DTT) with human antioxidant enzyme (PDB code : 3MNG).

KEYWORDS: 2-mercaptobenzimidazole, metal complexes, DFT, XRD, In-silico docking

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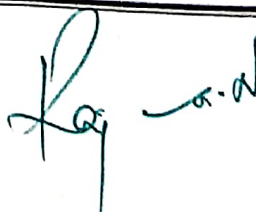
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IMPROVED AND EFFICIENT PROTOCOL FOR DIRECT REGENERATION FROM
COTYLEDONARY NODE OF GROUNDNUT (*ARACHIS HYPOGAEA* L.)

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Article Received on 11/06/2019

Article Revised on 01/07/2019

Article Accepted on 21/07/2019

ABSTRACT

Protocol has been developed for micropropagation of *Arachis hypogaea* L. under *in vitro* conditions. Cotyledonary node explants gave rise to multiple shoots when cultured on MS (Murashige and Skoog) medium supplemented with different concentrations of TDZ, BAP and Kin (Kinetin) singly along with auxin. The highest response of shoot multiplication was obtained in MS containing 1.0 mg/l TDZ and 0.5 mg/l NAA. Multiple shoots were transferred to elongation medium augmented with Gibberellic acid (GA₃) + Indole butyric acid (IBA). The regenerated shootlets were rooted on MS basal medium with different concentrations of IBA (Indole butyric acid) and NAA (Naphthalene acetic acid). The maximum frequency of rooting and highest number of roots were produced on medium containing IBA 0.5 mg/l. The plantlets, thus successfully established in soil and later to field.

KEYWORDS: Groundnut, Cotyledonary node, Shoot organogenesis, Thidiazuron, Plant micropropagation.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an economically important oil and protein rich crop whose seeds contain about 40 to 50% oil and 26 to 28% protein that has a significant impact in tropical and sub-tropical regions of Asia, Africa, North and South America. It is being cultivated on over 25.2 million ha worldwide with a total production of 41.2 million tons with an average yield of 1.67 tons/ha. India is the second largest producer of groundnut accounting 8 million tons from 6 million ha (FAOSTAT, 2014) which needs to be increased up to 15.8 million tons by 2025 to meet the growing demand. Productivity of ground nut has been low due to many biotic and abiotic stresses. There are several common diseases of groundnut crops viz., bacterial wilt and bacterial scab. Fungal diseases have resulted in decreased trend of its yield/acre. Conventional breeding approaches seem to be inadequate due to restricted direct gene pool and sexual incompatibility amongst the wild relatives (Sing and Sing 1989). In order to exploit direct gene transformation, an efficient regeneration system is pre-requisite.

Direct organogenesis from pre-existing meristem may provide a reproducible high frequency regeneration system. Though several protocols were developed. These protocols were specific for some genotypes and often not

reproducible. So there is a need for further improvement in shoot induction. Except cotyledonary node root, leaf and stem it is noticeably one of the least exploited tissues in groundnut tissue culture and genetic engineering, primarily, because of its reticence and lower responses for adventitious plant formation *in vitro* compared to other tissues, such as (McKently *et al.* 1990; Banerjee *et al.* 2007).

The present study exploits cotyledonary node potential to form reliable shoots *in vitro*. It reports the most efficient protocol that applies different treatments to achieve greater results for abundant multiple-shoot formation that outperforms all existing improved groundnut protocols for shoot induction in cotyledon node (Tiwari and Tuli 2011; Aina *et al.* 2012). The present success could increase the usage of these tissues in tissue culture for *in vitro* commercial and scientific micro-propagation as well as genetic engineering for crop improvement purposes.

MATERIAL AND METHODS

Seeds of groundnut cultivars GPBD-4 were surface sterilized with 0.1% (m/v) mercuric chloride for 4 - 5 min. Seeds were rinsed with sterile distilled water about 4 - 5 times and germinated on filter paper bridges containing sterile distilled water. Cotyledonary node



Research Article

www.ijrap.net (ISSN:2229-3566)

LICHEN GENUS *USNEA* IN KARNATAKARajeshwari N.¹, Archana Ramachandra Mesta^{2*}, Vinayaka K S³¹ Associate Professor, Department of Botany, Sahyadri Science College, Shimoga, Karnataka, India² Research Scholar, Department of Botany, Kumadvathi First Grade College, Shimoga Road, Shikaripura, Shimoga, Karnataka, India³ Associate Professor, Department of Botany, Kumadvathi First Grade College, Shimoga Road, Shikaripura, Shimoga, Karnataka, India

Received on: 18/09/19 Accepted on: 04/11/19

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DOI: 10.7897/2227-4343.110114

ABSTRACT

Usnea is a well-known genus of lichen for its medicinal uses all over the world. The lichen genus *Usnea* has fruticose morphology with pendulous or erect thallus and characterized by the presence of usnic acid. The present study aims to know the diversity of *Usnea* in Karnataka. The genus *Usnea* is identified up to species level based on its morphological, anatomical and chemical characters. The different forest types in Karnataka were surveyed for the work. We recorded 6 species of *Usnea* from the different parts of Karnataka. The higher altitudinal regions of the temperate forests harbour rich source of *Usnea*.

Keywords: Karnataka, *Usnea*, Usnic acid, fruticose thallus

INTRODUCTION

The state Karnataka is situated in the south western part of India. The geography of Karnataka contains all types of topographical variations such as mountains, coastal areas, hills and plateaus. One of the three biological hotspots in India, Western Ghats runs through Karnataka. It is known as Sahyadri or Malenadu. The average height of Sahyadri is about 900 meters. The highest altitudinal range of 1930 m is observed in Mullayangiri peak of Chikkamagaluru district¹. The altitudinal variation of less than 300 m above sea level to an average of 1500 m is observed here.

The state Karnataka is blessed with magnificent amount of forests. It includes different types of forests such as Evergreen and semi-evergreen forests, moist deciduous, dry deciduous and thorny forests. Lichens are the unique organisms with the combination of both algae and fungi. The rich growth of lichens can be seen in most tropical forests. The study of lichens in south India is mainly focused in Nilgiri and Palani hills^{2,3}. Only a little knowledge is known about the diversity of lichens in Karnataka^{4,5}.

The lichen genus *Usnea* belonging to the family Parmeliaceae is a lichenized ascomycetes consisting of more than 350 species all over the world⁶. *Usnea* is fruticose lichen with pendulous or erect thallus, which can be easily identified by its thread like morphology. The pigmentation of the basal part of the thallus, cortex and medulla, shape and type of branching are some of the morphological characters which don't change with the change in geographical area. The present study aims at the categorization of all the *Usnea* species of Karnataka.

MATERIAL AND METHODS

The present study is based on the collections made from August 2014 to December 2016. The survey was carried out in different

parts of Karnataka, such as Shimoga, Chikkamagaluru, Uttara Kannada, Dakshina Kannada, Udupi, Dharwad, Belgaum, Gadag, Haveri, Ballary, Chitradurga, Davanagere, Tumkuru, Chikaballapura, Kolar, Mysore, Chamarnjanagar and Kodagu districts, India.

The collected samples were taken to the laboratory, air dried and stored in lichen herbarium of K F G C, Shikaripura. The voucher specimen number LHKFGC0001 to LHKFGC0042 were collected during the present work and are identified up to species level. The P⁺ of the substrate trees was identified. The ecological parameters such as temperatures, humidity, altitude, latitude were noted at the place of collection. The morphological characters are noted down. The anatomical characters studied with the help of binocular microscope. The chemical tests are carried out to identify the secondary metabolites present in it^{10,11}. The identification of *Usnea* was done on the basis of morphological, anatomical and chemical characters^{12,13}.

RESULT AND DISCUSSION

Usnea was collected in different localities of Karnataka. The collected *Usnea* are identified as 6 different species based on its anatomy, morphology and colour test (Table 2). All the *Usnea* species collected were found in the temperate forests that is evergreen and semi-evergreen forests of the state. The deciduous and scrubby forests have no traces of *Usnea*. The *Usnea* species were collected at the altitudinal range of 600 m to 2350 m (Table 1). More number of *Usnea* thallus was found in the higher altitudinal region of 2350 m that is in Mullayangiri of Chikmagalur district. Only few thallus were observed in lower altitudinal region.

The present study reveals that the Karnataka state harbours 6 species of *Usnea* lichens (Plate 1 and Plate 2). More number of lichens was collected from temperate forests of higher altitudinal

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Physical Properties of Foxtail Millet (*Setaria italica* L): Variety-HMT100-1

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Abstract: Millets grains have substantial benefits as a draught resistant crop. Yield good productivity in the areas with water scarcity, possesses remarkable edible, nutritive values and ease of processing and food manufacturing. Millets being small seeds, contain large proportions of husk and bran. It requires dehushing and debranning prior to consumption (Hulse *et al.*, 1980). Engineering properties of foxtail millets are those which are useful and necessary for the design and the operation of various processing equipments. The mean value obtained for physical properties of foxtail millet such as length (mm), lateral diameter (mm), bulk density (kg/m^3), true density (kg/m^3) and porosity were 1.90 ± 0.015 , 1.60 ± 0.019 , 1150 ± 5.17 and 29 ± 1.2 respectively. The angle of repose mean value obtained was $28^\circ 04'$. The weight of 1000 grains (whole grains) and dehulled grains were 2.81 g and 2.09 g respectively. The shape of the grain found as spheroid.

Keywords: Engineering properties, foxtail millet, physical properties, processing equipments.

INTRODUCTION

Millets grains have substantial benefits as a draught resistant crop, yield good productivity in the areas with water scarcity, possesses remarkable edible, nutritive values and ease of processing and food manufacturing. Millets are the important ingredient of household food security and nutrition particularly

in draught years as the millets are harvested well even in the substantial low rains. Millets being small seeds, contain large proportions of husk and bran, which require dehushing and debranning prior to consumption (Hulse *et al.*, 1980). Despite their nutritional superiority, utilization of millets are restricted due to non-availability of processed millets


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Physical Properties of Foxtail Millet (*Setaria italica* L): Variety-HMT100-1

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Abstract: Millets grains have substantial benefits as a draught resistant crop. Yield good productivity in the areas with water scarcity, possesses remarkable edible, nutritive values and ease of processing and food manufacturing. Millets being small seeds, contain large proportions of husk and bran. It requires dehusking and debranning prior to consumption (Hulse *et al.*, 1980). Engineering properties of foxtail millets are those which are useful and necessary for the design and the operation of various processing equipments. The mean value obtained for physical properties of foxtail millet such as length (mm), lateral diameter (mm), bulk density (kg/m^3), true density (kg/m^3) and porosity were 1.90 ± 0.015 , 1.60 ± 0.019 , 1150 ± 5.17 and 29 ± 1.2 respectively. The angle of repose mean value obtained was $28^\circ 04'$. The weight of 1000 grains (whole grains) and dehulled grains were 2.81 g and 2.09 g respectively. The shape of the grain found as spheroid.

Keywords: Engineering properties, foxtail millet, physical properties, processing equipments.

INTRODUCTION

Millets grains have substantial benefits as a draught resistant crop, yield good productivity in the areas with water scarcity, possesses remarkable edible, nutritive values and ease of processing and food manufacturing. Millets are the important ingredient of household food security and nutrition particularly

in draught years as the millets are harvested well even in the substantial low rains. Millets being small seeds, contain large proportions of husk and bran, which require dehusking and debranning prior to consumption (Hulse *et al.*, 1980). Despite their nutritional superiority, utilization of millets are restricted due to non-availability of processed millets

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Processing and Value Addition of Minor Millets

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Abstract: Women is supreme inspiration of man's onward march. Women share abundant responsibility and perform a wide spectrum of duties in running the family, she involved in various aspects of agriculture and gainfully employed in other farm related activities. Even farm women involved in forward linkage activities importantly preparation of value added products. Millets are the important ingredient of household food security and nutrition particularly in draught areas as the millets are harvested well even in the substantial low rains. The farmers of Chitradurga district are predominantly grow millet crops. The district is popularly known as "millet bowl" of Karnataka. In view of this the study aims to know the area of millets production in Chitradurga district and avenues for preparation of value added products in different millet crops.

The study focused on empowerment of rural women through entrepreneurial activities from women SHG's constituted by small farmers and landless labourers of Vaniyilasaipura and Gowdrabatti villages of Chitradurga district. Empowerment of women was undertaken through training and demonstrations carried out in a participatory mode. The training was imparted for preparation of value added products in millet crops viz., finger millet (malt and cookies), foxtail millet (Cookies, Rusk, malt, chakkuli, nippattu), Little millet (Cookies, malt, chakkuli, nippattu and lado). For these products emphasis was given to quality control, packing in different methods even facility created to marketing of the product. The SHG groups showed interest to continue this activity. This brings new arena in rural women SHG groups and begins to startup as entrepreneurial activity. These employment creation activities enable them to get opportunities in their vicinity. The continuous earnings among the rural women will increase their living standards. The nutritive value of the family members will increase, the entrepreneurial activities can promote from preparation of value added activities from millet crops.

Keywords: Entrepreneurship, Millets, Value addition, SHG and Training.


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Comparative Leaf anatomy of some species of *Habenaria* Wild (Orchidaceae).

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ABSTRACT. The present study analyzed the characteristics in the leaf of Terrestrial Orchidaceae member i.e. different species of *Habenaria* Wild (*H. plantaginea* Lindl., *H. ovalifolia* Wight., *H. multicaudata* Sedgw., *H. crinifera* Lindl., *H. heyneana* Lindl., *H. elwesii* Hook.f., *H. longicorniculata* J.Graham., *H. pelorioides* Par. & Rehb. f. (*Odisha cleistantha* S. Mishra). Anatomical characters are important in identification and ecological adaptations. The anatomical characters have served as a tool for the genus's systematic. The plants were collected at different forest types from Shimoga district. Materials were fixed in FAA solution. Transverse sections were obtained by freehand sections, stained with 1% safranin. Leaf anatomical organization of *Habenaria* species (Stomata, epidermis, mesophyll, vascular bundles, hypodermis.) was observed. There was a distinct variation in the anatomical characters of the leaf. Detailed leaf anatomical characters can be used to distinguish species from others. Leaf anatomical characters with structural adaptation help plants to survive in different vegetation. The implication of this study is the importance of leaf anatomical features to support species identification and to increase understanding of orchid biology which are important in orchid conservation.

KEYWORDS: Orchidaceae, Anatomical character, *Habenaria* Wild, Adaptations.

INTRODUCTION

Orchidaceae with 25,000-30,000 species shows a high level of specialization and a great capacity for adaptation to different environments, which have contributed to the morphological and physiological, vegetative organization, that vary between species (Dressler, 1993; Frander *et al.*, 2017; Udupa, 2011). Orchidaceae is one of the largest family among monocots. Orchidaceae is the second largest flowering plant family of herbaceous, perennials that includes terrestrial, saprophytic, lithophytic, and epiphytic species (Pridgeon *et al.*, 1993). Orchids are associated with an endophytic symbiotic fungus, mainly in their root terrestrial orchids mainly grows in the floor of the forest and grassland.

Habenaria Wild is an orchid genus of about 600 species widely distributed throughout the tropical, subtropical and temperate regions of the world. This genus of terrestrial orchids is one of the genera having the largest number of species. In India, it is represented by 17 species in Western Himalaya (Jalal and Jayanthi, 2015). In *Habenaria* Wild. Prominent paired tuberosities with a small third tuberosity is also seen in this species (Pande *et al.*, 2010).

Flowers are highly attractive. The species can be easily identified when in bloom, but the vegetative characteristic (number and size of tubers and leaves, stem height) overlap in many of these. These structural and physiological variations permit plants to survive and reproduce in a variety of environmental conditions and contribute to protection against stress and herbivore damage (Frander *et al.*, 2017.) Particularly in the anatomy of groups are of a descriptive nature, and have focused upon the search for similarities or differences that contribute to the taxonomic determination.


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Phenology of Papilionoideae Members of Dummi Village, Holalkere Taluk, Chitradurga District, Karnataka.

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ABSTRACT

Phenology of papilionoid species was carried out at dummi village of chitradurga district, during the study period leafing, floral morphology, flowering pattern, flowering period and leaf fall was clearly observed. Dummi region is rich in floristic composition; the phenology of papilionoid taxa was studied. In the study area 19 species were identified under 9 genera, among the identified species majority of species starts leafing in the month of june and flowers in the month of august and extends upto October, leaf fall occurs in the month of December. All members of this family has papilionaceous corolla but differs from flowering behaviour. Study of floral phenophases helped to understand differential vegetative and reproductive phases in the study area with reference to its climatic condition. That data base can be utilized for further conservation and maintainance of that region.

Key words: Papilionoid Taxa, Phenology, dummi, Holalkere

INTRODUCTION

Phenology is literally "the science of appearance." Seasonal and climatic changes are some of the non-living or abiotic components of the environment that impact the living or biotic components (A R Kasarkar and Kulkarni, 2011). The study of plant phenology provides knowledge about the patterns of plant growth and development as well as the effects of the environment and selective pressures on flowering and fruiting behavior, the flowering of certain plants signals agronomic time (Zhang, et al., 2006).

The Fabaceae or Leguminosae, commonly known as the legume, pea, or bean family, is a large and economically important family of flowering plants. Leguminosae is the third largest family of flowering plants, the plants are often considered to be sub family of leguminosae (papilionoideae). Sanjappa 1990 estimated that there are about 1152 species under 179 genera in India.

According to Ali, it has an essentially worldwide distribution being found everywhere except Antarctica and the high altitudinal arctic regions. The family consists of herbs, sub shrubs, shrubs, trees and climbers. The trees are often found in tropical regions while the herbaceous plants and shrubs are predominant in extra tropical warm


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Transesterification of Algal Oil to Produce Algal Biodiesel

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To Cite this Article

Ranjith Y and Parameswara Naik, "Transesterification of Algal Oil to Produce Algal Biodiesel", *International Journal for Modern Trends in Science and Technology*, Vol. 05, Issue 11, November 2019, pp: 153-156.

Article Info

Received on 02-November-2019, Revised on 18-November-2019, Accepted on 22-November-2019, Published on 26-November-2019.

ABSTRACT

The role of fossil fuels in modern economy is quite vital. 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 were identified as *Spirogyra* spp. and *Oedogonium* spp. and they were 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 *Spirogyra* spp. and *Oedogonium* spp.

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

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I. INTRODUCTION

The world is about to face the predicament in energy sources. The consumption of fossil fuels and the available energy sources are the main problems needed to be solved. This critical situation that the world is about to face is a threat to modern human existence. Energy crisis will arise when there will not be enough energy sources to survive the demands of the world as the demand for energy increases. (Christi, 2005)

Algae are an important raw material for many industries i.e. from medicine to fertilizer and from fodder to food. Algae are the feedstock for many industrial productions like alginate derivatives, (Demirbas 2007)

carrageenan and agar-agar but they are also widely consumed as food in many countries. Some macroalgae are nutritionally very much valuable they are consumed with fresh or dried vegetables, salads, or as ingredients in a wide variety of cooked foods. Some known algae contain significant quantities of vitamins, protein, minerals and lipids. In algae the nutrient content may vary from species to species, from one geographical location to the other, one season to the other or even due to humidity as well as temperature. (Briggs, 2004)

Transesterification or alcoholysis is the reaction of a lipid with an alcohol to form esters and a by-product, glycerol. This reaction actually converts highly viscous raw lipid/oil into low

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SHORT COMMUNICATION

***Sarcoxylon compunctum* (Jungh.) Cooke. A new record to Western Ghats of India**

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Received : 17.10.2018

RMs Accepted : 19.11.2018

Published : 28.01.2019

Western Ghats of India received greater importance because of the rich biodiversity. Xylariaceae is one of the largest families among Ascomycota during exploration of Xylariales members in central Western Ghats regions of Karnataka, India, a gigantic Xylariaceae member was observed, studied and characterized on the basis of morphology and anatomical characters and identified as *S. compunctum*.

Key words: Ascomycota, diversity, saprophytic, Xylariaceae

Xylariaceae of Ascomycota comprises of 85 genera and more than 1300 species across the globe (Patel and Krishnappa, 2017). These members were having variation in their morphology and anatomical characters (Suwannasai et al. 2012), they are major saprophytes, weak pathogens also rarely found on termite nests and as Coprophilous (Patel et al. 2018). These members play important role in litter decomposition in forest. Western Ghats region of peninsular India characterized by variation in their geography and rich biotic resources including macro fungal diversity. This region covers an area of 16000 km² and lies in between 8°20' - 20° 40' N and 73°-77° E (Ramachandra et al. 2012). It covers Gujrat, Maharashtra, Goa, Karnataka, Kerala and Tamilnadu states (Radhakrishnan and Rajmohana, 2012). Many researcher have worked on the macro fungi in this region but Xylariaceae members were still not studied completely, this species record forms an addition to the fungi of Western Ghats of India.

Frequent field survey were conducted to explore the Xylariaceae members in central Western Ghats regions of Karnataka, India, during July to September 2018. A gigantic Xylariaceae member was recorded in the Jambekoppa forest region of Shivamogga district, Karnataka, India. Photographs were taken in their natural habitat

using Nikon 3300 Digital SLR camera, geographical ranges were recorded using Garmin 650 GPS system, and field notes were taken with respect to their morphological characters and collected without causing any damage to sporocarp and brought to laboratory for further analysis. Anatomical and morphological studies were made using Olympus CH20i binocular and Olympus SZ Stereo microscope, hand sections were used for the studying anatomical characters like Perithecia, ascus, asci and ascospores. The name of the taxa was authenticated and confirmed by using <http://www.mycobank.org> and <http://www.indexfungorum.org/names/names.asp>.

Taxonomic description

Sarcoxylon compunctum (Jungh.) Cooke, Grevillea 13 (68): 107 (1885) [MB#118870]

≡ *Hypoxylon compunctum* (Jungh.) Fr., Nova Acta Regiae Societatis Scientiarum Upsaliensis 1: 114 (1851) [MB#204305]

≡ *Xylaria compuncta* (Jungh.) Berk. Hooker's Journal of Botany and Kew Garden Miscellany 6: 204 (1854) [MB#184640]

≡ *Sarcoxylon compuncta* (Jungh.) Cooke (1885) [MB#236026]

≡ *Penzigia compuncta* (Jungh.) Sacc. & Paol., Attidell'Istituto Veneto Scienze 6: 387-428 (1888) [MB#245471]

Stromata solitary or fused sometime found in cluster, hemispherical to globose stroma, with a

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FISH DIVERISTY IN UMBLEYBYLU AND NARASIMHA RAJAPURA, BACK WATER OF BHADRA RSERVOIR, KARNATKA, INDIA.

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Abstract:

River is the main part of the conveyor that carries water forms the higher parts of the earth to the lower parts. The present study deals with the fish biodiversity of Umbleybyllu and Narashimha Rajapura form March 2017 to May 2018. Altogether 23 species from Narasimha Rajapura and 27 species form Umbleybyllu were recorded respectively these species belonging to different orders. The predominant orders of fishes in these areas are Cypriniformes, Siluriformes and Perciformes. The fishes recorded were found to be widely distributed and were present in good numbers in the river.

Keywords: Bhadra River, Umbleybyllu, Narasimha Rajapura, Cypriniformes, Siluriformes, Perciformes

INTRODUCTION:

Fish is a major protein rich food source for humans around the world. The Indian subcontinent has a large number of rivers. Biodiversity conservation necessitates knowledge on the diversity of animals and plants, their distribution status. The Western Ghats in India is one of the 25th richest mega biodiversity hot spot of the world. There is a need for the survey of biodiversity of fishes in different types of habitats all over the country (Jayaram, 1981).

Fish is a major protein rich food source for humans around the world. There are to date around 25,000 known fish species of which 15,000 are marine, that includes estuarine fishes, and nearly 10,000 are freshwater (Holmlund, 1999). According to 1996-IUCN red list of threatened animals, 84% freshwater fishes are threatened and 20% are extinct which belong to 3 genera, 27 species and 13 sub species (Calestousjuma, 2002). Barring few studies on the ichthyofauna of few reservoirs, rivers tanks, estuaries, no scientific observations have been carried out Karnataka to assess the status of fish and fishery potentials, prepare a list of threatened species and enforce conservational measures. Reservoirs present a good opportunity for studying the effect of scale on the relative importance of factors that determine diversity. The present study areas of water body is situated at 13o42' N latitude and 75o38' E longitude located near Lakkavalli town of Chikmaglore district, Karnataka and the confluence of the Bhadra River. The water of the reservoir is used for

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**PRODUCTION OF ALGAL BIODIESEL FROM FRESH WATER
ALGAE - OEDOGONIUM SPP,**

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ABSTRACT

In this investigation, *Oedogonium spp.*, 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* 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.*

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

INTRODUCTION

The depletion of petroleum diesel reserves has caused an increase in demand and price of diesel. Biofuels are referred to liquid, solid and gaseous fuels derived from organic matter, they generally divided into primary biofuels such as fuel wood are used in an unprocessed form primarily for heating and electricity production, secondary biofuels such as bioethanol and biodiesel are produced by processing biomass and could be used in vehicles and industrial processes. The idea of using algae as a source for biodiesel is not new, but now it has been taken seriously due to the increase in population, and rising price of petroleum. The basic sources of energy are petroleum, coal and natural gas. The continued use of petroleum sourced fuels is now widely recognized as unsustainable because of the depletion supplies and the contribution of these fuels to accumulation of carbon dioxide in the environment leading to increase of global warming. Algal biofuels offer great promise in contributing to the growing global demand for alternative sources of renewable energy. (Bowman *et.al.*, 2006)

Algae are an important feedstock for many industries such as from medicine to fertilizer and from fodder to food. Algae are the raw material for many industrial productions like carrageenan,



**Documentation of Macro Fungi in Thirthahalli Region of Karnataka: A Case Study**Nafeesa Begum¹ and B.R.Kiran²¹Department of Botany, Sahyadri Science College (Autonomous), Shivamogga, Karnataka.²Research & Teaching Assistant in Environmental Science, DDE, Kuvempu University, Shankaraghatta, Karnataka, India.**ABSTRACT**

The examination on macrofungal assorted variety in malnad surroundings i.e., Thirthahalli taluk of Shimoga region, Karnataka was intended during the period of two months from August to September, 2018 to distinguish and record the species which are available in the referenced spot. Bounty and assorted variety is more in rainy season than winter and summer. Mulching and dampness substance of substratum assume vital job in the development of macrofungi. Be that as it may, the work typically needs additional time on the grounds that each time we wouldn't get the macrofungi in the examination locales. It is hard to get similar species because of loss of substratum or change in it. The wood rotting organisms were typically present in every one of the seasons. Overwhelming precipitation additionally influences the development and improvement of macrofungal fruiting bodies. Progressively number of sporocarps and species were found in the period of August 2018, most likely for the most noteworthy precipitation and permeation was more in the dirt and high dampness in the substratum, which delivered increasingly number of fruiting bodies and distinctive macrofungal species. In our examination increasingly number of species have a place with beefy gilled fungi as similar species may require less downpour or dampness content for its improvement and they found in all the substratum. A few animal groups were consumable (*Termitomyces* sp.) and numerous species observed to be non-palatable.

Keywords : Macro Fungi, Thirthahalli Region, Karnataka

INTRODUCTION

Among every single living element, growths is an imperative essential part of biodiversity which assume a key job in deciding the assorted variety of different living beings (Zhang et al., 2010). Organisms are key utilitarian parts of woodland biological systems and they have gotten less consideration than creatures and plants, in spite of the fact that they are ubiquitous and profoundly various in nature. Organisms assume a crucial job in biological system works and have enormous impact on people and human-related exercises. Soil parasites assume a focal job in numerous natural procedures that are significant to keeping up biological system steadiness, as impacting soil ripeness, cycling of minerals and natural issue, just as plant wellbeing and sustenance (Barrico et al., 2010). Fungi are critical in woodland territories and are engaged with the deterioration of dead trees and

backwoods litter into soil and convey species-explicit advantages to their host plants, which render their biodiversity of high significance to plant sustenance. Fungi assume a critical job in the day by day life of people other than their usage in industry, horticulture, prescription nourishment industry, materials, bioremediation, normal cycling, as biofertilizers and numerous different ways. The nearness of broad biodiversity accessible in tropical backwoods has been distinguished as the fortune box for the rising field of biotechnology (Swapna et al., 2008).

Macrofungi have a place with the kingdom parasites, which establishes the most different gathering of creatures after creepy crawlies on this biosphere. They structure substantial fruiting bodies, visible without the guide of a magnifying instrument and incorporate fruiting bodies, for example, gilled parasites, container organisms, jar growths, carafe organisms, entomogenous organisms, tongue growths, coral growths, stinkhorns, section organisms, puffballs and flying creature's home growths (Bates 2006). There are a large number of animal varieties which are one of a kind and every specie delightful in its own specific manner. Since the beginning of developments, macrofungi have been entrancing to man because of their bizarre characters like unexpected appearance in confined places in gatherings, rings and in various geometrical shapes. Macrofungi develop productively and are found in numerous pieces of the world. They mix and take part or rival other smaller scale life forms conduct and predators (Razaq et al., 2014).

Sporocarps

The large scale growths are separated by containing spore bearing structures "Sporocarps" that are seen by bare eye, it comprise of mushrooms, puffballs, section organisms, false-truffles and container parasites are normal instances of full scale growths. It is regular for a specific parasite to create an unmistakable fruiting body just under an exact mix of conditions, including geographic area, rise, temperature, nugginess, light and encompassing verdure. Sporocarps are fleeting, may last just a couple of days before decaying or being eaten. Plainly visible growths with explicit fruiting organs and size, sufficiently enormous, to be noticeable.



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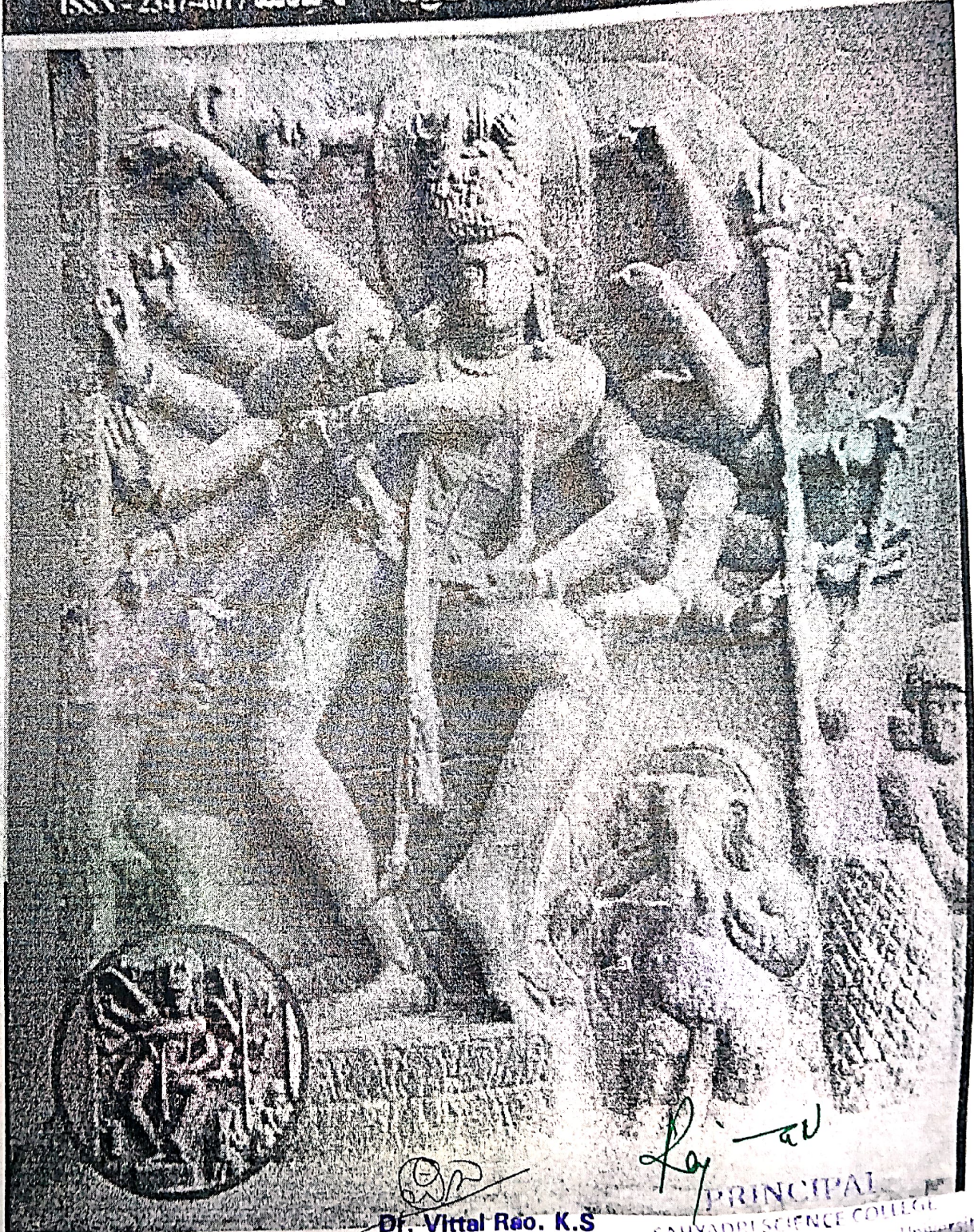
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ISSN - 2347-4017 ಮಾರ್ಚ್ - ಏಪ್ರಿಲ್ 2019 ಸಂಪುಟ - 5 ಸಂಚಿಕೆ 2



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೧೧. ವಸಾಹತುಶಾಹಿ ಚಿಂತನೆ: ಗೂಗಿ ವಾ ಧಿಯಾಂಗೊ

ಡಾ. ಹಾ ಮ ನಾಗಾರ್ಜುನ

ಆಫ್ರಿಕ ಖಂಡದ ನಾಡು-ನುಡಿಯನ್ನು ಕುರಿತು ಯೂರೋಪಿಯನ್ (ವಸಾಹತುಶಾಹಿ) ರಾಷ್ಟ್ರಗಳೊಂದಿಗೆ ತನ್ನ ಬರಹಗಳ ಮೂಲಕವೇ ಸಮರ್ಥವಾಗಿ ಹೋರಾಟ ಮಾಡಿದ ಗೂಗಿ-ವಾ-ಧಿಯಾಂಗೊ, ಕೀನ್ಯಾದಲ್ಲಿ ಹುಟ್ಟಿದವರು ಅವರು ತಮ್ಮ ಸಾಹಿತ್ಯವನ್ನು ಇಂಗ್ಲೀಷ್ ಭಾಷೆಯಲ್ಲೇ ಮೊದಲು ಬರೆದರೂ ನಂತರ ತಮ್ಮ ಅರಿವಿನ ಚಿಂತನೆಯ ಪ್ರಜ್ಞೆಯಿಂದ 'ಗೀಕೋಯೂ' ತಾಯ್ನೀಲದ ಭಾಷೆಯಲ್ಲಿ ಸಾಹಿತ್ಯ ಕೃಷಿಗೈದು ಶ್ರೇಷ್ಠ ಸಂಸ್ಕೃತಿ ಚಿಂತಕರೆನಿಸಿದರು. ವಸಾಹತುಶಾಹಿಯು ವಸಾಹತುರಾಷ್ಟ್ರಗಳ ಮೇಲೆ ಸಾಧಿಸಿದ ಕುತಂತ್ರ ವಿಜಯ, ಜಗತ್ತಿನ ಹಲವಾರು ದೇಶಗಳ ಮೇಲೆ ಬೀರಿದ ದುರ್ಮಾರ್ಗದ ಹೀನ ಕೃತ್ಯ ಎಂತಹದ್ದೆಂದು ಅರಿಯಬೇಕಾದರೆ ಮತ್ತು ನಮ್ಮ ಸಾಂಸ್ಕೃತಿಕ ಚಹರೆಗಳನ್ನು ಪಡೆದುಕೊಳ್ಳುವ ಕೆಲಸದಲ್ಲಿ ತೊಡಗಿರುವ ಮನಸ್ಸುಗಳೊಂದಿಗೆ ಗೂಗಿ ವಸಾಹತುಶಾಹಿ ವಿರುದ್ಧ ತೋರಿದ ನಿಲುವು ಚಿಂತನೆಗಳನ್ನು ಹಂಚಿಕೊಳ್ಳುವುದು ಭಾರತೀಯ ಸಾಹಿತ್ಯ ಸಂದರ್ಭದಲ್ಲಿ ಬಹುಮುಖ್ಯವೆನಿಸುತ್ತದೆ. ಕಾರಣ, ಭಾರತವು ಸಹ ಒಂದು ಕಾಲದಲ್ಲಿ ಬ್ರಿಟೀಷರ (ವಸಾಹತುಶಾಹಿ) ಆಳ್ವಿಕೆಗೆ ಒಳಪಟ್ಟಿತ್ತು. ಆ ಸಂದರ್ಭದಲ್ಲಿ ಯೂರೋಪಿಯನ್ ಸಾಹಿತಿಗಳು, ಚಿಂತಕರು ಭಾರತವನ್ನು ಅತ್ಯಂತ ಕೀಳಾಗಿ ಕಂಡಿದ್ದರು. ಅಷ್ಟೇ ಅಲ್ಲ ಇಲ್ಲಿನ ನಾಡುನುಡಿ, ಸಂಸ್ಕೃತಿಯನ್ನು ಕುರಿತು ಅವರಿಗೆ ಅನುಕೂಲವಾಗುವಂತೆಯೇ ವ್ಯಾಖ್ಯಾನವನ್ನು ಬರೆದುಕೊಂಡರು. ಅದರಂತೆಯೇ (ಅವರ ವ್ಯಾಖ್ಯಾನದಂತೆ) ನಾವು ಬದುಕುತ್ತಿದ್ದೇವೆಂದು ನಮಗೆ ನಾವೇ ಸಂತಸ

ಡಾ. ಹಾ ಮ ನಾಗಾರ್ಜುನ, ಸಹ ಪ್ರಾಧ್ಯಾಪಕರು, ಕನ್ನಡ ವಿಭಾಗ, ಸಹ್ಯಾದ್ರಿ

ವಿಜ್ಞಾನ ಕಾಲೇಜು, ಶಿವಮೊಗ್ಗ.

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ಬಸವಚೂಡ



ನವೆಂಬರ್ 2019

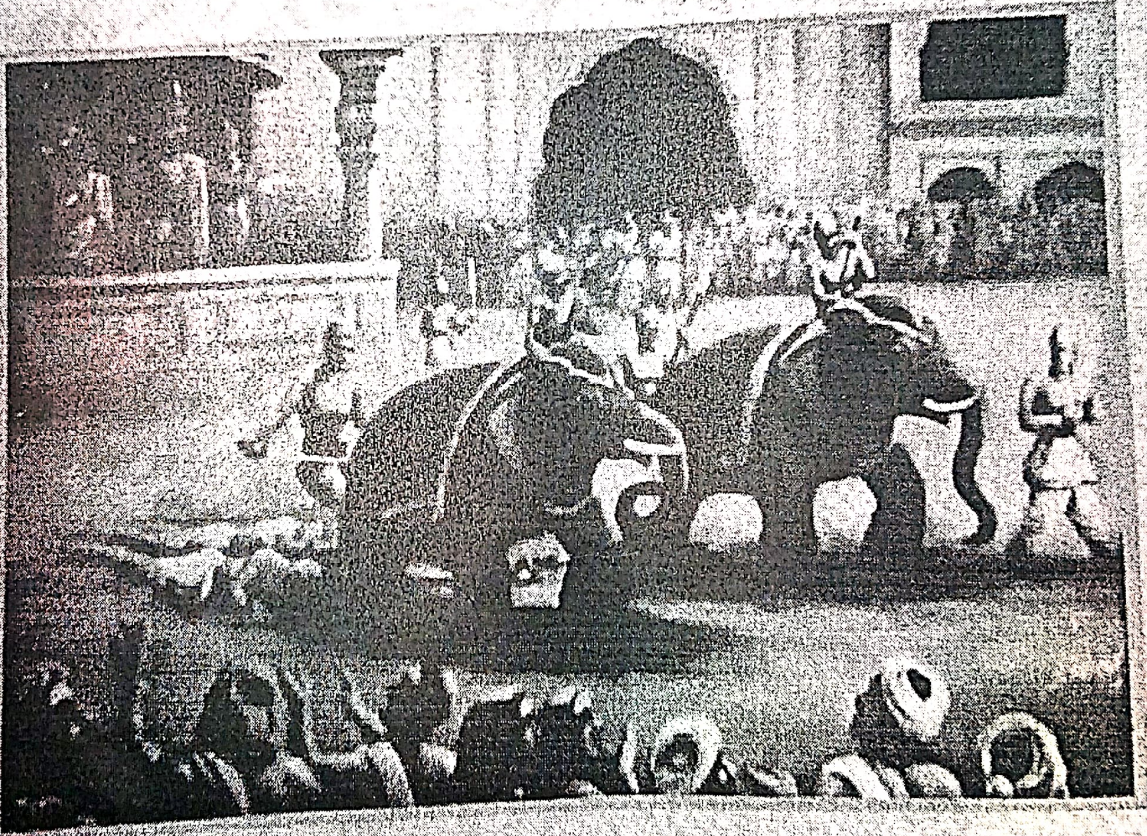
ನಂ. 471

ಹರಿ ಪ್ರತಿ ರೂ 15/-

ISSN 2348-425X

ಬಸವ ಕ್ರಾಂತಿ / ಕನ್ನಡದ ಕ್ರಾಂತಿ

ಕನ್ನಡ ರಾಜ್ಯೋತ್ಸವದ ಶುಭಾಶಯಗಳು



“ಹೋಳಿವಾಳಿಯಾನಲ್ಲ, ವೇಳಿವಾಳಿಯವ ನಾನಯ್ಯಾ,
ಹಾಳುಗೆಟ್ಟೋಡುವ ಅಳು ನಾನಲ್ಲವಯ್ಯಾ
ಕೇಳು, ಕೂಡಲಸಂಗಮದೇವಾ,
ಮರಣವೆ ಮಹಾನವಮಿ.”

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ಕನ್ನಡ ಸಾಹಿತ್ಯಕ್ಕೆ ವಚನಕಾರರ ಕೊಡುಗೆ

ಡಾ.ಹಾ.ಮ.ನಾಗಾರ್ಜುನ

ಭಾರತೀಯ ಸಾಹಿತ್ಯ ಸಂಸ್ಕೃತಿಯ ಇತಿಹಾಸದಲ್ಲಿ ಕರ್ನಾಟಕವು ಹನ್ನೆರಡನೇ ಶತಮಾನದಲ್ಲಿ ಮಹತ್ವದ ಸ್ಥಾನ ಪಡೆದಿದೆ. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಚಳುವಳಿಯ ದೃಷ್ಟಿಯಿಂದ ಗಮನಾರ್ಹವಾದ ಕಾಲಘಟ್ಟ ಈ ಅವಧಿಯಲ್ಲಿ ವಚನಕಾರರು ಪರಂಪರೆಯಿಂದ ನೆಲೆಗೊಂಡಿದ್ದ ರಾಜಕೀಯ, ಸಾಮಾಜಿಕ, ಸಾಹಿತ್ಯಿಕ, ಧಾರ್ಮಿಕ ಚೌಕಟ್ಟುಗಳನ್ನು ಮೀರಿ ಬೆಳೆದು, ಜನ ಸಾಮಾನ್ಯರಲ್ಲಿ ವೈಚಾರಿಕ ಚಿಂತನೆಗಳನ್ನು ಮೂಡಿಸಿದ ಕಾಲ ಇದಾಗಿದೆ. ಹಿಂದಿನ ಸಾಹಿತ್ಯಿಕ ಕಟ್ಟು ಕಟ್ಟಳೆಗಳನ್ನು ಸಾಂಸ್ಕೃತಿಕ ಭಿನ್ನತೆಗಳನ್ನು ಚಳುವಳಿಯ ಸ್ವರೂಪಗಳನ್ನು ಬದಲಾಯಿಸಲು ಪ್ರೇರಕವಾದ ಸಮಷ್ಟಿ ಶಕ್ತಿಗಳಾಗಿ ವಚನಕಾರರು ಇಲ್ಲಿ ಕಂಡುಬರುತ್ತಾರೆ. ವೈದಿಕ ಧರ್ಮದ ಧಾರ್ಮಿಕ ಆಚರಣೆಗಳು, ರಾಜಕೀಯ ವಲಯದಲ್ಲಿನ ದರ್ಪ, ನಿಬಂಧನೆಗಳಲ್ಲಿ ಮುರುಟಿ ಹೋಗಿದ್ದ ಸ್ತ್ರೀ ಸ್ವಾತಂತ್ರ್ಯಗಳು ಜನ ಸಾಮಾನ್ಯರ ಬದುಕನ್ನು ಕನಿಷ್ಠ ಮಟ್ಟಕ್ಕೆ ಕೊಂಡೊಯ್ದವು, ಜಾತಿ ತಾರತಮ್ಯ ಅಸಮಾನತೆಗಳು ಮೇಲ್ವರ್ಗದ ಭೌತಿಕ ತಂತ್ರಗಾರಿಕೆಯಲ್ಲಿ ಮುನ್ನಡೆದಿದ್ದವು. ಇದಕ್ಕೆ ಪ್ರತಿ ಸ್ಪಂದಿಸಿದ ಬಸವಾದಿ ಪ್ರಮುಖರು ತಮ್ಮ ವ್ಯಕ್ತಿತ್ವ ಸಾಹಿತ್ಯ ಸಾಮಾಜಿಕ ಅರಿವಿನಿಂದಾಗಿ ಸಮಾಜದಲ್ಲಿ ಕ್ರಾಂತಿಕಾರಕ ಬದಲಾವಣೆಯನ್ನು ತಂದರು. ಇದು ಪ್ರಗತಿಪರ ಸಮಾಜ ನಿರ್ಮಾಣದ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ನಿಷ್ಠೆ ಬದ್ಧತೆಗಳನ್ನು ಒಳಗೊಂಡ ಸಮೂಹವು ಹನ್ನೆರಡನೇ ಶತಮಾನದ ವೇಳೆಗೆ ಬಸವ ಕ್ರಾಂತಿಯ ಸಾತ್ವಿಕತೆಗೆ ಹೊಸ ರೂಪರೇಷೆಗಳನ್ನು ಸಜ್ಜುಗೊಳಿಸಿಕೊಂಡಿತು.

ವಚನಕಾರರು ಸಮಾಜನಿಷ್ಠ ಚಿಂತಕರಾಗಿದ್ದು, ತಮ್ಮ ನಡೆ-ನುಡಿಗಳ ಮೂಲಕವೇ ಯಾವುದೇ ವಿಷಯಗಳಲ್ಲಿಯೂ ತಮ್ಮ ಅನುಭವದ ನುಡಿಗಳನ್ನೇ ವಿಚಾರಗಳನ್ನಾಗಿಸಿದರು. ಇವರಿಗೆ ಆಧ್ಯಾತ್ಮವು ಲೌಕಿಕ ಹಿತದ ಮೂಲಕವೇ ಹೊರಹೊಮ್ಮಿದ್ದು, ಇಲ್ಲಿನ ವಿಶೇಷವೇ ಸರಿ. ವಚನಕಾರರು ತಮ್ಮ ಚಿಂತನೆಗಳ ಫಲವಾಗಿ ವಚನಗಳನ್ನು ರೂಪಿಸಿದರು. ಇದು ಕನ್ನಡ ಸಾಹಿತ್ಯವು ವಿಶ್ವ ಸಾಹಿತ್ಯದ ಮಟ್ಟಕ್ಕೆ ನಿಲ್ಲುವ ಮಹತ್ವವನ್ನು ಕಂಡುಕೊಂಡಿತು. ಈ ಮೂಲಕ ಕನ್ನಡ ಭಾಷೆಗೆ ವೈಚಾರಿಕತೆಯ ಸ್ವರೂಪವನ್ನು ನೀಡಿದ್ದು, ವಚನ ಸಾಹಿತ್ಯದ ಭಾಷೆ, ಆಚಾರ, ಸಂಸ್ಕೃತಿಗಳಲ್ಲಿ ಅಮೂಲಾಗ್ರವಾದ ಬದಲಾವಣೆಗಳನ್ನು ವಚನಕಾರರು ತಂದರು.

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