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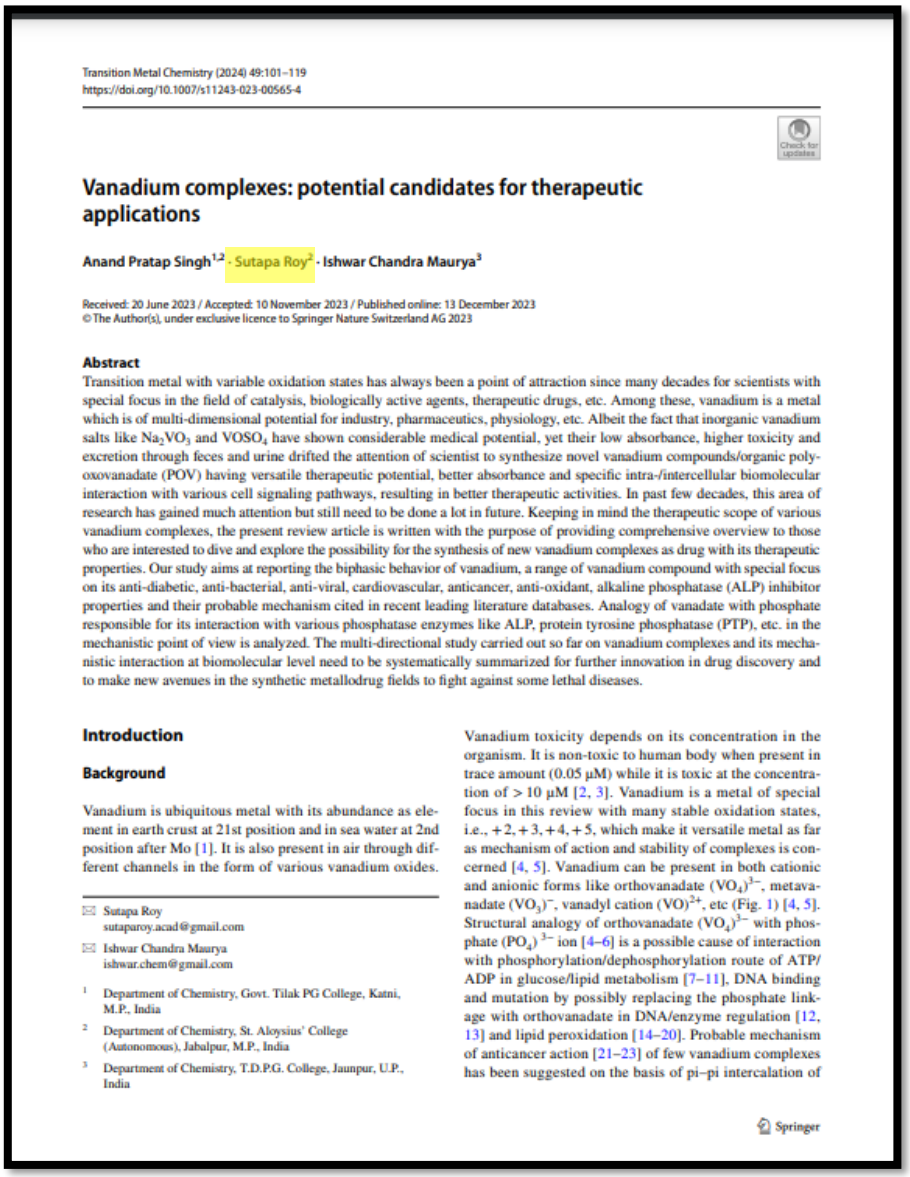


Transition Metal Chemistry (2024) 49:101–119
https://doi.org/10.1007/s11243-023-00565-4

Vanadium complexes: potential candidates for therapeutic applications

Anand Pratap Singh[1,2] · Sutapa Roy[2] · Ishwar Chandra Maurya[3]

Received: 20 June 2023 / Accepted: 10 November 2023 / Published online: 13 December 2023

Abstract
Transition metal with variable oxidation states has always been a point of attraction since many decades for scientists with special focus in the field of catalysis, biologically active agents, therapeutic drugs, etc. Among these, vanadium is a metal which is of multi-dimensional potential for industry, pharmaceutics, physiology, etc. Albeit the fact that inorganic vanadium salts like Na_2VO_3 and $VOSO_4$ have shown considerable medical potential, yet their low absorbance, higher toxicity and excretion through feces and urine drifted the attention of scientist to synthesize novel vanadium compounds/organic poly-oxovanadate (POV) having versatile therapeutic potential, better absorbance and specific intra-/intercellular biomolecular interaction with various cell signaling pathways, resulting in better therapeutic activities. In past few decades, this area of research has gained much attention but still need to be done a lot in future. Keeping in mind the therapeutic scope of various vanadium complexes, the present review article is written with the purpose of providing comprehensive overview to those who are interested to dive and explore the possibility for the synthesis of new vanadium complexes as drug with its therapeutic properties. Our study aims at reporting the biphasic behavior of vanadium, a range of vanadium compound with special focus on its anti-diabetic, anti-bacterial, anti-viral, cardiovascular, anticancer, anti-oxidant, alkaline phosphatase (ALP) inhibitor properties and their probable mechanism cited in recent leading literature databases. Analogy of vanadate with phosphate responsible for its interaction with various phosphatase enzymes like ALP, protein tyrosine phosphatase (PTP), etc. in the mechanistic point of view is analyzed. The multi-directional study carried out so far on vanadium complexes and its mechanistic interaction at biomolecular level need to be systematically summarized for further innovation in drug discovery and to make new avenues in the synthetic metallodrug fields to fight against some lethal diseases.

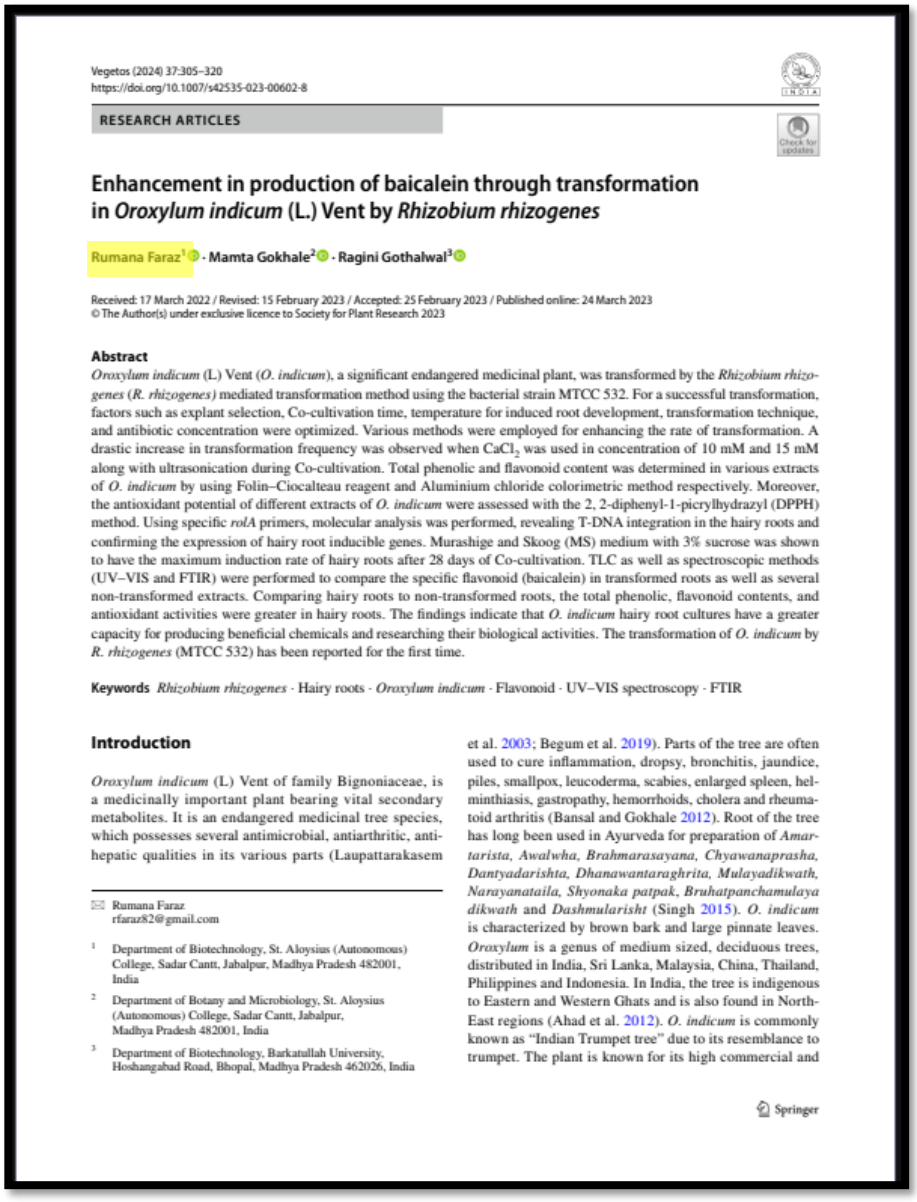
Introduction

Background

Vanadium is ubiquitous metal with its abundance as element in earth crust at 21st position and in sea water at 2nd position after Mo [1]. It is also present in air through different channels in the form of various vanadium oxides.

Vanadium toxicity depends on its concentration in the organism. It is non-toxic to human body when present in trace amount (0.05 µM) while it is toxic at the concentration of > 10 µM [2, 3]. Vanadium is a metal of special focus in this review with many stable oxidation states, i.e., +2, + 3, + 4, + 5, which make it versatile metal as far as mechanism of action and stability of complexes is concerned [4, 5]. Vanadium can be present in both cationic and anionic forms like orthovanadate $(VO_4)^{3-}$, metavanadate $(VO_3)^{-}$, vanadyl cation $(VO)^{2+}$, etc (Fig. 1) [4, 5]. Structural analogy of orthovanadate $(VO_4)^{3-}$ with phosphate $(PO_4)^{3-}$ ion [4–6] is a possible cause of interaction with phosphorylation/dephosphorylation route of ATP/ADP in glucose/lipid metabolism [7–11], DNA binding and mutation by possibly replacing the phosphate linkage with orthovanadate in DNA/enzyme regulation [12, 13] and lipid peroxidation [14–20]. Probable mechanism of anticancer action [21–23] of few vanadium complexes has been suggested on the basis of pi–pi intercalation of

✉ Sutapa Roy
sutaparoy.acad@gmail.com
✉ Ishwar Chandra Maurya
ishwar.chem@gmail.com
[1] Department of Chemistry, Govt. Tilak PG College, Katni, M.P., India
[2] Department of Chemistry, St. Aloysius' College (Autonomous), Jabalpur, M.P., India
[3] Department of Chemistry, T.D.P.G. College, Jaunpur, U.P., India



Vegetos (2024) 37:305–320
https://doi.org/10.1007/s42535-023-00602-8

RESEARCH ARTICLES

Enhancement in production of baicalein through transformation in *Oroxylum indicum* (L.) Vent by *Rhizobium rhizogenes*

Rumana Faraz[1] · Mamta Gokhale[2] · Ragini Gothalwal[3]

Received: 17 March 2022 / Revised: 15 February 2023 / Accepted: 25 February 2023 / Published online: 24 March 2023

Abstract
Oroxylum indicum (L) Vent (*O. indicum*), a significant endangered medicinal plant, was transformed by the *Rhizobium rhizogenes* (*R. rhizogenes)* mediated transformation method using the bacterial strain MTCC 532. For a successful transformation, factors such as explant selection, Co-cultivation time, temperature for induced root development, transformation technique, and antibiotic concentration were optimized. Various methods were employed for enhancing the rate of transformation. A drastic increase in transformation frequency was observed when $CaCl_2$ was used in concentration of 10 mM and 15 mM along with ultrasonication during Co-cultivation. Total phenolic and flavonoid content was determined in various extracts of *O. indicum* by using Folin–Ciocalteau reagent and Aluminium chloride colorimetric method respectively. Moreover, the antioxidant potential of different extracts of *O. indicum* were assessed with the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) method. Using specific *rolA* primers, molecular analysis was performed, revealing T-DNA integration in the hairy roots and confirming the expression of hairy root inducible genes. Murashige and Skoog (MS) medium with 3% sucrose was shown to have the maximum induction rate of hairy roots after 28 days of Co-cultivation. TLC as well as spectroscopic methods (UV–VIS and FTIR) were performed to compare the specific flavonoid (baicalein) in transformed roots as well as several non-transformed extracts. Comparing hairy roots to non-transformed roots, the total phenolic, flavonoid contents, and antioxidant activities were greater in hairy roots. The findings indicate that *O. indicum* hairy root cultures have a greater capacity for producing beneficial chemicals and researching their biological activities. The transformation of *O. indicum* by *R. rhizogenes* (MTCC 532) has been reported for the first time.

Keywords *Rhizobium rhizogenes* · Hairy roots · *Oroxylum indicum* · Flavonoid · UV–VIS spectroscopy · FTIR

Introduction

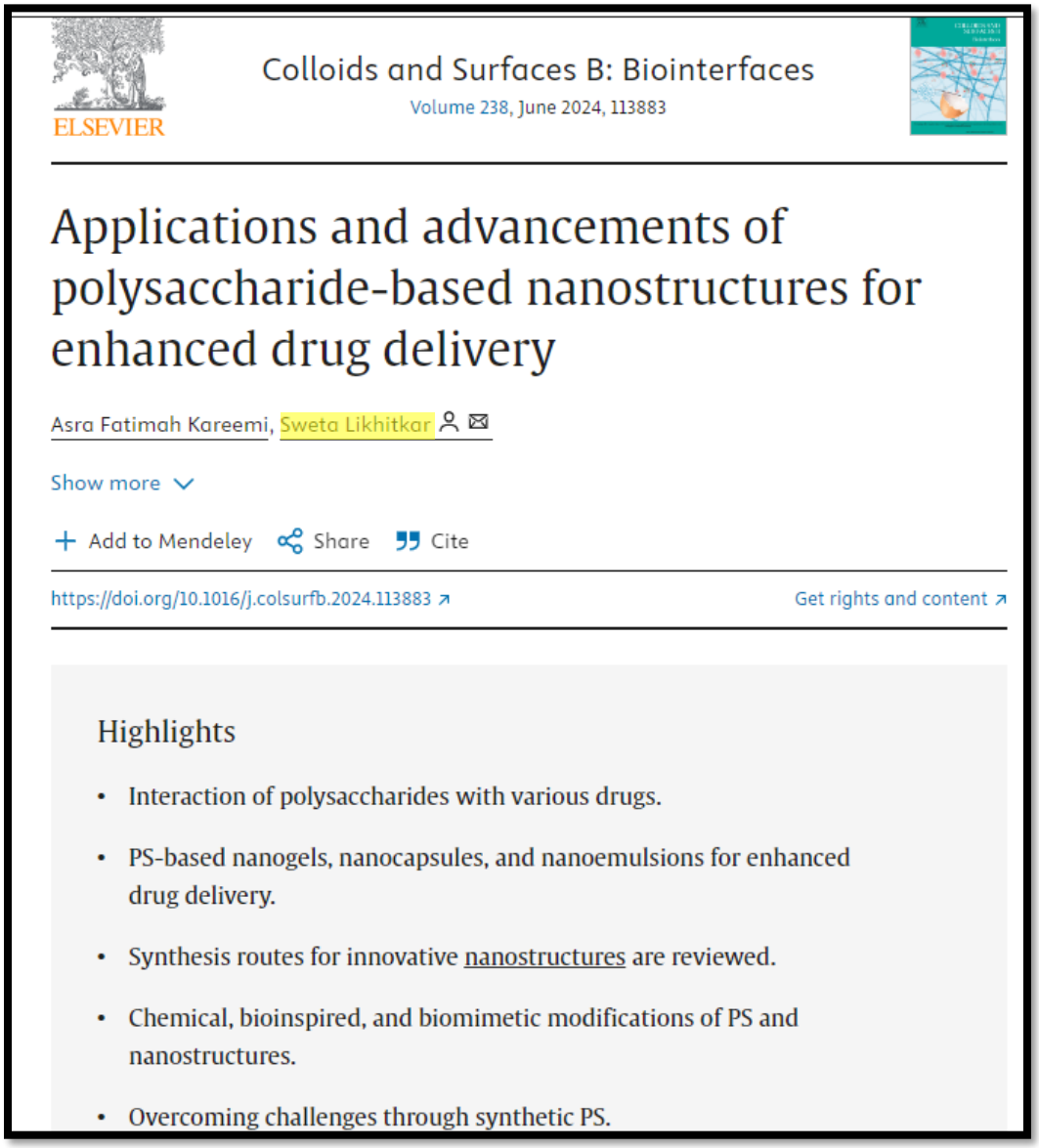
Oroxylum indicum (L) Vent of family Bignoniaceae, is a medicinally important plant bearing vital secondary metabolites. It is an endangered medicinal tree species, which possesses several antimicrobial, antiarthritic, antihepatic qualities in its various parts (Laupattarakasem et al. 2003; Begum et al. 2019). Parts of the tree are often used to cure inflammation, dropsy, bronchitis, jaundice, piles, smallpox, leucoderma, scabies, enlarged spleen, helminthiasis, gastropathy, hemorrhoids, cholera and rheumatoid arthritis (Bansal and Gokhale 2012). Root of the tree has long been used in Ayurveda for preparation of *Amartarista, Awalwha, Brahmarasayana, Chyawanaprasha, Dantyadarishta, Dhanawantaraghrita, Mulayadikwath, Narayanataila, Shyonaka patpak, Bruhatpanchamulaya dikwath* and *Dashmularisht* (Singh 2015). *O. indicum* is characterized by brown bark and large pinnate leaves. *Oroxylum* is a genus of medium sized, deciduous trees, distributed in India, Sri Lanka, Malaysia, China, Thailand, Philippines and Indonesia. In India, the tree is indigenous to Eastern and Western Ghats and is also found in North-East regions (Ahad et al. 2012). *O. indicum* is commonly known as "Indian Trumpet tree" due to its resemblance to trumpet. The plant is known for its high commercial and

✉ Rumana Faraz
rfaraz82@gmail.com

[1] Department of Biotechnology, St. Aloysius (Autonomous) College, Sadar Cantt, Jabalpur, Madhya Pradesh 482001, India

[2] Department of Botany and Microbiology, St. Aloysius (Autonomous) College, Sadar Cantt, Jabalpur, Madhya Pradesh 482001, India

[3] Department of Biotechnology, Barkatullah University, Hoshangabad Road, Bhopal, Madhya Pradesh 462026, India



ELSEVIER

Colloids and Surfaces B: Biointerfaces
Volume 238, June 2024, 113883

Applications and advancements of polysaccharide-based nanostructures for enhanced drug delivery

Asra Fatimah Kareemi, Sweta Likhitkar

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https://doi.org/10.1016/j.colsurfb.2024.113883

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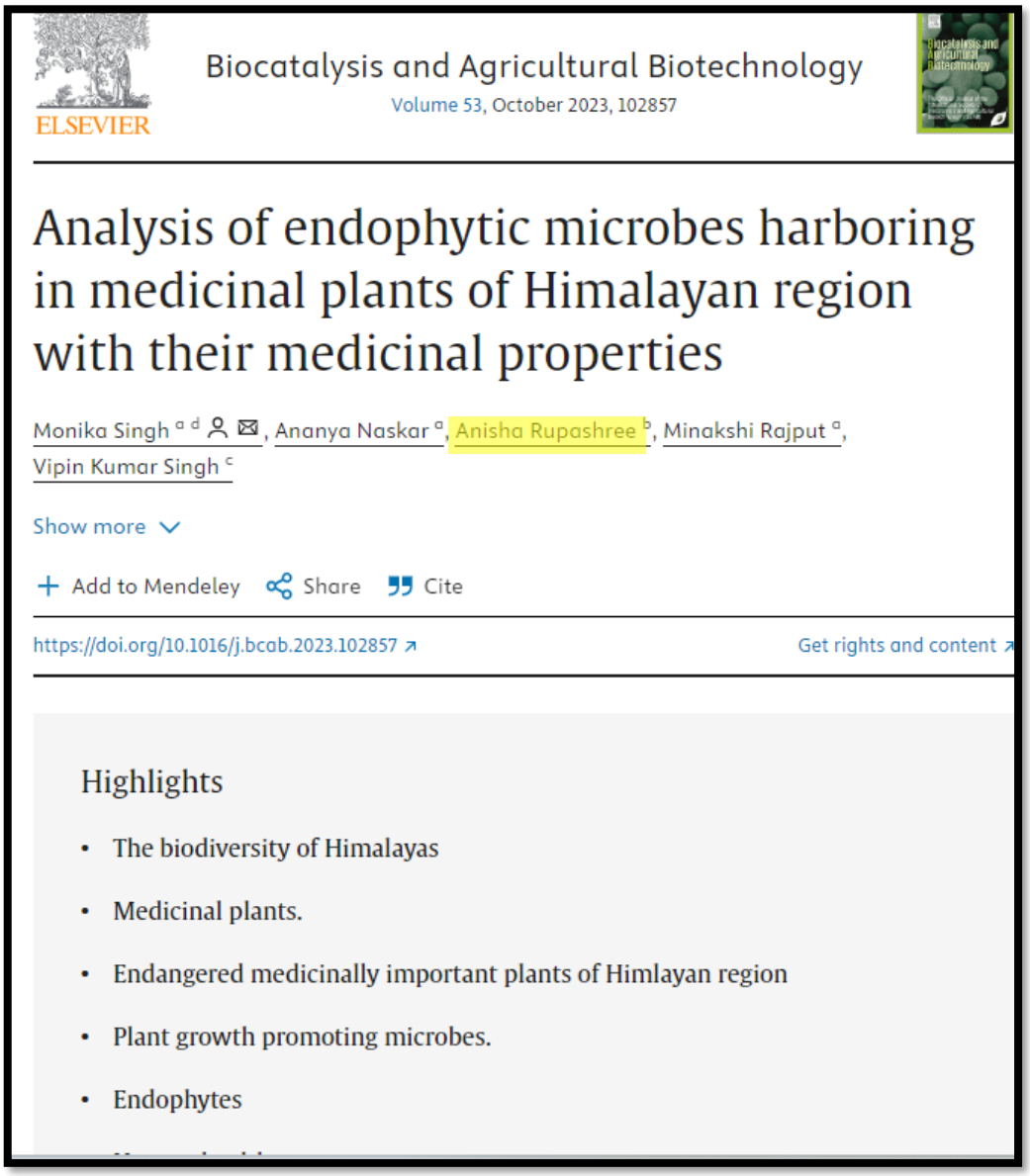
Highlights

- Interaction of polysaccharides with various drugs.
- PS-based nanogels, nanocapsules, and nanoemulsions for enhanced drug delivery.
- Synthesis routes for innovative nanostructures are reviewed.
- Chemical, bioinspired, and biomimetic modifications of PS and nanostructures.
- Overcoming challenges through synthetic PS.



ELSEVIER

Biocatalysis and Agricultural Biotechnology
Volume 53, October 2023, 102857

Analysis of endophytic microbes harboring in medicinal plants of Himalayan region with their medicinal properties

Monika Singh [a d], Ananya Naskar [a], Anisha Rupashree [b], Minakshi Rajput [a], Vipin Kumar Singh [c]

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https://doi.org/10.1016/j.bcab.2023.102857 Get rights and content

Highlights

- The biodiversity of Himalayas
- Medicinal plants.
- Endangered medicinally important plants of Himlayan region
- Plant growth promoting microbes.
- Endophytes

Meta-Analysis > Lupus. 2023 Jul;32(8):983-992. doi: 10.1177/09612033231182202. Epub 2023 Jun 7.

Prevalence of migraine in systemic lupus erythematosus: A meta-analysis

Surjyapratap Sarangi [1], Suraj K Nahak [1], Anisha Rupashree [2], Jogeswar Panigrahi [1], Aditya K Panda [1]

Affiliations + expand

PMID: 37283233 DOI: 10.1177/09612033231182202

Abstract

Background: Systemic lupus erythematosus (SLE) is an autoimmune disorder with a wide range of clinical manifestations, including neurological issues in about 25%-75% of cases. Among the neurological involvement cases, most cases show migraine. However, the prevalence of migraine varied worldwide, and in some studies, a higher incidence of migraine in SLE cases was reported compared to healthy controls. In the present study, we adopted a meta-analysis approach to find out the prevalence of migraine in SLE patients worldwide and investigate whether migraine frequency is more prevalent in SLE patients than controls.

Material and methods: Various literature databases such as Scopus, PubMed, Science Direct, and Google Scholar were screened for eligible studies. The last search was performed on January 21, 2023. Publication biases were accessed by Egger's regression analysis and funnel plots. Cochrane Q statistics and I^2 values explored the presence or absence of heterogeneity. All statistical analysis of meta-analysis was performed in comprehensive meta-analysis software v3.

Results: Based on predefined inclusion and exclusion criteria, 17 reports comprising 2901 SLE patients and 575 healthy controls were considered in the present study. The meta-analysis revealed the prevalence of migraine to be 34.8%. Furthermore, migraine was more prevalent in SLE patients than healthy controls (OR: 1.964, p = 0.000, 95% CI = 1.512-2.550). Similar trends were also observed while

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Role of Polyamines in Molecular Regulation and Cross-Talks Against Drought Tolerance in Plants

Samapika Nandy[1] · Saynati Mandal[2] · Santosh Kumar Gupta[3] · Uttpal Anand[4] · Mimosa Ghorai[1] · Avinash Mundhra[5] · Md. Habibur Rahman[6] · Puja Ray[1] · Sicon Mitra[7] · Durga Ray[8] · Milan Kumar Lal[9,10] · Rahul Kumar Tiwari[9,10] · Potshangbam Nongdam[11] · Devendra Kumar Pandey[12] · Mahipal S. Shekhawat[13] · Niraj Kumar Jha[7,17,18] · Saurabh Kumar Jha[7,8,17] · Manoj Kumar[14] · Radha[15] · Javad Sharifi-Rad[16] · Abhijit Dey[1]

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Abstract
Global agricultural demand and the impact of fluctuating climatic conditions including global warming have catastrophically limited crop productivity and immensely outstretched the market value of agricultural products leading to acute inflation. The effect of desiccation or drought stress in plants is manifested at three levels viz. morphological, biochemical, and molecular and plants possess their own molecular and signaling arsenal to combat or ameliorate various stresses. For decades, stress-tolerant cultivars have been investigated and modulation of polyamine (PA) signaling was found to play a major role in attenuating environmental stresses including drought as major abiotic stress. PA metabolism pathways with their ability to crosstalk with both primary and secondary metabolic pathways have been correlated with several other responses such as seed germination, plant growth, development, defense, hormonal regulation, stress tolerance, and crop yield. Recent transcriptomic and metabolomic approaches have expanded the knowledge on the regulation of stress-induced biochemical, molecular, and physiological alterations. To fully comprehend the intricate biochemical network of plant stress physiology, it is necessary to identify exact responses against specific stress stimuli, interpret concurrent epigenetic alterations, and use molecular switching. The present review encompasses recent updates on drought tolerance mechanisms mediated by diverse polyamines playing significant roles in metabolic regulation, oxidative stress management, and systematic stress-reversal signaling. Besides, the drought stress-reversal role of polyamines and their cross-talks with other signaling molecules have also been documented. Gene, enzyme, and transcription factor (TF) functional features were retrieved from the published papers involving transgenic or mutant plants with over-expression or loss-of-function investigations.

Keywords Polyamines · Drought stress · Stomatal closure · Abscisic acid · Cross-talks · Genetic manipulation · Seed germination

Introduction

Polyamines (PAs) are polycationic, low molecular weight, ubiquitous compounds, with aliphatic nitrogenous bases. In both prokaryotic and eukaryotic organisms, some important category of compound mediates the fundamental metabolic aspects like cell growth, differentiation, maturation, and apoptotic phenomenon. However, in plants, polyamines play a critical regulatory role in different phases of growth and developmental processes along with their pivotal role in biotic and abiotic stress responses. These basic traits have been considered quite "stimulative with broad prospects of application" in the recent era of molecular biotechnology and genetic engineering, to enrich overall plant physiology and biotechnology-based research (Chen et al. 2019; Alcázar et al. 2020; Nandy et al. 2022). Besides PAs, there are other plant bio-stimulants like inorganic compounds, biopolymers, and microbial metabolites. However, the mode of action, as well as the impact of polyamines on secondary metabolites, are exclusive (Jardin 2015; Pal et al., 2021). The significant regulatory role of polyamines has been observed in basic molecular, and physiological processes *viz.* central dogma,

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✉ Abhijit Dey
abhijit.dbs@presiuniv.ac.in
Extended author information available on the last page of the article

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An in vitro study of cytotoxicity of organophosphate insecticides (Imidacloprid, Profenofos, Dichlorvos) and natural products (Neem oil and Dashparni ark) on human peripheral lymphocytes by MTT and Trypan blue assay

Research Article

Asha Khanna[1], Pranita Bhatele[2], Daya Shankar Gautam[3]*, Priyanka Gupta[4], Vineeta Vaidya[4], Manoshi Mukherjee[5], Muskan Kachhi[5]

1. Director, AVIKA, Biological Research foundation, Jabalpur (M.P.) India.
2. Assistant Professor, Department of Biotechnology, Mata Gujri Mahilla Mahavidyalaya (autonomous), Jabalpur. India.
3. Assistant Professor, Department of Zoology, St. Aloysius' College (autonomous) Jabalpur (M.P.) India.
4. Student, Department of Biotechnology, Mata Gujri Mahilla Mahavidyalaya (autonomous) Jabalpur (M.P.). India.
5. Student, Department of Zoology, Government Model Science College (autonomous) Jabalpur (M.P.) India.

Abstract

Human population of India is increasing very fast. Everybody needs food to survive. Agricultural products must be boosted by adding adequate fertilisers and using appropriate insecticides. Organophosphates are one of the most frequently used insecticides. Their overuse leads to the contamination by agricultural runoff. The insecticides may enter drinking water as well. Since organophosphates are acetylcholinesterase inhibitors, they can be dangerous for human health. Hence, a toxicity study by MTT and Trypan Blue Assay of three common insecticides (Imidacloprid, Profenofos, Dichlorvos) and two natural products (*Dashparnik ark* and *Neem* oil) on lymphocytes was taken up. It was found that at 4 hours of incubation at 1mM Imidacloprid showed the greatest drop in viability followed by Dichlorvos and the least harm was caused by Profenofos. For 18 hours of incubation, the same trend was observed, but the decrease and increase were more pronounced. In the case of Profenofos and Dichlorvos the viability percent rises above that of the control. It was probably due to the defense mechanism involving the P450 detoxification pathway of the cells. The damage to the cells was of lesser magnitude when organic insecticides were used. *Neem* nano-drop emulsion showed a significant fall in viability at 2mg/ml. *Dashparnik ark* produced very little damage, but at higher concentration it boosted the viability. Apparently, the extract of leaves fermented in cow urine and cow dung was less damaging than that of other insecticides. Thus, organic insecticides are safer to use because they are ecofriendly and do not harm non-target organisms.

Keywords: Cytotoxicity, Lymphocytes, Insecticides, *Dashparni ark*, *Neem*.

Introduction

It is well known that the global population is continuously increasing. The global population was 7 billion in 2010 but is expected to reach 9 billion in 2045.(1) The population increase is even steeper in India. Indian population is currently 1.4 billion and is projected to exceed 1.5 billion in 2050.(2) To feed a continuously increasing population, an increase in food grain and crop production is necessary. Intense efforts have to be made to increase production of food grains seasonally. The agricultural sector contributes a major share (22.19%) to the gross value added (GVA) of the GDP of the country (46.4 lakh crore). So, an increase in agricultural production will also give a boost to the economy of our country.

Insecticides have been used for a long time to reduce crop losses, and many types of insecticides have been used in the agricultural industry by almost all types of farmers. The indiscriminate and frequent use of insecticides has resulted in soil and water pollution. This is mainly due to agricultural runoff. If humans are overexposed to these chemicals, they suffer from several ill effects, primarily because most of the insecticides used are organophosphates, which are acetylcholinesterase inhibitors. As such, they hinder nerve impulse transmission, and the target has to suffer the consequences. Therefore, it was thought beneficial to study their toxicity on human peripheral blood lymphocytes in vitro. Some organic insecticides are reportedly less toxic, so in this study, the cytotoxicity of the chemical insecticides has been compared with that of *Neem* oil nano-particle emulsion and *Dashparni Ark*.

Profenofos

Organophosphates are the most widely used group of pesticides globally. Profenofos is a very

* **Corresponding Author:**
Daya Shankar Gautam
Assistant Professor,
Department of Zoology,
St. Aloysius' College (autonomous).
Jabalpur (M.P.) India.
Email Id: dygautam@gmail.com

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International Journal of Analysis and Applications

Best Proximity Point and Existence of the Positive Definite Solution for Matrix Equations

Satyendra Kumar Jain[1], Gopal Meena[2,*], Rashmi Jain[2]

[1]*Department of Mathematics, St. Aloysius College Jabalpur (M.P.), India*
[2]*Department of Applied Mathematics, Jabalpur Engineering College Jabalpur (M.P.), India*

[*]*Corresponding author:* gmeena@jecjabalpur.ac.in

Abstract. In this research, $\alpha - \psi - \theta$ contraction has been defined to find the best proximity point in partially ordered metric spaces. Proper support for the result has been given in the form of a suitable example. The third part is fully devoted to the positive definite solution of matrix equations.

1. Introduction and Preliminaries

The concept of the best proximity point was introduced by Basha [5] with the help of the Banach contraction principle. It may be impossible to find a fixed point for two non empty subsets $L, M \subseteq W$ and a mapping $S : L \to M$ (for example, when $L \cap M = \phi$). However, it is very interesting to find a point $x \in L$, where x and Sx are as close as possible; in other words, find an $x \in L$ which minimizes $\varrho(x, Sx)$. Such optimal approximate solutions are called "best proximity points for S." Letter on many Mathematicians [1–3, 6, 9, 10] established best proximity point results. In 2014, idea of θ contraction introduced by Jleli et al. [8] and defined generalization of Banach contraction. In this paper, we define $\alpha - \psi - \theta$ contraction and establish the best proximity point in partially ordered metric spaces. Moreover, as a consequence of the result, a fixed point result and the existence of a positive definite solution to matrix equations have been given.

In the whole paper, complete metric space and the best proximity point are abbreviated as CMS and BPP, respectively. The subsequent symbols used in our results are:

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Key words and phrases. best proximity point; matrix equations; positive definite solution.

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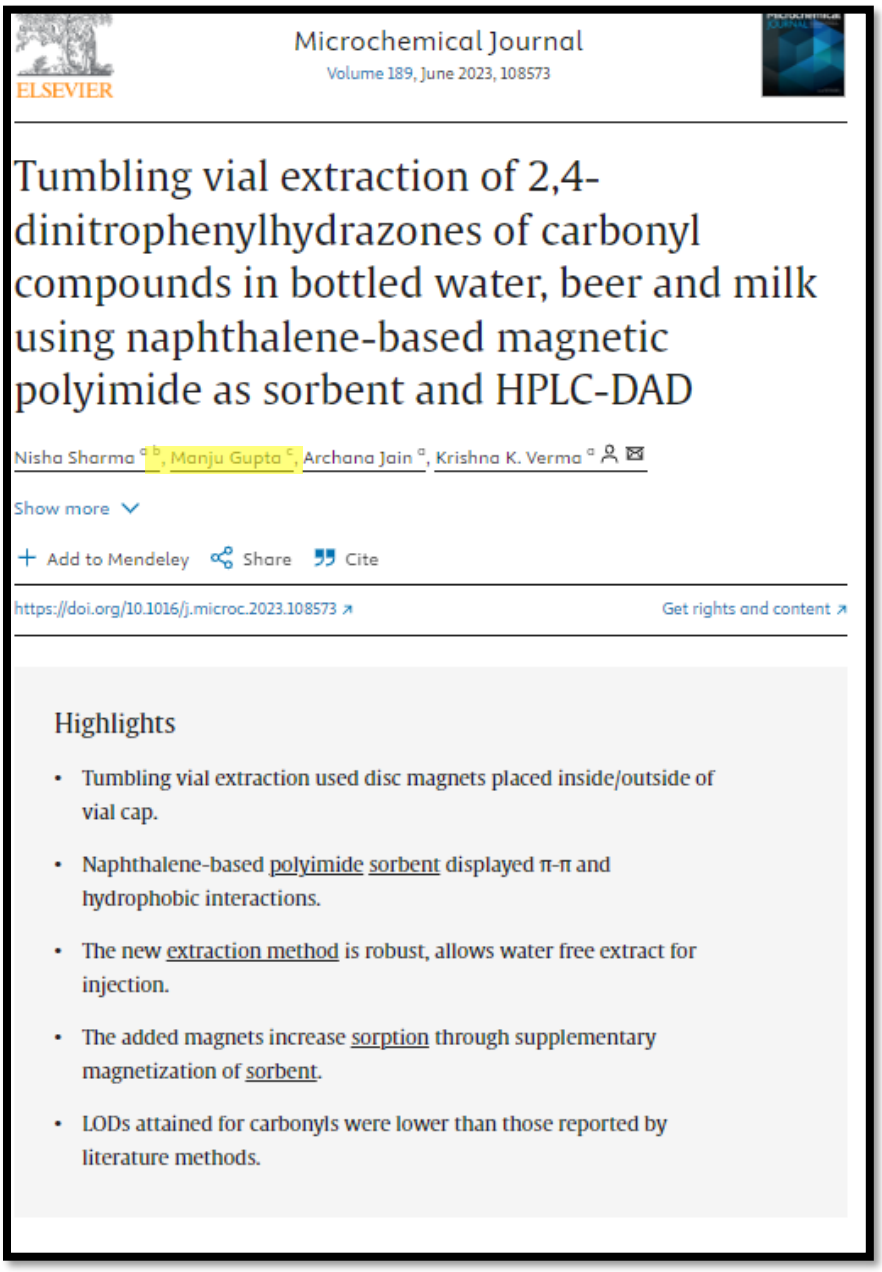
ISSN: 2291-8639



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Microchemical Journal
Volume 189, June 2023, 108573

Tumbling vial extraction of 2,4-dinitrophenylhydrazones of carbonyl compounds in bottled water, beer and milk using naphthalene-based magnetic polyimide as sorbent and HPLC-DAD

Nisha Sharma [a,b], Manju Gupta [c], Archana Jain [a], Krishna K. Verma [a]

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https://doi.org/10.1016/j.microc.2023.108573 Get rights and content

Highlights

- Tumbling vial extraction used disc magnets placed inside/outside of vial cap.
- Naphthalene-based polyimide sorbent displayed π-π and hydrophobic interactions.
- The new extraction method is robust, allows water free extract for injection.
- The added magnets increase sorption through supplementary magnetization of sorbent.
- LODs attained for carbonyls were lower than those reported by literature methods.

*Research Journal of Chemistry and Environment*_____Vol. **27 (12)** December **(2023)**
Res. J. Chem. Environ.

Pb^{2+} ion removal from contaminated aqueous solution by adsorption onto Graphene Oxide Sand Composite (GOSC) for efficient water purification

Khare Nidhi[1]*, Lawrence Smarika[2] and Chhatri Amita[2]
1. Department of Chemistry, Shriram College, Jabalpur (MP) - 482001, INDIA
2. Department of Chemistry, St Aloysius College (Auto), Jabalpur (MP), INDIA
*nidhi.khare304@gmail.com

Abstract

Lead is a heavy metal which affects all the systems of human body. An easy method for removal of lead contamination was developed by using graphene oxide coated sand particle (GOSC). In this study, GOSC was prepared using sand particle and sucrose solution under controlled heating program which shows efficient adsorption behavior compared to other adsorbents. GOSC offered very fast removal of Pb^{+2} with small amount of GOSC (0.09g) in 100 ppm adsorbate solution. Characterization of GOSC was done by using several advanced techniques like FTIR, XRD, SEM, EDX, TEM, DSC, and Zeta Potential measurements before and after adsorption of lead ion (Pb^{2+}).

Adsorption shows superiority over other methods because it involves effective and high removal efficiency adsorption (above 90%). Various parameters like the effect of time, pH, adsorbent, dose effect, concentration and temperature were studied. Various adsorption and kinetic models were also investigated using adsorption data and results showed that removal of lead (Pb^{2+}) ion follows Langmuir isotherm (R^2 = 99%), second order kinetics (R^2 = 98%) and higher intraparticle diffusion (R^2= 98%). The high percentage removal of metal ions with little quantity of GOSC confirmed that GOSC is an excellent, effective and economic adsorbent.

Keywords: GOSC, Adsorption, Contaminated water, Superiority.

Introduction

Lead (Pb) is the one of the most abundant substances with metallic grey appearance on the earth. It shows various oxidation states but forms stable compound in +2 and +4 oxidation states[20,29]. Mining, melting, galvanizing and metallurgical process and batteries, toys, cosmetics, paints, ceramics, lead piping etc. release Pb^{2+} into the environment[30,47]. It is a highly toxic metal and affects all the systems of the human body. It shows no harmful effects on human beings at low level but on high level exposure, it interacts with the enzymes and nervous system in human body. It causes various problems such as hypertension, immune toxicology, kidney and neurological problems, renal impairment, memory loss, mental retardation, brain hemorrhage, anemia, reproduction disorder, and even death at high level exposure.

Permissible limit of Pb^{2+} recommended by WHO in plants is 2mg/kg. In water it is 0.05mg/l and in the soil samples, it is between 0.061 to 0.461 mg/kg. Since the lead is non biodegradable, therefore the problems are amplified. Mitigation of Pb^{2+} can be achieved through various techniques like adsorption, precipitation, ion exchange, reverse osmosis, coagulation, electro dialysis, ultra filtration, and supported liquid membranes. Several adsorbents like paper sludge, sand particles, natural clay, fly ash, coal fly ash, bamboo charcoal, rice husk, tea waste, coconut shell, peanut shell, onion skin, orange and banana peel etc. have been used for removal of lead (Pb^{2+}) from waste water.

In recent years, carbon based materials are extensively used in the treatment of contaminated water. The engineered carbon (EC), bentonite, activated carbon, natural clays Al_2O_3- based nanocomposites and carbon based nanoadsorbent have been reported previously for removal of As^{3+}.[35,36,42] Various nanoadsorbents like hydroxyapatite/ chitosan composites, bentonite, rice husk, waste tire, rubber ash adsorbent, walnut shell etc. have also been reported for Pb^{2+} removal from waste water[8,12,31,46]. Activated carbon has been found to have the best surface area for adsorption of contaminants[2,4,7,44,48]. The present work focuses on exploring graphene, a carbon based material of extraordinary potential, for the removal of the certain toxic metal ions from synthetic water samples. Graphene is an interesting activated carbon adsorbent of the carbon family. In the present study graphene oxide is coated with sand and sucrose solution. The GOSC (Graphene Oxide Coated Composite) was employed for removal of Pb^{+2} ions from waste water because it is economic, highly efficient, easily available and ensures complete removal of Pb^{+2} ions. The adsorbent also shows potential of removing other organic and inorganic toxicants also. The adsorption capacity of this material is very high due to its porous nature and high surface area.

The multiple functional groups present on the graphene layer show multilayer adsorption of Pb^{+2}.[9,33,35,36,39,49] It shows properties like Quantum Hall effect and high thermal and Electrical conductivity[22].

This adsorption method is economically viable and adsorbent can be easily regenerated by using an appropriate

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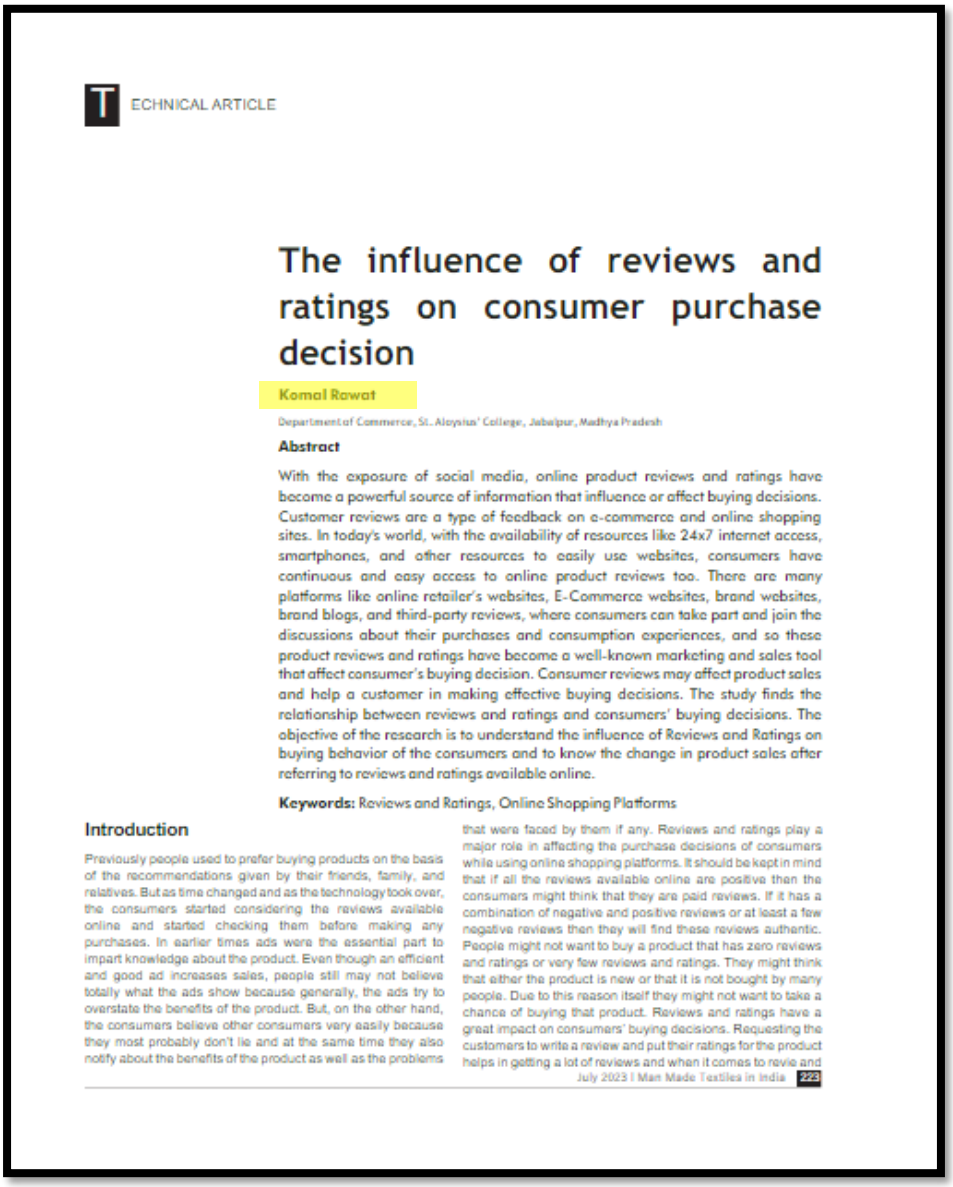


TECHNICAL ARTICLE

The influence of reviews and ratings on consumer purchase decision

Komal Rawat

Department of Commerce, St. Aloysius' College, Jabalpur, Madhya Pradesh

Abstract

With the exposure of social media, online product reviews and ratings have become a powerful source of information that influence or affect buying decisions. Customer reviews are a type of feedback on e-commerce and online shopping sites. In today's world, with the availability of resources like 24x7 internet access, smartphones, and other resources to easily use websites, consumers have continuous and easy access to online product reviews too. There are many platforms like online retailer's websites, E-Commerce websites, brand websites, brand blogs, and third-party reviews, where consumers can take part and join the discussions about their purchases and consumption experiences, and so these product reviews and ratings have become a well-known marketing and sales tool that affect consumer's buying decision. Consumer reviews may affect product sales and help a customer in making effective buying decisions. The study finds the relationship between reviews and ratings and consumers' buying decisions. The objective of the research is to understand the influence of Reviews and Ratings on buying behavior of the consumers and to know the change in product sales after referring to reviews and ratings available online.

Keywords: Reviews and Ratings, Online Shopping Platforms

Introduction

Previously people used to prefer buying products on the basis of the recommendations given by their friends, family, and relatives. But as time changed and as the technology took over, the consumers started considering the reviews available online and started checking them before making any purchases. In earlier times ads were the essential part to impart knowledge about the product. Even though an efficient and good ad increases sales, people still may not believe totally what the ads show because generally, the ads try to overstate the benefits of the product. But, on the other hand, the consumers believe other consumers very easily because they most probably don't lie and at the same time they also notify about the benefits of the product as well as the problems that were faced by them if any. Reviews and ratings play a major role in affecting the purchase decisions of consumers while using online shopping platforms. It should be kept in mind that if all the reviews available online are positive then the consumers might think that they are paid reviews. If it has a combination of negative and positive reviews or at least a few negative reviews then they will find these reviews authentic. People might not want to buy a product that has zero reviews and ratings or very few reviews and ratings. They might think that either the product is new or that it is not bought by many people. Due to this reason itself they might not want to take a chance of buying that product. Reviews and ratings have a great impact on consumers' buying decisions. Requesting the customers to write a review and put their ratings for the product helps in getting a lot of reviews and when it comes to revie and

Embedding SDG 12 in consumer behaviour.

A survey of knowledge, attitude and perception for sustainable consumption

Komal Rawat, Priya Sahni

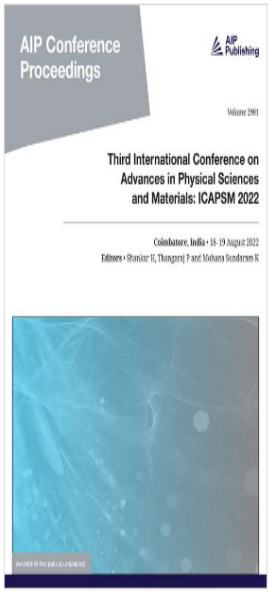
Received: 4 August 2023 | **Accepted:** 18 October 2023 | **Published:** 30 October 2023

Keywords: Sustainable Development Goals (SDGs); consumer behaviour; sustainable consumption; knowledge, attitude and perception.

Abstract. *The notion of sustainable development has led to a growing awareness of environmental issues related to human consumption. Consumer behaviour has a direct influence on the environment, regardless of whether the consumer is concerned about the environment or not. One strategy to address this issue is to continue to educate and propagate sustainable practices, particularly among younger generations. In this respect, it is necessary to*

VISIONS for sustainability www.ojs.unito.it/index.php/visions

Volume 2901, Issue 1
15 December 2023



THIRD INTERNATIONAL CONFERENCE ON ADVANCES IN PHYSICAL SCIENCES AND MATERIALS: ICAPSM 2022
18–19 August 2022
Coimbatore, India

RESEARCH ARTICLE | DECEMBER 15 2023

Eight extraordinary pythagorean triangles

Mita Darbari ; Prashans Darbari

+ Author & Article Information

AIP Conf. Proc. 2901, 030001 (2023)
https://doi.org/10.1063/5.0179381

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Eight distinctive triangles which satisfy Pythagorean equation and comply with the condition that sum of their three sides is a dodecic number are unearthed. For this, software Mathematica was applied and method of analysis was used. Various remarkable observations related to these triangles are perceived. A possible application of these triangles is suggested.

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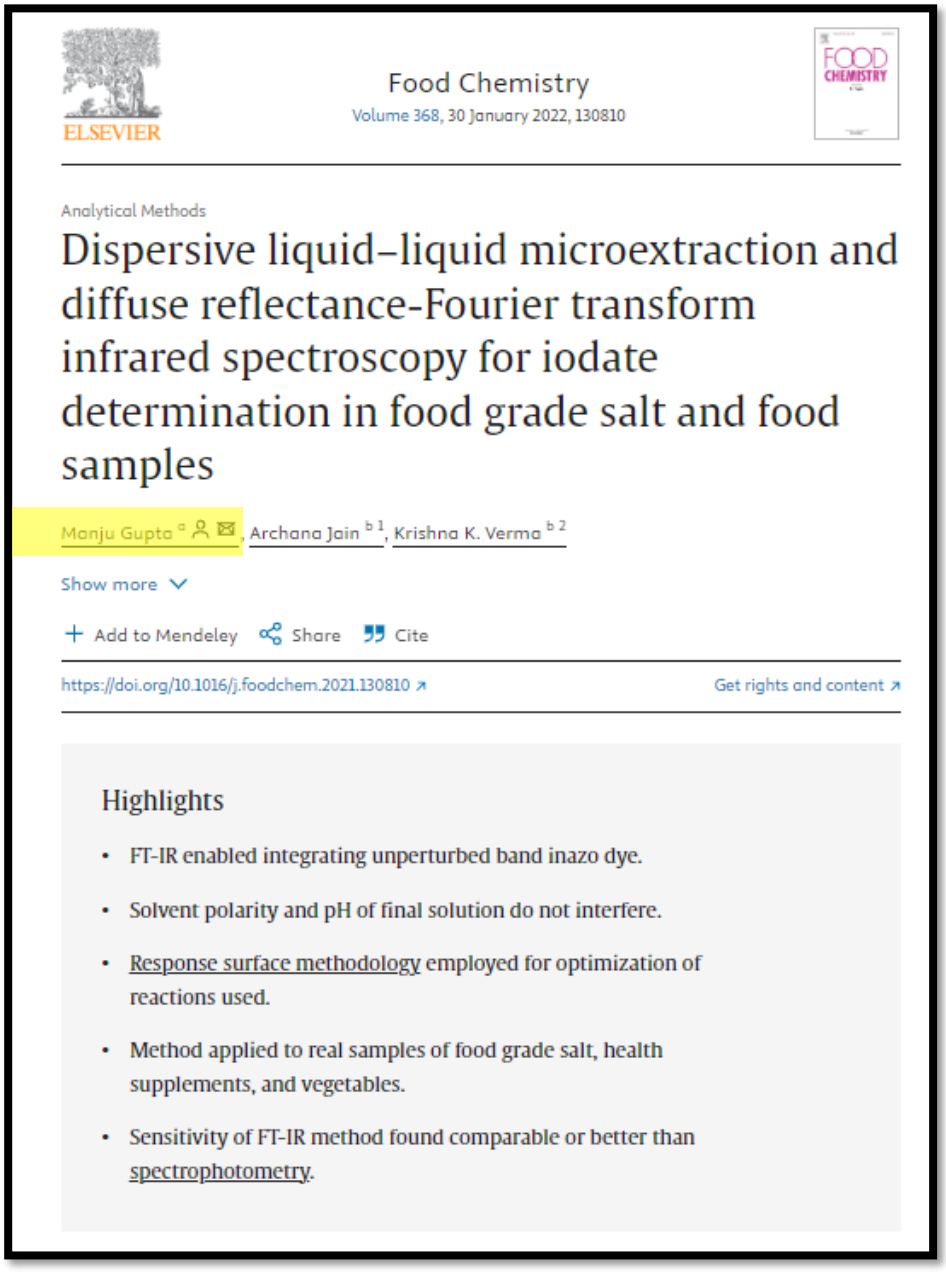
1 A.S. Posamentier, *The Pythagorean Theorem: The Story of its Power and Beauty* (1st ed., Prometheus Books, New York, 2010), pp. 127–128



ELSEVIER

Food Chemistry
Volume 368, 30 January 2022, 130810

Analytical Methods

Dispersive liquid–liquid microextraction and diffuse reflectance-Fourier transform infrared spectroscopy for iodate determination in food grade salt and food samples

Manju Gupta [a], Archana Jain [b 1], Krishna K. Verma [b 2]

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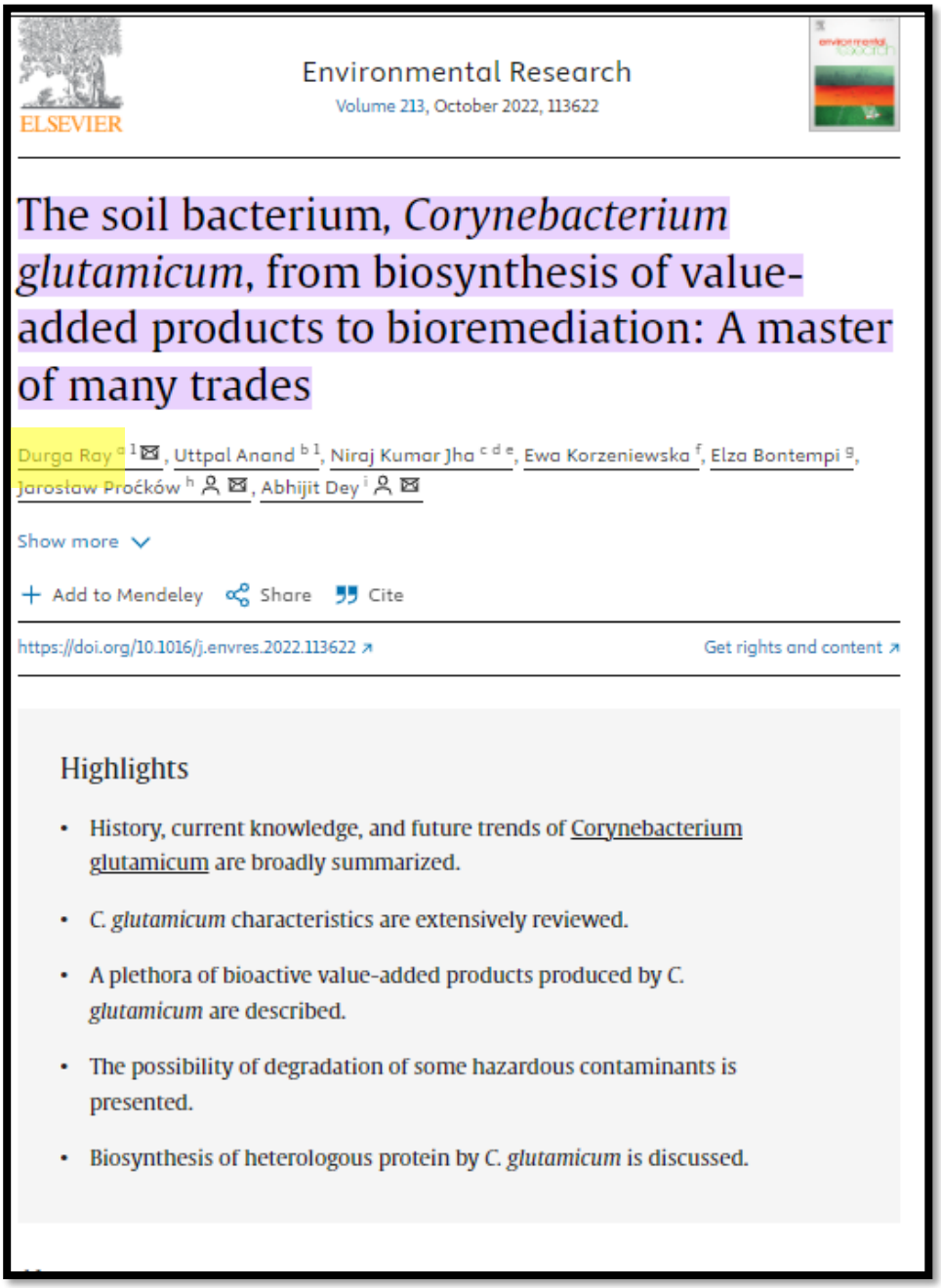
https://doi.org/10.1016/j.foodchem.2021.130810 Get rights and content

Highlights

- FT-IR enabled integrating unperturbed band inazo dye.
- Solvent polarity and pH of final solution do not interfere.
- Response surface methodology employed for optimization of reactions used.
- Method applied to real samples of food grade salt, health supplements, and vegetables.
- Sensitivity of FT-IR method found comparable or better than spectrophotometry.



ELSEVIER

Environmental Research
Volume 213, October 2022, 113622

The soil bacterium, *Corynebacterium glutamicum*, from biosynthesis of value-added products to bioremediation: A master of many trades

Durga Ray [a 1] ✉, Uttpal Anand [b 1], Niraj Kumar Jha [c d e], Ewa Korzeniewska [f], Elza Bontempi [g], Jarosław Proćków [h] ✉, Abhijit Dey [i] ✉

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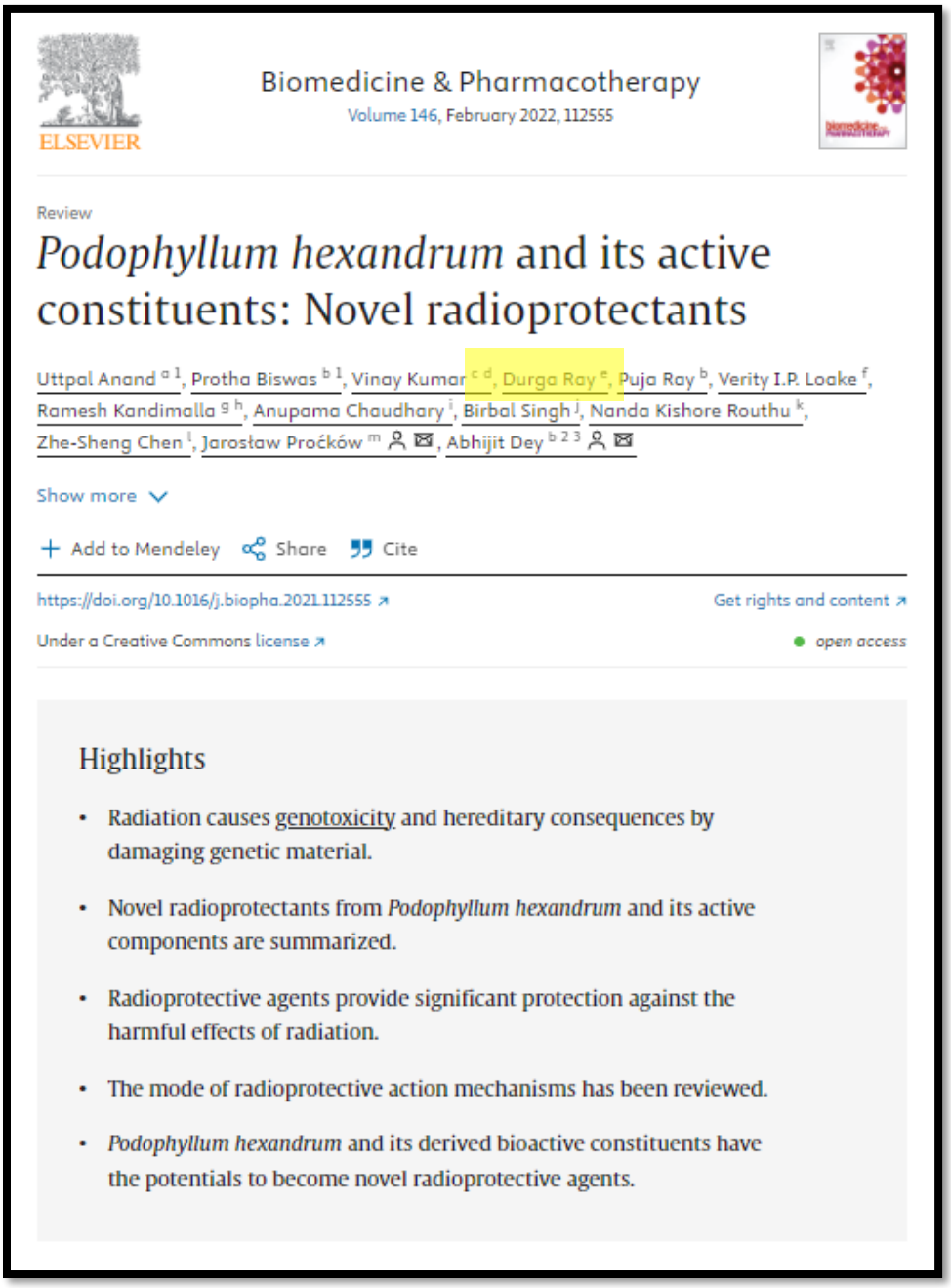
Highlights

- History, current knowledge, and future trends of Corynebacterium glutamicum are broadly summarized.
- *C. glutamicum* characteristics are extensively reviewed.
- A plethora of bioactive value-added products produced by *C. glutamicum* are described.
- The possibility of degradation of some hazardous contaminants is presented.
- Biosynthesis of heterologous protein by *C. glutamicum* is discussed.



ELSEVIER

Biomedicine & Pharmacotherapy
Volume 146, February 2022, 112555

Review

Podophyllum hexandrum and its active constituents: Novel radioprotectants

Uttpal Anand [a 1], Protha Biswas [b 1], Vinay Kumar [c d], Durga Ray [e], Puja Ray [b], Verity I.P. Loake [f], Ramesh Kandimalla [g h], Anupama Chaudhary [i], Birbal Singh [j], Nanda Kishore Routhu [k], Zhe-Sheng Chen [l], Jarosław Proćków [m] ✉, Abhijit Dey [b 2 3] ✉

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https://doi.org/10.1016/j.biopha.2021.112555

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Highlights

- Radiation causes genotoxicity and hereditary consequences by damaging genetic material.
- Novel radioprotectants from *Podophyllum hexandrum* and its active components are summarized.
- Radioprotective agents provide significant protection against the harmful effects of radiation.
- The mode of radioprotective action mechanisms has been reviewed.
- *Podophyllum hexandrum* and its derived bioactive constituents have the potentials to become novel radioprotective agents.

Applied Microbiology and Biotechnology (2021) 105:8593–8614
https://doi.org/10.1007/s00253-021-11580-9

MINI-REVIEW

Biotechnological interventions of in vitro propagation and production of valuable secondary metabolites in *Stevia rebaudiana*

Shahnawaz[1] · Devendra Kumar Pandey[1] · Merinashwari Konjengbam[1] · Padmanabh Dwivedi[2] · Prabhjot Kaur[1] · Vijay Kumar[1] · Durga Ray[3] · Puja Ray[4] · Romaan Nazir[1] · Harmeet Kaur[1] · Sidharth Parida[5] · Abhijit Dey[4]

Received: 30 May 2021 / Revised: 8 September 2021 / Accepted: 10 September 2021 / Published online: 28 October 2021

Abstract
Plant cell and tissue culture makes provision of a sustainable and nature-friendly strategy for the production of secondary metabolites, and modern progress in gene editing and genome engineering provides novel possibilities to improve both the qualitative and quantitative aspects of such phytochemicals. The ever-expanding quest for plant-based medicine to treat diabetes facilitates large-scale cultivation of *Stevia rebaudiana* to enhance the yield of its much-coveted low-calorie sweetener glycosides. The potential to process stevia as a "natural" product should enhance the acceptance of steviosides as a natural calorie-free sweetener especially suitable for use in diabetic and weight control drinks and foods. Besides sweetener agents, *S. rebaudiana* is a potent source of many antioxidant compounds and is used to cure immunodeficiencies, neurologic disorders, inflammation, diabetes mellitus, Parkinson's disease, and Alzheimer's disease. This comprehensive review presents the research outcomes of the many biotechnological interventions implicated to upscale the yield of steviol glycosides and its derivatives in in vitro cell, callus, tissue, and organ cultures with notes on the use of bioreactor and genetic engineering in relation to the production of these valuable compounds in *S. rebaudiana*.

Key points
- *Critical and updated assessment on sustainable production of steviol glycosides from Stevia rebaudiana.*
- In vitro *propagation of S. rebaudiana and elicitation of steviol glycosides production.*
- *Genetic fidelity and diversity assessment of S. rebaudiana using molecular markers.*

Keywords Steviol glycosides · Phytochemistry · Micropropagation · Elicitation · Biotechnology

✉ Devendra Kumar Pandey
dkpandey1974@gmail.com

✉ Abhijit Dey
abhijit.dbs@presiuniv.ac.in

[1] Department of Biotechnology, Lovely Professional University, Phagwara, Punjab, India

[2] Department of Plant Physiology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

[3] Department of Microbiology, St. Aloysius College, Jabalpur, Madhya Pradesh, India

[4] Department of Life Sciences, Presidency University, Kolkata, West Bengal, India

[5] Department of Biotechnology, MITS School of Biotechnology, Affiliated to Utkal University, Bhubaneswar, Odisha, India

Introduction

With the advancing world and modernization, we have been introduced to new eating habits, foods that are heaven in taste but are the reason behind the diseases that are fatal in nature. Out of these diseases, diabetes is one of the most commonly occurring diseases around the globe (Genco et al. 2020). Obesity brings elevated risk of type 2 diabetes in comparison to the healthy individuals (Ortega et al. 2020). India, presently with 67 million confirmed diabetic cases and 30 million prediabetic patients, is facing diabetes almost as an epidemic. Diabetes mellitus (type 2 diabetes) presents an array of metabolic disorders. Diabetes II represents a number of metabolic disorders in which affected people exhibit high level of blood glucose or blood sugar, either due to insufficient insulin production or due to the unresponsiveness of the body cells to insulin, or both. In case of diabetes I though, the body does not produce insulin (Eizirik et al. 2020). Approximately

Biomedical & Pharmacology Journal, March 2022. Vol. **15**(1), p. 523-530

Cytotoxic Effect of Cypermethrin and Neem Extract on Human Lymphocytes

Asha Khanna[1,2], Jyotsana Patel[1,2], Bishal Tiwari[1,2], Saurabh Pagare[1,4], Daya Shankar Gautam*[1,3] and Vineeta Ratoniya[1,2]

[1]AVIKA, Biological Research foundation, Jabalpur (M.P.) 482001, India.
[2]Department of Zoology and Biotechnology, Govt. Science College, Jabalpur (M.P.) 482001, India.
[3]Department of Zoology, St. Aloysius' College, Jabalpur (M.P.) 482001, India.
[4]Department of Biotechnology, Sarojini Naidu Govt. Girls P.G. College, Bhopal (M.P.) 462016, India.
*Corresponding Author E-mail: dygautam@gmail.com

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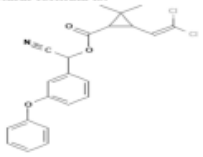
There is a need to increase our agricultural production of food grains and other crops to feed a continuously increasing population. To achieve this food security, use of insecticides/ pesticides has become necessary. Cypermethrin is a pyrethroid insecticide used for control of pests of cereals, fruits, vegetables and cotton etc. but it has several toxic effects on human beings. Apart from being neurotoxic, it has harmful effects on lymphocytes also. Neem is also a potent insecticide of herbal and indigenous origin. In this investigation the cytotoxicity of cypermethrin (dissolved in DMSO) and aqueous extract of neem leaves to human lymphocytes was studied by MTT assay. It was found that after an exposure of two hours to LC50 concentration of cypermethrin viability of lymphocytes fell to 87.83%; however at lower concentration the viability fell further because of the increase in the DMSO concentration, proving the toxicity of DMSO. Treatment of lymphocytes with 45% of neem extract increased the viability by 196% but at lower concentrations lesser increase was noted due to the increase in concentration of PBS. Thus apart from being a safe insecticide neem extract can be used to promote viability and proliferation of cells of animal origin also.

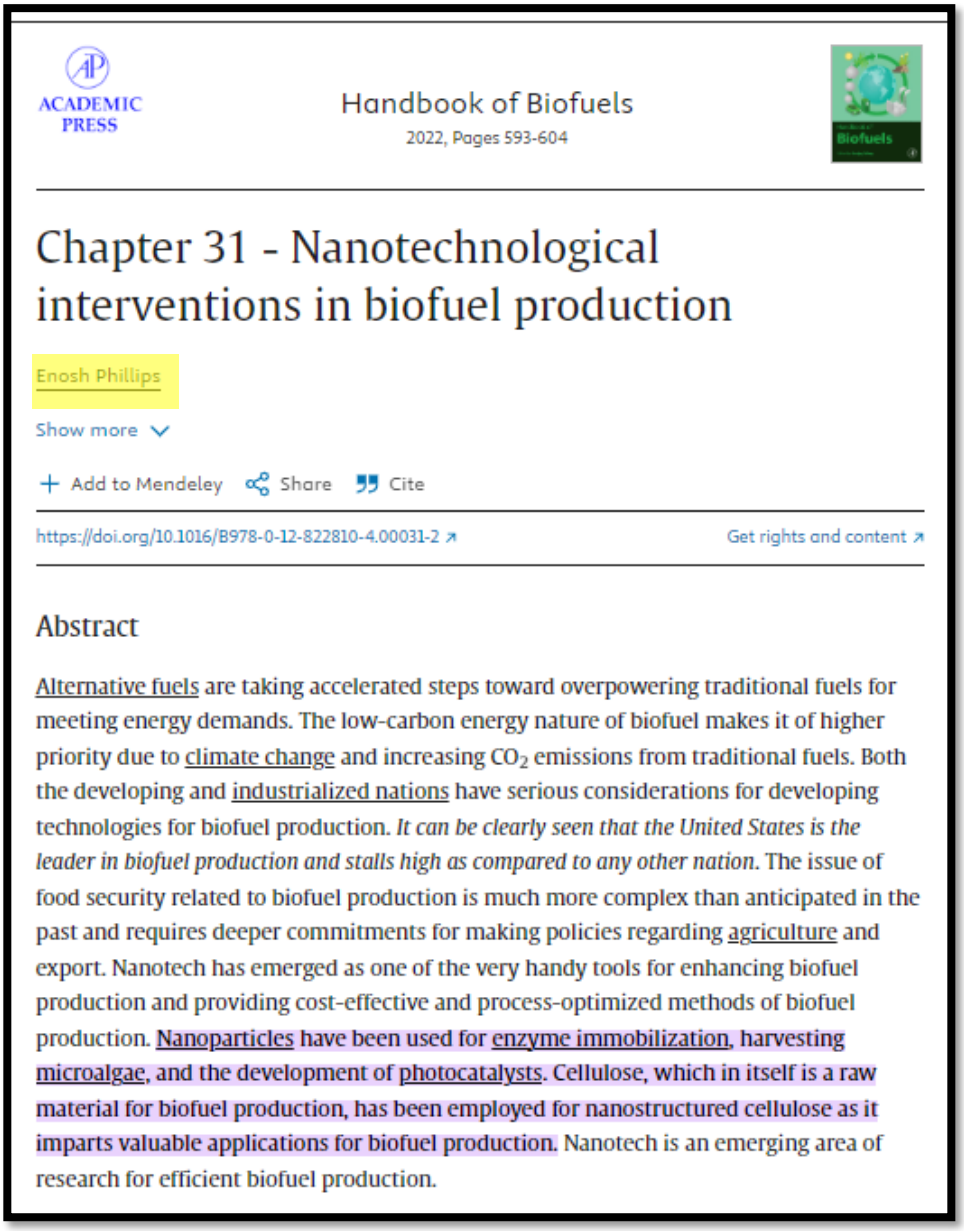
Keywords: Cypermethrin; Cytotoxicity; Lymphocytes; MTT Assay; Neem.

Cypermethrin is a pyrethroid of synthetic origin and is a commonly used insecticide in agricultural practices in India and globally. Natural pyrethroids are compounds derived from chrysanthemum flowers and many synthetic pyrethroids are in use as insecticides. In general the pyrethroids are considered to be less toxic to humans as compared to other classes of insecticides. Apart from its agricultural uses Cypermethrin is also used in consumer products to exterminate common domestic pests. It is used as pesticide for protecting cotton, cereals and fruits, specifically from diamond back moth, stem borer, fruit borer, Bihar hairy caterpillar in cabbage, okra, brinjal, wheat and sunflower crops. Its chemical formula is $C_{22}H_{19}Cl_2NO_3$ and molar mass is 416.30g/mol. The structural formula is:



Cypermethrin

IUPAC name [Cyano-(3-phenoxyphenyl)]3-(2,3dichloroethylyl)-2,2-dimethylcyclopropano-1-carboxylate



ACADEMIC PRESS

Handbook of Biofuels

2022, Pages 593-604

Chapter 31 - Nanotechnological interventions in biofuel production

Enosh Phillips

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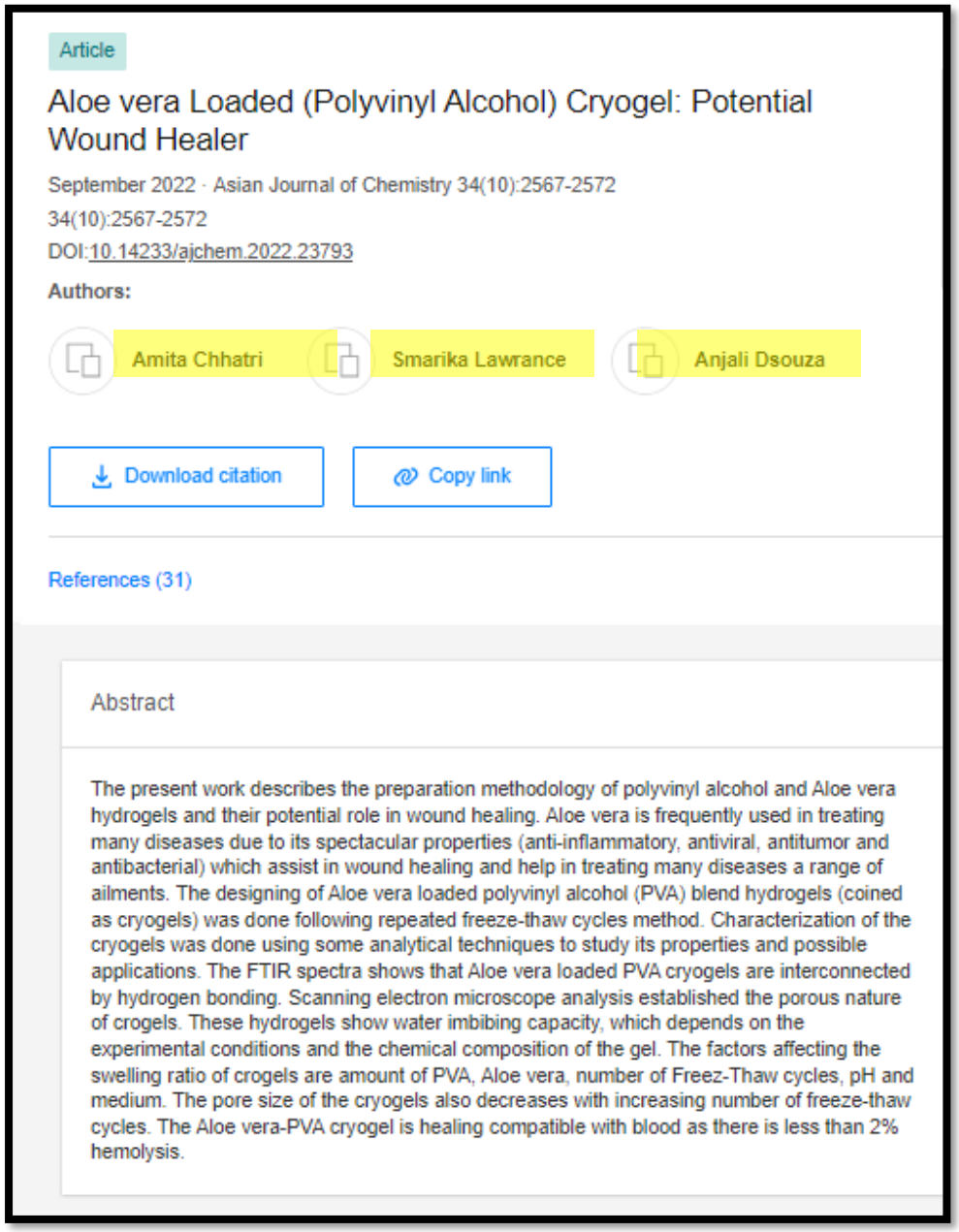
https://doi.org/10.1016/B978-0-12-822810-4.00031-2 Get rights and content

Abstract

Alternative fuels are taking accelerated steps toward overpowering traditional fuels for meeting energy demands. The low-carbon energy nature of biofuel makes it of higher priority due to climate change and increasing CO_2 emissions from traditional fuels. Both the developing and industrialized nations have serious considerations for developing technologies for biofuel production. *It can be clearly seen that the United States is the leader in biofuel production and stalls high as compared to any other nation.* The issue of food security related to biofuel production is much more complex than anticipated in the past and requires deeper commitments for making policies regarding agriculture and export. Nanotech has emerged as one of the very handy tools for enhancing biofuel production and providing cost-effective and process-optimized methods of biofuel production. Nanoparticles have been used for enzyme immobilization, harvesting microalgae, and the development of photocatalysts. Cellulose, which in itself is a raw material for biofuel production, has been employed for nanostructured cellulose as it imparts valuable applications for biofuel production. Nanotech is an emerging area of research for efficient biofuel production.



Article

Aloe vera Loaded (Polyvinyl Alcohol) Cryogel: Potential Wound Healer

September 2022 · Asian Journal of Chemistry 34(10):2567-2572
34(10):2567-2572
DOI:10.14233/ajchem.2022.23793

Authors:

Amita Chhatri Smarika Lawrance Anjali Dsouza

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References (31)

Abstract

The present work describes the preparation methodology of polyvinyl alcohol and Aloe vera hydrogels and their potential role in wound healing. Aloe vera is frequently used in treating many diseases due to its spectacular properties (anti-inflammatory, antiviral, antitumor and antibacterial) which assist in wound healing and help in treating many diseases a range of ailments. The designing of Aloe vera loaded polyvinyl alcohol (PVA) blend hydrogels (coined as cryogels) was done following repeated freeze-thaw cycles method. Characterization of the cryogels was done using some analytical techniques to study its properties and possible applications. The FTIR spectra shows that Aloe vera loaded PVA cryogels are interconnected by hydrogen bonding. Scanning electron microscope analysis established the porous nature of crogels. These hydrogels show water imbibing capacity, which depends on the experimental conditions and the chemical composition of the gel. The factors affecting the swelling ratio of crogels are amount of PVA, Aloe vera, number of Freez-Thaw cycles, pH and medium. The pore size of the cryogels also decreases with increasing number of freeze-thaw cycles. The Aloe vera-PVA cryogel is healing compatible with blood as there is less than 2% hemolysis.

Jain et al. Journal of Inequalities and Applications (2022) 2022:73
https://doi.org/10.1186/s13660-022-02807-y

Journal of Inequalities and Applications

RESEARCH Open Access

Best proximity point results with their consequences and applications

Satyendra Kumar Jain[1], Gopal Meena[2*], Deepak Singh[3] and Jitendra Kumar Maitra[4]

*Correspondence:
gmeena@iecjabalpur.ac.in
[2]Department of Applied Mathematics, Jabalpur Engineering College, Jabalpur (M.P.), India
Full list of author information is available at the end of the article

Abstract

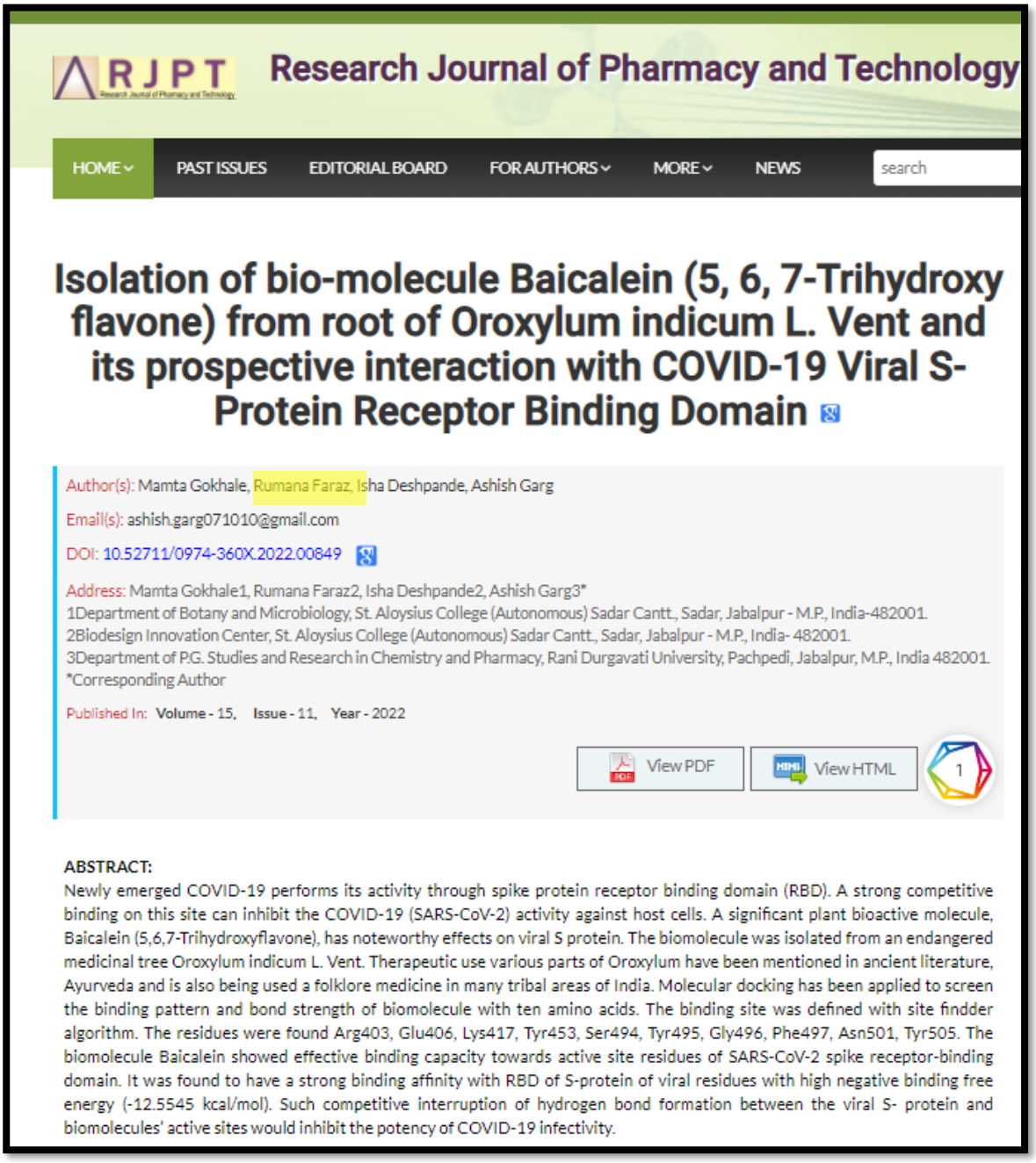
In the commenced work, we establish some best proximity point results for multivalued generalized contractions on partially ordered complete metric spaces along with the tactic of altering distance function. Furthermore, we deliver some examples to elaborate and explain the usability of the attained results. To arouse further interest in the subject and to show its efficacy, we devote this work to recent applications of fractional calculus and also invoke our findings to the equation of motion modeling to differential equations.

MSC: 54H10; 54H25; 47H10

Keywords: Best proximity point; Partially ordered set; *F*-contraction; Metric space

1 Introduction and preliminaries

Estimating the solution of fixed point problems is well thought-out as one of the main problems in the metric fixed point theory. This forces the researchers to use the contractive conditions on underlying functions, to guarantee the existence of the fixed point. However, this issue becomes more interesting and challenging when mappings involved are non-self. This evolves the concept of best proximity point and related theorems. In fact a best proximity point theorem is principally dedicated to global minimization of the real-valued function $y \to \sigma(y, Sy)$, which measures the error involved for an approximate solution of the equation $Sy = y$ (fixed point problem). In other words, a best proximity point theorem expounds sufficient conditions for the existence of an element y such that the error $\sigma(y, Sy)$ is minimum. The more general version of best proximity point theorems having more than one non-self-mapping is known as common best proximity point theorems. In 2010, Basha [3] found a best proximity point with the help of the Banach contraction principle. Basha et al. [4] gave the existence of common best proximity points for pairs of non-self-mappings in metric spaces. Karapinar and Erhan [7] also studied best proximity for different types of contractions. Interestingly, these best proximity point theorems also serve as a natural generalization of fixed point theorems. If the mapping under consideration is a self-mapping, then a best proximity point becomes a fixed point. Note that one can convert optimization problems to the problem of finding the best proximity points. Hence, the existence of the best proximity points develops the theory of optimization. Through this theory, one can guarantee that a solution of the multi-objective global



Research Journal of Pharmacy and Technology

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Isolation of bio-molecule Baicalein (5, 6, 7-Trihydroxy flavone) from root of Oroxylum indicum L. Vent and its prospective interaction with COVID-19 Viral S-Protein Receptor Binding Domain

Author(s): Mamta Gokhale, Rumana Faraz, Isha Deshpande, Ashish Garg

Email(s): ashish.garg071010@gmail.com

DOI: 10.52711/0974-360X.2022.00849

Address: Mamta Gokhale1, Rumana Faraz2, Isha Deshpande2, Ashish Garg3*
1Department of Botany and Microbiology, St. Aloysius College (Autonomous) Sadar Cantt., Sadar, Jabalpur - M.P., India-482001.
2Biodesign Innovation Center, St. Aloysius College (Autonomous) Sadar Cantt., Sadar, Jabalpur - M.P., India- 482001.
3Department of P.G. Studies and Research in Chemistry and Pharmacy, Rani Durgavati University, Pachpedi, Jabalpur, M.P., India 482001.
*Corresponding Author

Published In: Volume - 15, Issue - 11, Year - 2022

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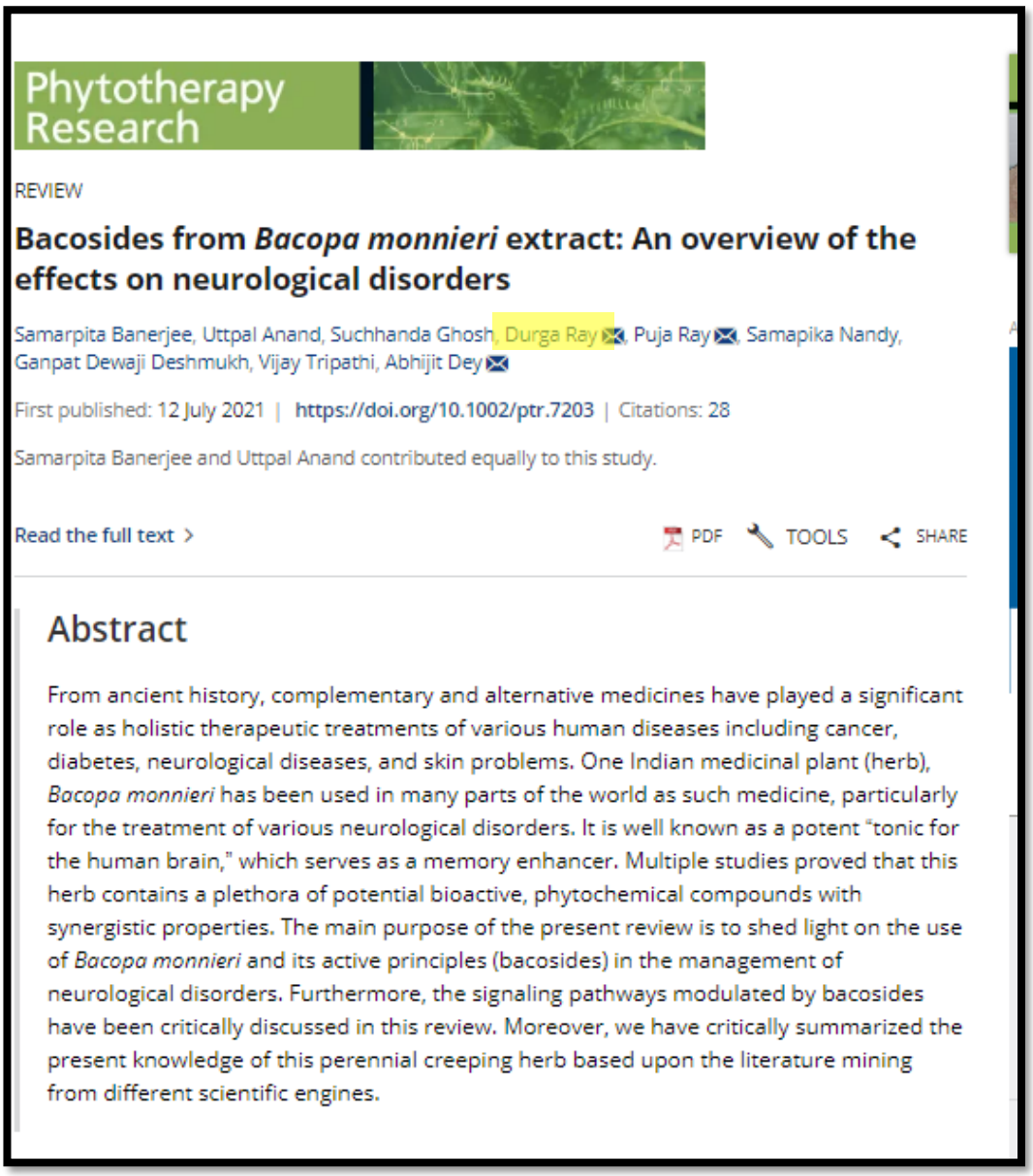
ABSTRACT:
Newly emerged COVID-19 performs its activity through spike protein receptor binding domain (RBD). A strong competitive binding on this site can inhibit the COVID-19 (SARS-CoV-2) activity against host cells. A significant plant bioactive molecule, Baicalein (5,6,7-Trihydroxyflavone), has noteworthy effects on viral S protein. The biomolecule was isolated from an endangered medicinal tree Oroxylum indicum L. Vent. Therapeutic use various parts of Oroxylum have been mentioned in ancient literature, Ayurveda and is also being used a folklore medicine in many tribal areas of India. Molecular docking has been applied to screen the binding pattern and bond strength of biomolecule with ten amino acids. The binding site was defined with site finddder algorithm. The residues were found Arg403, Glu406, Lys417, Tyr453, Ser494, Tyr495, Gly496, Phe497, Asn501, Tyr505. The biomolecule Baicalein showed effective binding capacity towards active site residues of SARS-CoV-2 spike receptor-binding domain. It was found to have a strong binding affinity with RBD of S-protein of viral residues with high negative binding free energy (-12.5545 kcal/mol). Such competitive interruption of hydrogen bond formation between the viral S- protein and biomolecules' active sites would inhibit the potency of COVID-19 infectivity.



Phytotherapy Research

REVIEW

Bacosides from *Bacopa monnieri* extract: An overview of the effects on neurological disorders

Samarpita Banerjee, Uttpal Anand, Suchhanda Ghosh, Durga Ray, Puja Ray, Samapika Nandy, Ganpat Dewaji Deshmukh, Vijay Tripathi, Abhijit Dey

First published: 12 July 2021 | https://doi.org/10.1002/ptr.7203 | Citations: 28

Samarpita Banerjee and Uttpal Anand contributed equally to this study.

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Abstract

From ancient history, complementary and alternative medicines have played a significant role as holistic therapeutic treatments of various human diseases including cancer, diabetes, neurological diseases, and skin problems. One Indian medicinal plant (herb), *Bacopa monnieri* has been used in many parts of the world as such medicine, particularly for the treatment of various neurological disorders. It is well known as a potent "tonic for the human brain," which serves as a memory enhancer. Multiple studies proved that this herb contains a plethora of potential bioactive, phytochemical compounds with synergistic properties. The main purpose of the present review is to shed light on the use of *Bacopa monnieri* and its active principles (bacosides) in the management of neurological disorders. Furthermore, the signaling pathways modulated by bacosides have been critically discussed in this review. Moreover, we have critically summarized the present knowledge of this perennial creeping herb based upon the literature mining from different scientific engines.

Chapter 13

Biobutanol Production and Advancement

Enosh Phillips

Book Editor(s):Neha Srivastava, Manish Srivastava

First published: 27 April 2021 | https://doi.org/10.1002/9781119772125.ch13

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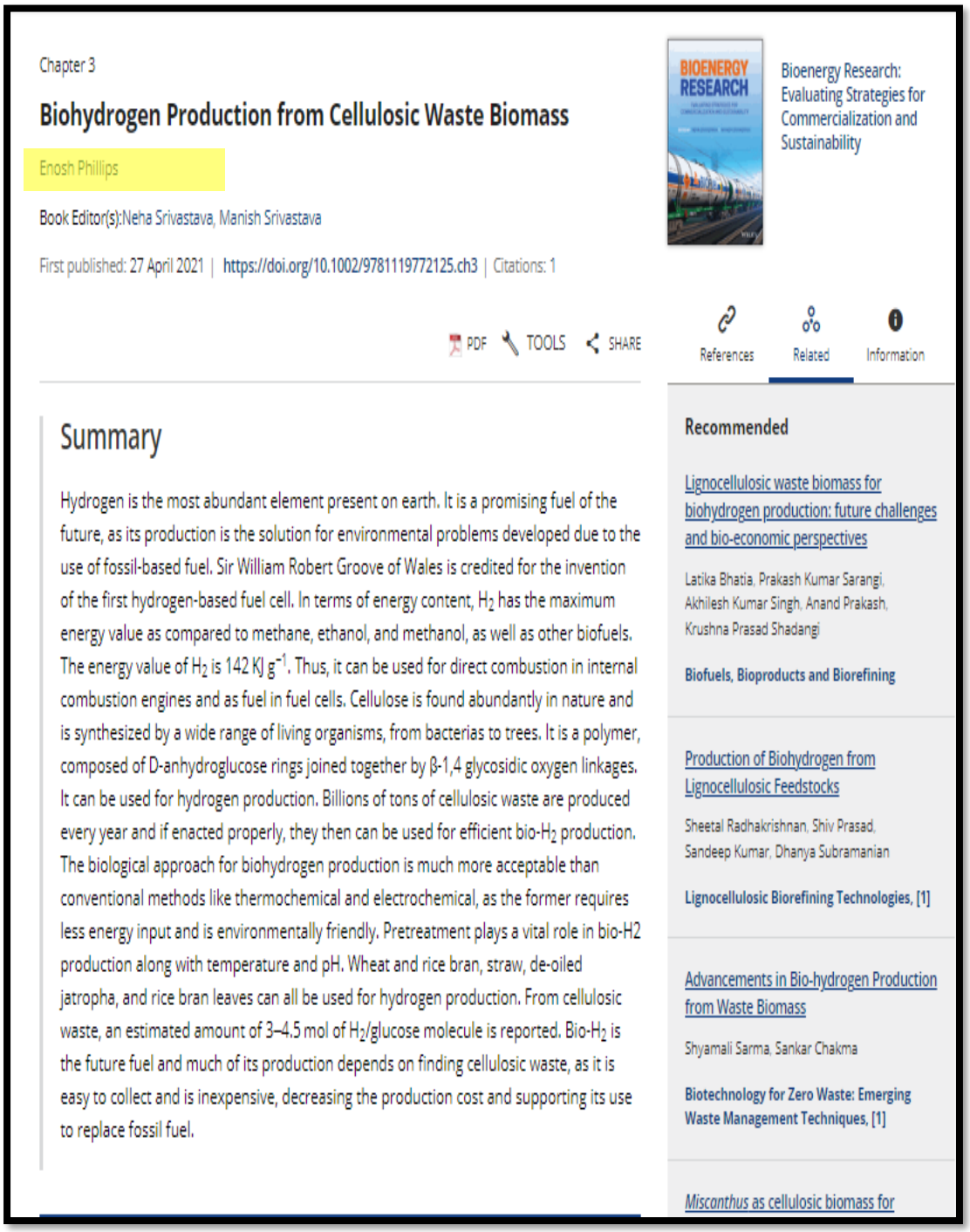
Summary

The present economy depends upon petroleum fuel. The concerns are rising worldwide with the depletion of fossil fuels, which includes petroleum. Moreover, combustion of petroleum has continuously affected the environment by raising the concentration of greenhouse gases like CO, CO_2, and N_2O. Biofuels are the alternative fuels developed from biomass. Biofuels have oxygen levels up to 45%, whereas petroleum has none. Although biodiesel and bioethanol dominate the biofuel market, they have several disadvantages. These are overcome by biobutanol. *Clostridium sp*. has been vital in biobutanol production. It produces butanol via the ABE method. Annually, biomass is produced in millions of tons by photosynthetic organisms, mainly by plants. Biomass may contain different amounts of polysaccharide useful for biobutanol production. Pretreatment plays an important role in increasing the yield. Since the inception of the idea for the bioproduction of butanol as an alternative fuel, many developments have taken place to enhance production and make the process efficient.

References



Chapter 3

Biohydrogen Production from Cellulosic Waste Biomass

Enosh Phillips

Book Editor(s):Neha Srivastava, Manish Srivastava

First published: 27 April 2021 | https://doi.org/10.1002/9781119772125.ch3 | Citations: 1

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Bioenergy Research: Evaluating Strategies for Commercialization and Sustainability

References Related Information

Summary

Hydrogen is the most abundant element present on earth. It is a promising fuel of the future, as its production is the solution for environmental problems developed due to the use of fossil-based fuel. Sir William Robert Groove of Wales is credited for the invention of the first hydrogen-based fuel cell. In terms of energy content, H_2 has the maximum energy value as compared to methane, ethanol, and methanol, as well as other biofuels. The energy value of H_2 is 142 KJ g^{-1}. Thus, it can be used for direct combustion in internal combustion engines and as fuel in fuel cells. Cellulose is found abundantly in nature and is synthesized by a wide range of living organisms, from bacterias to trees. It is a polymer, composed of D-anhydroglucose rings joined together by β-1,4 glycosidic oxygen linkages. It can be used for hydrogen production. Billions of tons of cellulosic waste are produced every year and if enacted properly, they then can be used for efficient bio-H_2 production. The biological approach for biohydrogen production is much more acceptable than conventional methods like thermochemical and electrochemical, as the former requires less energy input and is environmentally friendly. Pretreatment plays a vital role in bio-H2 production along with temperature and pH. Wheat and rice bran, straw, de-oiled jatropha, and rice bran leaves can all be used for hydrogen production. From cellulosic waste, an estimated amount of 3–4.5 mol of H_2/glucose molecule is reported. Bio-H_2 is the future fuel and much of its production depends on finding cellulosic waste, as it is easy to collect and is inexpensive, decreasing the production cost and supporting its use to replace fossil fuel.

Recommended

Lignocellulosic waste biomass for biohydrogen production: future challenges and bio-economic perspectives

Latika Bhatia, Prakash Kumar Sarangi, Akhilesh Kumar Singh, Anand Prakash, Krushna Prasad Shadangi

Biofuels, Bioproducts and Biorefining

Production of Biohydrogen from Lignocellulosic Feedstocks

Sheetal Radhakrishnan, Shiv Prasad, Sandeep Kumar, Dhanya Subramanian

Lignocellulosic Biorefining Technologies, [1]

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Advances and Applications in Mathematical Sciences
Volume 20, Issue 8, June 2021, Pages 1609-1622

ϕ-CONTRACTION AND ITS APPLICATION TO FRACTIONAL DIFFERENTIAL EQUATION

GOPAL MEENA, SATYENDRA KUMAR JAIN and J. K. MAITRA

Jabalpur Engineering College
Jabalpur, M.P., India
E-mail: gmeena@jecjabalpur.ac.in

St. Aloysius College Jabalpur
(M.P.) India
E-mail: satyendra.jain.26@gmail.com

RDVV Jabalpur, M.P., India
E-mail: jkmrdvv@rediffmail.com

Abstract

In this article we defined ϕ contraction, which is more globally than previously defined θ contraction and generalized Khan contraction [4]. More general phenomena have also been shown by giving the suitable examples. The rearmost part of this article consists of the application of this contraction to fractional differential equation.

1. Introduction and Preliminaries

Firstly, the idea of θ contraction in 2014 introduced by Jleli et al. [2] and defined generalization of Banach Contraction. After that many researchers (see [1], [3], [5]) developed work on fixed point. In 2017 Piri et al. [4] defined generalized Khan contraction and they settled the existence and uniqueness of fixed point. In this work with the concept of θ contraction and Khan contraction we defined new type of ϕ contraction and furnished fixed point theorem, supporting examples for the newly defined concept and application to fractional differential equations is the important part of this article.

2010 Mathematics Subject Classification: 55M20, 46B85.
Keywords: fixed point, metric space, contraction.
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Research Article

Fumaria indica (L), a Famous Medicinal Herb of Tribal Regions of Jabalpur, Madhya Pradesh: Broad Spectrum Antibacterial and Phytochemical Profilng Against Some Pathogenic Microorganisms

Shoket Ali[1,*], Shikha Bansal[2], Ravi Prakash Mishra[1]

ABSTRACT

This work describes the broad spectrum antibacterial properties of methanolic and chloroform extracts of *Fumaria indica* herb in different concentrations (50 mg/ml, 100 mg/ml and 150 mg/ml) against *Bacillus subtilis*(MTCC 10110), *Staphylococcus aureus*(MTCC96), *Escherichia coli* (MTCC 77), *Pseudomonas aeruginosa* (MTCC1688) and *Klebsiella pneumonia* (MTCC4032) using agar well diffusion method compared to standard antibiotic ciprofloxacin. Results have shown significant activities against the tested microorganisms viz., *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* than other strains. Minimum inhibitory as well as minimum bactericidal concentrations against *Bacillus subtilis* and *Klebsiella pneumonia* were evaluated. The study indicates the possible potentiality of *F. indica* act as an active antibacterial agent in the modern drug formulations. As the target plant species serves for the tribal medicinal purposes in several tribal regions of Madhya Pradesh, hence, the aim of the present study is to link comparatively the possible traditional use of this herb with the modern antibiotic usage.

Keywords: Fumaria indica, Ant bacterial activity, Zone of Inhibition, Tribes, Phytochemicals.

Shoket Ali[1,*], Shikha Bansal[2], Ravi Prakash Mishra[1]

[1]Environmental biotechnology lab, Department of Post Graduate Studies and Research in Biological Science, Rani Durgavati University, Jabalpur, Madhya Pradesh, INDIA.
[2]Department of Botany and Microbiology St. Aloysius College (Autonomous) Jabalpur, Madhya Pradesh, INDIA.

Correspondence
Shoket Ali
Environmental biotechnology lab, Department of Post Graduate Studies and Research in Biological Science, Rani Durgavati University, Jabalpur, Madhya Pradesh, INDIA.
E-mail: shoketali008@gmail.com

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INTRODUCTION

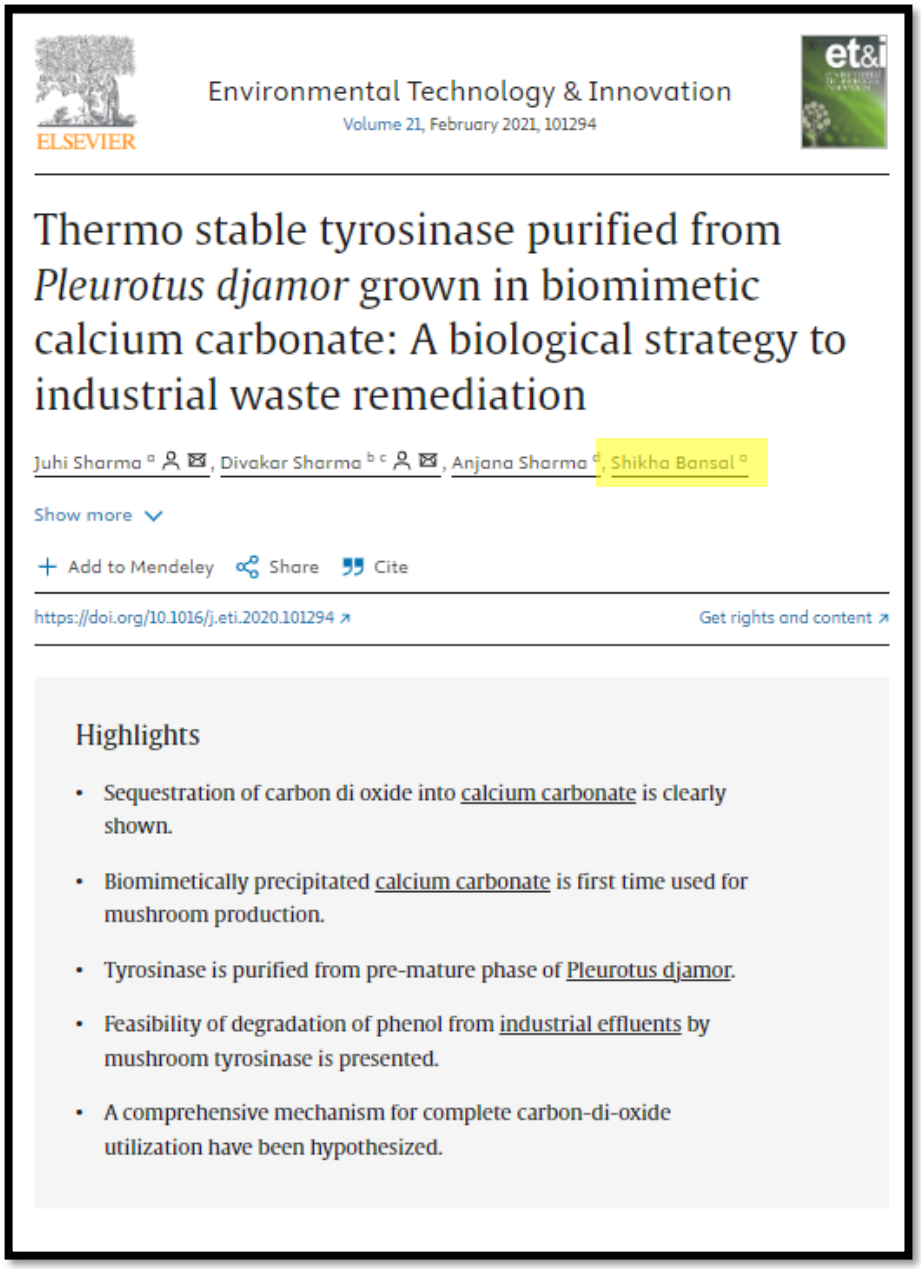
Fumaria indica (L.) belongs to family Fumariaceae, and genus Fumaria commonly called shahtera "Pit papra" in the tribal vernacular. It is an annual herb and its distributed all over Asia, Europe and Africa. It is a familiar weed found in the plains of India. *F. indica* have been reported various medicinal purposes to acquire pharmacological activities like antipyretic[1] hepatoprotective[2] hypoglycemic[3] antidiarrheal[4] antispasmodic[5] anthelmintic[6] anticancer[7] antiperiodic compound[8] liver complaints[9] and scrofulous skin affections.[10] Infectious diseases have threatened the continued existence of humans since very early civilizations.[11,12] The folk remedies, are still as an important part of traditional medicine[13] presently many human diseases and infections are cured by a diversity of plants[14] or plant derivative products.[15] The main cause for the continuing attention and broad research on plants for antibacterial properties is the manifestation of challenging strains of bacteria.[16,17] These strains are competent to survive with the same pace as their genetic evolution requires continuous development of new drugs against them.[18] Therefore, bacteria in fastidious are imposing require for new drugs.[19] Infectious diseases are persistent and are major explanation of premature death all over world.[20,21] The prevalence of severe infections in human beings has significantly increased all over the world and it has become the leading cause of mortality in developing countries.[22] About 80% population of the world relies on plants as a natural source of medicine.[23] They are used medicinally in different countries and are a source of many potent and powerful drugs.[24] This study was aimed on validating the traditional use of selected medicinal plants against common bacteria, causing several human infections including *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, and *Klebsiella pneumonia*.[25,26] By evaluating their *in vitro* antibacterial activity. The plants investigated in this study commonly used to treat the infectious diseases and the associated symptoms are listed in (Table 1).

MATERIALS AND METHODS

Plant materials and extraction

The plant was collected from Bagrachi village of Jabalpur district. The collection was done in March, 2017. To confirm and authenticate the identified plant taxonomically, the samples were examined at State Forest Research Institute (SFRI) under voucher no. 586. The plant was selected based on reports of its widespread use among the tribal communities. The collected plant materials were air-dried and finely powdered using a blender. To prepare methanol and chloroform extracts of the plant materials, 20 g of each powdered plant material was extracted with 200 ml of methanol and chloroform for 48 h at room temperature. The extracted suspensions were filtered through Whatman No. 1 filter paper (Himedia) and the filtrates were concentrated to dryness using a rotary evaporator, to yield the crude extract (Table 2)

Cite this article: Ali S, Bansal S, Mishra RP. *Fumaria indica* (L), a Famous Medicinal Herb of Tribal Regions of Jabalpur, Madhya Pradesh: Broad Spectrum Antibacterial and Phytochemical Profilng Against Some Pathogenic Microorganisms. Pharmacogn J. 2020;12(3):619-23.



ELSEVIER

Environmental Technology & Innovation
Volume 21, February 2021, 101294

Thermo stable tyrosinase purified from *Pleurotus djamor* grown in biomimetic calcium carbonate: A biological strategy to industrial waste remediation

Juhi Sharma [a], Divakar Sharma [b c], Anjana Sharma [d], Shikha Bansal [a]

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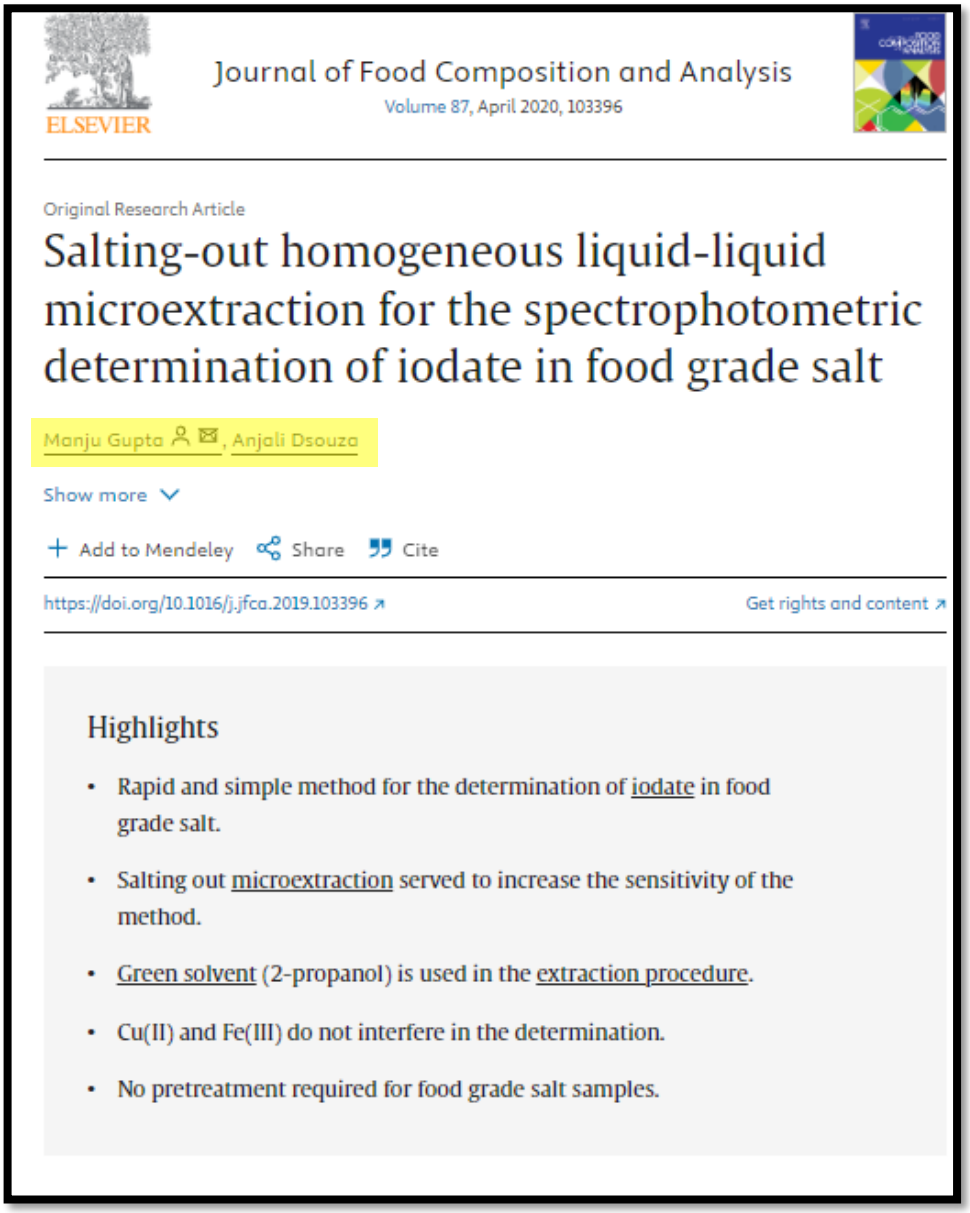
Highlights

- Sequestration of carbon di oxide into calcium carbonate is clearly shown.
- Biomimetically precipitated calcium carbonate is first time used for mushroom production.
- Tyrosinase is purified from pre-mature phase of Pleurotus djamor.
- Feasibility of degradation of phenol from industrial effluents by mushroom tyrosinase is presented.
- A comprehensive mechanism for complete carbon-di-oxide utilization have been hypothesized.



ELSEVIER

Journal of Food Composition and Analysis
Volume 87, April 2020, 103396

Original Research Article

Salting-out homogeneous liquid-liquid microextraction for the spectrophotometric determination of iodate in food grade salt

Manju Gupta, Anjali Dsouza

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Highlights

- Rapid and simple method for the determination of iodate in food grade salt.
- Salting out microextraction served to increase the sensitivity of the method.
- Green solvent (2-propanol) is used in the extraction procedure.
- Cu(II) and Fe(III) do not interfere in the determination.
- No pretreatment required for food grade salt samples.

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Volume 2270, Issue 1
2 November 2020

INTERNATIONAL CONFERENCE ON PHYSICS AND CHEMISTRY OF MATERIALS IN NOVEL ENGINEERING APPLICATIONS: PCMNEA2020, KCT
6–7 February 2020
Coimbatore, India

RESEARCH ARTICLE | NOVEMBER 02 2020

A study of the optical band gap energy and Urbach energy of fullerene (C_{60}) doped PMMA nanocomposites

A. Dhanaraj; K. Das; J. M. Keller
+ Author & Article Information

AIP Conf. Proc. 2270, 110040 (2020)
https://doi.org/10.1063/5.0019420

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Fullerene dispersion in a polymer matrix alters the values of band gap energy and Urbach energy of the nanocomposite. In the presented work, the influence of fullerene dispersion and polymer-fullerene interactions on the band gap energy and Urbach energy of poly (methyl methacrylate)-fullerene C_{60} nanocomposite has been studied by means of UV-Vis absorption spectroscopy. Pure and different doped films of gradually increasing concentrations were fabricated using solvent casting technique. Optical properties of these films were obtained from the UV-VIS absorption spectra, at normal incidence, over190-1100 nm spectral range. The optical absorption edge was described using the Tauc model. Band gap energy of the thin films was found using Tauc plot. The width of the band tails, known as Urbach tails, were evaluated to quantify the structural disorder. Optical characterization showed that average absorption and band gap energy decreased, while Urbach energy increased with the addition of fullerene C_{60}.

Topics

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Volume 2369, Issue 1
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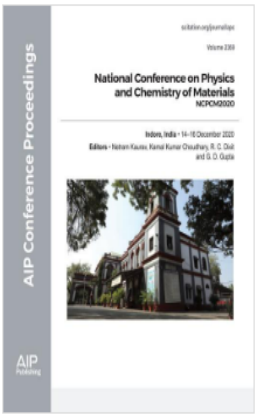

NATIONAL CONFERENCE ON PHYSICS AND CHEMISTRY OF MATERIALS: NCPCM2020
14–16 December 2020
Indore, India

RESEARCH ARTICLE | SEPTEMBER 13 2021

Crystalline properties of ZnO doped poly (methyl methacrylate) PMMA thin films

Nisha Pandey; Arunendra Kumar Patel; Amrita Dwivedi
+ Author & Article Information

AIP Conf. Proc. 2369, 020099 (2021)
https://doi.org/10.1063/5.0061155

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The present study deals with the synthesis and characterization of Pure PMMA polymer film and ZnO incorporated PMMA composite film using X-ray diffraction technique.The pure PMMA and ZnO incorporated PMMA composite were prepared by solution casting method. The crystalline properties such as crystallite size, interplanar distance and crystallinity index has been calculated and studied as a function of ZnO. The study reveals that, as we increase the concentration of ZnO in to the PMMA film, the crystalline properties are enhancing. The crystallinity index for pure PMMA, .05% and .1% ZnO doped PMMA are found to be 15.73% , 22.2% and 24.17% respectively.

Topics
Doping, Crystal structure, Crystalline properties, Polymers, Thin films, Diffraction, Chemical compounds

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Volume 2224, Issue 1
29 May 2020

EMERGING INTERFACES OF PHYSICAL SCIENCES AND TECHNOLOGY 2019: EIPT2019
29–30 August 2019
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RESEARCH ARTICLE | MAY 29 2020

Morphological characterization of silver nanoparticles in-situ with poly (vinyl alcohol) based smart gel matrix

Deepti S. Desphande; Sarita Dubey; Rishabh Sharma
+ Author & Article Information

AIP Conf. Proc. 2224, 050001 (2020)
https://doi.org/10.1063/5.0000950

Share Tools

The present study focuses on synthesis of a smart polymer matrix in the form of hydrogels of poly(vinyl alcohol) (PVA), synthesized via redox polymerization technique, containing silver nanoparticles *In-situ*. Silver is a metal with potential antibacterial activity. Among the various synthetic methods available for the chemical reduction of silver nanoparticles, *green synthesis* is an important eco-friendly technique. This eco-friendly green synthesis of silver nanoparticles (AgNPs) was accomplished using *Apple Extract* as a reducing agent and aqueous silver nitrate as the precursor, at room temperature. The AgNPs formation was observed as a color change of the mixture from colorless to dark-brown. These particles were then encapsulated *in-situ* with the reaction mixture of aqueous poly(vinyl alcohol) (PVA), followed by the use of redox pair and crosslinker. The synthesized gel, were then characterized morphologically. The presence of silver in the gel matrix was confirmed by different characterization techniques such as UV-Vis spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR) and X-Ray Diffraction (XRD). A peak at 400 nm obtained in UV-Visible spectroscopy, confirmed the formation of AgNPs. UV-Vis spectra at different time intervals further indicate an increase in the amount of AgNPs produced from the mixture. Fourier Transform Infrared Spectroscopy identifies the presence of carboxyl groups as the reducing agent and capping agent for the formation of the AgNPs. Scanning electron microscopic (SEM) images of the synthesized gel shows spherical shaped silver nanoparticles embedded in sponge-like polymer matrix. The X-ray diffraction pattern confirmed the crystalline structure of the synthesized gel along with the presence of elemental silver. The antibacterial nature of silver, present in the gel matrix, promotes their use in food packaging industries.

Topics

Commonwealth Law Bulletin ›
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Articles

Water rights in India: economic good, fundamental rights, or human rights?

Ashu Jain & Gary Lilienthal

Pages 501-522 | Published online: 23 Oct 2020

Cite this article https://doi.org/10.1080/03050718.2020.1836500 Check for updates

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Abstract

While India battles COVID-19, hand washing is the survival strategy. The research objective is to critically examine water rights in India. The research asks whether there are rights to water in India, and if so, what kind. The thesis proposition is that India has derivative rights to water that are neither fundamental nor human rights. The research methodology is by narrative analysis. States prefer an economic good theory, rom the Dublin Statement. Fundamental rights to ground water in India are unlikely to be shifted. The India

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International Journal of Ayurvedic Medicine, Vol 12 (4), 878-882

Go Ark; an ameliorative bio-product (*in vitro*) on Phenyl induced cytotoxicity

Research Article

Daya Shankar Gautam[1]*, Saraswati Mishra[2], Prahlad Marskole[2], Nisha Tiwari[2], Anjali Kumari[2], Sakshi Dwivedi[2] & Kahkashan Naz[2]

1. Assistant Professor, 2. MSc Students
Department of Zoology, St Aloysius' College (Autonomous), Jabalpur (M. P.), India.

Abstract

Phenyl (PHY) is one of the chemicals which are used as a disinfectant in the world due to its toxic potential. Cleaning workers are directly exposed to it in institutes, hospitals and houses. Cow urine/Go Ark (GA) has been proved as a bioenhancer in many studies. The present study dealt with the *in vitro* analysis of PHY induced cytotoxicity (CT) on human peripheral blood lymphocytes and ameliorative potential of Distillate cow urine/Go Ark (DGA) and Fresh Go Ark (FGA) as GA is believed to be an elixir in Ayurved. MTT assay was used to study CT and Cell viability % on Human peripheral blood lymphocytes (HPBL) *in vitro*. CT of PHY was found to be higher than that of DGA and FGA treated groups. This showed that when PHY induced cells were treated with DGA and FGA, they showed increase in the cell viability %. It was also found that FGA had more potential for enhancing cell viability % of HPBL than that of DGA. We suggest that GA can be used as an ameliorative agent on PHY induced CT. It can be explored by *in vivo* experiments further for its detoxification properties. Now a day, PHY is used in combination with GA for cleaning purposes as "Gonyl", it may be safe for cleaning workers to use GA based disinfectants to diminish the CT induced due to PHY exposure at the time of cleaning.

Key Words: Ameliorative effect, Cytotoxicity, Go Ark, MTT assay, Phenyl.

Introduction

Cow urine

Cow which is also called as 'Gau Mata' is a mobile dispensary and wealth of medicines. The GA remedy can cure us from several incurable and curable diseases. The ancient Indian literature, like *Charak Samhita, Atharva Veda, Rajni Ghantu, Amritsagar, Vridhabhagabhatt, Sushrut Samhita* and *Bhavprakash* describe about these things nicely. GA Treatment and Research Center have concluded that it can cure blood pressure, asthma, diabetes, eczema, psoriasis, heart attack, in arteries, blockage, fits, AIDS, piles, cancer, prostrate, migraine, thyroid, arthritis, ulcer, gynecological problems, abortion, constipation, acidity, nose and ear problems, and many other diseases on the basis of a lot of research already done in the previous few years. GA has shown that it contains sodium, manganese, nitrogen, sulphur, carbolic acid, iron, phosphate, silicon, chlorine, citric, tartaric, succinic acids, magnesium, maleic, and calcium salts, vitamin A, B, C, D, E, creatinine, hormones, minerals, enzymes, lactose and gold acids. When there is imbalance of the substances in the body, a person becomes diseased. The GA contains the ingredients, which are available in the human body. Therefore, consumption of GA cures from incurable diseases and maintains the balance of these substances. (1)

GA abolishes the poisonous properties of residues and keeps body healthy. Electric currents (rays) retain body in fit status. These currents exist in our environment. These rays enter our body through copper in form of extremely small currents. Copper is found in cow urine. One of the qualities of copper is to attract these electric waves and we become healthy. (2)

Dhama K.,*et al* (3) submitted in their research article that the recent medication has helped us to cure a number of ailments of mankind and creatures; but the existence of inveterate diseases like acquired immunodeficiency syndrome, diabetes, cancer, rheumatoid arthritis, increasing trends of antibiotics resistance, side effect of allopathy medicine and biopesticides have caused nutritional risk. This has made the situation more serious than ever before. Now, it has been the urge for scientist and researcher to find novel therapies. GA remedy has become cost effective which has the least adverse impact when compared with modern medicine.

Gulhane *et al* (4) found that GA has got distinct significance in Indian tradition. It is believed to have a pious cleansing effect also. *Panchagavya Chikitsa* (Cowpathy) is the treatment based on cow. The life style diseases like diabetes, AIDS, cancer, autoimmune diseases, etc. are increasing steadily in this existing era. Unreasoned use of antibiotics causes increase in antibiotic resistant infectious diseases. GA has been

*** Corresponding Author:**
Daya Shankar Gautam
Assistant Professor,
Department of Zoology,
St Aloysius' College (Autonomous),
Jabalpur (M. P.). India.
Email Id: dygautam@gmail.com

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International Journal of Ayurvedic Medicine, Vol 11 (3), 410-414

In vitro analysis of the effect of Go Ark on Human Peripheral Blood Lymphocytes

Research Article

Daya Shankar Gautam[1]*, Prahlad Marskole[2], Saraswati Mishra[2], Nisha Tiwari[2], Anjali Kumari[2], Sakshi Dwivedi[2], Kahkashan Naz[2]

1. Assistant Professor, 2. MSc Students, Department of Zoology, St Aloysius' College (Autonomous), Jabalpur (M. P.), India.

Abstract

Cow is worshiped in India as "*Gomata*" since ancient time. Its values have been signified in *Vedas, Puranas & Ayurveda*. Its urine/Go Ark is used in rituals & medicines traditionally in India. The Significance of Cow Urine has been studied by many workers. Now it is available in the market as distillate. Hence this study was designed to assess the potential of Fresh Go Ark (FGA) and Distillate Go Ark (DGA) on Human Peripheral blood lymphocytes (PBL) in Vitro using MTT Assay. It was found that FGA & DGA both had the potential to enhance the cell viability of Human PBL. FGA showed greater potential towards the enhancement of cell viability on Human PBL than that of DGA. However the difference between the impacts of FGA & DGA was not found to be significant when tested through Two way ANOVA.

Key Words: *Fresh Go Ark, Distillate Go Ark, MTT Assay, Cow urine, Cell viability, Human PBL.*

Introduction

Cow in India is worshiped like mother of all living beings which provides all pleasures to them. All the products obtained from cow possess medicinal properties. Cow urine/*Go Ark* (GA)/ is used as a medicine to cure from many curable and incurable ailments. The significance of GA is mentioned in many *Ayurvedic* classical texts, such as *Sushrut Samhita, Bhavprakash* and *Charaka Samhita*.(1)

GA is supposed to have therapeutic value. It is used in many drug formulations. Essentially, GA is used for purification and also as a disinfectant. It has a shelf life of around 5 years. So it can be the most effective natural antiseptic and disinfectant as compared to the synthetic chemicals which are currently been used for the same purposes by the people. (2)

Bhadauria *et al* (3) explained that GA is not a toxic substance as it contains 2.5% urea, 95% water and 2.5% a mixture of hormones, salts, minerals and enzymes.

GA is a secretion of animal origin with an effective medicinal & therapeutic uses. Cow (*Kamadhenu*) is considered as a holy animal by Indians. In *Rigveda* (10/15), considers GA as nectar. Numerous medicinal properties of GA are mentioned in *Charak* (*shloka*-100) and in *Sucruta* (45/221) such as reversal of certain cardiac and renal diseases, anemia, jaundice, weight loss, indigestion, diarrhea, edema, skin diseases including vitiligo, stomach ache and hemorrhoids. It is capacity to correct all the imbalances in the body and maintains the general health of organisms. (4)

It is believed that GA is gifted by god to the people. Now a day's a number of incurable diseases are occurring in the world harming human societies. GA is solution for all diseases which is used for treating illnesses like skin disorder, blood pressure, constipation, cancer, diabetes, AIDS etc. GA has been used in the rural areas in India since ancient time as an effective antiseptic for skin diseases, wounds, bathing, etc. (5)

Eight types of animals can be used for obtaining urine, out of which GA is believed as the best. Skin-disorders (*Kushtha, Pama, Kilasa, Kandu*), Gastro Intestinal disorders (*Kamala, Pandu, Gulma, Atisara, Krumi, Aanaha, Mutraroga*), *Kasa, Shwasa* and *Visha* are treated by the use of GA. Oral administration of GA is used to treat diseases. (6)

Nitrogen, phosphate, sulphur, manganese, sodium, iron, chlorine, silicon, magnesium, tartaric and calcium salts, maleic, vitamin A, B, C, D, E, citric, enzymes, creatinine, minerals, lactose, gold acids and hormones are found in GA. GA ingredients resembles with human body. Therefore, consumption of GA is beneficial to retain the equilibrium of these substances. It cures many such diseases which are incurable. (7)

GA is considered the elixir of life in the ancient scriptures of Ayurveda. GA based drug formulations would certainly be proved to have a potential medicine that will diminish the increasing pressure on for the use of antibiotics and chemicals. It has the potential to be used for the management of many diseases. This urine therapy could have a great scope for curing wide range of diseases which are dreadful because it is

* **Corresponding Author:**
Daya Shankar Gautam
Assistant Professor, Department of Zoology,
St Aloysius' College (Autonomous),
Jabalpur (M. P.), India
Email Id: dygautam@gmail.com

Home › Substrate Analysis for Effective Biofuels Production › Chapter

Algal Butanol Production

Chapter | First Online: 01 February 2020

pp 33–50 | Cite this chapter

Substrate Analysis for Effec
Production

Enosh Phillips

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Abstract

The energy of the sun converted to chemical energy by photosynthetic plants drives the life on earth. Energy has become an important aspect of the development of human civilization. Presently 80% of the energy demand is fulfilled by the fossil fuels which are non-renewable and has a reserve up to a few years. Moreover, the combustion of fossil fuels has increased the concentration of greenhouse gases effecting the climate and ecosystem. Renewable sources of energy like biofuels are promising alternatives to reduce the dependence on fossil fuels. Butanol is one such biofuel which has shown to blend in with the present fuel like petroleum, fulfilling the energy demands of transportation and industries. Butanol was initially being produced by the crop plants hence threatening the food security. Microalgae, an easily grown photosynthetic organism, has shown its capacity to enhance and increase the production of butanol without affecting the crop

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INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 9, ISSUE 03, MARCH 2020 ISSN 2277-8616

Special Pythagorean Triangles And Cryptography

Mita Darbari, Prashans Darbari, Aditi Singh, Jayeshikha Uikey, Mohd Irshad

Abstract— We have found a very interesting result by using some special Pythagorean triangles, where the sum of two legs is undecic. We have used application of these triangles in cryptography to code and decode any message.

Keywords: Pythagorean triangle, cryptography, Mathematica, eleventh power, coding, decoding

1. INTRODUCTION

THe Pythagoras theorem is still attracting the minds of young and old alike even after two thousand five hundred years after it was proved rigoursly. Darbari and Darbari [1] have found Pythagorean triangles with perimeter to be a sum of three squares with consecutive sides. Darbari and Darbari [2] developed a method for cryptography using special Pythagorean triangles with sum of their two legs as undecic. Using the same Pythagorean triangles, we propose another method for sending secured messages. In today's modern era we know that security is the prime factor that exists in everyone's life.

2. METHODOLOGY

A. METHOD OF ANALYSIS

PQR is a right angled triangle where P, Q are the two legs of triangle and R is the hypotenuse.

$$P^2 + Q^2 = R^2 \quad (1)$$

If we use Pythagorean mathematics then the primitive solutions of the above Pythagorean equation (1) are

$$P = a^2 - b^2, Q = 2ab, R = a^2 + b^2 \quad (2)$$

where a, b belong to I such that a > b > 0 and (a, b) = 1 and a, b are of opposite parity.

Let us take the constraint that sum of two legs of right angle triangle is a power of eleven or undecic.

Let P and Q be the two legs of a right angled triangle and R is the hypotenuse then,

$$P + Q = \alpha^{11} \quad (3)$$

From (2) we get

$$a^2 - b^2 + 2ab = \alpha^{11} \quad (4)$$

B. ALGORITHM

Darbari and Darbari[2], with the help of software *Mathematica* solved the equation (4), by the command

$$Reduce[a^2 - b^2 + 2ab - \alpha^{11} == 0, \{a, b, \alpha\}]$$

The eleven solutions of (4) are as follows:

$$\alpha = (a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = -(-1)^{1/11}(a^2 - b^2 + 2ab)^{1/11}$$

Revised manuscript received on 5 September 2019.

Correspondence author

- *Mita Darbari, Department of mathematics, St. Aloysius college (autonomous), Jabalpur India. E-mail: m.darbari@rediffmail.com*
- *Prashans Darbari, pursuing BS-MS (Mathematics), Indian institute science education and research, Mohali, India. E-mail : prashansd@rediffmail.com*
- *Aditi Singh, pursuing M.sc (mathematics), St Aloysius college, Jabalpur, India, Email-id adithbaghel5a@gmail.com*
- *Jayeshikha Uikey pursuing M.sc (Mathematics), St Aloysius college, Jabalpur, India, Email-id jai14uikey@gmail.com*
- *Mohd Irshad , pursuing M.sc (mathematics), St Aloysius college, Jabalpur ,India Email id – mohdirshadit033@gmail.com*

$$\alpha = (-1)^{2/11}(a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = -(-1)^{3/11}(a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = (-1)^{4/11}(a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = -(-1)^{5/11}(a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = (-1)^{6/11}(a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = -(-1)^{7/11}(a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = (-1)^{8/11}(a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = -(-1)^{9/11}(a^2 - b^2 + 2ab)^{1/11}$$
$$\alpha = (-1)^{10/11}(a^2 - b^2 + 2ab)^{1/11}$$

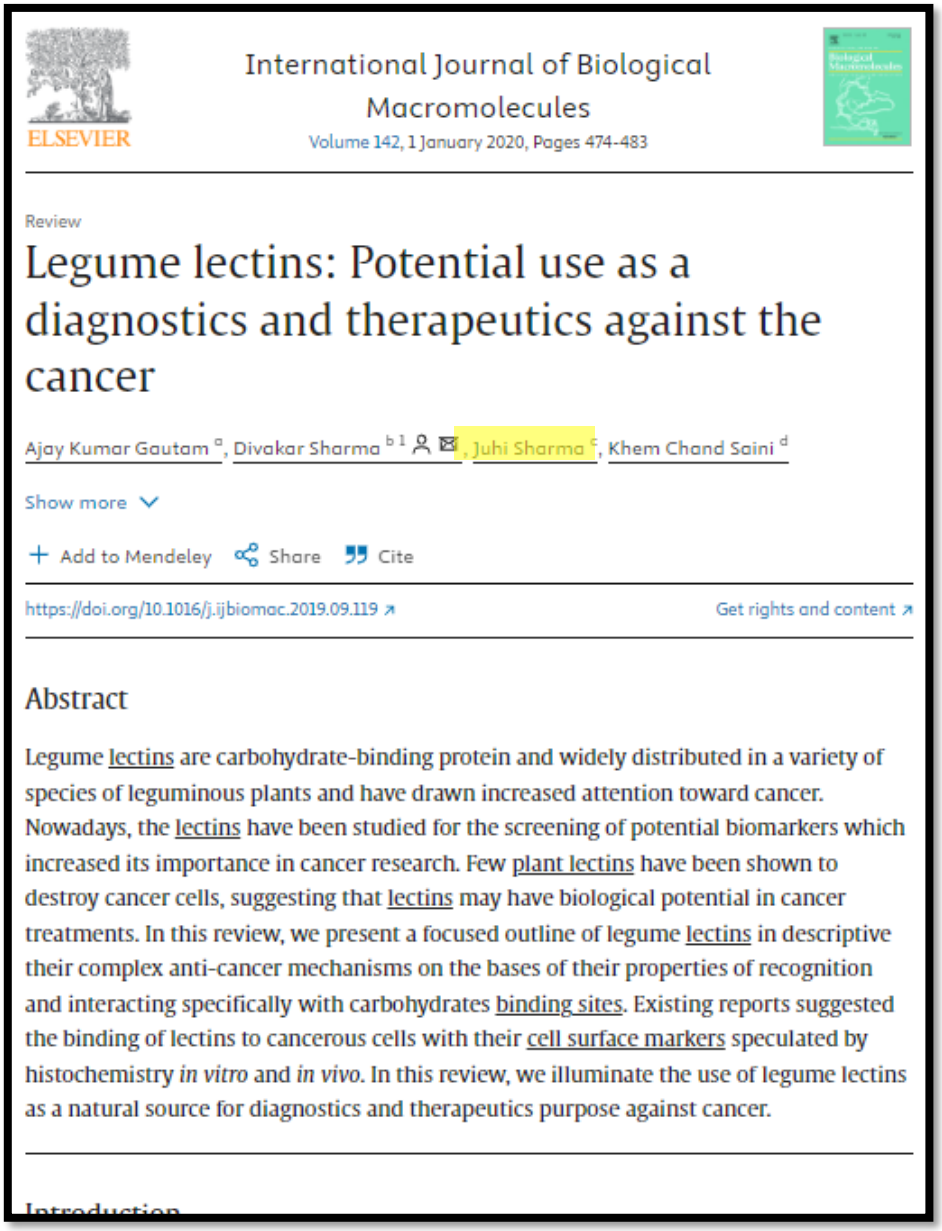
(5) They also found the integral solutions of equation (5), by using *Mathematica*, by following command:

$$Findinstance[a^2 - b^2 + 2ab - \alpha^{11} == 0 \&\& b < a \&\& 0 < a < 10^{15} \&\& 0 < b < 10^{15} \&\& 0 < \alpha < 10^{11} \&\& GCD[a, b] == 1, \{a, b, \alpha\}, integers, 10000]$$

(6) The 71 solutions of equation (5) in terms of P, Q, R are obtained by them. We have taken the values of P only for cryptography which are as follows:

TABLE 1: Values of P which satisfy $P^2 + Q^2 = R^2$ and $P + Q = \alpha^{11}$

S. No	P
1	1184304355
2	34188843715725
3	585631085655375
4	6419083110764707
5	200458617831831401
6	1112513344934547755
7	962281642682177653
8	12010288634937331235 1
9	291239176016833405485
10	727312866875079884179
11	3113343335912662513 29
12	5100539931352673355705
13	125664567227653357267 5
14	116547799182722597985 65
15	404698774312850241953 43
16	407096136137430569307 59
17	121413030488163770368915
18	253974840823063062066645
19	697272843691662924908551
20	495900111402164448426417
21	106551239714552078015659 5
22	184356280959190184306482 1
23	819721431616623209026353
24	825722281501959170887735 1
25	167623595790529561172582 19
26	908284041896121325408685 7
27	303900685363900391066375 05
28	137638125163119555291545 83
29	488604170039205107968535 93
30	760143723324447226557080 19



ELSEVIER

International Journal of Biological Macromolecules
Volume 142, 1 January 2020, Pages 474-483

Review

Legume lectins: Potential use as a diagnostics and therapeutics against the cancer

Ajay Kumar Gautam [a], Divakar Sharma [b 1], Juhi Sharma [c], Khem Chand Saini [d]

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Abstract

Legume lectins are carbohydrate-binding protein and widely distributed in a variety of species of leguminous plants and have drawn increased attention toward cancer. Nowadays, the lectins have been studied for the screening of potential biomarkers which increased its importance in cancer research. Few plant lectins have been shown to destroy cancer cells, suggesting that lectins may have biological potential in cancer treatments. In this review, we present a focused outline of legume lectins in descriptive their complex anti-cancer mechanisms on the bases of their properties of recognition and interacting specifically with carbohydrates binding sites. Existing reports suggested the binding of lectins to cancerous cells with their cell surface markers speculated by histochemistry *in vitro* and *in vivo*. In this review, we illuminate the use of legume lectins as a natural source for diagnostics and therapeutics purpose against cancer.

Introduction

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Bioremediation of melanoidin contamination in distillery effluent using *Aspergillus brasiliensis*

TANIM ARPIT SINGH [1*], TRASHI SINGH [2], RANJAN SINGH [2], PRABHASH KUMAR PANDEY [3], RAJEEVA GAUR [4], FARRUKH JAMAL [5], SUBHENDRA KUMAR PATEL [6], SHIKHA BANSAL [7]

[1] Maharaja Ranjit Singh College of Professional Sciences, Indore (M.P.), India
[2] Cyanobacterial Research Lab, Rani Durgavati University, Jabalpur (M.P.), India
[3] Choithram College of Professional Studies, Indore (M.P.), India
[4] Department of Biochemistry, Allahabad University, Allahabad (U.P.), India
[5] Department of Microbiology, RamManohar Lohia Avadh University, Ayodhya (U.P.), India
[6] Department of Biochemistry, RamManohar Lohia Avadh University, Ayodhya (U.P.), India
[7] Department of Microbiology, St. Aloysius College Autonomous, Jabalpur (M.P.), India

Abstract

The current investigation is the first report of utilization of *Aspergillus brasiliensis* for the decolorization of melanoidin in distillery effluent. The effluent generated from alcohol distilleries is one of the most complex wastewater with a high biological oxygen demand (BOD) and other organic, inorganic, and toxic constituents. The effluent contains melanoidin, a dark brown compound, which is difficult to remediate by using conventional technologies. The disposal of spent wash in the natural environment is hazardous and can deteriorate land and water resources. The decolorization of spent wash through physical and chemical methods remains unsuitable, and the only alternative to decolorize spent wash is biological treatment. In the current study, three fungal strains were isolated from the distillery waste and screened for their ability to decolorize melanoidin. The isolate RS2 exhibited maximum decolorization of 83% and was identified as *Aspergillus brasiliensis*. Its optimum growth temperature was 37 °C, and the maximum efficiency was recorded after 120 h of incubation. Nutritional sources were investigated for the fungi showing the maximum decolorization of melanoidin, and starch and peptone were found to be the best carbon and nitrogen sources, respectively. At 1.5% starch concentration and 1.5% peptone concentration, the decolorization level attained was 87.45% and 88.74%, respectively. *A. brasiliensis* exhibited a high potential to decolorize melanoidin. The decolorization percentage was high, which makes this fungus a potential candidate for use at the industrial scale for the bioremediation of spent wash.

Key words: spent wash; effluent; melanoidin; bioremediation; decolorization

Introduction

Alcohol distilleries are considered to be one of the most polluting industries as they generate large amounts of effluent rich in pollutants. In India, there are more than 500 distilleries, and they generate 2.75 billion liters of alcohol and produce 50 billion liters of effluent per year (Subramanian et al., 2005; Tiwari et al., 2007). The majority of distilleries are attached to sugar factories, and their effluent is known as spent wash. For every one liter of alcohol produced, 10–15 liters of spent wash is generated. If the daily generation of spent wash is calculated, in a general distillery where ethanol is produced from cane molasses, half a million liter of spent wash is generated daily (Tiwari et al., 2012). Alcohol distillery tops the list in the Red Category industries, with a high polluting potential, according to the Ministry of Environment and Forest (MOEF), the Government of India (Tiwari et al., 2007).

The spent wash from distilleries is not only high in organic and inorganic contaminants but also contains dark brown recalcitrant compounds known as melanoidin. These natural compounds are formed by the con-

* Corresponding author: Maharaja Ranjit Singh College of Professional Sciences, Indore (M.P.), India; e-mail: tanim.arpit@gmail.com

TECHNICAL ARTICLE

Educators' online buying behavior: A step towards knowledge management with special reference to higher education institutions in Jabalpur city

Komal Rawat and Meenakshi Swamy
Department of Commerce, St. Aloysius' College, Jabalpur

Abstract

Educators are facilitators of student learning and creators of productive classroom environments. The building of education doesn't need any brick and mortar but requires a comprehensive structure of collective human knowledge. Nowadays online shopping of educational material has become new trend of shopping and is rapidly becoming an imperative part of life. The objective of this paper is to unearth the buying behavior of educators for different products and know their stream wise preference towards online shopping in Jabalpur city.

Keywords: Educator, Buying behavior, Online shopping, Knowledge management

Introduction

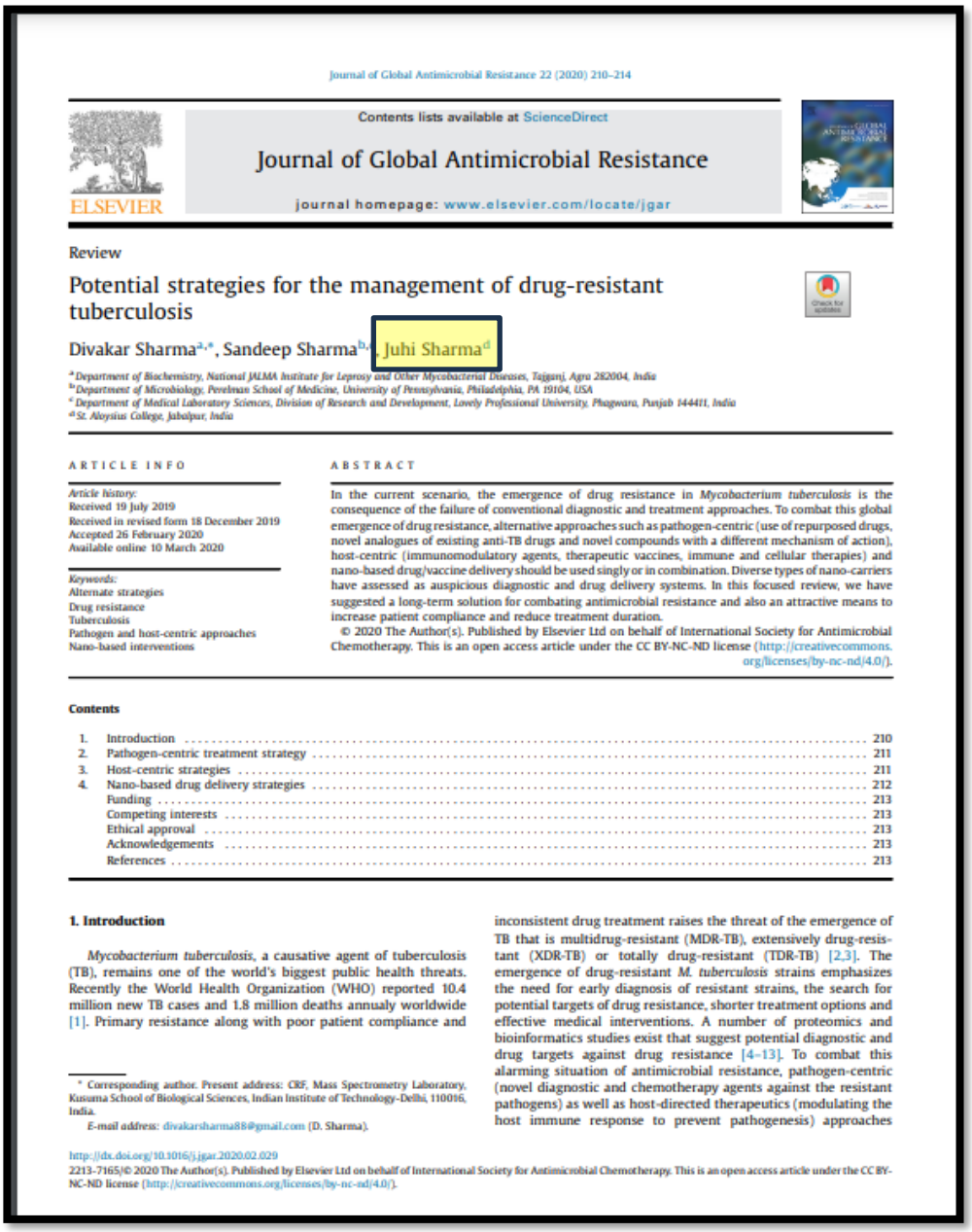
In the present era it has been observed that there is a tremendous growth in the internet based network of free online teaching resources which assist teaching and learning process. These resources are called teaching and learning objects, open education material or online learning resources in which innovative and interactive curricula can be designed. Educator is a person who provides education and inspires learners for a systematic knowledge. Educators are the facilitator of learning and impart knowledge, develop the powers of reasoning and judgment among the learners. Educators are buying online of educational material towards the melioration of learners. They create their own Google class room teaching, lesson plan, video lectures and as well as various tools such as visualization and simulation that support the manipulation of real world phenomena. These materials are often used and it made available in resource collection such as like digital library, portals that facilitate educator access, free online book material that benefitted the educators as well as learners. The present paper highlights the aspect of knowledge management which is basically related to the educators who shop online of teaching material. The online resources are very supportive to enhance and share knowledge in various ways that fundamentally transform into practice.

Buying behavior

Buying behavior is a response of consumers towards a product which includes planning, acts, strategies and decision for a product. It consists of all activities, preference, attitude and intentions related to purchase of a product. Nowadays educators are motivating towards buying of educational material online which helps them to make the learning environment more fruitful.

Online shopping

The act of purchasing products directly over the internet by using any web browser is known as online shopping. It is



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Review

Potential strategies for the management of drug-resistant tuberculosis

Divakar Sharma[a,*], Sandeep Sharma[b], Juhi Sharma[d]

[a] Department of Biochemistry, National JALMA Institute for Leprosy and Other Mycobacterial Diseases, Tajganj, Agra 282004, India
[b] Department of Microbiology, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA 19104, USA
[c] Department of Medical Laboratory Sciences, Division of Research and Development, Lovely Professional University, Phagwara, Punjab 144411, India
[d] St. Aloysius College, Jabalpur, India

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ABSTRACT

In the current scenario, the emergence of drug resistance in *Mycobacterium tuberculosis* is the consequence of the failure of conventional diagnostic and treatment approaches. To combat this global emergence of drug resistance, alternative approaches such as pathogen-centric (use of repurposed drugs, novel analogues of existing anti-TB drugs and novel compounds with a different mechanism of action), host-centric (immunomodulatory agents, therapeutic vaccines, immune and cellular therapies) and nano-based drug/vaccine delivery should be used singly or in combination. Diverse types of nano-carriers have assessed as auspicious diagnostic and drug delivery systems. In this focused review, we have suggested a long-term solution for combating antimicrobial resistance and also an attractive means to increase patient compliance and reduce treatment duration.

Contents

1. Introduction

Mycobacterium tuberculosis, a causative agent of tuberculosis (TB), remains one of the world's biggest public health threats. Recently the World Health Organization (WHO) reported 10.4 million new TB cases and 1.8 million deaths annually worldwide [1]. Primary resistance along with poor patient compliance and inconsistent drug treatment raises the threat of the emergence of TB that is multidrug-resistant (MDR-TB), extensively drug-resistant (XDR-TB) or totally drug-resistant (TDR-TB) [2,3]. The emergence of drug-resistant *M. tuberculosis* strains emphasizes the need for early diagnosis of resistant strains, the search for potential targets of drug resistance, shorter treatment options and effective medical interventions. A number of proteomics and bioinformatics studies exist that suggest potential diagnostic and drug targets against drug resistance [4–13]. To combat this alarming situation of antimicrobial resistance, pathogen-centric (novel diagnostic and chemotherapy agents against the resistant pathogens) as well as host-directed therapeutics (modulating the host immune response to prevent pathogenesis) approaches

* Corresponding author. Present address: CRF, Mass Spectrometry Laboratory, Kusuma School of Biological Sciences, Indian Institute of Technology-Delhi, 110016, India.
E-mail address: divakarsharma88@gmail.com (D. Sharma).

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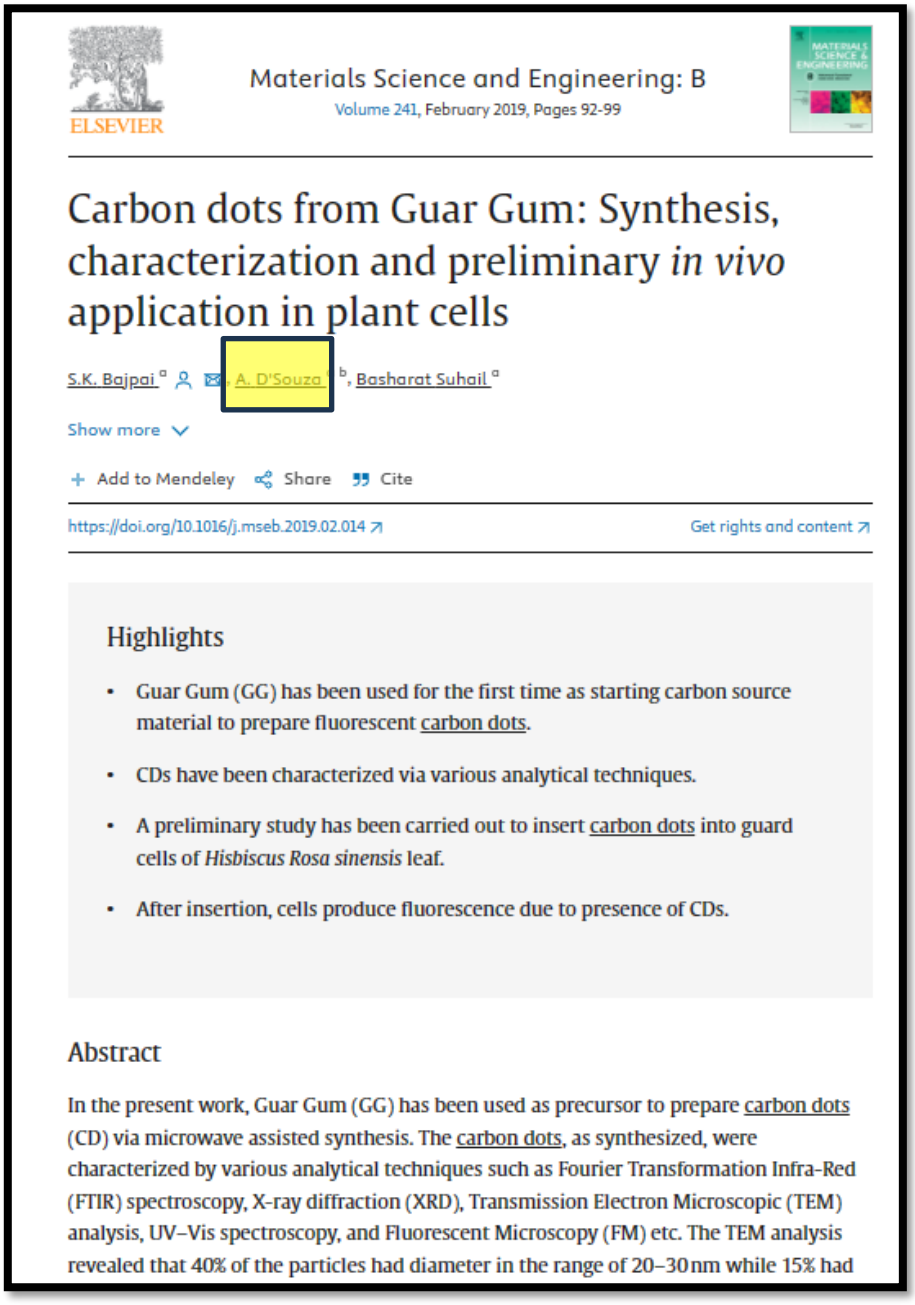

ELSEVIER

Materials Science and Engineering: B
Volume 241, February 2019, Pages 92-99

Carbon dots from Guar Gum: Synthesis, characterization and preliminary *in vivo* application in plant cells

S.K. Bajpai [a], A. D'Souza [b], Basharat Suhail [a]

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Highlights

- Guar Gum (GG) has been used for the first time as starting carbon source material to prepare fluorescent carbon dots.
- CDs have been characterized via various analytical techniques.
- A preliminary study has been carried out to insert carbon dots into guard cells of *Hisbiscus Rosa sinensis* leaf.
- After insertion, cells produce fluorescence due to presence of CDs.

Abstract

In the present work, Guar Gum (GG) has been used as precursor to prepare carbon dots (CD) via microwave assisted synthesis. The carbon dots, as synthesized, were characterized by various analytical techniques such as Fourier Transformation Infra-Red (FTIR) spectroscopy, X-ray diffraction (XRD), Transmission Electron Microscopic (TEM) analysis, UV–Vis spectroscopy, and Fluorescent Microscopy (FM) etc. The TEM analysis revealed that 40% of the particles had diameter in the range of 20–30 nm while 15% had

Blue light–emitting carbon dots (CDs) from a milk protein and their interaction with *Spinacia oleracea* leaf cells

Original Article | Open access | Published: 20 April 2019
Volume 9, pages 203–212, (2019) Cite this article

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S. K. Bajpai A. D'Souza Basharat Suhail

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Abstract

The milk protein casein (Cas) has been employed as carbon resource material to synthesize nitrogen–doped carbon dots (N–CDs) via microwave exposure. The dots, when exposed to UV light, produced blue fluorescence. The N–CDs were characterized by ultra violet (UV) spectroscopy, Fourier transformation infrared spectroscopy, X–ray diffraction (XRD), dynamic light scattering analysis, fluorescent microscopy (FM), and transmission electron microscopy (TEM). The XRD analysis revealed a broad peak at $2\theta = 20°$, thus indicating the turbostratic carbon phase. TEM analysis and particle size distribution curve revealed that nearly, 85% of the particles had diameter below 10 nm and the particles had spherical geometry. The HRTEM analysis revealed that carbon dots exhibited lattice fringes with a d–spacing of 0.21 nm, corresponding to the (100) plane lattice of graphite. The fluorescence spectral studies indicated a red shift in the emission peak from 420 to 450 nm as the excitation wavelength increased from 300 to 340 nm. The zeta potential of particles was found to be −11.3 mV. Finally, impregnation of N–CDs was studied in *Spinacia oleracea* leaf. It was observed that as the concentration of N–CDs' solution increased, percent insertion (PI) also increased, but the time required for maximal insertion decreased with increasing concentrations of N–CDs in the feed solutions. In the carbon dots' solution with a concentration of 200 ppm, maximum percent insertion (MPI) was obtained after 80 min. However, with the increasing concentration of N–CDs in the feed solutions, time of getting MPI reduced, i.e., in 600 ppm, it was 30 min, and in 800 ppm, it was 10 min.

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Fortifying The Messages

Mita Darbari, **Prashans Darbari, Soumya Nema, Mansi Sahu, Reena Soni**

Abstract: In this paper, a method for sending secured messages on internet is presented in a very simple way using Special Pythagorean Triangles.

Index Terms: Code, encryption, legs, Mathematica, message, primitive solutions, Pythagorean Triangles.

1. INTRODUCTION

IN modern times , world is embedded with technologies. In this technological world it is very difficult to secure our messages from hackers. To resolve this problem, we have discovered a new method of cryptography to encrypt our alpha-numeric messages in the form of numbers. Darbari and Darbari [1] have found special Pythagorean Triangles and Darbari and Darbari [2] have given a method of cryptography based on special Pythagorean Triangles whose sum of Two Legs is Undecic. They had found 71 such Triangles and we have extended the number to 245. And we proposed another method for encryption of messages based on these numbers.

2 PROPOSED METHODOLOGY

2.1 Method of Analysis

Pythagorean Triangles have been known since the ancient times. It consists of three positive integers X, Y, Z such that

$$X^2+Y^2=Z^2 \quad (1)$$

The triangle is said to be primitive if gcd (X, Y, Z) =1.

The primitive solutions of the above Pythagorean equation are given by the Euclid's formula [3] -

$$X=p^2-q^2, Y=2pq, Z=p^2+q^2 \quad (2)$$

where $p,q \in I$ such that $p>q>0$ and gcd (p,q) = 1 where p and q are of opposite parity. Sum of two legs is a power of eleven, that is, undecic: If X and Y are two legs of a right-angled triangle and Z is the hypotenuse, then

$$X+Y=\alpha^{11} \quad (3)$$

i.e., $$p^2-q^2+2pq=\alpha^{11} \quad (4)$$

2.2 Algorithm

Solving equation (4) using the software Mathematica, by the the command

Reduce $\left[p^2-q^2+2pq-\alpha^{11}==0,\{p,q,\alpha\}\right]$ the eleven solutions are given by

$$\begin{aligned}
\alpha &= (p^2-q^2+2pq)^{1/11}\\
\alpha &= -(-1)^{1/11}(p^2-q^2+2pq)^{1/11}\\
\alpha &= (-1)^{2/11}(p^2-q^2+2pq)^{1/11}\\
\alpha &= -(-1)^{3/11}(p^2-q^2+2pq)^{1/11}\\
\alpha &= (-1)^{4/11}(p^2-q^2+2pq)^{1/11}\\
\alpha &= -(-1)^{5/11}(p^2-q^2+2pq)^{1/11} \quad (5)\\
\alpha &= (-1)^{6/11}(p^2-q^2+2pq)^{1/11}\\
\alpha &= -(-1)^{7/11}(p^2-q^2+2pq)^{1/11}\\
\alpha &= (-1)^{8/11}(p^2-q^2+2pq)^{1/11}\\
\alpha &= -(-1)^{9/11}(p^2-q^2+2pq)^{1/11}\\
\alpha &= (-1)^{10/11}(p^2-q^2+2pq)^{1/11}
\end{aligned}$$

Seeking the integral solutions of (5), using Mathematica, by the following command:

$$[p^2-q^2+2pq-\alpha^{11}==0 \&\& p<q \&\& 0<p<10^{18} \&\& 0<q<10^{18} \&\& 0<\alpha<10^{11} \&\& GCD[p,q]==1, \{p,q,\alpha\}, Integers, 10000]$$

3 APPLICATION IN CRYPTOGRAPHY

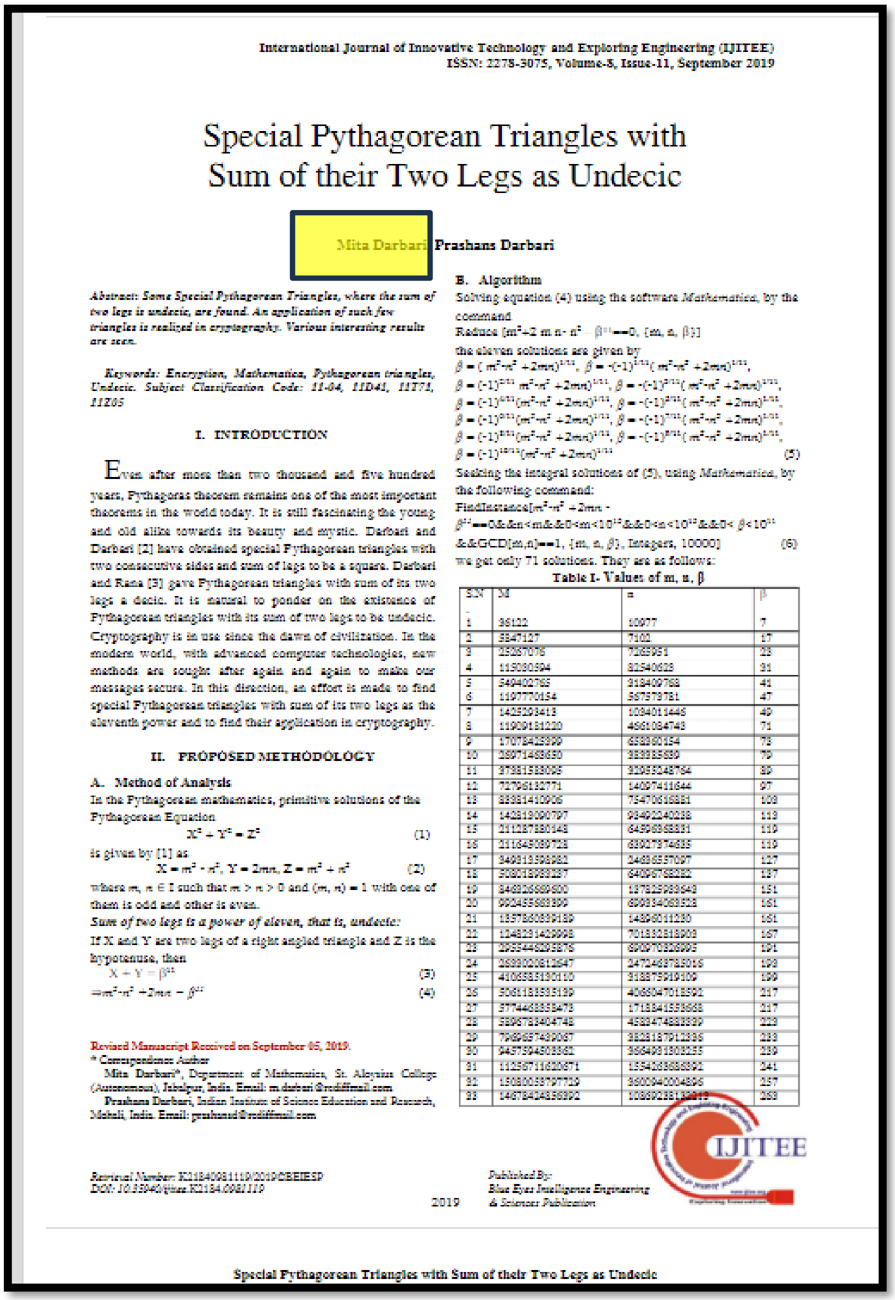
Cryptography is a branch of applied mathematics which deals with coding and decoding of personal messages. These messages are unintelligible to everyone except the authorized users. For this we have derived a method.

3.1 Method

In our cryptographic method we have divided the codes in the form of alphabetical blocks as A to Z, then one gap is taken for space between the two words, then taken in the reverse order as Z to A, then again, a gap and the same process continues for seven times. So, we got seven blocks of alphabets. After which we allocated the digits from 0 to 9, and then left a gap. Then we allocated some special characters and left a gap at last.

To allocate the elements, we chose last three digits of **p** from

- ***Mita Darbari**, Department of Mathematics, St. Aloysius College (Autonomous), Jabalpur, India. Email: m.darbari@rediffmail.com*
- ***Prashans Darbari**, Indian Institute of Science Education and Research, Mohali, India. Email: prashansd@rediffmail.com*
- ***Soumya Nema**, St. Aloysius' College (Autonomous), Jabalpur, India. Email: soumyanema144@gmail.com*
- ***Mansi Sahu**, St. Aloysius' College (Autonomous), Jabalpur, India. Email: mansis988@gmail.com*
- ***Reena Soni**, St . Aloysius' College (Autonomous), Jabalpur, India. Email: reenasoni9111@gmail.com*



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Special Pythagorean Triangles with Sum of their Two Legs as Undecic

Mita Darbari, Prashans Darbari

***Abstract:** Some Special Pythagorean Triangles, where the sum of two legs is undecic, are found. An application of such few triangles is realized in cryptography. Various interesting results are seen.*

Keywords: Encryption, Mathematica, Pythagorean triangles, Undecic. Subject Classification Code: 11-04, 11D41, 11T71, 11Z05

I. INTRODUCTION

Even after more than two thousand and five hundred years, Pythagoras theorem remains one of the most important theorems in the world today. It is still fascinating the young and old alike towards its beauty and mystic. Darbari and Darbari [2] have obtained special Pythagorean triangles with two consecutive sides and sum of legs to be a square. Darbari and Rana [3] gave Pythagorean triangles with sum of its two legs a decic. It is natural to ponder on the existence of Pythagorean triangles with its sum of two legs to be undecic. Cryptography is in use since the dawn of civilization. In the modern world, with advanced computer technologies, new methods are sought after again and again to make our messages secure. In this direction, an effort is made to find special Pythagorean triangles with sum of its two legs as the eleventh power and to find their application in cryptography.

II. PROPOSED METHODOLOGY

A. Method of Analysis

In the Pythagorean mathematics, primitive solutions of the Pythagorean Equation

$$X^2 + Y^2 = Z^2 \quad (1)$$

is given by [1] as

$$X = m^2 - n^2,\ Y = 2mn,\ Z = m^2 + n^2 \quad (2)$$

where $m, n \in I$ such that $m > n > 0$ and $(m, n) = 1$ with one of them is odd and other is even.

Sum of two legs is a power of eleven, that is, undecic:

If X and Y are two legs of a right angled triangle and Z is the hypotenuse, then

$$X + Y = \beta^{11} \quad (3)$$

$$\Rightarrow m^2 - n^2 + 2mn = \beta^{11} \quad (4)$$

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* Correspondence Author

Mita Darbari*, Department of Mathematics, St. Aloysius College (Autonomous), Jabalpur, India. Email: m.darbari@rediffmail.com

Prashans Darbari, Indian Institute of Science Education and Research, Mohali, India. Email: prashansd@rediffmail.com

B. Algorithm

Solving equation (4) using the software *Mathematica*, by the command

Reduce [m^2+2 m n - n^2 - β^11==0, {m, n, β}]

the eleven solutions are given by

$\beta = (m^2 - n^2 + 2mn)^{1/11}$, $\beta = -(-1)^{1/11}(m^2 - n^2 + 2mn)^{1/11}$,
$\beta = (-1)^{2/11}(m^2 - n^2 + 2mn)^{1/11}$, $\beta = -(-1)^{3/11}(m^2 - n^2 + 2mn)^{1/11}$,
$\beta = (-1)^{4/11}(m^2 - n^2 + 2mn)^{1/11}$, $\beta = -(-1)^{5/11}(m^2 - n^2 + 2mn)^{1/11}$,
$\beta = (-1)^{6/11}(m^2 - n^2 + 2mn)^{1/11}$, $\beta = -(-1)^{7/11}(m^2 - n^2 + 2mn)^{1/11}$,
$\beta = (-1)^{8/11}(m^2 - n^2 + 2mn)^{1/11}$, $\beta = -(-1)^{9/11}(m^2 - n^2 + 2mn)^{1/11}$,
$\beta = (-1)^{10/11}(m^2 - n^2 + 2mn)^{1/11}$ (5)

Seeking the integral solutions of (5), using *Mathematica*, by the following command:

FindInstance[m^2-n^2 +2mn - β^11==0&&n<m&&0<m<10^12&&0<n<10^12&&0< β<10^11 &&GCD[m,n]==1, {m, n, β}, Integers, 10000] (6)

we get only 71 solutions. They are as follows:

Table I- Values of m, n, β

S.N.	M	n	β
1	36122	10977	7
2	3847127	7102	17
3	25287076	7263951	23
4	119080394	82540623	31
5	549402765	318409768	41
6	1197770154	587573781	47
7	1425293413	1094011446	49
8	11909181220	4661084743	71
9	17078425399	658890154	73
10	28971468630	383383889	79
11	37381383095	32083248764	89
12	72796132771	14097411644	97
13	83381410906	75470616881	103
14	142813090797	93492240238	113
15	211287880148	64398688831	119
16	211645089723	63927374635	119
17	349813398982	24686557097	127
18	308018983297	64096798282	137
19	346826689600	137825988643	151
20	992455683399	699834068528	161
21	1357860839139	14896011230	161
22	1248231429998	701332818903	167
23	2935446293876	690970826995	191
24	2639020812647	2472468789016	193
25	4106583130110	318875919109	199
26	5061183335139	4066047018592	217
27	5774463338473	1713841538668	217
28	5896783404748	4538474883339	223
29	7969857439067	3828187912336	233
30	9457594308362	3664981308233	239
31	11256711620671	1554268686892	241
32	15080088797729	3600940004896	257
33	14678424836892	108892881[illegible]	263

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