

3.3.1.1. Number of research papers in the journals notified on UGC care year wise during the last five year 2019-20

Sl. No.	Title of paper	Name of the Author/s	Department of the teacher	Name of the Journal	Year of publication	ISSN Number	Link to the Journal		Is it in UGC care list
							Link of the website of journal	Link of the article	
1	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://www.scienceDirect.com/science/article/pii/S1476927119305730	Yes
2	Synthesis, Molecular Docking, And Apoptogenic Efficacy of Novel Heterocycle Analogs to Target B-Cell Lymphoma 2X-Linked Inhibitors of Apoptosis Proteins to Regress Melanoma	Zabiullazabiulla, Vikas H. Malojirao, Yasser Hussein Eissa Mohammed, Prabhuthirusan gu, B. T. Prabhakar, Shaik ath Ara Khanum	Biotechnology	Medicinal Chemistry Research	2019	1054-2523	https://www.springer.com/journal/4	https://link.springer.com/article/10.1007/s00044-019-02357-x	Yes
3	Synthesis of Coumarin Analogs Appended with Quinoline And Thiazole Moiety And Their	Prashanth AvinBv, Thirusangu	Biotechnology	Biomedicine and Pharmacotherapy	2019	0753-3322	https://www.sciencedirect.com/journal/biomedicine-and-pharmacotherapy	https://www.sciencedirect.com/journal/biomedicine-and-pharmacotherapy	Yes

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	Apoptogenic Role Against Murine Ascitic Carcinoma.	Ranganatha VI, Prabhakar Bt, Sharath Chandra Jnn, Khanum Sa					cedirect. com/journal/biom and-pharmac otherapy	.science direct.com/science/article/pii/S07533322 18381940	
4	Antibacterial Potential of <i>Caesalpinia Bonducella</i> Extracts and Their Isolated Phytoconstituents: In Vitro And in Silico Analysis.	Kumar, S.R.S., Shastrri, S.L., Venkatesh, R., Pradeepa, K., Krishna	Biotechnology	Journal Of Applied Biology And Biotechnology	2019	2455-7005	https://ia bonline.in /	https://jabo nline.in/ad min/php/up loads/367_p df.pdf	Yes
5	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	ISSN: 2277-4343.	https://w ww.ijrap. net/inde x.php	https://www. researchgate. net/publicati on/33877761 5_LICHEN_GE NUS_USNEA_IN_KARNATA KA	No
6	Biology of Potato Tuber Moth <i>Pthorimaeperculella</i> (Zeller) under Storage at Different Seasons in Hassan District, Karnataka, India.	Kushala G., Ramesh Babu H.N. and Rajeshwari N.	Botany	Plant Archives	2020	ISSN: 0972-5210	http://w ww.plant archives. org/	http://planta rchives.org/2 0-2/4015- 4021%20(653 6).pdf	Yes- 19901
7	Assessment of Antimicrobial Activity of Ethanollic Extraction of <i>Usneaghatensis</i> and <i>Usneamulata</i>	Archana R.M., Rajeshwari N. and Vinayaka K.S.	Botany	International Journal of Research in Ayurveda and Pharmacy	2020	ISSN: 2277-4343	https:// www.iira p.net/in dex.php	Offline	no

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8	Indigenous storage practices for Paddy in Shimoga District, Karnataka.	Sunil Kumar T.V., Rajeshwari N., Krishnappa M. and Ramesh Babu H.N.	Botany	International Journal of Botany Studies	2020	ISSN: 2455- 541X	https://www.botanyjournal.com/	Offline	no
9	Assessment of chemical properties of <i>Tinospora cordifolia</i>	Nafeesa Begum and Ranjith Y	Botany	International Journal for Modern Trends in Science and Technology	2020	ISSN: 2455- 3778	http://www.ijmfts.com/	https://www.researchgate.net/publication/347374258_Assessment_of_Chemical_Properties_of_Tinospora_Cordifolia	no
10	Preliminary Phytochemical Analysis and Extraction of Crude Drugs from Medicinal Plants	Arunakumar N.C., Ranjith Y. and Veeranna B Shettar	Botany	International Journal of Innovative Research in Science, Engineering and Technology	2020	ISSN: 2319- 8753	https://www.iomeworld.org/innovative-research-science-engineering-technology.html	Offline	no
11	Preliminary Phytochemical Screening of Medicinal Plants used in Traditional Medicine	Arunakumar N.C. and Ranjith Y.	Botany	International Journal for Modern trends in Science and Technology	2020	ISSN: 2455- 3778	http://www.ijmfts.com/	http://www.ijmfts.com/volume6/issue10/19.IJMTSTO610069.pdf	no
12	Evaluation of Antimicrobial, Antimicrobial Anthelmintic and Antioxidant Activities	Vagdevi H M	Chemistry	International Journal of Pharmaceutical	2019	ISSN: 0975- 8232	https://ijpharmaceutical.com/	doi:10.13040/ijphr0975-	no

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13	Synthesis Dna Photo Cleavage Molecular Docking and Anticancer Studies Of 2-Methyquinoline G	Krishnamurthy G.	Chemistry	Chemical Biology Letter	2019	ISSN: 2347-9825	http://pubs.jscenu.in	no			
14	Dna Binding, Molecular Docking and Antimicrobial Evaluation Of Novel Azo Dye Ligand And Their Metal Complexes	Krishnamurthy G.	Chemistry	J. Inorg. Organomet. Polym	2019	ISSN: 1574-1451	http://www.springer.com/journal/10904	doi.org/10.1007/s10904-019-0139418	no		
15	Novel Bioactive Azo-Azomethine Based Cu (II), Co (II) And Ni(II) Complexes, Structural Determination And Biological Activity	Krishnamurthy G.	Chemistry	J. Mol. Struct	2019	ISSN: 0022-2860	https://www.sciencedirect.com/journal/journal	doi.org/10.1016.https://www.sciencedirect.com/science/article/abs/pii/S002228601930417X	no		
16	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	ISSN: 2588-5839	http://www.ajgre-enchem.com/	doi:10.33945/sam/ajgc/2020	no		
17	Spectral, Dft Calculations, Biological and Molecular Docking Studies Of 2-(Thiophen-2-Ylsulfanyl)	Yuvaraja Tem	Chemistry	Ijsrr	2019	ISSN: 2279-0543	http://www.ijstr.org/vo18issue1jan-march2019.pdf	yes			



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Methyl]-1h-Benzimidazole Based Metal (II) Complexes.														
18	ವಸಾಹರಣಶಾಹಿ ಗೂಡಿವಾಣಂಜಿರಂಗೂ	ಕನ್ನಡ	Dr. H M Nagarjuna	Kannada	ಅಭಿಜಾನ ಕನ್ನಡ (ಅಪರಿಚಿತರನ್ನು ಆಸಕ್ತಿ ಮಾಹಿತಿ/ವಿಷಯ)	2019	ISSN 2347- 4017	---	Offline	No				
19	ಕನ್ನಡ ಸಾಹಿತ್ಯ ವಚನಕಾಲಗಳು ಕೊಪ್ಪಳ		Dr. H M Nagarjuna	Kannada	ಬಸವಪಟ್ಟಿ, ನವಂಬರ್ ಬೆಂಗಳೂರು ಸಂಕೇ ೪೭೦	2019	ISSN 234842 5X	-----	Offline	No				
20	Role Of Gut Micro Flora In Toxicity <i>Bacillus</i> <i>Thuringiensis</i> Subspecies Galleriate To The Larvae Of <i>Spodopteralitura</i> (Noctuidae: Lepidoptera)		Onkarappa R and Sanjay Yalashetti	Microbiology	Plant Archives	2020	0972- 5210	http://www.plantarchives.org/index.html	https://www.scopus.com/sourcelid/19900193211	Yes				
21	Isolation and Characterization Of Alkaline Protease Producing <i>Streptomyces Tendae</i> So-13 From Rhizosphere Soil Of Western Ghats		Onkarappa R And Sanjay Yalashetti	Microbiology	Research Bioscience Biotechnology Communication	2020	0974- 6455	https://www.actor.org/journal/index/22016/www.bbrc.in	https://military.vate.com/journal-profile	No				
22	Studies on Diversity Of Zooplankton Fauna Of Hansvaditank, Gondichannalli, Shivamogga, Karnataka, India.		Sayeswara HA and Kumar Swamy N	Zoology	International Journal Of Scientific Research & Review	2019-20	Volume : 8, Issue 2,Pp. 96-101, (Issn: 2279- 0543)	http://www.micpublisher.org/gallery/r-17.pdf	http://www.dynamicpublisher.org/RANS/	64650 yes				
23	A Preliminary Survey On Wetland Birds In Nagathbelagalutank Industrial Town Bhadravathi,		Sayeswara HA	Zoology	International Journal Of Scientific Research & Review	2019	Volume : 8, Issue 2, Pp.	http://www.dynamicpublis	http://www.dynamicpublisher.org/gallery/r-17.pdf	64650				

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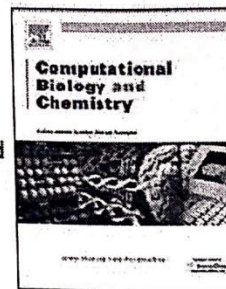
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Journal Pre-proof

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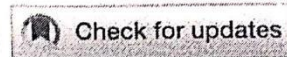
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Synthesis, molecular docking, and apoptogenic efficacy of novel N-heterocycle analogs to target B-cell lymphoma 2/X-linked inhibitors of apoptosis proteins to regress melanoma

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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

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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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

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

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Keywords:

Coumarin
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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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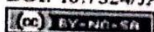
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Antibacterial potential of *Caesalpinia bonducella* extracts and their isolated phytoconstituents: *In vitro* and *in silico* analysis

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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 (4E)-5-{{2-[(1E)-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 (16.16 \pm 1.16 mm), whereas the isolated phytoconstituent SC2 showed the highest inhibition (16.50 \pm 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 Caesalpinaceae. 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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Research Article

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



LICHEN GENUS *USNEA* IN KARNATAKA

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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 forests 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 harbours 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 Karnataka⁴⁻⁶.

The lichen genus *Usnea* belonging to the family Parmeliaceae is a lichenized ascomycetes consisting of more than 350 species all over the world⁷. *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, Udipi, Dharwad, Belgaum, Gadag, Haveri, Ballary, Chitradurga, Davanagere, Tumkuru, Chikaballapura, Kolara, Mysore, Chamarajinagar 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 pH 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 Chikkamagaluru 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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BIOLOGY OF POTATO TUBER MOTH *PHTHORIMAEA OPERCULELLA* (ZELLER) UNDER STORAGE AT DIFFERENT SEASONS IN HASSAN DISTRICT, KARNATAKA, INDIA

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Abstract

Studies were under taken to learn biology of the Potato Tuber Moth *Phthorimaea operculella* (Zeller) on potato under storage conditions during winter, summer season and rainy season. Results obtained showed that with an average range temperature of 28°C and relative humidity 66% in winter season, average range temperature of 33°C and relative humidity 47% in summer season and average temperature of 30°C and average of relative humidity of 79% in rainy season, the development durations of immature stages were as follows. The incubation period was 3.6 days in winter season, 3 days in summer 3.5 days in rainy season. The larval stage duration average was 11.8 days in winter, 8.2 days in summer season, 10.3 days in rainy season. The pupal stage duration average was 6.1 days in winter season, 6 days in summer and 7.1 days in rainy season, the total life cycle average was 21.5 days in winter, 17.2 days in summer and 20.9 days in rainy season, the average number of eggs laid by female was 118.6 eggs/female in winter season for 60.4 eggs/female in summer season, 90.5 in rainy season. The female survived for an average of 16.9 days in the winter, 11.1 days in summer, 13.3 days in rainy, the male survived for 14.9 days in winter season, 8.2 days in summer season and 11 days in rainy season.

Key words: Potato, Storage, Seasons and Life cycle

Introduction

Potato (*Solanum tuberosum* L.) popularly known as 'The king of vegetables', has emerged as fourth most important food crop in India after rice, wheat and maize. Indian vegetable basket is incomplete without Potato. Because, the dry matter, edible energy and edible protein content of potato makes it nutritionally superior vegetable as well as staple food not only in our country but also throughout the world. According to 2018 data Area of potato in Karnataka is 41,000 ha, Production 36,10,000 tonne and Productivity is 13.30 tonne/ha, in Hassan district Area of potato is 11071 ha, Production 1,42,971 tonne and Productivity 12.91 tonne/ha (Department of Horticulture, Hassan 2018).


Insect pests are one of the major constraints in the commercial production of potato crop. According to Simpson (1977) this species has apparently originated

from Western South America along with its host (Graf, 1917). It was first introduced to India in 1906 through seed potatoes brought to Bombay from Italy (Lefroy, 1907).

The potato tuber moth *Phthorimaea operculella* (Zeller) is a serious insect pest of potato it causes great damage in store condition. In some cases the damage reached 100 per cent for the stored potato. Potato tuber moth (PTM) is found in tropical, subtropical, and Mediterranean areas (Golizadeh and Esmaceli, 2012) is the most serious pest both in field and storage, causing great damage to foliage and tubers and it is one of the pests that causes the most extensive damages in the field and storage of potatoes, especially in warm dry climates (Larrai *et al.*, 2007).

The larvae mine leaves and tubers, causing damage to potatoes in storage and in field condition. Although, the larvae do some feeding on potato foliage and stems,


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Research Article

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ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF ETHANOLIC EXTRACTION OF
USNEA GHATTENSIS AND *USNEA UNDULATA*

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ABSTRACT

The fungal partner of lichens produces a great variety of biologically active metabolites such as antibiotic, antiviral, anti-inflammatory and many others. Antimicrobial is a substance which either inhibits the growth of micro-organism or kills the microbes. The pathogenic microorganisms causing number of diseases in plants and animals have developed resistance against many commonly available chemicals and antibiotics. Lichens are the combination of two life forms algae and fungi. A large number of lichens are known for the source of important secondary metabolites. The present study aims at the antimicrobial properties of two species of *Usnea* belonging to the largest family Parmeliaceae. The antibacterial activity of two species of *Usnea* was tested against six organisms such as *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Salmonella typhi*, *Escherichia coli*, *Vibrio cholerae*, *Bacillus coagulans*. Both species of *Usnea* had shown inhibitory activity against all pathogen but to different extent. These two species of *Usnea* are found in large quantity in Mullayangiri of Karnataka and these two species can be used sustainably in the preparation of antimicrobials.

Keywords: *Usnea*, antimicrobial, pathogen, Parmeliaceae

INTRODUCTION

The symbiotic association of fungi and algae or cyanobacteria forms the slow growing life forms called lichens. Lichens are very sensitive organisms and show poor growth in industrial area and big cities. Hence they are considered as indicators of air pollution¹. More than 50% of lichens that have been studied synthesize substances with some degree of antimicrobial activity². Many researches have been carried out to prove the antifungal and antimicrobial activity of the lichens. Different concentrations of lichen extracts have a variable degree of lichen activity³. Antifungal and antimicrobial activity of extracts from *Usnea* species is extremely proved. Secondary metabolites such as Usnic acid, Pulvinic acid derivatives, aliphatic acids, orcinol type depsides and depsidones are well known for its effective antimicrobial activity.

Lichens and their products are used in traditional medicines for centuries and used as an alternative treatment in various parts of the world. The secondary metabolites of lichens are unique with respect to higher plants and are found their uses in many fields such as medicines, dyes, cosmetics, deodorants, preservatives and also in biopesticides. These lichens grow slowly but still they are resistant to decaying microorganisms. This fact suggests that the lichen substances are very effective antibiotics⁴.

The secondary metabolites from the lichens have the capacity to inhibit the seed germination in vascular plants and spore germination in mosses⁵. These antimicrobial roles of the secondary metabolites of lichens have made possible for the lichens to live for hundreds of years⁶. *Usnea ghattensis* and *Usnea undulata* are fruticose lichens with bushy thallus. *U. ghattensis* is erected bushy but *U. undulata* shows sub-pendant thallus. *U.*

ghattensis is found growing in Karnataka and Maharashtra^{5,6} whereas *U. undulata* is distributed in states of Arunachal Pradesh, Meghalaya, Nagaland, Karnataka, Kerala and Tamil Nadu^{6,7}.

MATERIAL AND METHODS

Collection of the sample


Lichen *Usnea ghattensis* is collected from the Mullayangiri and Kemmangundi hills of Karnataka and Mahabaleshwar hills of Maharashtra. The lichen *U. undulata* was collected from Mullayangiri peaks of Karnataka, India. The collected lichens were dried and stored in lichen herbarium of K.F.G.C, Shikaripura. The lichens were identified up to species, based on its anatomy, morphology and chemical characters⁸⁻¹². The herbarium voucher specimen number of *U. ghattensis* is LHKFGC0012 and *U. undulata* is LHKFGC0015, are used for preparing the lichen extracts.

Test organisms

Six bacterial cultures were procured from Microbiology Department, Sahyadri Science College, Shimoga, India. *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Salmonella typhi*, *Escherichia coli*, *Vibrio cholerae*, *Bacillus coagulans* are the 6 test organisms.

The lichens were washed, dried and ground to powder. 10 g portion of powder was added to 100 ml of ethanol, mixed well, sonicated and left for 48 hours at room temperature with occasional stirring. The extracts were prepared by decanting the contents of flask through a clean muslin cloth and again with Whatman No.1 filter paper to get a clean filtrate. The filtrate was

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Indigenous storage practices for paddy in shimoga district, Karnataka

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Abstract

Storage of paddy is one of the important intermediate stage between production and consumption. Use of paddy is regular in daily basis in most part of the world. Storage of paddy done in many ways by considering usage. If paddy has to be transported it will be stored in bags some other methods are also used by farmer's or by storage holders. These storage methods studied in present work are following from generation to generation hence they considered as indigenous storage practices. Practices followed for storing paddy in many villages of Shimoga district were studied, each storage structure is unique and different in its method of construction, materials use and usage. Farmers or storage holders are using these methods which have retained from more than hundreds of years accordingly their capacity in maintaining the quality and quantity of stored paddy seeds.

Keywords: paddy, traditional storage, non-chemical storage, ecofriendly storage

1. Introduction

Paddy (*Oryza sativa*, L.) is consumed worldwide. It is one of the staple food, grain produced and consumed by India is increasing Prakash *et al.*, (2016) ^[1] and consumption rate also becoming more. 17% of the year food production must be stored considered security of the nation according FAO (food and agriculture organization) Xiaoli *et al.*, (2008) ^[2]. It is easy for paddy to grow, harvest, pack, store and transport. It had good amount of nutrients, vitamins, carbohydrates and many varieties of food can be prepared, so consumption percentage is high among the world. One of the major challenges for the paddy grower is to match the need of demand within the time period, make reach for the maximum population even one in longer distance. Improper handling of postharvest processes maximize the fungal activity and mycotoxin percentage during storage was recorded by Magan and Aldred (2004) ^[3] so storage systems must be very good, it's very much need to consider physical and chemical properties otherwise changes occur as ages passes during storage it down grade the milling quality also Zhongkai *et al.*, (2003) ^[4]. For storage of paddy many more methods are followed in some part of world air tight storage are preferred in this insects and microbes get controlled by increase rate of carbon dioxide within the closed system by Thilakarathna *et al.*, (2005) ^[5]. Insects in storage container can live in temperature between 8 - 41°C (Jayas and White 2003) ^[6]. Considering safety, quantity and transportation storage done by some methods which is following traditionally by people at their household level. In our study area 27 villages are visited and interacted with the storage holders and to farmers. Our study area Shimoga is part of Malnad region, we selected parts of shimoga region for field survey which comes under the Malnad belt. It receives more rainfall in a year, weather and land is very much suitable for paddy to grow, as rice is main course in the daily food of people of Malnad they prefer paddy to grow regularly. Farmers who growing paddy will store paddy by some of the method which became common method among them in their region, which referred as traditional storage systems.

Pre storage process like drying is needed, improper drying effect on antioxidants (phenolic and anthocyanin) which lead early aging of stored rice by Lindemann *et al.*, (2019), these precautions help paddy to store for longer period. It's an important decision to select good suitable storage structures which are user friendly ecofriendly and economic. Economic storage systems has to be promote more considering the poor farmer number among the nation (Mehta *et al.*, 2012) ^[8]. Maximum quantities like several quintals of paddy can stored in these systems at household level. In early days paddy stored in panatha or kanaja are used for sowing also, as per the farmers feedback seeds stored for 3-5 months shows more than 80% of germination in field condition. There for these storage methods are very preferable ones among the farmers in Shimoga region.

2. Methodology

2.1 Field survey

During the survey we observed several storage systems which in use, most of the storage holder's prefer 2-3 type of storage system to use regularly at their household level. We done the survey in taluks of Shimoga district which comes under Malnad belt region. There are three taluk Sagara, Hosanagara and Thirthahalli come under Malnad belt. These field areas was visited during the month June-August 2019 in this visit we approached many villages of the three region and interacted with number of farmers and storage holders. Information regarding Paddy growing, variety of paddy growing, harvesting, drying and storage process are collected. Here mainly we are focusing on method of traditional storage using. So collected some important and elaborate information about storage system we got the information like type of a storage system used, the construction methodology, maintain process & cost, pre filling process, method followed to get optimum moisture in paddy before filling are noted in our data sheath. Paddy sample and storage system photos was collected. Three taluk was surveyed people of these taluk in between them sharing the information or knowledge about to choose best


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Assessment of Chemical Properties of *Tinospora Cordifolia*

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ABSTRACT

The plant produces have phyto medicine this can be derived from bark, leaf, flower, fruit and seeds (Raghunathan and Rama Mitra, 1982). In the present study the phyto chemical analysis were carried out in leaf and bark of *Tinosporacordifolia*. *Tinosporacordifolia* is an important medicinal plant used in ayurvedic system of medicine. The stem of the plant is grayish brown in colour and bitter in taste. The stem is soft wooded, dry. The plant has been used as an anti spasmodic, anti inflammatory, Jaundice, Diabetes, seminal weakness, urinary tract infections, fever, skin diseases and expectorant, carminative, digestive, anti stress and aphrodisiac.

KEYWORDS: *Tinospora cordifolia*, Phytochemicals, Chikka magalore District,

I. INTRODUCTION

Then importance of plant is known to us well, the plant kingdom is a treasure house of potential drug and from the plant are easily available less expensive safe and efficient rarely have side effect. About most of the people use traditional medicine which as compound derived from medicinal plant. However such plant should be investigated better understand their properties, the medicinal plant action on human body and these bioactive substances includes synthesized by primary or rather secondary metabolism of living organisms. The plant produces have phyto medicine this can be derived from bark, leaf, flower, fruit and seeds (Raghunathan and Rama Mitra, 1982). In the present study the phyto chemical analysis were carried out in leaf and bark of *Tinosporacordifolia*. *Tinosporacordifolia* is an important medicinal plant used in ayurvedic system of medicine. The stem of the plant is grayish brown in colour and

bitter in taste. The stem is soft wooded, dry. The plant has been used as an anti spasmodic, anti inflammatory, Jaundice, Diabetes, seminal weakness, urinary tract infections, fever, skin diseases and expectorant, carminative, digestive, anti stress and aphrodisiac. Piles problems can be controlled by eating this plant mixed with milk or water and thus preventing the bleeding and constipation (Kirtikar et.al. 1987) Leaves are rich in protein, calcium and phosphorous (Singh and Singh 2003; Sinha et.al., 2004). The alcoholic extract caused reduction in fasating blood sugar which has been interpreted as indicating some indirect action of drug on carbohydrates metabolism (Sinha et.al. 2004). Decoction of *Tinosporacordifolia* showed anti-inflammatory activity, paste or juice of this plant is applied locally for burning sensation (Sinhaet.al., 2004). *Tinosporacordifolia* the killing ability of


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PRELIMINARY PHYTOCHEMICAL ANALYSIS AND EXTRACTION OF CRUDE DRUGS FROM MEDICINAL PLANTS

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ABSTRACT: Herbal managements are becoming all the time more popular, as the herbal preparations have no or least side effects than man-made drugs. In our present study, the various parts of medicinal plants are used in Ayurvedic and other general medicines for the treatment of various diseases. This study was designed to evaluate the phytochemical and antimicrobial activities of medicinal plants extracted by the Soxhlet extraction method with various solvents. The extracts of these various plants have effective for the treatments of alimentary canal, bronchitis, diarrhea, inflammation, cough, skin, insect bite, abdominal pain, gastrointestinal complaints and for proper regulation of menstrual flow.

KEYWORDS: Phytochemical, medicinal plants, *Abutilon indicum*, *Balanites egyptiaca*, *Caesalpinia bonduc*.

I. INTRODUCTION

The use of every existing ways of plant protection, about 33 percent of annual harvested food commodities of the globe are damaged by the pests and the loss which is approximated as 6000 corers annually. Speedy and efficient execution of plant diseases in agriculture commodities is commonly accomplished by using the artificial pesticides and industrialization. However, unsystematic use of the artificial pesticides and modern technology has developed health hazards in humans as well as animals by means of residual toxicity. Pathovars of *Xanthomonas* are notorious to disease development on numerous vegetables, cash crops and are stated to have improved resistance to Ampicillin, Kanamycin, Streptomycin and Pencillin. The other disease developing microbes in humans and animals are like *E.coli*, *Candida albicans* (form of yeast), *Staphylococcus aureus* (facultative anaerobic gram-positive cocci), *Pseudomonas aeruginosa* (gram-negative bacterium). These microbes lead to many diseases for which the therapy is highly costly and those cannot be afforded by the below poverty line members, middle class peoples as well as tribals. The alternate for this is the use of medicinal plants which is the old technique coming from past centuries.

Medicinal plants are the ones thought to possess the medicinal properties, but some plants or the phytochemical ingredients of them have been proven by precise science and also got the approval by famous regulatory agencies like USFDA or EFSA to have medicinal effects. Plants have developed the capability to produce chemical compounds that actually aid them to defend themselves against insects, fungi and herbivorous mammal attacks. By chance, few of the compounds, whilst being toxic to plant predators, turn out to have favorable effects in human disease therapy. Such secondary metabolites are extremely diverse in structure; a lot of them are aromatic substances like phenols or oxygenated phenol derivatives. Besides the production of plant primary metabolites, plants can produce secondary metabolites like flavonoids, alkaloids, reducing sugars, saponins, tannins, terpenoids etc., which are not frankly involved in organism development, growth and reproduction. The tribal practioners make use of these secondary metabolites in disease curing. Unlike the primary metabolites the secondary metabolite absence does not leads to instantaneous fatality. However, there may be an impairment of organism survivability and fecundity in long term. They are often constrained to a narrow set of species with in a poly-genetic group and often play a vital role in plant defense against other species and herbivores. They are also useful to human beings as recreational drugs, medicines and flavorings.

Most of the secondary metabolites of interest to human kind fit into categories which classify secondary metabolites based on their bio-synthetic origin. Various classes of secondary metabolites include the

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Preliminary Phytochemical Screening of Medicinal Plants used in Traditional Medicine

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ABSTRACT

Fundamental screening of phytochemicals is a significant advance, in the location of the bioactive standards present in restorative plants and therefore may prompt medication disclosure and improvement. In the current examination, chief phytoconstituents of the six chose restorative plants of various families were distinguished so as to relate their essence with bioactivities of the plants. Screening of six chose therapeutic plants was performed for the presence of tannins, flavonoids, terpenoids, saponins, steroids, phlobatannins, starches, glycosides, coumarins, alkaloids, proteins, emodins, anthraquinones, anthocyanins and leucoanthocyanins utilizing standard strategies. All the chose restorative plants were found to contain tannins and flavonoids. In addition, terpenoids were additionally present in all the chose plants aside from *P. dactylifera*. but *P. dactylifera*. Then again, saponins and steroids were missing in all plants aside from *S. chirata* and phlobatannins were missing in all plants aside from *R. sativus*. Likewise, starches, glycosides and coumarins were available in all the chose plants aside from *P. dactylifera* and *R. sativus*. Alkaloids were available in all the chose plants aside from *F. religiosa*, *P. dactylifera* and *R. sativus*. Proteins were available just in *F. religiosa* and *S. chirata*. Though emodins, anthraquinones, anthocyanins and leucoanthocyanins were missing in all the chose six plants. It is evident from the study that *S. chirata* is of highest therapeutic efficacy possessing majority of phytochemical classes of compounds and *P. dactylifera* is of lowest therapeutic potential due to the absence of majority of phytoconstituents.

KEYWORDS: Medicinal plants, Preliminary, Screening, Phytochemical.

INTRODUCTION

Restorative plants other than remedial specialists are likewise a major wellspring of data for a wide assortment of synthetic constituents which could be created as medications with exact selectivity. These are the repositories of conceivably valuable substance mixes which could fill in as more up to date leads and signs for current medication plan [1]. The most significant of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic mixes [2]. Relationship

between's the phytoconstituents and the bioactivity of plant is attractive to know for the combination of mixes with explicit exercises to treat different wellbeing afflictions and ongoing infections too [3].

Inferable from the noteworthiness in the above setting, such starter phytochemical screening of plants is the need of great importance so as to find and create novel helpful specialists with improved adequacy. Various exploration bunches have likewise detailed such examinations all through



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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.

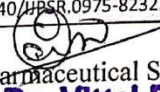
The emergence of resistance to the major classes of antibacterial agents is recognized as a serious health concern. The search for antibacterial agents with a new mode of actions will always remain as an important and challenging task. Plants based antimicrobial have enormous potential; they are effective 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.

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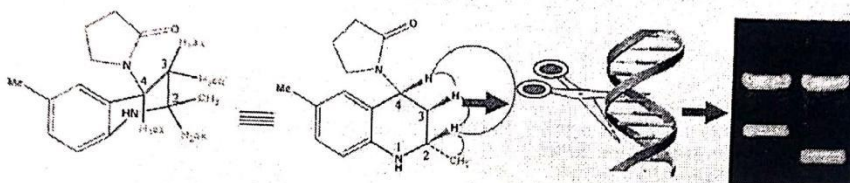
Synthesis, DNA photocleavage, molecular docking and anticancer studies of 2-methyl-1,2,3,4-tetrahydroquinolines

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

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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-ylidene-azonyl]-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

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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 dyeing 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 medical applications, including antibacterial, anticancer, antifungal,

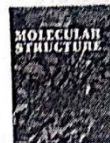
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Novel bioactive azo-azomethine based Cu (II), Co (II) and Ni(II) complexes, structural determination and biological activity

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ABSTRACT

A novel bioactive azo-azomethine tridentate ligand N'-(E)-[2-hydroxy-3-methoxy-5-[(E)phenyldiazenyl] phenyl]methylidene]pyridine-3 carbonylhydrazide (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-[(Z)-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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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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 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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Spectral, DFT Calculations, Biological and Molecular Docking Studies of 2-[(Thiophen-2-ylsulfanyl)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-ylsulfanyl)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 bida date mode of coordination and displays the octahedral geometry, except Cu(II) complex exhibit distorted octahedral geometry. X-ray diffraction (powder pattern) data suggest that amorphous 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) exhibit 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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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

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ವಿಜ್ಞಾನ ಕಾಲೇಜು, ಶಿವಮೊಗ್ಗ.
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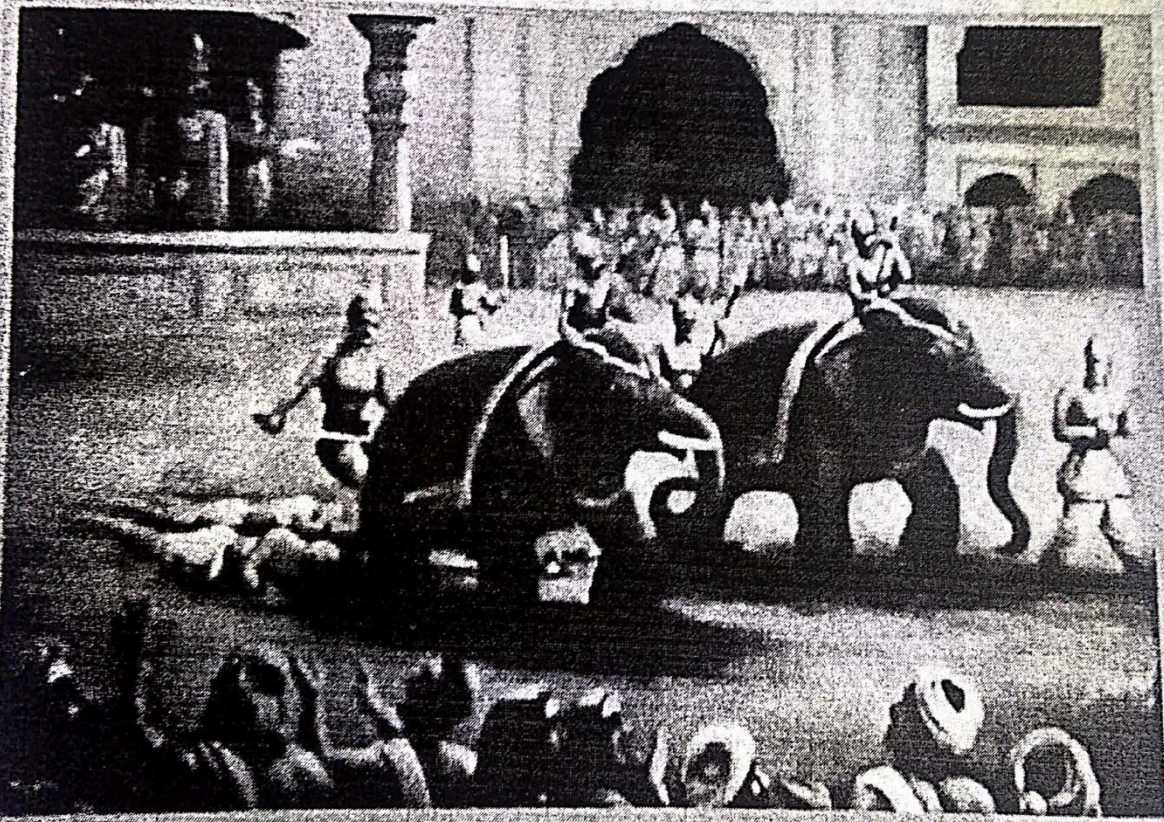
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ಕನ್ನಡ ರಾಜ್ಯೋತ್ಸವದ ಶುಭಾಶಯಗಳು



“ಜೋಷವಾಳಿಯಾನಲ್ಲ, ವೇಳೆವಾಳಿಯವ ನಾನಯ್ಯಾ,
ಹಾಳುಗೆಟ್ಟೋಡುವ ಆಳು ನಾನಲ್ಲವಯ್ಯಾ
ಕೇಳು, ಕೂಡಲಸಂಗಮದೇವಾ,
ಮರಣವೆ ಮಹಾನವಮಿ.”

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ಕನ್ನಡ ಸಾಹಿತ್ಯಕ್ಕೆ ವಚನಕಾರರ ಕೊಡುಗೆ

ಡಾ. ಪಾ. 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 ಚಳವಳಿಯ 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 ರೂಪರೇಷಗಳನ್ನು ಸಜ್ಜುಗೊಳಿಸಿಕೊಂಡಿತು.

ವಚನಕಾರರು ಸಮಾಜನಿಷ್ಠ ಚಿಂತಕರಾಗಿದ್ದು, ತಮ್ಮ ನಡೆ-ನುಡಿಗಳ ಮೂಲಕವೇ ಯಾವುದೇ ವಿಷಯಗಳಲ್ಲಿಯೂ ತಮ್ಮ ಅನುಭವದ ನುಡಿಗಳನ್ನೇ ವಿಚಾರಗಳನ್ನಾಗಿಸಿದರು. ಇವರಿಗೆ ಆಧ್ಯಾತ್ಮವು ಲೌಕಿಕ ಹಿತದ ಮೂಲಕವೇ ಹೊರಹೊಮ್ಮಿದ್ದು, ಇಲ್ಲಿನ ವಿಶೇಷವೇ ಸೌ. 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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ROLE OF GUT MICROFLORA IN TOXICITY OF *BACILLUS THURINGIENSIS* SUBSPECIES *GALLERIAE* TO THE LARVAE OF *SPODOPTERA LITURA* (NOCTUIDAE: LEPIDOPTERA)

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Abstract

It is well known understands that synergistic and additive effects both between *Bt* toxins and other compounds do occur. Mode of action of *B. thuringiensis* (*Bt*) Cry toxins are very specific. Different strains of *Bt* are specific to different receptors in insect gut wall. *Bt* toxicity depends on recognizing receptors, damage to the gut by the toxin occurs upon binding to a receptor. Each insect species have different types of receptors. Comparatively less consideration has been devoted to other important research aspects, such as the compound network of molecular interactions underpinning the host killing mechanism and the role of factors other than the pore-forming toxins that contribute to *B. thuringiensis* pathogenicity and virulence. The presence of symbiotic gut flora in the insect midgut also plays a major role. We examined the interaction between *Bacillus thuringiensis* subsp. *galleriae* and larval gut flora in the lepidopteran pest, *Spodoptera litura*. Dose-mortality bioassays of *Bt* *galleriae* were conducted on normal and gut flora eliminated larvae of *S. litura*. The results showed that the gut microflora play a major role in determining the toxicity of *B. thuringiensis*.

Keywords: Bacterial diversity, insect gut microbes, Elimination of bacteria, microbial interactions

Introduction

The entomopathogenic bacterium, *Bacillus thuringiensis* (*Bt*) produces parasporal crystals that are toxic to wide array of insects and other related organisms. The targeted mode of action in the insect gut includes solubilization of the crystals upon ingestion by the susceptible insect and its activation by midgut proteases then binding to the pore forming toxin at specific receptors present on the midgut brush border membrane vesicle (Soberon *et al.*, 2016). However, comparatively less interest has been shown to the other factors such as the function of gut microflora in modulating *Bt* toxicity. Insects harbor a different range of gut bacteria that aids in host insect nourishment and protection from pathogenic microbes (Engel and Moran, 2013). However, compared to mammalian gut, the insect gut harbors only few microbial species, but specialized in their function. DGGE analysis of the field population of *Spodoptera litura* reportedly contain more than 15 gut bacterial OTUs (Gadad *et al.*, 2017).

It is well understood that the *S. litura* is relatively less susceptible to many *Bt* strains including the widely used *Bt kurstaki* HD-1. *S. litura* (Noctuidae: Lepidoptera) is a polyphagous pest and cosmopolitan in distribution. The various experimental evidences indicate that the gut microflora play an additive role in increasing the toxicity of *Bt* in few insect species (Broderick *et al.*, 2009). However, in other insects the gut microfloras were linked to degradation/inactivation of toxic effect of *Bt* (Heckel *et al.*, 2018; Xia *et al.*, 2018).

Bt is considered as feasible alternative way to manage the pests under organic agriculture as well as to eliminate the pesticide resistant individuals. The current work explored the effective role of gut microflora on toxicity of *Bt* to the larvae of *S. litura*.

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Materials and Methods

Collection and rearing of test insect

The egg masses and larvae of *S. litura* were collected from cabbage field at ICAR-NBAIR farm, Bengaluru, Karnataka, India (13°05' N, 77°33' E). The *S. litura* larvae were reared on fresh castor leaves till pupation. During ovipositions of the adult moths were provided with 10% honey solution fortified with multivitamins. Eggs were surface sterilized in 0.2% sodium hypochlorite solution and the larvae from F1 generation were maintained on chickpea based artificial diet at 28± 2 C, 60% relative humidity and 14:10h photoperiod.

Elimination of gut microflora

The elimination of gut micro flora was determined by feeding the larvae of *S. litura* with a range of antibiotic concentrations in combination. The neonate larvae of *S. litura* was fed with a combination of streptomycin and rifampicin (each 50µg/ml) amended diet till molting to second instar was found to inhibit >99% of the culturable midgut bacteria in the larvae and hence in subsequent gut curing experiments the same combination and dose were used. The freshly molted second instar larvae reared on antibiotic amended diet and normal diet were used in dose-mortality bioassays.

Culturing and formulation of *Bacillus thuringiensis* (*Bt*)

The locally isolated *Bt* subsp. *galleriae* (MTCC 8977) was grown in Luria Bertani broth at laboratory conditions 150 rpm for 72 hours at 30°C. The sporulated culture was centrifuged at 8000 rpm and the pellet was washed twice with 0.5M NaCl solution followed by washing thrice with sterile distilled water. The resultant pellet was subjected to lactose-acetone based co-precipitation method (Dulmage *et al.*, 1970). The precipitate containing spore crystal mixture was vacuum dried, powdered and used for bioassay studies.

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Isolation and Characterization of Alkaline Protease Producing *Streptomyces tendae* SO-13 from Rhizosphere Soils of Western Ghats

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ABSTRACT

Microbial alkaline proteases are among the salient hydrolytic enzyme and used extensively as biocatalysts, Extracellular alkaline protease is of great importance due to its applications in detergent, food and leather industries by the prokaryotic actinomycetes. The present investigations were focusing on soil actinomycetes. Screening for alkaline protease and characterization of specific strain from rhizosphere soil from Western Ghats of Karnataka, India. The zones of hydrolysis were observed on skim milk agar medium under pH 10.0 at 30±02 OC for 5 to 7 days and produced 117.67 U/mL of alkaline protease by the fermentation. Morphological and biochemical characterization of the isolate was carried out and found that the isolate belongs to the *Streptomyces* genus. Further species confirmation of the *Streptomyces* was done by 16S rRNA gene sequencing. The obtained nucleotide sequences SO-13 were submitted to the GenBank database and the accession number assigned is MW130237. The results reveal the isolate SO-13 was identified as *Streptomyces tendae*. The present data reveal that the isolate SO-13 represents *Streptomyces tendae*. The potentiality of the eco-friendly enzyme could be used for various industrial applications. The alkaline protease production from *Streptomyces tendae* SO-13 is the potent strain for commercial use. Further investigation at the commercial level and novel applications of alkaline proteases to be carried out.

KEY WORDS: WESTERN GHATS, RHIZOSPHERE SOIL, STREPTOMYCES TENDAE, ALKALINE PROTEASE.

INTRODUCTION

The Western Ghats of India has been considered as one of thirty-four biodiversity hot spots in the world, with rich flora and fauna. The Western Ghats of Karnataka popularly known as Sahyadri hills are treasure houses of endangered species but less studied concerning microbial biodiversity. Actinomycetes are widely distributed in soil,

and constitute a significant part of soil microflora (Bawazir and Manjula 2018). Soil actinomycetes are prokaryotes with various metabolic activities (Chavan et al., 2013). Actinomycetes are gram-positive, filamentous, bacteria, characterized by the formation of aerial mycelium, and spores on solid media, with DNA high in G+C content of 60-70 mol% (Shirling and Gottlieb 1966; Subbaraju and Onkarappa 2018).

Among the microorganisms, actinomycetes acquire special importance as the power source of antibiotics and, other bioactive primary and secondary metabolites such as enzymes (Chavan et al., 2013). Sources of commercial enzymes cover a wide range from microorganisms then animals and plants sources. Fungi and yeast contribute about 50%, bacteria 25%, animal 8% and plant 4% of the total in commercial enzymes production (Azmi et al., 1999). Proteases of neutrophilic as well as alkaliphilic

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Studies on Diversity of Zooplankton fauna of Hansvadi tank, Gondhichatnalli, Shivamogga, Karnataka, India

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ABSTRACT

The Zooplankton composition of Hansvadi tank was studied for a period of six months from April to September 2017. Zooplankton diversity is one of the most important ecological parameters in water quality assessment. Zooplankton plays a vital key role in energy transfer of an ecosystem. Therefore these are considered as link between the producers and consumers. Zooplankton is the intermediate between phytoplankton and fish. The zooplanktons determine the quantum of fish stock. The failure of fishery resources is attributed to the reduced zooplankton population. A total of 22 species belonging to four groups were recorded, of which rotifers and cladocerans were dominant. Relative abundance of zooplankton in tank showed maximum of rotifera (36.36%) followed by cladocera (31.81%), copepoda (18.18%) and protozoa (13.63%). The presence of Brachionus species indicates that the tank is approaching towards eutrophic action and is organically polluted. The ecological status of the tank was found to be impoverished in terms of species composition.

Keywords: Zooplankton, Hansvadi tank, Shivamogga


INTRODUCTION

Zooplanktons assume a great ecological significance in aquatic ecosystem as they play vital role in food web of the food chain, nutrient recycling and in the transfer of organic matter from primary producers to secondary consumers like fishes (Krishnamurthy *et al.*, 1979; Sayeswara *et al.*, 2014). Zooplanktons are ecologically and economically important heterogeneous group of tiny aquatic organisms that can move at the mercy of water currents, as they have weak power of locomotion. Zooplanktons are considered as excellent Bioindicators, because zooplankton diversity indicates the quality of water (Dadhick and Sazena, 1999). If there is any fluctuation in the aquatic environment it directly or indirectly affects the zooplankton diversity, because they are very sensitive and respond immediately according to the adverse effect of environment.

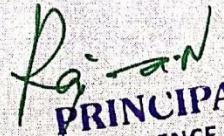
The major groups of freshwater zooplanktons are rotifers, cladocera and copepod. Rotifers are the most dominant zooplankton group in freshwater ecosystems. Hence rotifer species composition is considered as

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A Preliminary survey on wetland birds of Nagathibelagalu tank in industrial town Bhadravathi, Karnataka, India

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ABSTRACT

The present investigation deals with study of diversity of water birds of Nagathibelagalu tank of Bhadravathi, Karnataka from September 2017 to August 2018. Water birds are an important component of most of wetland environment, as these occupy several trophic levels in the food web of wetland. During the present investigation, 24 species of water birds belonging to 10 families were recorded. The dominant family was Anatidae represented by 5 species, followed by Charadriidae and Ardeidae with 4 species each. Threskiorithidae and Rallidae were represented by three species each. The families with lowest representation of one species were Reurvirostridae, Sternidae, Phalacrocoracidae, Jalamodae and Scolopacidae. Based on the frequency of sightings, sixteen common, three very common and five rare birds were recorded. Twenty three water birds are Least Concerned and one is Nearly Threatened. The study revealed that the tank harbors many resident and few migratory bird species. The present study location is also facing tremendous conservation challenges by the impact of anthropogenic alteration of the habitats in and around the tank.

Key words: Wetland birds, Nagathibelagalu tank, Least concern, Bhadravathi

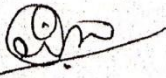
INTRODUCTION

Studies shows that wetlands are extremely important areas throughout the world for wildlife protection, recreation, sediment control and flood prevention (Sivaperuman and Jayson, 2000). Wetlands are being used for agriculture, aquaculture and disposing the waste materials (Veeramani and Usha, 2018). They are most productive ecosystems play a vital role in nutrient observation and erosion control. In addition, wetlands provide home for a many species of wildlife such as birds, mammals, fishes, frogs, insects and plants (Buckton, 2007).


Avifauna is one of the most important ecological indicators to evaluate the quality of habitats (Lodhi *et al.*, 2018). Wetlands provide a wintering ground for many species of migratory birds. However, wetlands in India are facing tremendous anthropogenic pressures (Prasad *et al.*, 2002), which adversely influence the structure of bird communities (Reginaid *et al.*, 2007). Monitoring of wetland birds provide valuable information on ecological health and status of wetlands and can be vital tool

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FISH DIVERSITY IN UMBLEYBYLLU AND NARASIMHA RAJAPURA, BACK WATER OF BHADRA RESERVOIR, KARNATAKA, INDIA.

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Abstract:

River is the main part of the conveyor that carries water from the higher parts of the earth to the lower parts. The present study deals with the fish biodiversity of Umbleybyllu and Narasimha Rajapura from March 2017 to May 2018. Altogether 23 species from Narasimha Rajapura and 27 species from 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 13°42' N latitude and 75°38' E longitude located near Lakkavalli town of Chikmagloire district, Karnataka and the confluence of the Bhadra River. The water of the reservoir is used for

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