3.3.1 Number of research papers published per teacher in the Journals as notified on UGC CARE list during the academic year 2022-23.

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Total number of research papers published per teacher in the Journals notified on UGC website for year 2022-23.

Summary sheet

Sr. No.	Title of paper	Name of the author/s	Department of the teacher	Calendar Year of publication	ISSN number
1	A sustainable approach to produce yeast lipid by utilizing marine macroalgae biomass	Manisha Nanda, Krishna Kumar Jaiswal, Jyoti Negi, Fábio de Farias Nevesd, J. Ranjitha, Makhail S. Vlaskin, Anatoly V. Grigorenko, P.K. Chauhang, Vinod Kumar	Biotechnology	2023	0016-2361
2	Robust physical mutagenesis and multiomics for microalgae bioprospecting	Manisha Nanda Mikhail S. Vlaskin Vinod Kumar	Biotechnology	2023	1878-4372
3	Knowledge and Attitudes of Gut Health and Probiotics in Indian University Students	Deepti Gulati1* and Shubhangi	Biotechnology	2023	1138-5790
4	TLC, DLC and platelet count in Young Female Population of Dehradun Region	Vinit Vishnoi, Upsana Raturi, D.K.Awasthi and Gyanendra Awasthi	Biochemistry	2023	2349-8870
5	Epidemiological Studies about Vitamin D status in pregnant women	Vineet Vishnoi, Rajesh Kumar Jha, D.K.Awasthi and Gyanendra Awasthi	Biochemistry	2023	2455-2631
6	Vitamin D: A Brief Review	Vineet Vishnoi, Rajesh Kumar Jha, D.K.Awasthi and Gyanendra Awasthi	Biochemistry	2023	2456-4184
7	Thyroid Diseases :A Review	Vineet Vishnoi, Pankaj Kumar, D.K.Awasthi and Gyanendra Awasthi	Biochemistry	2023	2349-6002
8	Thyroid Profiling of Population in Dehradun Region	Vineet Vishnoi, Pankaj Kumar, D.K.Awasthi and Gyanendra	Biochemistry	2023	2250-1770

Sr. No.	Title of paper	Name of the author/s	Department of the teacher	Calendar Year of publication	ISSN number
		Awasthi			
9	Vitamin D and Micronutrients (Znic and Magnesium) status in Young females	Vineet Vishnoi, Aman Tadiyal, D.K.Awasthi and Gyanendra Awasthi	Biochemistry	2023	2349-6002
10	Impact of Petroleum Products on Liver Profile of Petrol Pump workers.	Gyanendra Awasthi, Deepali Joshi Vineet Vishnoi, and D.K.Awasthi	Biochemistry	2023	2250-1770
11	Antioxidant Defence Response and Micronutrient Content Availability in Cyamopsis Varieties in eCO2 Concentration	Sonali Mehrotra and Karunaker P. Tripathi	Botany	2023	2454-1117
12	Chir pine and banj oak responses to pre-monsoon drought across slope aspects and positions in central Himalayas	Vidit Tyagi, Surendra P. Singh, Ripu Daman Singh & Surabhi Gumber	Botany	2023	0167-6369
13	Influence of slope position and aspect pn the vegetation attributes and tree-water relations in forests of the central Himalayas	Vidit Tyagi, Surendra P. Singh, Ripu Daman Singh, Surabhi Gumber, Rajesh Thadani & Rajiv Pandey	Botany	2023	1672-6316
14	Consistent response to topographical variation in net assimilation rate across the central Himalayan broadleaved forests	Vidit Tyagi, Surendra P. Singh, Surabhi Gumber, Ripu Daman Singh	Botany	2023	1872-2032
15	Study of Forest Fire Incidences and Management in Mussoorie Forest Range, Dehradun, Uttarakhand, India	Androse Chiri, Manish Kumar, Vikaspal Singh* , Sandhya Goswami, A K Uniyal, Rashmi T Chamoli	Forestry	2023	2861-9776
16	Potential of non-timber forest products in the household income of Tengnoupal district, Manipur,	A.K. Uniyal,Khaling Silvia,Vikaspal Singh,Rashmi T. Chamoli	Forestry	2023	2320–6063

Sr. No.	Title of paper	Name of the author/s	Department of the teacher	Calendar Year of publication	ISSN number
	India				
17	Optimization of Siderophore Production by Bacillus subtilis DR2 and Its Effect on Growth Promotion of Coriandrum sativum	Sonali Kumari, Shilpi Kiran, Sushma Kumari, Pankaj Kumar, Abha Singh	Microbiology	2023	1068-3674
18	Comparison of Antioxidant Properties and Flavonoid of Natural and in vitro Cultivated Nardostachys jatamansi	Hem Chandra Pant, Indra Rautela, Harsh Vardhan Pant, Arun Kumar, Pankaj Kumar, Kaneez Fatima, Naveen Gaurav	Microbiology	2023	0253-150X
19	Characterization of culture condition dependent, growth responses of phosphate solubilizing bacteria (Bacillus subtilis DR2) on plant growth promotion of Hordeum vulgare	Sonali Kumari, Pankaj Kumar, Shilpi Kiran, Sushma Kumari & Abha Singh	Microbiology	2023	2229-4473
20	Genomics, Proteomics, and Metabolomics Approaches to Improve Abiotic Stress Tolerance in Tomato Plant	Bindu Naik,Vijay Kumar, Sheikh Rizwanuddin, Mansi Chauhan, Megha Choudhary, Arun Kumar Gupta, Pankaj Kumar, Vivek Kumar, Per Erik Joakim Saris, Muzamil Ahmad Rather, Shuvam Bhuyan, Panchi Rani, Sadhna Mishra, Sarvesh Rustagi	Microbiology	2023	1422-0067
21	Comparative study of ethanol production from sodium hydroxide pretreated rice straw residue using Saccharomyces cerevisiae and Zymomonas mobilis	Naveen Kumar, Anita Yadav, Gulab Singh, Ajay Singh, Pankaj Kumar & Neeraj K. Aggarwal	Microbiology	2023	0302-8933
22	Reconditioning of plant metabolism by arbuscular mycorrhizal networks in cadmium contaminated soils: Recent	Harmanjit Kaur, Tashima, Sandeep Singh, Pankaj Kumar	Microbiology	2023	0944-5013

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23	Characterization and comparative assessment of bactericidal activity of carbon nanodots (CDs) and nanoparticles (CNPs) prepared from soot's of clarified butter and mustard oil, respectively	Vikas Pahal, Pankaj Kumar, Rahul Kumar, Parveen Kumar, Vinod Kuma	Microbiology	2023	2455-7005
24	Effect of Bio-Decolorised Spent Wash on Plant Growth Promotion	G. Singh, A. K. Singh, P. Kumar & M. Mandal	Microbiology	2023	1068-3674
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26	Modernized Management of Biomedical Waste Assisted with Artificial Intelligence	Sarkar O, Dey AK, Malik T.	Microbiology	2023	2563-9218
27	Phytochemical Investigation and Evaluation of Antioxidant and Antimicrobial Potential of Ardisia solanacea Leaf Extract	Kanwal Jeet, Versha parcha, Sas Bswas and Sukanya Chettri	Pharmaceutical Chemistry & Chemistry	2022	2456-3315
28	Studies on antioxidant potential and total phenolic contents of dried powder and pulp ofraw and ripeCarica papaya fruit	Bhardwaj Madhvi, Mahajan Babita, Kumar Ankush, Parcha Versha	Pharmaceutical Chemistry & Chemistry	2023	0970-2067
29	Artifical intelligence: a virtual chemist for natural product drug discovery	Shefali Arora, Sukanya Chettri, Versha Percha, Deepak Kumar & Mamta Latwal	Pharmaceutical Chemistry & Chemistry	2023	0739-1102
30	Ashwagandha: A Flagship Herb of Ayurveda from Past to Present Nano Era	Shefali Arora, Krishna Samanta, Sukanya Chettri, Devendra Rawat, Versha Percha, Deepak Kumar	Pharmaceutical Chemistry & Chemistry	2023	2230-973X
31	Correlation between neck	Deptee Warikoo, Ankita Pandey,	Physiotherapy	2023	2249-

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	proprioception with neck pain and disability in patients with mechanical neck pain	Riya, Sumaiya Muneer, Mohit chatterjee			555X
32	Immediate effect of nerve flossing technique on f-wave in piriformis syndrome	Deptee Warikoo, Diksha bhatt, Mohit chatterjee, Riya, Sumaiya muneer	Physiotherapy	2023	2349-5162
33	Nerve conduction velocity of the tibial nerve of healthy male and female students at Dolphin institute- A comparative study	Warikoo Deptee Agarwal Aditi Chatterjee Mohit Riya Muneer Sumaiya	Physiotherapy	2023	2349-5162
34	Effectiveness of trunk exercise on unstable surface for improving dynamic sitting balance, gait, function and fear of fall in elderly- an experimental study	Rawat Nidhi, Warikoo Deptee, Bhatt Sunil	Physiotherapy	2023	2349-5138
35	Prevalence of musculoskeletal disorders among women workers of himadri hans handloom	Dr. Keerty Mathur, Dr. Nikita Arya, Dr. Deepty Mathur	Physiotherapy	2023	2249 - 555X
36	Prevalence of knee dysfunction and its associated factors in housemaids in patiala.	Dr. Richa Agrawal, Harshita Raghu, Lovish Gupta	Physiotherapy	2023	2249 - 555X
37	Effect of chemical herbicides and mechanical practices on yield, yield attributes and economics of Berley (Hordeum vulgare L.) in valley condition of Dehradun	Kuldeep Kumar, Anil Kumar, Mayank Sharma, Abhishek Kumar Tyagi, Arnab Khanda and C. S. Pandey	Agriculture	2022	2278-6783
38	Effects of seed treatment on termite damage in Wheat crop	Laishram Bikash Singh and Vikrant	Agriculture	2022	2349-8242
39	Performance of paddy straw mulch and herbicides on weeds flora and	Rahul Nayam, Pankaj Budakoti, Anuj Gupta, CS Pandey and	Agriculture	2022	2349-

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	yield of wheat (Triticum aestivum L.) variety HD3086	Hunny Negi			8242
40	G6PD Deficiency in Dehradun Population	Rashmi, D K Awasthi. Gyanendra	Biochemistry	2022	2581-3048
41	Iron Deficiency Anemia: A Review	Vineet Vishnoi, D. K. Awasthi and Gyanendra Awasthi	Biochemistry	2022	
42	Red Cell Variables in Young Female Population of Dehradun Region	Vinit Vishnoi, Upsana Raturi, D.K.Awasthi and Gyanendra Awasthi	Biochemistry	2022	2349-8870
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47	Enhancement of Carbon Assimilates and Macronutrients in Legumes under Elevated CO2 Concentration	Sonali Mehrotra, Karunaker Prasad Tripathi	Botany	2022	2454-1117

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54	Effects of Corona Pandemic on Global Environment and Economy	Naveen Gaurav, Anjali Thapa,Yunus Ali, Ashish Kulshrestha, Neha Saini, Pramod Kumar Joshi, Himani Rawat,	Microbiology	2022	2456-7051

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56	Chemical Composition, Antioxidant and Antimicrobial Potential of the Essential Oils from Aerial Parts of Tagetes patula L. at Different Phenological Stages	Meena Kafaltiya,Hema Lohani,Ujjwal Bhandari,S. Zafar Haider,Nirpendra Chauhan,Tripti Malik Ahuja,Shailja Pant &Neeta Joshi	Microbiology	2022	0972-060X
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58	Overview: Insights on the Phytochemical, Pharmacological, and Biological Aspects of Acorus calamus and Artemisia roxburghiana: Wild Aromatic Plant Species of Himalayan Region of Uttarakhand	Versha Parcha, Sukanya Chhetri, Deepak Kumar and Rajendra Rana	Pharmaceutical Chemistry & Chemistry	2022	1869-9391
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61	Development of biochar from crofton weed & relationship between biochar properties and its applicability as a heavy metal removal activity	Versha Parcha, Pankaj Bhandari and Amita Sati	Pharmaceutical Chemistry & Chemistry	2022	0973-3507
62	Antioxidant Potential of different extracts of Xanthium strumarium leaves	Deepak Kumar, Ashwani Sanghi, Shefali Arora, Shobhit Vidyarthi	Pharmaceutical Chemistry & Chemistry	2022	0974-3618

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Full Length Article

A sustainable approach to produce yeast lipid by utilizing marine macroalgae biomass

Manisha Nanda [a], Krishna Kumar Jaiswal [b], Jyoti Negi [c], Fábio de Farias Neves [d], J. Ranjitha [e], Makhail S. Vlaskin [f], Anatoly V. Grigorenko [f], P.K. Chauhan [g], Vinod Kumar [h i]

[a] Department of Biotechnology, Dolphin (P.G.) Institute of Biomedical and Natural Sciences, Dehradun, 248007, India
[b] Department of Green Energy Technology, Pondicherry University, Puducherry, 605014, India
[c] Department of Green Energy Technology, Pondicherry University, Puducherry 605014, India
[d] Biological Sciences and Fisheries Engineering Department (DEP), Algae Culture and Biotechnology Laboratory (LCBA), Santa Catarina State University (UDESC), Laguna, Santa Catarina, Brazil
[e] CO2 Research and Green Technologies Centre, Vellore Institute of Technology, Vellore 14, India
[f] Joint Institute for High Temperatures of the Russian Academy of Sciences, 13/2 Izhorskaya St, Moscow 125412, Russian Federation
[g] Faculty of Applied Sciences and Biotechnology, Shoolini University, Solan 173229, HP, India
[h] Algal Research and Bioenergy Lab, Department of Life Sciences, Graphic Era (Deemed to Be University), Dehradun, Uttarakhand, 248002, India
[i] Peoples' Friendship University of Russia (RUDN University), Moscow 117198, Russian Federation

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Abstract

Marine macroalgae have qualities to utilize it as feedstocks to produce wide spectrum of biofuels, chemicals, and bioactive compounds. Microorganisms play an important role in converting macroalgae biomass into high value products, and genetic modification have been developed to increase their capabilities. The present work has investigated the escalation of lipids by ethyl methanesulfonate (EMS) mutagenesis in oleaginous yeasts and their simultaneous waste-free cultivation in underutilized hydrolyzed macroalgae biomass. After microwave-mediated hydrolysis of the macroalgal biomass, 37 g of glucan per 100 g of biomass were

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Robust physical mutagenesis and multiomics for microalgae bioprospecting

Manisha Nanda • Mikhail S. Vlaskin • Vinod Kumar

Published: April 26, 2023 • DOI: https://doi.org/10.1016/j.tplants.2023.04.002 • Check for updates

Literature

Article info

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Physical mutagenesis and multiomics in microalgae bioprospecting. (1) Exposure of microalgae to the physical mutagen and dose optimization. (2) High-throughput mutants screening and generation of mutants library. (3) Cultivation of mutants for expression of various bioactive compounds. (4) Using integrated omics for exploring the outcomes of physical mutagenesis can reflect the metabolism of the targeted compounds in microalgae. This enables finding ideal culture conditions for microalgae strain improvement, leading to a particular phenotype. Abbreviations: GC-MS, gas chromatography–mass spectrometry; LC-MS, liquid chromatography–mass spectrometry; MS, mass spectrometry; UPLC-MS, ultra performance liquid chromatography-tandem mass spectrometer; XRD, X-ray diffraction.

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Knowledge and Attitudes of Gut Health and Probiotics in Indian University Students

Deepti Gulati[1*] and Shubhangi[2]

[1*,2] Department of Biotechnology, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehra Dun-248007, Uttarakhand, India

Abstract: *The study assessed probiotics understanding, use, and anticipated benefits among 18-27 year old students (N = 498; 268 females). A cross-sectional survey (31 questions) was distributed online to undergraduates and postgraduates. More than half (58.8%, N = 293) were probiotics users, mainly educated females (Ps <0.05), showing higher gut health awareness and healthier habits. Users (48.1%) reported improved digestion, less bloating, and reduced constipation. Non-users (64.4%) were willing to try probiotics, especially if recommended by a healthcare professional (52.7%). Probiotics consumption linked to better gut flora awareness (OR: 1.71, 95% CI: 1.39-2.08), more physical activity (OR: 1.45, 95% CI: 1.02-2.04), and fruit intake (OR: 1.22, 95% CI: 0.91-1.65). In conclusion, individuals with greater gut health awareness and healthier lifestyle were more likely to consume probiotics. Health experts' probiotics education may boost consumption, particularly for those with specific conditions or less healthy habits.*

Keywords: Awareness, Gut health, Lifestyle, Probiotics, Consumption, Health behavior

1. Introduction

Gut flora's role in human health has garnered significant interest in recent years. A healthy gut is deemed essential for overall well-being, maintaining a balance between commensal and pathogenic bacteria. This equilibrium, often disrupted by an unhealthy lifestyle marked by

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TLC, DLC AND PLATELET COUNT IN YOUNG FEMALE POPULATION OF DEHRADUN REGION

Vineet Vishnoi[1], Upsana Raturi[2], D. K. Awasthi[3] and Gyanendra Awasthi[2]*

[1]Department of Chemistry, DAV (PG) College, Dehradun.
[2]Department of Biochemistry, DIBNS, Dehradun.
[3]Department of Chemistry, JNMPG College, Lucknow.

***Corresponding Author: Gyanendra Awasthi**
Department of Biochemistry, DIBNS, Dehradun.

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ABSTRACT

Background: This study aimed to assess the Total Leukocyte Count (TLC), Differential Leukocyte Count (DLC) and Platelet count in Young Female population of Dehradun region. **Methods:** In this cross-sectional study, blood samples of 30 female volunteers studying in Dolphin Institute, Dehradun were collected from May to August, 2022. Capillary blood samples were drawn and following viz Total Leukocyte Count (TLC), Differential Leukocyte Count (DLC) and Platelet count were measured using Sysmex cell counter. **Results and Conclusion:** All the measured Hematological parameters of young female students were found to be within the reference range of Indian healthy population and none of the parameter was too high or too low. Thus, as per our study the young female students were having normal hematological profile. The main Drawback of the study was that sample size was low and larger sample size is required in order tofind out the reference range in the above region.

KEYWORDS: TLC, DLC and Platelet Count.

INTRODUCTION

The total leukocyte count (TLC) and differential leukocyte count (DLC) are important components of the complete blood count (CBC) and influence many clinical decisions. White cell count varies in physiological conditions and many pathological states seen commonly in clinical practice. Standard normal ranges for these parameters are used in routine practice.[1]

Leukocyte count is also affected by racial and ethnic factors that are not well recognized. The several population has been reported to have lower than normal WBC and neutrophil count. Benign essential neutropenia has been described in the African, African Americans and Afro-Caribbean population[2. 3] and some ethnic groups in the Middle east.[3] These individuals however, have no increase in susceptibility to infection or any other adverse effect due to the leukopenia.[2]

In the present multicultural environment, knowledge of low/high white cells and DLC variatins in persons of Indian descent is important to avoid unnecessary investigations or inappropriate treatment in these otherwise healthy individuals.[4]

Another component of blood is platelets that are responsible for hemostasis. These help in clotting of blood by both intrinsic and extrinsic systems. A study was conducted by Balduini and Noris, 2014, in which association between platelet count and age was found by a larger study that evaluated 12,142 adult inhabitants of the United States and found statistically significant differences between young and old individuals.[05] Evidence have also suggested that gender differences play a role in platelet reactivity and this observation has been confirmed in more recent studies and this observation has been confirmed in more recent studies. Differences in vessel wall biology between men and women, as well as the direct influence of sex hormones (estrogens, progesterone, or androgens) on platelets or their indirect effect on the blood vessel wall, might be underlying conditions from a biological point of view.[6]

The present study was done to evaluate TLC, DLC and Platelet Count in Young Female population of Dehradun region.

PATIENTS AND METHODS

Study population

In this cross-sectional study, blood samples of 30 female volunteers studying in Dolphin Institute, Dehradun were collected from May to August, 2022. This project was approved by the Ethics Committee of Dolphin Institute and signed informed consent was gathered from all patients before study initiation.

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Epidemiological Studies about Vitamin D status in pregnant women

Vineet Vishnoi[1], Rajesh Kumar Jha[2], D.K.Awasthi[3] and Gyanendra Awasthi*[4]

1: Department of Chemistry, DAV (PG) College, Dehradun
2: Department of Pathology, DIBNS, Dehradun
3: Department of Chemistry, JNMPG College, Lucknow
4: Department of Biochemistry, DIBNS, Dehradun

Abstract: *Vitamin D* refers to a group of fat-soluble secosteroids It is essential for maintaining healthy bones and teeth. It also plays many other important roles in the body, including regulating inflammation and immune function. The present paper discuss different studies about Vitamin D status in pregnant women.

In a study High Prevalence of Vitamin D Deficiency in Pregnant Women: A National Cross-Sectional Survey conducted by **Stefanie vandevijvere *et al*; 2012,** during 2010-2011 in Belgium. The women were selected via a multi-stage proportionate-to-size sampling design. Blood samples were collected and a questionnaire was completed face-to-face. 55 obstetric clinics were randomly selected and 1311 pregnant women participated in the study. The median serum 25-hydroxyvitamin D [25-(OH)D] concentration was significantly lower in the first trimester (20.4 ng/ml) than in third trimester (22.7 ng/ml). Of all women, 74.1% (95%CI = 71.8–76.5%) were Vitamin D insufficient (25-(OH)D ,30 ng/ml), 44.6% (95%CI = 41.9–47.3%) were Vitamin D deficient (25-(OH)D,20 ng/ml), while 12.1% (95%CI = 10.3–13.8%) were severely Vitamin D deficient (25-(OH)D ,10 ng/ml). Of all women included, 62.0% reported taking Vitamin D-containing multivitamins, of which only 24.2% started taking those before pregnancy. The risk of Vitamin D deficiency (25-(OH)D< 20 ng/ml) was significantly higher for less educated women and women who reported not going on holidays to sunny climates. The risk of severe Vitamin D deficiency (25-(OH)D < 10 ng/ml) decreased for women who reported alcohol consumption during pregnancy, decreased with more frequent use of sunscreen lotion and increased for smokers and women who reported preference for shadow. In conclusion, Vitamin D deficiency is highly prevalent among pregnant women in Belgium and this raises concerns about the health consequences for the mother and the offspring. A targeted screening strategy to detect and treat women at high risk of severe Vitamin D deficiency is needed in Belgium and in Europe.

In a study by **Alec J Ekeroma *et al;* 2015** in New Zealand Vitamin D deficiency was present in 109/259 (42%) of pregnant women in a south Auckland cohort. Of those enrolled in winter (June-August)/spring (September-November), Vitamin D deficiency was present in 43% of European, 67% of Māori, 80% of Pacific and 59% of women of other ethnic groups. Supplementation for all pregnant women during winter/spring could be an appropriate intervention for prevention of Vitamin D deficiency during pregnancy in New Zealand.

In a study in Switzerland during 2014-2015, Prevalence of Vitamin D Deficiency and Its Associations with Skin Color in Pregnant Women in the first trimester conducted by **Aline Richard *et al;* 2017**. The prevalence of Vitamin D deficiency (<20 ng/mL) in women in early pregnancy in Switzerland and evaluated the association of skin color with Vitamin D deficiency. In a single-center cohort study, the validated Fitzpatrick scale and objective melanin index were used to determine skin color. Of the 204 pregnant women included, 63% were Vitamin D deficient. The mean serum 25-hydroxyvitamin D concentration was 26.1 ng/mL (95% confidence interval (CI) 24.8–27.4) in Vitamin D–sufficient women and 10.5 ng/mL (95% CI 9.7–11.5) in women with deficiency. In the most parsimonious model, women with dark skin color were statistically significantly more often Vitamin D deficient compared to women with light skin color (OR 2.60; 95% CI 1.08–6.22; adjusted for age, season, Vitamin D supplement use, body mass index, smoking, parity). This calls for more intense counseling as one policy option to improve Vitamin D status during pregnancy, i.e., use of Vitamin D supplements during pregnancy, in particular for women with darker skin color.

In a study during 2008-2010 in Oslo, Norway;Vitamin D deficiency and supplementation in pregnancy in a multiethnic population-based cohort by **Ase R. Eggemoen *et al*; 2016**. Data are from the STORK Groruddalen project, which is a population-based, prospective cohort of 823 healthy women from 65 countries attending Child Health Clinics (CHC) for antenatal care in Groruddalen, Oslo, Norway, between May 2008 and March 2010. Severe deficiency (25(OH)D <25 nmol/L) was found at gestational weeks (GW) 15 in 45% of women from South Asia, 40% from the Middle East and 26% from Sub-Saharan Africa, compared to 2.5% in women from East Asia and 1.3% of women from Western Europe. Women from South Asia, the Middle East and Sub-Saharan Africa had mean values that were −28 (95 % CI:-33, −23), −24 (−29, −18) and −20 (−27, −13) nmol/L lower than in Western women, respectively. Ethnicity, education, season and intake of Vitamin D were independently associated with 25(OH)D. At GW 28, the mean 25(OH)D had increased from 23 (SD:7.8) to 47 (27) nmol/L ($p < 0.01$) in women who were recommended Vitamin D supplementation, with small or no change in women with sufficient Vitamin D levels at baseline.
They conclude that Vitamin D deficiency was prevalent among South Asian, Middle Eastern and African women. The serum levels of 25(OH)D increased significantly from GW 15 to 28 in Vitamin D deficient women who received a recommendation for supplementation. This recommendation of Vitamin D supplementation increased Vitamin D levels in deficient women.

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Vitamin D: A Brief Review

Vineet Vishnoi[1], Rajesh Kumar Jha[2] , D.K.Awasthi[3] and Gyanendra Awasthi*[4]

1:Department of Chemistry, DAV (PG) College, Dehradun
2:Department of Pathology, DIBNS, Dehradun
3: Department of Chemistry, JNMPG College, Lucknow
4:Department of Biochemistry, DIBNS, Dehradun

Abstract: *Vitamin D* refers to a group of fat-soluble secosteroids It is essential for maintaining healthy bones and teeth. It also plays many other important roles in the body, including regulating inflammation and immune function. The present review highlights the sources of Vitamin D, vitamin D synthesis, its function, reasons for Vitamin D deficiency and measures to overcome its deficiency and Vitamin D status in pregnant women and Neonates.

Key Words: Secosteroids, inflammation, immune function

Introduction:

Vitamin D refers to a group of fat-soluble secosteroids (is a type of steroid with a "broken" ring) responsible for increasing intestinal absorption of calcium, iron, magnesium, phosphate and zinc. The most important compounds in this group in case of humans are vitamin D_3 (also known as cholecalciferol) and vitamin D_2 (Ergocalciferol) *(Holick MF; 2006). Vitamin D_3 (Cholecalciferol) is produced from the conversion of 7-dehydrocholesterol in skin and vitamin D_2 is produced by some plant life in response to UV radiation, example in mushrooms.*

Vitamin D is an important nutritional factor in the health of the mother and her infant. Vitamin D regulates expression of >1000 genes in humans, and vitamin D receptors are found in several tissues/cells in the human body **(GindeAA *et al;* 2010).**

The classical and non-classical pathways of this hormone affect calcium metabolism, the immune system, cell proliferation and differentiation, infection, and cancer **(Garland CF *et al*; 2006).** Vitamin D deficiency can cause skeletal as well as extra skeletal diseases. Vitamin D is involved in bone formation, resorption, and mineralization and in maintaining neuromuscular function.

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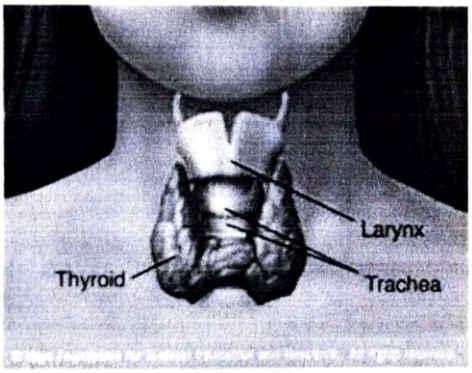
Thyroid Diseases: A Brief Review

Vineet Vishnoi[1], Pankaj Kumar[2], D.K.Awasthi[3], Gyanendra Awasthi[2]
[1]*Department of Chemistry, DAV (PG) College, Dehradun*
[2]*Department of Biochemistry, DIBNS, Dehradun*
[3]*Department of Chemistry, JNMPG College, Lucknow*

Abstract: Thyroid diseases are common worldwide. In India too, there is a significant burden of thyroid diseases. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases. This review focuses on common diseases of thyroid and their epidemiology in India.

Key Words: Thyroid Diseases, India and Epidemiology



Thyroid disease is being increasingly diagnosed with greater awareness and is one of the chronic non-communicable disease affecting women more, though male population is not spared of the ailment. Thyroid is a butterfly-shaped gland in the neck region, just above collarbone. It is one of the endocrine glands, which make hormones. The thyroid hormones, thyroxine(T4) and triiodothyronine (T3) are tyrosine-based hormones produced by the thyroid gland primarily to regulate metabolism

An important component in the synthesis of thyroid hormones is iodine. The major form of thyroid hormone in the blood is thyroxin (T4). The thyroid also produces the hormone calcitonin, which plays a role in calcium homeostasis. Thyroxine increases cardiac output, heart rate,basal metabolic rate, ventilation rate, potentiates brain development, and potentiates the effects of catecholamines (i.e. increases sympathetic activity),and thickens the endometrium in females. These hormones also regulate protein, fat, and carbohydrate metabolism, to see human cells using their energetic compounds. They also stimulate vitamin metabolism. Numerous physiological and pathological stimuli influence thyroid hormone synthesis. Both excess (hyperthyroidism) and deficiency (hypothyroidism) of thyroxine can cause disorders. Hyperthyroidism is the clinical syndrome caused by an excess of circulating free thyroxin, free triiodothyronine, or both.

The symptoms of hyperthyroidism are fast heart rate, nervousness, increased perspiration, muscle weakness, trembling hands, weight loss, hair loss, skin changes, increased frequency of bowel movements, decreased menstrual flow and less frequent menstrual flow, goiter and exopthalmus. [N. Kochupillai;2000, Hueston WJ; 2001]

Hypothyroidism is the case where there is a deficiency of thyroxin, triiodiothyronine, or both. The symptoms of hypothyroidism are feeling slow or tired, cold, drowsy, slow heart rate,poor memory, difficulty in concentrating ,muscle cramps, weight gain, husky voice, thinning hair, dry and coarse skin, feeling depressed, heavy menstrual flow, milky discharge from the breasts and infertility[N. Kochupillai;2000]

Thyroid diseases are, arguably, among the commonest endocrine disorders worldwide. India too, is no exception. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases. (Ambika Gopalakrishnan Unnikrishnan and Usha V Menon; 2011). Thyroid diseases are different from other diseases in terms of their ease of diagnosis, accessibility of medical treatment, and the relative visibility that even a small swelling of the thyroid offers to the treating physician. Early diagnosis and treatment remains the cornerstone of management.

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Thyroid Profiling of Population in Dehradun Region

Vineet Vishnoi[1], Pankaj Kumar[2] , D.K.Awasthi[3] and Gyanendra Awasthi*[2]

1:Department of Chemistry, DAV (PG) College, Dehradun
2:Department of Biochemistry, DIBNS, Dehradun
3: Department of Chemistry, JNMPG College, Lucknow

Abstract: Disorders of thyroid hormones are one of the most common endocrine diseases in India. Various studies projected that approximately 42 million populations are affected by thyroid disorders in India. The prevalence and type of thyroid disorders depend on various factors like age, sex, ethnicity, geographical area, nutritional status, national policies, healthcare delivery system, and drug intake. The present study was taken to find prevalence of thyroid disorders in Dehradun population. Total 119 subjects were taken for study 27 males and 33 females were of less than forty years of age and 29 males and 30 females were of more than 40 years of age All the subjects were normal with respect to anthropometric profile

As per TSH values out of 29 male patients above 40 years of age 20% were suffering from mild hypothyroidism. 11% patients were suffering from hyperthyroidism. Out of total thirty three female patients above 40 years of age 21% were suffering from mild hypothyroidism. 12.1% were suffering from mild hyperthyroidism. Out of total thirty male patients below 40 years of age 16% were suffering from mild hypothyroidism. out of total thirty male patients below 40 years of age, thus as per TSH values 13% were suffering from mild hypothyroidism out of total twenty six female patients below 40 years of age 27% were suffering from mild hypothyroidism. Out of total twenty six female patients below 40 years of age 3.8% were suffering from mild hyperthyroidism

As per T4 values Out of 29 male patients above 40 years of age, 20% were suffering from mild hypothyroidism. Out of total twenty nine male patients above 40 years of age T4 value 11% patients were suffering from hyperthyroidism.

Out of total thirty three female patients above 40 years of age 15% were suffering from mild hypothyroidism. Out of total thirty three female patients above 40 years of age 18.1% were suffering from mild hyperthyroidism. 20% were suffering from mild hypothyroidism. Out of total thirty male patients below 40 years of age 17% were suffering from mild hypothyroidism. .out of total thirty male patients below 40 years of age 13% were suffering from mild hyperthyroidism out of total twenty six female patients below 40 years of age 15% were suffering

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Vitamin D and Micronutrients (Zinc and Magnesium) status in Young Females

Vineet Vishnoi[1], Aman Tadiyal[2], D.K. Awasthi[3], Gyanendra Awasthi*[2]
[1]*Department of Chemistry, DAV (PG) College, Dehradun*
[2]*Department of Biochemistry, DIBNS, Dehradun*
[3]*Department of Chemistry, JNMPG College, Lucknow*

Abstract: Vitamin D is a micronutrient that is needed for optimal health throughout the whole life. VitaminD3 can be either synthesized in the human skin upon exposure to the UV light of the sun, or it is obtained from the diet and Micronutrients (Zinc, Magnesium) essential for metabolism that catalyzes large number of reactions, facilitates protein folding, helps in manage chronic disease, keep bones strong.

Vitamin D was estimated by ELISA and Znic and Magnesium by colorimetric methods.

It was observed that the status of Vitamin D in all thirty young females were very low, The Zinc values of four subjects were above normal range and Zinc values of twenty-six subjects were in normal the range. None of the subjects demonstrated the zinc values below normal the range.

The Magnesium values of seven subjectswere below the normal range (1.7 mg/dl) and twenty-three subjects were in the normal range (1.7-2.2 mg/dl). None of the subjects demonstrated the zinc values above the normal range. The most probable reason was inadequate exposure to sunlight and consumption of junk food.

INTRODUCTION

Vitamin D is a fat insoluble vitamin, known for its antirachitic activity.[Sharman *et al.*,1975] Calciferols are a group of lipid insoluble compounds with a 4 ringed cholesterol backbone and referto both, Vitamin D3, i.e., cholecalciferol and Vitamin D2, i.e., ergocalciferol.[Houghton and Vieth .,2006] Vitamin D, in general, refers to Vitamin D3. Vitamin D can be synthesized endogenously. About 90% of the required Vitamin D is synthesized in the skin under sun exposure.[Holick *et al.*, 2003] It is needed for the maintenance of normal blood levels of calcium and phosphate that are required for normal mineralization of bone, muscle contraction, nerve conduction, and general cellular function in all cells of the body. It is also found to be important for immune function, for inflammation, cell proliferation, and differentiation. [Holick *et al.*, 2003Kumar, *et al.*, 2013] The active form of Vitamin D stimulates the absorption of calcium in the duodenum and increases calcium influx in distal tubules of kidney through nuclearVitamin D receptor (VDR); latter is specifically regulated by parathormone level.[Holick *et al.*;2005]

Zinc, an essential mineral, is naturally present in some foods, added to others, and available as a dietary supplement. Zinc is also found in some cold lozenges, over-the-counter drugs sold as cold remedies, and some denture adhesive creams. Zinc is involved in many aspects of cellular metabolism. It is required for the catalytic activity of hundreds of enzymes, and it plays a role in enhancing immune function, protein and DNA synthesis, wound healing, and cell signaling and division [Institute of Medicine report, 2001, Ryu *et al.*, 2020, King *et al.*, 2014, MacDonald *e*, 2000]. Zinc also supports healthy growth and development during pregnancy, infancy, childhood,and adolescence and is involved in the sense of taste [Ryu *et al.*, 2020, King *et al.*, 2014,]. The total amount of zinc in the body is approximately 1.5 g in women and 2.5 g in men[Ryu *et al.*, 2020]. Most of this zinc is stored in skeletal muscle and bone [Institute of Medicine report,2001, Ryu *et al.*, 2020, King *et al.*, 2014].

The processes that maintain zinc homeostasis are absorption of zinc from the diet, excretion into the gastrointestinal tract, and reabsorption in the gastrointestinal lumen [Ryu *et al.*, 2020, King *etal.*, 2014]. In general, as zinc intakes rise, the amount of zinc absorbed also increases, but its fractional absorption drops [Ryu *et al.*, 2020, King *et al.*, 2014]. Serum or plasma zinc levels are typically used in clinical practice to assess zinc status. In healthypeople, the amount of zinc in serum or plasma is 80 to 120 mcg/dL (12 to 18 mcmol/L) [Ryu *et al.*, 2020]. Serum zinc levels below 70 mcg/dL in women and 74 mcg/dL in men indicate inadequate zinc status. However, both

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IMPACT OF PETROLEUM PRODUCTS ON LIVER PROFILE OF PETROL PUMP WORKERS

Gyanendra Awasthi[1]*, Deepali Joshi[2] ,Vineet Vishnoi[3], D.K.Awasthi[4]

1:Department of Biochemistry, DIBNS, Dehradun
2:Department of Agriculture, HIT,Dehradun
3::Department of Chemistry, DAV (PG) College, Dehradun
4: Department of Chemistry, JNMPG College, Lucknow

ABSTRACT: The daily use of petroleum products both in and outside petroleum industries may have effects on users. The workers involved in the job of filling the petrol or diesel in the vehicles are the one maximally exposed to the petroleum fumes. Sources of petroleum vapour at the petrol pumps include losses from underground tanks, displacement vapour losses from filler pipes during refueling, fuel spillage and evaporative and tailpipe emissions from motor vehicles. The liver major detoxifying organ is affected most by chronic exposure to Gasoline fumes.

The present study was done with objective to access impact of petroleum vapors on the liver of petroleum pump workers in Dehradun region. The blood sample of total 150 petroleum attendant were taken 50 petroleum attendant were having work experience between 1-5 years, 50 attendants were having work experience between 6-10 years and 50 petroleum attendants were having work experience of more than 10 years. None of the workers were overweight and obese. All were non diabetic and there TSH level were normal and none of them is hypertensive. None of them were smokers or tobacco chewers. Data pertaining to different parameters of liver were recorded from 50 subjects each from three groups based on years of working experience in petrol pumps with 1 – 5 yrs, 6 – 10 yrs and >10yrs. The data was analyzed applying one way ANOVA Technique.

Insignificant increase in *SGOT, SGPT* and significant increase in *Alkaline Phosphatase* and total bilirubin concentration with the increase in years of exposure to gasoline fumes and significant decrease in albumin, total protein and A/G ratio with increase in years of exposure indicate degenerative changes in liver on chronic exposure to petroleum products.

Keywords: Gasoline, Liver function tests, Petrol pump workers

RESEARCH ARTICLE

Antioxidant Defence Response and Micronutrient Content Availability in *Cyamopsis* Varieties in eCO_2 Concentration

Sonali Mehrotra[1], Karunaker P. Tripathi[2]

DOI: 10.18811/ijpen.v8i03.07

Abstract

There is need for research that explores the impact of elevated carbon dioxide on the antioxidant defense system, crop nutrition and soil micro-nutrients availability which was not investigated much in past studies.

A pot experiment was performed to analyse antioxidant defence response including Superoxide dismutase (SOD) enzyme assay, total Ascorbate, Ascorbate peroxidase (APX) leaf data assay, Flavanoid and Total Phenolic content (TPC) in leaves samples. Micronutrients analysis and nutritional quality were estimated including Cr, Mn, Fe, Co, Cu, Zn, As, Se, Mo and Pb elements. Micronutrients analysis were determined in soil, leaves, pods and seeds of RGC 1002 and RGC 1066 *Cyamopsis* varieties fumigated under e[CO_2]=550±20ppm and a[CO_2]=420±20ppm maintained at FACE setup at CSIR- NBRI, Lucknow.

Superoxide dismutase activity was found to decline in RGC 1002 [-16.63%] and RGC 1066 [-17.90%] while total ascorbate, ascorbate peroxidise activity, total phenol and flavonoid content increased in RGC 1002 [+9.37%, +6.30%, +11.53%, +10.46%] and RGC 1066 [+66.32%, +12.17%, +76.50%, +19.82%] under elevated carbon dioxide e[CO_2] concentration in both the cultivars. Micronutrient content declined in leaves but it was enhanced in pods and seeds of both the cultivars under e[CO_2] concentration. In leaves, pods and seeds of RGC 1002 micro-nutrient contents were Fe [-56.00%, +6.00%, +9.75%], Cu[-23.16%, +7.45%, +10.46%], Zn[-30.61%,+28.30%,+7.41], Mn[-32.29%, +23.05., +7.52] content. However in RGC 1066, there was a differential response regarding some of the metals Cu[-52.81%,+5.58%, +6.42%], Zn[-20.29%.+9.50%.+6.50%], Mn[+31.54%, +11.18%, +9.96%], Fe[+32.99%, +4.00%, +8.71%] content was found to increased under e[CO_2] concentration.

Antioxidant response in both the cultivars was enhanced under e[CO_2] concentration that leads to the scavenging of ROS particles thus leading to declining of ROS and mitigating the plant against abiotic stress condition. This conditions leads to altogether improvement in plant antioxidant defences system. It was observed that the interaction between e[CO_2] and both plant varieties increased uptake of micro-nutrients in pods and seeds in both the cultivars. Apart from these RGC 1066 varieties showed better uptake and translocation of micro-nutrient content (Fe, Cu, Zn) than RGC 1002 plant variety under e[CO_2] concentration. Thus, it can be concluded that RGC 1066 is better than RGC 1002 plant variety which is adapting and performing in better way under e[CO_2] concentration.

Keywords: e[CO_2], a[CO_2], FACE, ROS, SOD, APX

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Introduction

Globally atmospheric carbon dioxide (CO_2) concentration dramatically increased up to 550 ppm due to ongoing anthropogenic activities involving greenhouse gas emissions and fossil fuel combustion leading to global surface temperature rising by 2°C at the end of this century (IPCC 2018). While elevated CO_2 positively effect the crop yield (Lam *et al.*, 2012), and biomass but negative (Hogy *et al.*, 2013, Myers *et al.*, 2014), positive (Carvalho *et al.*, 2020) or neutral effects on nutrients dynamics. Much research had been conducted on plant translocation and accessibility of macronutrients specially nitrogen, phosphorus and potassium but limited papers deals with both macro and micronutrient studies. However it remains still unclear how the changes in plant growth under CO_2 enrichment affect the availability of soil micronutrients and their accessibility to plant uptake. Not only the CO_2 enrichment concentration affects the uptake of micronutrients to plants but their mobility in soil is mediated by plant mediated soil processes.

Micronutrients also known as "magic wands" plays an important role in plant development, enzyme production and reproduction. The deficiency of micronutrients often results in specific diseases that negatively affect plant growth, as they are involved in a series of enzyme formations and metabolic processes (Khoshgoftarmanesh *et al.*, 2010). The availability of these micronutrients is not only regulated by their total amount in soil but also controlled by the climatic conditions, especially under the current enrichment of atmospheric CO_2 (Jhonson, 2013). Loladze (2002) suggested that terrestrial plants were experiencing a global imbalance of essential elements with carbon assimilation under CO_2 enrichment.

Recent studies provides convincing evidences that staple cereals like wheat, rice as well as legumes have lower

[1]Department of Life Sciences, Suddhowala, Uttarakhand Technical University, Dehradun.

[2]Botany Department, Dolphin (PG) Institute of Biomedical and Natural Sciences, Manduwala, Chakrata Road, Dehradun, Uttarakhand India

***Corresponding author:** Sonali Mehrotra, Department of Life Sciences, Suddhowala, Uttarakhand Technical University, Dehradun, Email: sonali.mehrotra412@gmail.com.

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Chir pine and banj oak responses to pre-monsoon drought across slope aspects and positions in Central Himalaya

Vidit Tyagi · Surendra P. Singh · Ripu Daman Singh · Surabhi Gumber

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Abstract The difference in maintaining a safety margin with regard to hydraulic conductance between pine and oak species influences their distribution in a region. Chir pine (*Pinus roxburghii*) and banj oak (*Quercus leucotrichophora*) are the principal species of Central Himalayan forests between 1000 and 2000 m elevations. Nearly 80% of annual precipitation of ~ 1400 mm in the region occurs during monsoon, from mid-June to September, whereafter droughts of varying length and intensity are common. The main objective of the study is to find out the responses of these two evergreen tree species to pre-monsoon (March to mid-June) water stress and topographical heterogeneity that occur in Central Himalaya. We measured soil and tree water potential and osmotic adjustment across five seasons on three slope positions, namely, hill base, mid-slope, and hill top, on north and south slope aspects. Chir pine showed an early response to pre-monsoon drought by restraining daily change in Ψ to 0.89 MPa, while predawn Ψ (Ψ_{PD}) was still moderate (isohydric tendency). In contrast, the daily reduction in Ψ of banj oak kept on increasing up to 1.49 MPa, despite severely low Ψ_{PD} (anisohydric tendency). In both tree species, Ψ was invariably lower on south aspect than north aspect and declined from hill base to hill top. Such responses to slope aspect and position, however, were relatively less apparent in chir pine, which tended to maintain a wide safety margin when under stress. As for soil Ψ, banj oak site retained monsoon rainwater more effectively than chir pine.

Keywords Hill base · Hydraulic safety · Osmotic adjustment · Soil water potential · Water potential

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V. Tyagi
Department of Botany, Dolphin (PG) Institute of Bio-Medical and Natural Sciences, Dehradun, Uttarakhand 248007, India
e-mail: drtyagi2007@gmail.com

S. P. Singh (✉)
Central Himalayan Environment Association (CHEA), Dehradun, Uttarakhand 248007, India
e-mail: surps@yahoo.com; spsecology@gmail.com

R. D. Singh · S..Gumber
Department of Forestry and Environmental Science, DSB Campus, Kumaun University, Nainital, Uttarakhand 263001, India
e-mail: ripuds4777@gmail.com

S. Gumber
e-mail: surabhigumber19@gmail.com

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Introduction

Oak (*Quercus*) and pine (*Pinus*), with > 400 and ~ 120 species, respectively, are the principal forest-forming genera of the mid-latitudinal belt of the Northern Hemisphere. Their geographical ranges broadly overlap and include all three continents of the Northern Hemisphere, with major centers in Mexico, the USA, Europe, and

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Original Article

Influence of slope position and aspect on the vegetation attributes and tree-water relations in forests of the central Himalayas

Vidit TYAGI[1] https://orcid.org/0009-0003-2532-9523; e-mail: drtyagi2007@gmail.com

Surendra P. SINGH[2*] https://orcid.org/0000-0003-3139-9301; e-mail: surps@yahoo.com, spsecology@gmail.com

Ripu Daman SINGH[3] https://orcid.org/0000-0002-2875-2664; e-mail: ripuds4777@gmail.com

Surabhi GUMBER[3] https://orcid.org/0000-0003-2438-9041; e-mail: surabhigumber19@gmail.com

Rajesh THADANI[4] https://orcid.org/0000-0001-5713-8367; e-mail: thadani_rajesh@hotmail.com

Rajiv PANDEY[5] https://orcid.org/0000-0003-4849-775X; e-mail: rajivfri@yahoo.com

* *Corresponding author*

1 Dolphin (PG) Institute of Bio-medical and Natural Sciences, Dehra Dun 248007, India

2 Central Himalayan Environment Association (CHEA), Dehradun 248007, India

3 Department of Forestry and Environmental Science, DSB Campus, Kumaun University, Nainital 263001, India

4 Centre for Ecology Development and Research (CEDAR), A-17 Mayfair Gardens, New Delhi 110016, India

5 Indian Council of Forestry Research and Education (ICFRE), Dehra Dun 248007, India

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Abstract: While the need for understanding the effects of topographical factors on forest structure and function is well recognized, comprehensive studies are scarce. This study evaluates the effect of slope aspect and slope position on water relations and forest attributes across six forest types occurring between 400 m and 2600 m altitude in the Central Himalaya (27°-38°N). We found that predawn tree water potential and soil water potential were generally higher on moist north slope aspect (-0.78±0.05 MPa and -3.34±0.18 MPa, respectively) than dry south slope aspect (-0.82±0.18 MPa and -3.77±0.18 MPa, respectively). Across six different forests, these values were higher at hill base (-0.71±0.06 MPa and -2.77±0.19 MPa, tree predawn water potential and soil water potential, respectively) than other topographical positions. The favorable effect of north aspect and hill base was also observed in maintaining soil water and tree water potential during the dry season. Vegetation attributes, such as species richness, unique species and plant density were also generally higher on north slope and hill base than southern aspect and lowest at hill top. Across forest types, the hill base provided shelter to 46 unique species, compared to 16-18 at the other positions, thus emphasizing its importance as refugia for species to survive climate change induced perturbations. The favorable conditions of hill base position not only contribute to increase in alpha diversity, but also to extended species distributional range.

Keywords: Hill base; Himalaya; Refugia; Unique species; Water relation

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Consistent response to topographical variation in net assimilation rate across the central Himalayan broadleaved forests

Vidit Tyagi [a], Surendra P. Singh [b,*], Surabhi Gumber [c], Ripu Daman Singh [c]

[a] Department of Botany, Dolphin (PG) Institute of Bio-Medical and Natural Sciences, Dehradun 248007, India
[b] INSA, Hony. Scientist, Central Himalayan Environment Association (CHEA), Dehradun 248006, India
[c] Research Scholar, Department of Forestry and Environmental Science, DSB Campus, Kumaun University, Nainital 263001, India

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Water potential

ABSTRACT

In a mountainous landscape, vegetation patterns are influenced by the interaction of slope aspect and topographical positions. Here, we have examined the effect of two contrasting aspects (North and South) and three slope positions (Hill Base, Mid Slope and Hill Top) on net assimilation rate (NAR) of trees across four forest sites of the monsoonal Central Himalaya between 400 and 2300 m elevations. The study species, namely *Shorea robusta, Quercus leucotrichophora*, and *Q. floribunda* were broadleaved evergreen with concentrated summer leaf drop and simultaneous leafing. The NAR of these broadleaved species was measured in five seasons (pre-monsoon, monsoon, autumn, winter and spring) diurnally at their respective forest sites. In each of the forest site the dominant species was the same, on both aspects and the three slope positions. We also analyzed topographical associated effect of tree water relations on NAR, using the data of an earlier study on these species. The average NAR (μ mol m^{-2} s^{-1}) across the four forest sites and five seasons, (measured diurnally) was higher on the north (5.08 ± 0.23) slope aspect than south aspect (4.61 ± 0.22; average of 120 NAR values for each aspect), and among the three slope positions, it was higher on hill base (5.13 ± 0.29), than on mid-slope (4.80 ± 0.27) and hill top (4.61 ± 0.26; average of 80 NAR values for each position). These patterns in NAR values in relation to slope aspects and slope positions were also found separately for each of the species, and each of the seasons. The NAR varied across the sites, seasons and day time from 2.84 to 11.99 μ mol m^{-2} s^{-1}, largely because of the variation in tree water potential and leaf phenological changes. To conclude, the NAR shows a consistency in responses to differences in slope aspects and slope positions across the forests ranging from tropical to warm temperate type. The study would help generalizing topographical effects on tree growth.

1. Introduction

Forest growth and productivity are generally investigated using remote sensing and modeling methods [2]. However, forests vary spatially in species composition, particularly in topographically complex mountainous landscapes, which are difficult to capture at coarse scales [19]. In view of these, fine scale measurements are necessary to understand forest dynamics in mountains [4]. Net Assimilation Rate (NAR) is considered a major growth component, along with specific leaf area and leaf mass ratio. Based on data compiled from 1240 observations, consisting of 614 species from 83 experiments, Shipley [26] found that NAR was the best predictor of variation in RGR. Photosynthesis and stomatal conductance are involved to varying extents in determining how tree species respond to change in soil moisture [23]. A decrease in stomatal conductance results in a reduced net assimilation, but it also shields a species from severe water stress, and the damage to photosynthetic mechanism [23].

Topographical factors in mountains play a key role in determining primary productivity [15] because they affect light availability, soil moisture and temperature. For example, in the Northern Hemisphere, soil moisture in North-facing aspect (hereafter referred to as N aspect) remains higher during the spring and summer, compared with South-facing aspect (hereafter referred to as S aspect). Solar radiation hits more directly on S aspect than N aspect (in the northern Hemisphere) resulting in a higher evaporation and earlier dry down of soils on south aspect [10].

The degree to which NAR, stomatal conductance and related ecophysiological processes are modified by topographical factors

* Corresponding author.
E-mail addresses: surps@yahoo.com, spsecology@gmail.com (S.P. Singh).

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Breif Report

Study of Forest Fire Incidences and Management in Mussoorie Forest Range, Dehradun, Uttarakhand, India

Androse Chiri, Manish Kumar, Vikaspal Singh*, Sandhya Goswami, A K Uniyal, Rashmi T Chamoli

Department of Forestry, Dolphin PG Institute of Biomedical and Natural Sciences, Dehradun, India

ABSTRACT

The greater fire incidences were reported in the month of March to May of fire season in the studied forest ranges. Forest fire not only influences the vegetation but also damage the natural habitats of different associated faunal species. More fire incidences were recorded in the year of 2021, 2019 and 2018 while the years of 2020 and 2017 with less fire incidences. Forest ranges of Raipur and Mussoorie has encountered more fire incidences during year 2017 to 2021 as compare to rest of forest ranges in the study area. The majority of lower altitude forest areas of these ranges are composed of Sal (*Shorea robusta*) and Chir pine (*Pinus roxburghii*) mixed forest. The water bodies and upper layers of the soil in these forest areas gets dried up during the summer season due to heat, which making it highly prone to fire.

Keywords: Forest fire; Forest ranges; Garhwal himalayan; Mussoorie

INTRODUCTION

Forest fires are used as tool in different ecosystems according to management and regeneration requirements. The species mix, habitat structure and biodiversity may influence by controlled and uncontrolled fire in an ecosystem (Global Wildfire Information System-2019) [1]. Severe impacts can be seen by forest fires such as loss of human life, biodiversity, habitat, production and productivity; degradation of landscapes and disruption of livelihoods (ISFR-2021). Forest fire prone classes in Uttarakhand state are as extremely fire prone (0.20%), very highly fire prone (3.12%), highly fire prone (16.75%), moderately fire prone (24.22%) and less fire prone (55.71%) as per classified by ISFR-2021.

Various studies in relation to forest fire have been investigated in different parts of India. Fule recently accessed a study on frequent burning in chir pine forest of Uttarakhand and concluded that ongoing frequent surface fire regimes linked to human land use as prominent disturbance factors in chir pine forests [2]. Singh in Chamoli and Bageshwar Forest division of Uttarakhand observed that fire frequency largely determined by moisture conditions and the traditional practices of biomass collected by local people [3]. Forest fire activity changes in central Indian part have been investigated by Jain, by using satellite observation during 2001 to 2020 and from 2001 to 2020, 70% of yearly forest fires over the region occurred during March (1,857.5 counts/month) and April (922.8 counts/month) [4].

In the central Himalaya, particularly Uttarakhand, frequent man-made fires are associated with the chir-pine (*Pinus roxburghii*), banj oak (*Quercus leucotrichophora*) forest zone (generally between 800 to 2000 m altitude) and promote the regional dominance of chir-pine at the expense of broadleaf oak forests [5]. In context of sub-montane and montane zone of Garhwal Himalaya, Tiwari reported the most of forest fires were manmade or intentional fire. Kumari carried out a comparative study in two different; burned and unburned forest communities, revealed that burnet forests were more dense and rich than unburned forests [6,7]. In the Eastern-Himalayan part of India, Sharma observed forest fire as a potential environmental threat in recent years in Sikkim. Present study is an attempt to compare fire incidences and management practices in Mussorrie forest range of Dehradun district during the year 2017 to 2021 [8].

Study area

The study area was Mussoorie forest range of district Dehradun in Uttarakhand. The area comprised of temperate Oak and coniferous forest as per Chmapion & Seth classification [9]. *Quercus leucotrichophora* is most abundant Oak species and under conifer forest, species of *Cedrus deodara* and *Pinus roxburghii* occurred in the study area. The geographic locations of studied forest ranges are represented in Table 1.

Correspondence to: Vikaspal Singh, Department of Forestry, Dolphin PG Institute of Biomedical & Natural Sciences, Dehradun, India, E-mail vikaspals@gmail.com

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Potential of non-timber forest products in the household income of Tengnoupal district, Manipur, India

A.K. Uniyal*, Khaling Silvia, Vikaspal Singh and Rashmi T. Chamoli
Department of Forestry, Dolphin (PG) Institute of Biomedical & Natural Sciences, Manduwala, Dehradun, Uttrakhand, India
aku2236@gmail.com

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Abstract

This investigation was carried out to explore the role of non-timber-forest-produce to household livelihood of income of the tribal people in Tengnoupal District, Manipur, India to ensure their food security and local employment. A randomized questionnaire based sampling was done among different tribal communities from different villages. Cost, income and returns were estimated of NTFPs collection. This study reveals that 50% employment was generated from NTFPs collection wages. The highest average income per household is Rs.75000. The higher income is generated from the bamboo among all the NTFPs in study area (Tengnoupal district). Thus, income generated from the NTFPs in sustainable manner for food and livelihood security. The main problems facing by the tribal is inappropriate benefits, lack of processing activity in the area, low cost of products once it is sold in bulk. The processing activities must be improved through regular training and skill development to ensure continuous livelihood income and employment.

Keywords: NTFP, sustainable income, Tengnoupal District, livelihoods, social and cultural values.

Introduction

Non- Timber Forest Products plays a vital role in livelihood of people in and around the forest[1]. NTFPs includes medicinal plants, dyes, mushrooms, fruits, resins, bark, roots and tubers, leaves, flowers, seeds, honey, etc. NTFPs are sources of food and livelihood security for communities living in and around the forests[2]. As per the FAO[3], NTFPs defined as *"all goods for commercial, industrial and subsistence use derived from forest and their biomass"*. Initially NTFPs collection by local populace was done for fulfillment of their daily needs, later these activities acquired commercial arena which leads to larger trade and income levels due to increasing market demand. Revenue from NTFPs trade could be used for forest conservation activities[4].

There are huge number of forests produces used by local people and industries[5]. These forest produce are known by (1) timber and (2) non- timber produces (NTFPs). Among these, timber products are considered highly valuable in the world, on the other hand, NTFPs also play great role in subsistence livelihoods of communities living around forest areas, hence underrated till date. Besides this, they contribute considerably to household income, local food and healthcare as well as, providing many more socio-cultural values[6,7]. Even after their importance, local NTFPs are not accurately evaluated as a revenue component for the livelihoods of indigenous people[8]. Furthermore, systematic data for income generation from NTFPs is not well available at national level in many developing countries[9].

NTFPs plays varied role from place to place on the basis of economic and cultural features at local level. As in developed countries, NTFPs get importance for their cultural and recreational activities, biodiversity conservation, and rural economic development. In some developing countries, including Africa and Asia, NTFPs are mainly used for subsistence and income generation[7,10], where non timber forest produces are considered as suitable alternative to cope with the gaps due to less beneficial agricultural production or other emergencies[11,12]. Therefore, needful prioritization of NTFPs-based activities by the government and other stakeholders can be used to enhance the economic and social wellbeing of people living around forest areas[13].

India has been described as a "melting pot" of races and tribes. India has one of the largest and diverse tribal populations of about 645 distinct tribesin the country. The tribal population in India according to the 2011 census is 104 million or 8.6% of the total population. In India over 50 million people are dependent on non timber forest produces for their subsistence and cash income, which contribute approximately 50% of the income for 30-40% of the tribal people. Further, non timber forest produces incurred around 50 to 70% of forest-related income for country, which revealed that non timber forest produces are among the chief source of income for large populace around forest areas[12, 14,15]. Forest is associated with socio-economic and cultural life of tribal in India. These tribal groups inhabit wide ecological and geo-climatic conditions in different concentration throughout the country. The collection of non timber forest produces by the tribal is mainly for their daily needs. The high rate of extraction from forests is oneof the reasons for the rapid

Optimization of Siderophore Production by *Bacillus subtilis* DR2 and Its Effect on Growth Promotion of *Coriandrum sativum*

Russian Agricultural Sciences

Aims and scope

S. Kumari, P. Kumar, S. Kiran, S. Kumari & A. Singh

Abstract

Under scarce iron conditions, several bacteria, fungi and plants secrete ferric iron-specific ligands, generically termed as siderophores that are able to bind with insoluble ferric ion thereby making them available to the host organisms. Siderophore producing bacteria were isolated from the rhizospheric soil of *Eragrostis cynosuroides* by CAS agar screening and CAS shuttle assay method. Among five positive isolates, DR2 produced a relatively high level of siderophore (69.81 SU%) and was identified as catecholate type. Further, it was identified as *Bacillus subtilis* DR2 (KP455653) based on 16S rRNA gene sequencing and phylogenetic analysis. Media optimization revealed that the strain *B. subtilis* DR2 showed maximum siderophore yield (80.60 SU%) under optimized condition of 72 h incubation at 35°C in succinate media at pH 8, supplemented with sucrose as carbon and $NaNO_3$ as nitrogen sources. It was further tested as seed inoculants under pot culture conditions and was found to be very efficient in seed germination and growth promotion of *Coriandrum sativum*. Thus, the present study signifies that *B. subtilis* DR2 may be a promising candidate with potential of plant growth promotion to be used as biofertilizer for various crops.

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[1-8]

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Comparison of Antioxidant Properties and Flavonoid of Natural and *in vitro* Cultivated *Nardostachys jatamansi*

Hem Chandra Pant[1], Indra Rautela[2], Harsh Vardhan Pant[3], Arun Kumar[1], Pankaj Kumar[4], Kaneez Fatima[5], Naveen Gaurav[1]

10.18805/ag.D-5654

ABSTRACT

Background: India has very rich diversity of medicinal plants. Medicinal plants are thought to be a rich source of ingredients that can be used in the development of pharmaceutical or synthetic drugs. Aside from that, these plants play an important role in the development of human drug all over the world. Whether in modern or traditional medicine, medicinal plants are used to maintain health, to treat a specific condition, or both. Nardostachys is one of the most important medicinal plant having several therapeutic properties. It is threatened in its natural habitat due to over exploitation for therapeutic purposes and high demand in the traditional medicine system. Keeping these points in mind, we attempted to investigate alternative uses of *in vitro* grown plants in place of wild plants without disrupting plant-based therapeutics and market demand. And then compare the root extract of the *Nardostachys jatamansi* plant's antioxidant and flavonoid levels under *in vitro* and natural growth conditions.

Methods: *Nardostachys jatamansi* is a plant that is widely used in traditional medicine systems. Because of its wide spread use in traditional medicine, this plant is considered endemic. In our study, we compare of antioxidant quality and Flavonoid amount of Natural and *in vitro* propagated *Nardostachys jatamansi*. Firstly we cultivated *in vitro* plants from *Nardostachys jatamansi* nodal explants for comparative analysis. The methanol extract of *in vitro* grown and wild-type plant root extract was then prepared using the maceration method. The extract was subjected to a comparative DPPH method to determine the presence of antioxidant potential in natural and *in vitro* grown plants. Furthermore, the HPLC analysis was used to detect and quantify the amount of Quercetin in both natural and *in vitro* propagated plants.

Result: When grown *in vitro* at a higher concentration, the roots of *Nardostachys jatamansi* have greater antioxidant potential than when they are grown naturally. They demonstrated antioxidant DPPH radical scavenging activity, with an IC50 value of 29.55 µg/ml for *in vitro* generated plants and 24.18 µg/ml for naturally grown plants. The concentration of Quercetin (mg/ml) for natural plant species is 1.95 and for *in vitro* propagate plant is 1.83. The HPLC analysis presents distinct peaks, with the main peaks having retention time for standard Quercetin (10.38) in the natural plant (10.34) and *in vitro* grown plants (10.32). In the end, natural-type species that had been produced *in vitro* were used to obtain the potential of micro propagated plants. The DPPH test and flavonoid were tested on the root extract of natural and *in vitro* plants. Both plants displayed promising antioxidant activity and an HPLC study identified the Quercetin component.

Key words: Antioxidants, Ascorbic acid, DPPH, HPLC, *Nardostachys jatamansi*, Quercetin.

INTRODUCTION

In the region of 3000 to 5000 m high altitude plant is found, *Nardostachys jatamansi* is a fragmented, perennial, flower-patterned plant with a height of 10 to 60 cm. The plant's short, dark grey, woody and thickened rhizome is a modified stem. The herb has rosette-shaped, whole, lanceolate leaves. According to Kumar *et al.*, (2011) the plant's flowers have a pale purple color. From the plant's rhizome, essential oil was extracted using the hydro-distillation method. According to Pradhan and Paudel 2014 the oil has a smell that is comparable to musk pod and is greenish in hue. In addition to alpine meadows, juniper scrub, dwarf rhododendron forests and open pine forests, rocky outcrops are the usual habitat type, according to (Ghimire *et al.*, 2005). In the Kumaon, Garhwal and Nepal Himalayan regions, the *Nardostachys jatamansi* plant is quite plentiful, but because local herb collectors and traders have taken advantage of it, it is now scarce. When *Nardostachys jatamansi* was first mentioned as being heavily exploited in the Indian

[1]Department of Biotechnology, Shri Guru Ram Rai University, Dehradun, Dehradun-248 001, Uttarakhand, India.
[2]Department of Biotechnology, Uttaranchal University, Dehradun-248 001, Uttarakhand, India.
[3]Shri Guru Ram Rai P.G. College, Dehradun-248 001, Uttarakhand, India.
[4]Department of Microbiology, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun- 248 007, Uttarakhand, India.
[5]Department of Microbiology, Galgotias University, Greater Noida-201 310, Uttar Pradesh, India.

Corresponding Author: Naveen Gaurav, Department of Biotechnology, Shri Guru Ram Rai University, Dehradun, Patel Nagar, Dehradun-248 001, Uttarakhand, India. Email: naveensri17@gmail.com

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Characterization of culture condition dependent growth responses of phosphate solubilizing bacteria (*Bacillus subtilis* DR2) on plant growth promotion of *Hordeum vulgare*

Sonali Kumari, Pankaj Kumar, Shilpi Kiran, Sushma Kumari & Abha Singh

Abstract

Phosphorus (P) is one of the essential macro nutrients required for the growth and development of plant. Phosphate solubilising bacteria (PSB) are very effective in improving soil fertility by solubilising insoluble soil P, making them readily available to the plants. In the present work, PSB were isolated from the rhizosphere of *Eragrostis cynosuroides* on Pikovskaya's agar media at 30 °C and pH 7. Among positive isolates, the isolate DR2 was selected, based on highest zone of solubilization (15 mm), phosphate solubilization efficiency (150%) and solubilization index (4.5) on 4th day of incubation period. The isolated DR2 was identified as *Bacillus subtilis* on the basis 16 S rRNA gene sequence (Gene bank Accession Number KP455653). Optimized cultural conditions resulted in maximum P-solubilization after 96 h of incubation at 35 °C in Pikovsakaya's broth (having 1% TCP) of pH 7.0 with glucose and ammonium sulphate, used as carbon and nitrogen sources, respectively. *B. subtilis* DR2 significantly enhanced the growth of barley seedlings in terms of seed germination (60%) with percent enhancements in root length (93.71%), shoot length (41.30%) and biomass

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Review

Genomics, Proteomics, and Metabolomics Approaches to Improve Abiotic Stress Tolerance in Tomato Plant

Bindu Naik [1], Vijay Kumar [2,*], Sheikh Rizwanuddin [3], Mansi Chauhan [3], Megha Choudhary [2], Arun Kumar Gupta [1], Pankaj Kumar [4], Vivek Kumar [2], Per Erik Joakim Saris [5,*], Muzamil Ahmad Rather [6], Shuvam Bhuyan [6], Panchi Rani Neog [6], Sadhna Mishra [7] and Sarvesh Rustagi [8]

1 Department of Food Science and Technology, Graphic Era (Deemed to Be) University, Bell Road, Clement Town, Dehradun 248002, Uttarakhand, India
2 Himalayan School of Biosciences, Swami Rama Himalayan University, Swami Rama Nagar, Jolly Grant, Dehradun 248014, Uttarakhand, India
3 Department of Life Sciences, Graphic Era (Deemed to Be) University, Bell Road, Clement Town, Dehradun 248002, Uttarakhand, India
4 Department of Microbiology, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun 248007, Uttarakhand, India
5 Department of Microbiology, Faculty of Agriculture and Forestry, University of Helsinki, FI-00014 Helsinki, Finland
6 Department of Molecular Biology and Biotechnology, Tezpur University, Tezpur 784028, Assam, India
7 Faculty of Agricultural Sciences, GLA University, Mathura 281406, Uttar Pradesh, India
8 Department of Food Technology, Uttaranchal University, Dehradun 248007, Uttarakhand, India
* Correspondence: vijaygkp@gmail.com (V.K.); per.saris@helsinki.fi (P.E.J.S.)

Abstract: To explore changes in proteins and metabolites under stress circumstances, genomics, proteomics, and metabolomics methods are used. In-depth research over the previous ten years has gradually revealed the fundamental processes of plants' responses to environmental stress. Abiotic stresses, which include temperature extremes, water scarcity, and metal toxicity brought on by human activity and urbanization, are a major cause for concern, since they can result in unsustainable warming trends and drastically lower crop yields. Furthermore, there is an emerging reliance on agrochemicals. Stress is responsible for physiological transformations such as the formation of reactive oxygen, stomatal opening and closure, cytosolic calcium ion concentrations, metabolite profiles and their dynamic changes, expression of stress-responsive genes, activation of potassium channels, etc. Research regarding abiotic stresses is lacking because defense feedbacks to abiotic factors necessitate regulating the changes that activate multiple genes and pathways that are not properly explored. It is clear from the involvement of these genes that plant stress response and adaptation are complicated processes. Targeting the multigenicity of plant abiotic stress responses caused by genomic sequences, transcripts, protein organization and interactions, stress-specific and cellular transcriptome collections, and mutant screens can be the first step in an integrative approach. Therefore, in this review, we focused on the genomes, proteomics, and metabolomics of tomatoes under abiotic stress.

Keywords: abiotic stress; climate variability; metabolic reactions; phytohormones; defense feedback; transcriptional changes; metabolomics; microbial interaction

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1. Introduction

Solanum lycopersicum L. (Solanaceae), generally known as tomato, is one of the most significant fruits that are nutritionally classified as a vegetable. It contains carotenoids (lycopene and carotene), phenolic compounds (flavonoids), vitamins (ascorbic acid, -tocopherol, vitamin A) [1], glycoalkaloids (tomatine), and phytosterols (-sitosterol, campesterol, and stigmasterol) [2,3]. Fernandes et al. (2021) [4] stated the high percentage of polyunsaturated and monounsaturated fatty acids such as palmitic and arachidic acid, oleic

Comparative study of ethanol production from sodium hydroxide pretreated rice straw residue using *Saccharomyces cerevisiae* and *Zymomonas mobilis*

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Volume 205, article number 166, (2023) Cite this article

Naveen Kumar, Anita Yadav, Gulab Singh, Ajay Singh, Pankaj Kumar & Neeraj K. Aggarwal

Abstract

Rice straw is a suitable alternative to a cheaper carbohydrate source for the production of ethanol. For pretreatment efficiency, different sodium hydroxide concentrations (0.5–2.5% w/v) were tested. When compared to other concentrations, rice straw processed with 2% NaOH (w/v) yielded more sugar (8.17 ± 0.01 mg/ml). An alkali treatment induces effective delignification and swelling of biomass. The pretreatment of rice straw with 2% sodium hydroxide (w/v) is able to achieve 55.34% delignification with 53.30% cellulose enrichment. The current study shows the effectiveness of crude cellulolytic preparation from *Aspergillus niger* resulting in 80.51 ± 0.4% cellulose hydrolysis. Rice straw hydrolysate was fermented using ethanologenic *Saccharomyces cerevisiae* (yeast) and *Zymomonas mobilis* (bacteria). Overall, superior efficiency of sugar conversion to ethanol 70.34 ± 0.3% was obtained with the yeast compared to bacterial strain 39.18 ± 0.5%. The current study showed that pretreatment with sodium hydroxide is an effective method for producing ethanol from rice straw and yeast strain *S. cerevisiae* having greater fermentative potential for bioethanol production than bacterial strain *Z. mobilis*.

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Microbiological Research

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Reconditioning of plant metabolism by arbuscular mycorrhizal networks in cadmium contaminated soils: Recent perspectives

Harmanjit Kaur [a], Tashima [b], Sandeep Singh [c], Pankaj Kumar [d]

[a] Department of Botany, University of Allahabad, Prayagraj 211002, Uttar Pradesh, India.

[b] Department of Botany, Akal University, Talwandi Sabo, Bathinda, Punjab 151302, India

[c] Department of Botany, Kanya Maha Vidyalaya, Jalandhar, Punjab 144004, India

[d] Department of Microbiology, Dolphin (PG) Institute of Biomedical and Natural Sciences, Manduwala, Dehradun, Uttarakhand 248007, India

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Abstract

Cadmium (Cd) is one of the most perilous nonessential heavy metal for plants, owing to its high water solubility and obstruction with various physiological and biochemical processes. It enters food chain via plant uptake from contaminated soil, posing a grave menace to ecosystem and mankind. Green remediation comprises approaches intended at prudent use of natural resources for increasing profits to humans and environment. Arbuscular mycorrhizal (AM) fungi are considered a promising green technological tool for remedial of Cd-polluted soils. They are naturally associated with root system of plants in Cd-contaminated soils, evidencing their tolerance to Cd. AM can decrease Cd uptake by plants broadly through two strategies: (1) extracellular mechanisms involving Cd chelation by root exudates, binding to fungal cell wall/structures or to the glycoprotein glomalin; (2) intracellular means involving transfer via hyphal network, detoxification and vacuolar sequestration mediated by complexation of Cd with glutathione (GSH), phytochelatins (PCs), metallothioneins (MTs) and polyphosphate granules. Additionally, mycorrhizal symbiosis facilitates reconditioning of plants' metabolism primarily through dilution effect, increased water and mineral uptake. Recently, AM-induced remodelling of root cell wall synthesis has been reported to improve plant vigor and

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Characterization and comparative assessment of bactericidal activity of carbon nanodots (CDs) and nanoparticles (CNPs) prepared from soot's of clarified butter and mustard oil, respectively

Vikas Pahal[1*], Pankaj Kumar[2], Rahul Kumar[1], Parveen Kumar[3], Vinod Kumar[4]

[1]Department of Microbiology, Dolphin PG College of Science and Agriculture, Chunni Kalan, Fatehgarh Sahib, Punjab, India.
[2]Department of Microbiology, Dolphin PG Institute of Biomedical and Natural Sciences, Dehradun, Uttrakhand, India.
[3]Bio-Nanotechnology Lab, Central Scientific Instruments Organization, Chandigarh, India.
[4]HR-TEM Facility Lab, Department of pharmacology and toxicology, National Institute of Pharmaceutical Education and Research (NIPER), SAS Nagar, Mohali, Punjab, India.

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Carbon nanodots, carbon nanospheres, bactericidal effect, XTT-colorimetric assay

ABSTRACT

Carbon nanoparticles (CNPs) are carbon-based nanomaterial with dimensions in the range of 1–100 nm. In the present research, an ecofriendly, simple, and highly reproducible method was used to prepare the CNPs from the soot of clarified butter (carbon dots) and mustard oil (carbon nanospheres) in both pristine and oxidized forms. The obtained CNPs were subjected to various analyses such as UV-visible, Fourier transform infrared (FTIR), dynamic light scattering, high-resolution transmission electron microscopy, energy-dispersive X-ray, and X-ray diffraction (XRD). The analyses demonstrate that the size of butter-originated CNPs was found in the ranges of 10–90 nm (raw) and 5–20 nm (oxidized), whereas, in the case of mustard oil-originated CNPs, the size was observed in the ranges of 100–150 nm (raw) and 50–80 nm (oxidized). As per zeta potential results, the net surface charges on CNPs were observed as −9.05 and −14.6 mV in the case of raw and oxidized CNPs from butter, respectively, and −12.7 and −20.1 mV in the case of raw and oxidized CNPs from mustard oil, respectively. XRD results showed the typical graphitic crystalline nature of both kinds of CNPs irrespective of their initial raw material. FTIR results confirmed hydroxyl, carboxyl, carbonyl, and amide groups on CNPs that help in their capping and stabilization in the solvent media. Five bacterial strains, *Staphylococcus aureus*, *Escherichia coli*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae*, and *Moraxella catarrhalis*, were used to assess the bactericidal potential of synthesized CNPs using agar-well and 2,3-bis-(2-methoxy-4-nitro-5-sulfophenyl)-2*H*-tetrazolium-5-carboxanilide-colorimetric methods. Butter-mediated oxidized CNPs were the most effective bactericidal agent against all the bacterial strains compared to mustard-originated CNPs. Furthermore, CNPs-mediated toxicity towards bacteria was both size and concentration dependent. *Staphylococcus aureus* and *S. epidermidis* were the most sensitive [minimum inhibitory concentration (MIC): 800 µg/ml] and resistant (MIC: 2.0 mg/ml) bacteria, respectively, towards CNPs-mediated toxicity. The synthesized CNPs were devoid of any metallic impurities and hence worthy of being used in various applications like imaging, labeling, sensor-technology, and environment monitoring and as an antibacterial agent.

1. INTRODUCTION

Carbon, the most abundant and essential building element of life, has been enthralling scientists for ages. In recent decades, carbon-based nanometer-sized allotropes like carbon nanotubes (CNTs), Carbon nanoparticles (CNPs), carbon nanodots (CDs), carbon nanofibers, graphene/graphite nanosheets, fullerene, nanorods, nanodiamonds, nano-onions, and other such structures are mesmerizing scientists because of their great importance and applications in diversified fields [1–3]. These carbon-based nanostructures possess exceptional physicochemical and electrochemical properties such as optical properties, magnetic properties, catalytic properties, thermal stability, mechanical properties, biocompatibility, resistance to degradation, presence of large reactive surface area per unit volume, electrical conductivity, excellent adsorption characteristics, easiness in surface modifications, and ideal drug delivery property. These

*Corresponding Author
Dr. Vikas Pahal, Department of Microbiology, Dolphin PG College of Science and Agriculture, Chunni Kalan, Fatehgarh Sahib, Punjab, India.
E-mail: vikaspahal3 @ gmail.com

Russian Agricultural Sciences Article

Effect of Bio-Decolorised Spent Wash on Plant Growth Promotion

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Russian Agricultural Sciences

Aims and scope

G. Singh, A. K. Singh, P. Kumar & M. Mandal

Abstract

Distillery spent wash contain heterogeneous polymer which are dark brown in colour and have offensive odour called melanoidins. It reduces the soil alkalinity and inhibits the seed germination. Decolorization of distillery spent wash by physical and chemical methods were found mainly unsuitable but microbial treatment provides safer, more efficient, eco-friendly, less expensive and alternative methods. In the current study eighteen bacterial isolates were isolated from the soil of polluted sites of Dehradun. The organisms were identified as *Bacillus* sp., *Pseudomonas* sp., and *Rhizobium* sp. Two different types of spent wash (treated and untreated) were collected aseptically from Doon Valley Industry, Kuawala, Dehradun. 10 and 25% of spent wash were prepared and inoculated with the isolated culture for decolorization assay. The consortium of best three selected isolates MPM-06, MPM-08 and MPM-14 showed the maximum decolorization i.e. 82.18%. This spent wash was used as a fertilizer on Berseem which enhanced the seed germination and all growth parameters. Now a day's farmers use the chemical fertilizers for high production of crops which contribute largely to soil degradation and also created the loss of nutrients from the soil. Our study concludes that biological treatment can be an effective way to reduce dark brown color, pH, BOD and TDS. Based on the above fact we can recommend farmers to use the bio-decolorized spent wash as a fertilizer to enhance the soil fertility for better crops productivities.

Journal of Infectious Diseases & Microbiology
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Perspective

Eat Healthy to Keep UTI's at Bay

Tripti Malik*

Abstract

Recurrent Urinary Tract Infections (UTIs) are traditionally managed by antibiotics; leads to high health costs and antibiotic resistance. Diet supplementation with alkalizing agents, cranberries, fermented foods, probiotics and vitamins not only alleviates the symptoms but also boosts the immunity against UTIs.

Keywords: Urinary tract infections; UTIs; Antibiotics; *E. coli*; Recurrent urinary tract infections.

Abbreviations: *E. coli: Escherichia Coli*; L: Litre; OTC: Over the Counter; RUTIs: Recurrent Urinary Tract Infections; UTIs: Urinary Tract Infections.

Perspective

Eat and drink Urinary Tract Infections and be merry', can state true for treatment and prevention of Urinary Tract Infections (UTIs). These infections rank second throughout the world in morbidity. In certain individuals, UTIs recur, termed as Recurrent Urinary Tract Infections (UTIs) or persistent UTIs. These chronic infections are characterized as either two episodes of symptomatic bacterial cystitis within the last six months or three episodes within the last year. The recurrence causes an adverse effect on the health especially of women and old aged persons [1-3]. Likewise other infections, the prophylaxis of these includes long-term and high dose antibiotics which incurs large financial costs to health-care systems and also, accounts for antimicrobial resistance. Due to long term treatment; the armamentarium of antibiotics which were once effective for treatment of UTIs is now diminishing. Therefore, preventive measures and non-antibiotic alternative therapies are need of hour for the effective management of RUTIs. Recommended preventive measures includes improvement of personal hygiene, which includes pre- or post-coital voiding, increase in frequency of urination, proper wiping patterns, avoiding douching, use of proper undergarments, dis-continuation of spermicides, and use of appropriate vaginal estrogens [3]. Proper nutrition can also boost the human immune system and prevent UTIs. The consumption of uro-protective food items or supplementation of certain nutraceuticals

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REVIEW ARTICLE

Modernized Management of Biomedical Waste Assisted with Artificial Intelligence

Olivea Sarkar[1], Avick Kumar Dey[2], Tripti Malik[3]*

Sarkar O, Dey AK, Malik T. Modernized Management of Biomedical Waste Assisted with Artificial Intelligence. Int J Biomed Clin Anal. 2023;3(2):69-86.

Abstract

Biomedical waste can lead to severe environmental pollution and pose public health risks if not properly handled or disposed of. The efficient management of biomedical waste poses a significant challenge to healthcare facilities, environmental agencies, and regulatory bodies. Traditional management methods often fall short of efficient handling of biomedical waste due to its enormous quantity, diverse, and complex nature. In recent years, different approaches employing Artificial Intelligence (AI) techniques have been introduced and have shown promising potential in biomedical waste management. Wireless detection and IoT methods have enabled the monitoring of waste bins, predictions for the amount of waste, and optimization of the performance of waste processing facilities. This review paper aims to explore the application of AI through machine learning and deep learning models in optimizing the collection, segregation, transportation, disposal, and monitoring processes, which leads to improved resource allocation with risk mitigation of biomedical waste along with prediction, and decision-making using AI algorithms.

Key Words: *AI in waste management; IoT in waste management; Blockchain technology; Biomedical waste segregation; Robotics in BMW*

Abbreviations: AI: Artificial Intelligence; BMW/BMWM: Biomedical Waste Management; CPCB, India: Central Pollution Control Board, India; CBWTF/CBMWTF: Common Bio-medical Waste Treatment Facility; OSHA: Occupational Safety and Health Administration; WHO: World Health Organization; EU: European Union; GIS: Geographical Information System; MWM: Medical waste management; IoT: Internet of things; RFID: Radio Frequency Identification; POI: Point of Interest; MLDPAF: Machine Learning-driven Predictive Analytic Framework; DPoS: Delegated Proof of Stake; RTOS: Real Time Operating System; DL: Deep Learning; GA: Genetic Algorithms; CNN: Convolutional Neural Networks; LSTM: Long Short-Term Memory; CI: Cohort Intelligence; IBW: Infectious Biomedical Waste; IMW: Infectious Medical Waste; SCND: Supply Chain Network Design

[1]*Department of Nursing, DSMS Group of Institutions, Durgapur, West Bengal, India*
[2]*Department of Computer Applications, DSMS Group of Institutions, Durgapur, West Bengal, India*
[3]*Department of Microbiology, Dolphin (P.G.) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India*

**Corresponding author: Tripti Malik, Associate Professor, Department of Microbiology, Dolphin (P.G.) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India. Tel: +919127230414, E-mail: triptimalikahuja@gmail.com*

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Research article

Studies on antioxidant potential and total phenolic contents of dried powder and pulp of *raw and ripe Carica papaya* fruit

Bhardwaj Madhvi[1], Mahajan Babita[1], Kumar Ankush[2], Parcha Versha[3]

[1]Department of Chemistry, G.G.M. Science College, Jammu, J&K, India
[2]P.G. Department of Chemistry, Government (PG) Degree College, Bhaderwah, J&K, India
[3]Department of Pharmaceutical Chemistry & Chemistry, Dolphin (PG) Institute of Biomedical & Natural Sciences, Manduwala, Dehradun, India

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Correspondence author: **Versha Parcha**. Email: vershaparcha@gmail.com

ABSTRACT

Introduction and Aim: Antioxidants are frequently used as active ingredients in anti-aging supplements with the intention of preserving health and preventing diseases. However, recent research has concentrated on conventional therapies that have a long history of successfully treating several diseases. *C. papaya* is a good alternative and exhibits significant antioxidant, diuretic, antihyperglycemic, anticancer, analgesic, and depressive properties from a key plant constituent. In this study, total phenolic content, and antioxidant potential of raw and ripe *Carica papaya* were examined.

Materials and Methods: C. Samples of raw and ripe *Carica papaya* were collected from the local market of Dehradun. Dried powder and fresh pulp of the raw and ripe *Carica papaya* was individually subjected to phytochemical test principles. Total phenolic contents were estimated using the Folin-Ciocalteu and antioxidant potential using DPPH and ferric chloride reducing power assay method.

Results: The fresh pulp and powder of ripe *Carica papaya* showed high content of phenolics in fresh ripe pulp, fresh raw pulp, dried ripe powder and raw dried powder as 200, 195,185 7 mg/100 g respectively with an antioxidant activity DPPH radical scavenging activity, 80.2, and 75. .76.4 and 74.5 respectively which is comparable to butylated hydroxy anisole (BHA) and diphenhydramine (DPPH) radical scavenging activity.

Conclusion: The fresh pulp and powder of ripe *Carica papaya* showed wide antioxidant activity (DPPH) radical scavenging activity. Hence, it can be effectively used as an organic substitute for chemical compounds (BHA, BHT) which have a lot of harmful side effects. Moreover, phytochemical studies of *Carica papaya* have shown the presence of phenolic compounds well justified by estimation of content which are responsible for its potent antioxidant activity.

Keywords: *Carica papaya*; antioxidant; phenolic content; radical scavenging; bioactive compound.

INTRODUCTION

The changing lifestyle and environmental conditions have predisposed common man towards numerous diseases. Many disorders involve oxidative damage via arthritis, Parkinson's, heart attack, AIDS, stroke, cancer, cataract, stress, and a long list of degenerative disorders including aging (1,2). At present, O_2 is being viewed as playing a lead role in the generation of Reactive Intermediates, thereby causing cellular damage. Oxidative damage generates Reactive O_2 species (ROS) N_2 species which mainly include free Radicals which are chemical entities possessing a single electron. Free radicals are manageable by the body, but when they are produced in excess, damage may result. Thus, numerous therapeutic approaches that incorporate the use of antioxidants (3) are available to address this issue.

Inhibiting chemical reactions involving oxygen is what antioxidant molecules or compounds do. Oxidation reactions, which harm cells in both humans and animals, are among these reactions. When free radicals cause harm, antioxidants stop it and fix it. When used as food additives, antioxidants have drawn a lot of interest. Antioxidants are frequently used in food products, both artificial and natural. For the body to maintain its natural health, natural antioxidants like lycopene, vitamin E, A & C, etc., are crucial. Natural antioxidants, which stop other molecules from oxidizing, are mostly found in the fresh juice and vegetables we eat. The use of natural antioxidants has been expanding due to the safety and ecological responsibility of these substances, as well as the increasing constraints on the use of synthetic antioxidants and increased public awareness of health issues. The use of some common synthetic antioxidants has generated debate, including (BHA) butylated hydroxy anisole and (BHT) butylated hydroxytoluene. In India and Romania, the use of BHT has already been outlawed after tests revealed metabolic stress. According to some studies, BHT combined with fats interfered with the liver's capacity to detoxify. BHT and BHA slow down rancidity, which is present in cereals, snacks, instant potatoes, and cosmetics (4). Rancidity is caused by oxidation of fats and oils. In this regard, C. papaya is a good

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Artifical intelligence: a virtual chemist for natural product drug discovery

Shefali Arora[a], Sukanya Chettri[a], Versha Percha[b], Deepak Kumar[b] and Mamta Latwal[a]

[a]Department of Chemistry, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, India; [b]Department of Pharmaceutical Chemistry, Dolphin(PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India

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ABSTRACT

Nature is full of a bundle of medicinal substances and its product perceived as a prerogative structure to collaborate with protein drug targets. The natural product's (NPs) structure heterogeneity and eccentric characteristics inspired scientists to work on natural product-inspired medicine. To gear NP drug-finding artificial intelligence (AI) to confront and excavate unexplored opportunities. Natural product-inspired drug discoveries based on AI to act as an innovative tool for molecular design and lead discovery. Various models of machine learning produce quickly synthesizable mimetics of the natural products templates. The invention of novel natural products mimetics by computer-assisted technology provides a feasible strategy to get the natural product with defined bio-activities. AI's hit rate makes its high importance by improving trail patterns such as dose selection, trail life span, efficacy parameters, and biomarkers. Along these lines, AI methods can be a successful tool in a targeted way to formulate advanced medicinal applications for natural products. 'Prediction of future of natural product based drug discovery is not magic, actually its artificial intelligence'

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KEYWORDS
Data mining; bioactivity data; molecular interaction attribute; encoding natural product

Introduction

Nature has a huge store of medicinal compounds. It has inspired 50% of all drugs of today and only a few of them utilize as potential drugs derived from natural products. A new emerging technology namely 'Artificial intelligence (AI)' is very helpful to find the targeted way to get the novel pharmaceutical applications for natural products. This method provides a cheap and easy platform for manufacturing natural products with the same effects. Many natural products with potential active ingredients are selected by evolutionary mechanisms. By the time of the mid- 1970s, natural products find as the fount of a pharmaceutical drugs for new human therapy. In the period between the 1980s and the 2010s, 2/3 of the drug was discovered from unaltered NPs, and NP analogs and contained NP pharmacophores 5%, 28%, 35% respectively (Newman and Cragg, 2020). Many researchers adopted many computational methods for the discovery and structure determination of bioactive natural products and the use of molecular patterns for target selectivity and combinatorial design (Giordanetto and Kihlberg, 2014; Johnston et al., 2015; Merk et al., 2018; Nugroho and Morita, 2019; Rodrigues, 2017). Many artificial intelligence-based engineers first look for predictable target molecules of natural products especially proteins to get information about the pharmacologically applicable compounds. AI technology is a meaningful method to identify the target protein and a pairs of active ingredients in natural compounds in a comparison to conventional screening. Limited research has been reported about the interaction of natural compounds with the different proteins present in the human body to produce remarkable effects. A bacterial molecule namely marinopyrrole A (a natural substance with a complicated structure) have different biological activity such as anti-inflammatory, antibiotics, and anti-cancer activity, and many AI researchers derived an algorithm to get possible target proteins of marinopyrrole A. By implementing the different AI and machine learning models, the developed algorithm analyzed the pharmacologically active parts of marinopyrrole A with the comparable patterns of already discovered new drugs for which the target proteins to which they attach the familiar. During drug discovery, as the pattern matches, the scientists were capable to identify eight human receptors and enzymes which can be the binding site of bacterial molecules. The above discovered enzymes and receptors are involved in the immune system, pain process, and inflammation. Many experiments performed in the lab proved that marinopyrrole A can generate considerable interaction with most of the predicted protein. AI method is the reliable method to narrow down the protein targets of natural products by more than 50% and shorten the research of novel pharmaceutically active agents. The synthesis of marinopyrrole A is a very expensive and time-consuming process, so finding an alternative way as AI makes it possible to find the target proteins of marinopyrrole A which is needed for getting better results in the future. AI algorithms can be used more simply to design active ingredients with life effects as natural structures and are useful not only to prepare new drugs but on the verge of possible fundamental switch in medical-chemical research. In the future AI is

CONTACT Shefali Arora shefali.arora@ddn.upes.ac.in

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Review Article

Ashwagandha: A Flagship Herb of Ayurveda from Past to Present Nano Era

Shefali Arora[1,*], Krishna Samanta[1], Sukanya Chettri[1], Devendra Rawat[1], Versha Percha[2], Deepak Kumar[2]

[1]Department of Chemistry, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, INDIA.
[2]Department of Pharmaceutical Chemistry, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, INDIA.

ABSTRACT

Plants are considered excellent resources for the generation of greener biomaterials. Plant extract are renewable in nature. Various metabolites present in plant extract are normally used in redox reaction for the formation of eco-friendly nano-particles. It is also considered as the main factory for the green synthesis of metal nano-particles. The plant-based nano-particles is very necessary for absolute harmony connection between plant science and nanotechnology. Ashwagandha is the non-toxic herb which used to treat a range of conditions and its life changing benefits runs over a long time. Its numerous medicinal values make this plant so popular. It is a stress buster which works for all "SUPERHERB". This super herb rejuvenates our body and brain from the inside out. Present review depicts the variety of assistance of Ashwagandha plant with or without nanoparticles, from the past to the present time of corona.

Correspondence:
Shefali Arora
Energy Acres, PO Bidholi, Via Prem Nagar, Dehradun-248007, Uttarakhand, INDIA.
Email: shefali.arora@ddn.upes.ac.in

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Keywords: Ashwagandha, Plant extract, Nanoparticles, COVID-19, Natural inhibitor.

INTRODUCTION

Treatment of Ayurveda always gives side benefits not side effects. Ashwagandha is an evergreen shrub which is found in India, Africa and many parts of the Middle East. It is known as Rasayana for more than 6000 years.[1] Its botanical name is *Withania somnifera* and commonly known as winter cherry or poison gooseberry which is the annual evergreen shrub from the family Solanaceae. The name of family Solanaceae means "dream carrier" with reference to restful sleep. This family plants supported sleep and use to provide daytime energy and stress. Sometime this herb is called "Indian Ginseng" although it is unrelated to the Ginseng species as Ginseng support energy and stamina and Ashwagandha gives claming and nourishing stress support.[2] The root of Ashwagandha smells (gandha) like horse (in Sanskrit *Ashwa* means horse), that's why the plant name is Ashwagandha.[3] The plant requires the dry stony soil with sun to partial requirement of shade. In most of the countries this herb is sold as dietary supplement. The various part of Ashwagandha works as anthelmintic, astringent, diuretics, narcotics, thermogenic and as tonic. Its powder is given to the children with milk and works as tonic and able to gives the power of horse. This herb is used against nervous breakdown, insomnia, vitiated conditions of vata, rheumatism, constipation, leukoderma etc.[4] In Tanzania, the root of Ashwagandha is used to promote uterine constraction and sexual stimulant.[5,6] The plant is works as rejuvenative for men, strengthen muscles, bone marrow, muscle and semen. It also promotes longevity and youthful vitality.[7] The whole plant itself have medicinal importance (Figure 1). The leaves of plants are rich in iron and can be taken as herbal tea. The plant leaves are helpful during heavy periods and anemia. Its leaves are useful in painful swellings and fever. Its leaves also consume as energy sources and decreases fever and pain during swelling. The flower parts having diuretics, depurative, astringent and aphrodisiac property. The seeds are known for anthelmintic activity and used to treat memory loss, anxiety, hysteria, syncope etc. Drug-free and non-habit-forming herb of Ashwagandha contain melatonin, a hormone which is naturally produced in the brain and help for sound cycle asleep naturally. A Russian scientist N.V. Lazarez described the plant as adaptogen as it satisfied the criteria of non-toxic, benefit of overall well-being and reduce and regulate stress by helping the body adapt.

ASHWAGANDHA AS A SUPPLEMENT

Ashwagandha is considered as "Real Potent Regenerative Tonic or Rasayana of Ayurveda". Because of the nature of adaptogen, the Ashwagandha is used for many states of stress which may be physical and mental. Ashwagandha extract is the best form to take in. Various forms of it are available in the market such as capsules, gummies, liquid drops and powders which can be mix in to drinks (Figure 2). Its two branded extract is KSM66 and Sensoril are very popular. Both brands are fully standardized,

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Original Research Paper

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Health Science

CORRELATION BETWEEN NECK PROPRIOCEPTION WITH NECK PAIN AND DISABILITY IN PATIENTS WITH MECHANICAL NECK PAIN

Deptee Warikoo	HOD,Department of Physiotherapy,DIBNS,Dehradun
Ankita Pandey	Researcher DIBNS,Dehradun
Riya*	Researcher DIBNS,Dehradun*Corresponding Author
Sumaiya Muneer	Researcher DIBNS,Dehradun
Mohit chatterjee	Researcher DIBNS,Dehradun

ABSTRACT **INTRODUCTION:** Pain located in the neck is a common medical condition. Neck pain can come from a number of disorders and diseases and can involve any of the tissues in the neck. Examples of common conditions causing neck pain are degenerative disc disease, neck strain, osteoarthritis, cervical spondylosis, spinal stenosis, poor posture, neck injuries such as whiplash, a herniated disc, or a pinched nerve (cervical radiculopathy). One of the main problems of patients with neck pain is the impairment of cervical proprioception which leads to the disturbance of cervical sensorimotor control. **METHODS:** An experimental study was conducted on 30 patients having acute, sub acute and chronic neck pain at Dolphin Health centres, Dehradun. The neck proprioception was tested by using (JPE): i.e. Joint Position Error Tool. Descriptive analysis for neck proprioception along with neck pain and disability was done. **RESULTS:** The patients showed significant positive correlation between neck pain, disability and proprioception. **CONCLUSION:** In patients with Mechanical Neck Pain and Disability, the proprioception of neck is positively affected. The result of this study concludes presence of strong relationship between neck proprioception deficit and pain along with disability. Thus, inclusion of rehabilitation or training of neck proprioception should be an integral part of management in patients with neck pain.

KEYWORDS : neck pain, cervical proprioception, cervical sensory motor

Introduction

Neck pain (NP) is a common phenomenon with a point prevalence between 5.9% and 38.5% with a mean prevalence of 7.6%.[1] About two thirds of the population have neck pain at some time in their lives, and prevalence is highest in middle age.[2] Neck pain is a common condition and one of the leading causes of disability worldwide, with mean estimates of 7.6%-point prevalence (range, 5.9–38.7%), 37% annual prevalence (range, 16.7–75%), and 48.5% lifetime prevalence (range, 14.2–71%).

Most patients who present with neck pain have "nonspecific (simple) neck pain," where symptoms have a postural or mechanical basis. Aetiological factors include poor posture, anxiety, depression, neck strain, and sporting or occupational activities. Neck pain after whiplash injury also fits into this category, provided no bony injury or neurological deficit is present. Although neck pain can be attributed to traumatic (such as whiplash-associated) disorders, metabolic, neoplastic, inflammatory, or infectious diseases, most neck pain has no discernible cause and is considered to be idiopathic.[3]

The cervical spine has a very delicate proprioceptive system, which signals the position of the head relative to the trunk, coordinates the vestibular and visual systems and plays a crucial role in controlling posture and balance.[4] One of the main problems of patients with neck pain is the impairment of cervical proprioception which leads to the disturbance of cervical sensorimotor control. Cervical sensorimotor control involves central integration and processing of all the afferent information (i.e., visual, vestibular, and cervical proprioceptive inputs), and execution of the motor program through the cervical muscles, contributing to the maintenance of head posture and balance as well as the stability of cervical joints.[5]

In spite of these known facts, proved by various researches, there is still a dearth of literature to prove any relationship between cervical proprioception and the disability and pain caused in neck pain patients.

Methodology

An experimental study was conducted to see the Correlation between neck proprioception with neck pain and disability in patients with mechanical neck pain.

The scale used to measure the pain was VAS[6] for disability we used NDI and to proprioception error in patients of neck pain we used JPE (joint position error tool). Data was collected after the purpose of study was explained to subjects and the consent form was signed.

The patient with neck pain provided a VAS form where the scores were recorded accordingly to their pain.

The NDI is a self-assessment instrument of the specific functional status of subjects with neck pain with 10 elements, including pain, personal care, weight gain, reading, headache, concentration, work, driving, sleeping, and leisure.

The Cervical JPE Test is a measurement tool used to clinically assess an individual's cervicocephalic proprioception ability. Cervicocephalic proprioception describes one's sense of position of their head and neck in space.[7] The Cervical JPE Test measures the ability of a blindfolded patient to accurately relocate their head position back to a predetermined neutral point after cervical joint movement. The test is most commonly performed with head movement in the transverse and sagittal planes.[7]

Data analysis

The collected data was analyzed using IBM SPSS Statistics 23.Descriptive statistics were computed. Pearson Correlation coefficient was computed to analyse the correlation between the domains of the study. The statistical significance was set at 0.05 with 95% of the confidence interval.

Result

A total of 30 subjects were enrolled for the study with a mean age of 38.10 ± 9.94 years. The average proprioception impairment was 3.95 ± 1.579. Meanwhile, the mean VAS anddisability score was 5.63 ± 1.691 and 36.7033 ± 9.845 respectively.

Table1 : Descriptive Statistics

	Mean ± SD
Age	38.10 ± 9.949
Proprioception Impairment (Cervical JPE)	3.95 ± 1.579
VAS	5.63 ± 1.691
NDI Score	36.7033 ± 9.845

The correlation analysis revealed statistically significant positive correlation between age and proprioception impairment, implicating linear relationship between age and proprioception impairment. Similarly, age was found to have statistically significant positive linear relationship with VAS (R=0.4, P=0.029) and disability score (R=0.398, P=0.029). Also, proprioception deficit was found to have

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JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

IMMEDIATE EFFECT OF NERVE FLOSSING TECHNIQUE ON F-WAVE IN PIRIFORMIS SYNDROME

1.Deptee Warikoo
HOD,Department of Physiotherapy,DIBNS,Dehradun

2.Diksha Bhatt
Assistant Professor, Department of Physiotherapy,DIBNS,Dehradun

3.Riya
Researcher DIBNS,Dehradun

4.Sumaiya Muneer
Researcher DIBNS,Dehradun

5.Mohit chatterjee
Researcher DIBNS,Dehradun

6.Pranshi Agarwal
Researcher DIBNS,Dehradun

ABSTRACT:

INTRODUCTION:

Piriformis syndrome is a neuromuscular disorder that occurs when the sciatic nerve is compressed or irritated by the piriformis muscle. This may cause pain, tingling and numbness in the buttocks and along sciatic nerve. Nerve flossing technique is a neurodynamic technique, which moves the nerve through the tissues proximally and distally to the maximum possible extend by moving every joint and body part that the nerve crosses. Standard nerve conduction studies for evaluation of the sciatic nerve includes testing the ipsilateral common fibular and tibial motor nerve conduction and minimum F-wave latencies.

METHODS:

10 Male and female subjects of age 20 to 30 were selected on the basis of inclusion criteria from Dolphin (P.G) Institute of biomedical and natural sciences, Dehradun. All subjects were assessed for piriformis syndrome

RESULTS:

The results of the paired sample t-test showed statistically significant difference between the values of pre and post data in posterior tibial nerve when stimulated at ankle and popliteal fossa. Meanwhile, no statistically

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NERVE CONDUCTION VELOCITY OF THE TIBIAL NERVE OF HEALTHY MALE AND FEMALE STUDENTS AT DOLPHIN INSTITUTE – A COMPARATIVE STUDY

Warikoo Deptee, Agarwal Aditi., Chatterjee Mohit, Riya, Muneer Sumaiya
HOD, Department of Physiotherapy, Researcher
DIBNS, Dehradun

ABSTRACT

INTRODUCTION

The nerve conduction study is a test used to check mainly motor and sensory conduction of the human body's nerves. Also, it tests how quickly electrical impulses move along a nerve. In this examination, electrically stimulating peripheral nerve and recording the response from the target muscle or nerve. Nerve conduction study is a good and cheap diagnostic tool for the nerve disorder.

METHODOLOGY

30 students were selected for study based on individual criteria from the Dolphin (P.G) institute of biomedical and natural sciences Dehradun, all the subject which take part in the study were physiotherapy students. There are 2 groups of people for the study 15 male and 15 female students. NCV is done for the posterior Tibial nerve was done by stimulating at Site 1- On the ankle and Site 2- On the popliteal fossa, recordings were made followed by stimulation.

RESULTS

The mean of latency at ankle joint showed difference with females having more value than males. However, the difference was not significance. There was no significant difference of latencies at popliteal fossa gender differences in NCV values were previously established by many studies. The present study depicted that when NCV reading for ankle and popliteal fossa were compared for duration females showed more mean value than {ankle: 14.04 (female) 13.11(male), popliteal-fossa :21.13(females) and 18.65(males) although there was no significant difference between the reading

CONCLUSION

On evaluating the mean values of nerve conduction velocity of Tibial nerve in both the genders, a difference in mean values was observed. However, it was not statistically significant difference, but in our study the Nerve Conduction Velocity values were high in males and less in females whereas latency and amplitude were high in females.

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EFFECTIVENESS OF TRUNK EXERCISE ON UNSTABLE SURFACE FOR IMPROVING DYNAMIC SITTING BALANCE, GAIT, FUNCTION AND FEAR OF FALL IN ELDERLY- AN EXPERIMENTAL STUDY

Oct. 2023

Rawat Nidhi[1], Warikoo Deptee[2], Bhatt Sunil[3]

Abstract

Introduction-The balance and gait of elderly persons are crucial factors in health.Postural imbalance and functional performance instability in gait are both closely related to trunk dysfunction. To be able to live independently and perform ADLs, one must have trunk control and dynamic sitting balance.

Objective- To find out the effectiveness of trunk exercises on unstable surfaces for improving dynamic sitting balance, gait, function and fear in the geriatric population.

Study Design- An experimental study.

Method- Using a random sampling technique, 18 participants were chosen for the study based on the criteria. Prior to using a Swiss ball without back or foot support, participants were taught to practise exercises on a balancing board. For a total of 3 weeks, you exercise for 15 seconds, then relax for 2 seconds. This pattern is repeated 7 times over 5 days. Timed up and go, Berg, Lawton instrumental, and Fall efficiency scales were used to measure gait, balance, daily living activities, and fear of falling..

Result-The result of this present study showed that trunk exercises on the unstable surface were very effective to improve the dynamic sitting balance, functional activities of daily living, and gait and prevent falls in the elderly.

Conclusion-The study concluded that trunk workouts on an unstable surface were very beneficial in improving dynamic sitting balance, functional activities of daily living, gait, and preventing falls in the elderly.

Keywords-Dynamic sitting balance, gait in elderly, fear of fall

Original Research Paper

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Physiotherapy

PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG WOMEN WORKERS OF HIMADRI HANS HANDLOOM

Dr. Keerty Mathur* Assistant Professor, DIBNS, Dehradun *Corresponding Author

Dr. Nikita Arya Student Researcher, DIBNS, Dehradun

Dr. Deepty Mathur Founder of MPNFZ, Dehradun

ABSTRACT Uttarakhand is a hilly region,and many have migrated for employment to plains. One major means of livng there is handloom industry. A one year survey study was done among women workers of Himadri Hans Handloom, Almora to find the prevalence of musculoskeletal disorders. Standardised Nordic questionnaire was used among subjects taken conveniently. Results revealed there is high prevalence of WMSDs among weavers with maximum effect on low back (14.6%) followed by shoulder (13.6%) neck(13.1%). knees(12.6%), upper back(11.5%), wrists(10.4%), elbow(8.8%), ankles/feet(8.3%) and hip/thighs(7.0%).

KEYWORDS : Work related musculoskeletal disorders(WRMDs), Handloom workers.

INTRODUCTION

"Work- Related Musculoskeletal Disorders" (WRMDs) is a term used to describe a painful or disabling injury to the muscle, tendon or nerves caused or aggravated by work.[1] Several studies on handloom weavers have showed that there are a high rate of work-related musculoskeletal problems throughout the world and is a major cause of disability affecting not only individual but the society as a whole.[2]

Weaving is considered to be one of the most tedious profession, that demands long hours of static work which can develop musculoskeletal disorders (MSD) as awkward posture, repetitive movements and contact in work, causing musculoskeletal strain increasing the possibility of fatigue and insufficient tissue recovery period leading to pain and discomfort.[3] Work-related musculoskeletal disorders are injuries or disorders occurred to the muscles, nerves, tendons, joints, cartilage, and spinal discs.[4]

The process of weaving encompasses a multitude of activities involving repeated movement of upper and lower limbs to operate pedals and shuttles, with arms rose away from the body. As a result of this weaving and other handloom activities become a high risk occupation for developing musculoskeletal disorders.[5]

Work related musculoskeletal disorders adversely affect individual worker and business activities, including reducing work productivity and well-being of workers, increasing medical cost, decreasing job satisfaction, degrading the quality of the physical and mental dimensions of health, and causing daily activity limitation.[6]

The purpose of this study was to find the prevalence of work related musculoskeletal disorders among women working at Himadri Hans, Handloom Dinapani, Almora, Uttarakhand.

METHODOLOGY

Study Design

The study is a survey study of 12 months duration to find the prevalence of WMSD among women working at handloom.

Sampling Technique:

women workers from Himadri Hans Handloom Deenapani Almora were selected according to the inclusion and exclusion criteria .All subjects signed a consent form and were ready to take part in the study. Subjects were given instructions regarding procedure.

Source of data: 160 women workers of himadri hans, handloom, dinapani, almora ,uttarakhand were taken as subjects of the study.

Eligibility

Inclusion Criteria

- Women workers age 19-55 years of Himadri Hans handloom Deenapani Almora.
- Complaint of non- specific pain at various body regions.

Exclusion Critera

- Pregnant and lactating women.
- Recent Hospitalisation.
- Spinal surgeries.
- Evidence of a specific pathological condition

Procedure

The subjects were introduced to the study followed by signing of consent form, general assessment regarding the socio-demographic data(name, gender, age, education level ,post medical history, & personal history, family history were gathered in participants assessment form.

Standardised Nordic musculoskeletal questionnaire was used for evaluation of musculoskeletal problems in body regions.

The questionnaire consisted of a series of objective questions with yes or no response and some were in multiple choice questions.

RESULTS

The entire questions were scored and submission of all scores was done. The collected data was analysed by IBM SPSS Statistics 23.

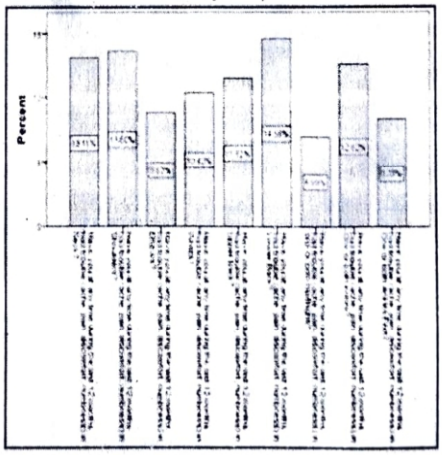

Fig 1: Bar Chart representing percentage of respondents who had trouble in last 12 months that prevented from doing normal work.

Table 1: Responses of trouble in last 7 days

	Responses	
	N	Percent
Have you had trouble at any time doing the last 7 days in Neck?	39	13.3%
Have you had trouble at any time doing the last 7 days in Shoulders?	37	12.6%
Have you had trouble at any time doing the last 7 days in Elbows?	23	7.8%

Original Research Paper

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Physiotherapy

PREVALENCE OF KNEE DYSFUNCTION AND ITS ASSOCIATED FACTORS IN HOUSEMAIDS IN PATIALA.

Dr. Richa Agrawal* Assistant Professor *Corresponding Author

Harshita Raghu Researcher

Lovish Gupta Reseacher

ABSTRACT The knee is a complex modified hinge joint. The stability of joint is provided by various soft tissue structures like the anterior and posterior cruciate ligaments, the medial and lateral collateral ligaments, the menisci, the capsule and the muscles crossing the joint The majority of housemaids are women, poor and immigrants with minimal education and has to work like cleaning, washing utensils, clothes, cooking etc. Factors like travelling distance, BMI, parity etc may have effect on the knee pain. The main objective is to find the prevalence of knee dysfunction and its associated factors in housemaids in Patiala. **Methods:** Based on inclusion and exclusion criteria 100 subjects were taken for the study, subjects fill the questionnaires about Knee injury and Osteoarthritis Outcome Score, and self made questionnaire on factors affecting knee pain. **Result:** The subjects were assessed on the basis of Knee injury and osteoarthritis outcome score (KOOS) scoring in which 39.1% of the subjects had no problem in knee (Frequency=52), 33.1% had mild problem (Frequency=44), 18% had moderate problem (Frequency=24), 8.3% had severe problem (Frequency=11) and 1.5% had extreme problem (Frequency=2). **Conclusion:** 39.1% of subjects had no problem in knee while, 33.1% had mild problem, 18% had moderate problem, 8.3% had severe problem and 1.5% had extreme problem.Association of knee pain with factors is significant for working hours, travelling distance, number of deliveries, Body Mass Index and economical status

KEYWORDS : Knee dysfunction, Osteoarthritis, Housemaids, KOOS

INTRODUCTION

The knee joint is known to be a complex modified hinge joint having movements flexion and extension about the sagittal plane, varus and valgus rotation about the frontal plane and facilitates the medial rotation at the end of the knee flexion and the lateral rotation at the terminal extension of the knee at the transverse plane.[1] The stability of joint is provided by various soft tissue structures like the anterior and posterior cruciate ligaments, the medial and lateral collateral ligaments, the menisci, the capsule and the muscles crossing the joint.[2] Goldblattet al[3] stated that a thorough knowledge of the complex anatomy and biomechanical function of the structures of the knee is essential to make accurate clinical diagnoses and decisions regarding the treatment of the multiple-ligament-injured knee.

Ferreira AH[4] observed that continuous knee pain and osteoarthritis has negative impact on psychic domain and quality of life. According to Oxford[5], a housemaid is a girl or woman who is a servant employed to do house work such as sweeping, cleaning utensils, washing clothes, cooking, caring of children and such other work. Waerness[6] in his study says, given the nature of housework, Women's work is comprised of many small tasks like cooking, moping, cleaning activities, washing clothes, ironing clothes, washing utensils which on the whole cannot be concentrated according to ordinary principles of effective allocation of time. Housemaids are part of community who leave their primary living place or their families because of challenging life events that obligate them to search other alternatives to survive or for perceived better life. The majority of housemaids are women, poor and immigrants with minimal education[9]. Body Mass Index[10], is defined as a person's weight in kilograms divided by the square of the person's height in meters (kg/m2). Sharma Let al[11] stated BMI has negative effect on knee particularly in women. It shows an association between an increased body mass index (BMI) and knee osteoarthritis.

METHODOLOGY

Sample

A total of 133 subjects were taken from in and around Patiala for the survey on the basis of inclusion and exclusion criteria having age 21-40 years and with 3 years of work.

Procedure

Research was survey in nature and 150 subjects were taken out of which 17 were excluded based on inclusion and exclusion criteria and 133 subjects were selected by Snowball sampling from different areas of Patiala. Informed consent was taken from 133 subjects. Subjects were interviewed and assessed on a self made assessment form to fulfill the inclusion and excluded on the basis of special tests like Anterior Drawer test, Posterior Drawer test, Patellar Grind test, Varus stress test, Valgus stress, Apley's compression test, Apley's distraction test and Mc Murray test. Then the subjects filled questionnaire Knee Injury and Osteoarthritis Outcome Score about knee to find about the prevalence of dysfunction and how it affect the quality of life of such subjects. After that another self made questionnaire was used to find out the effect of factors like parity, hours of working, type of work, mode of travel. Then data was analysed and result was obtained.

RESULTS

The subjects were assessed on the basis of Knee injury and osteoarthritis outcome score (KOOS) scoring in which 39.1% of the subjects had no problem in knee (Frequency=52), 33.1% had mild problem (Frequency=44), 18% had moderate problem (Frequency=24), 8.3% had severe problem (Frequency=11) and 1.5% had extreme problem (Frequency=2)

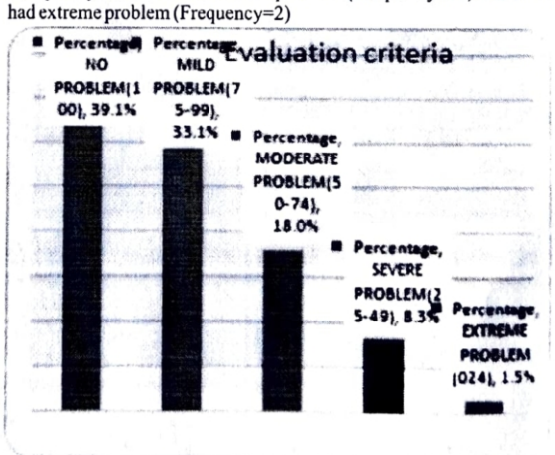

Figure 1: Knee injury and osteoarthritis outcome score (KOOS) scoring.

The chi-square test was used to determine the association between the score levels and selected demographic variables. It shows the association of scores of Knee injury and osteoarthritis outcome score and demographic variables. There was significant association of Knee injury and osteoarthritis outcome score with demographic variable age with Chi square value of 30.677. Knee injury and osteoarthritis outcome score was also significantly associated with factors like Working hours, Travelling distance, Number of deliveries, Body Mass Index and Economical status with Chi square value of 30.044, 33.808, 60.249, 55.458 and 47.126 respectively. Factors like Type of work and

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Research Article

Effect of Chemical Herbicides and Mechanical Practices on Yield, Yield Attributes and Economics of Barley (*Hordeum vulgare* L.) in Valley Conditions of Dehradun

Kuldeep Kumar, Anil Kumar, Mayank Sharma, Abhishek Kumar Tyagi, Arnab Khanda* and C. S. Pandey

Department of Agriculture, Dolphin (P.G.) Institute of Biomedical & Natural Sciences, Manduwala, Dehradun - 248007

Abstract

The field study was taken on barley cv. RD-2035 at Dolphin (P.G.) Institute of Biomedical & Natural Sciences, Manduwala (Dehradun) during *Rabi* season 2020-21 using 8 treatments viz. Clodinafop @ 50 gm a.i./ha at 25 DAS (T_1), Clodinafop @ 50 gm a.i./ha at 25 DAS + 1 hand weeding at 50 DAS (T_2), 2,4 D @ 500 gm a.i./ha at 25 DAS (T_3), 2,4 D @ 500 gm a.i./ha at 25 DAS + 1 hand weeding at 50 DAS (T_4), Metribuzin @ 180 gm a.i./ha at 25 DAS (T_5), Metribuzin @ 180 gm a.i./ha at 25 DAS + 1 hand weeding at 50 DAS (T_6), Two hand weeding at 25 DAS and 50 DAS taken as weed free (T_7) and weedy check (T_8) in Randomized Block Design replicated thrice. Results interpreted that treatment T_7 had superior results in yield & yield parameters viz. number of spikes meter^{-2}, ear length, grains ear^{-1}, test weight, grain yield, straw yield, biological yield, harvest index and economics viz. gross returns, net returns and benefit cost ratio than other treatments.

Keywords: Chemical Herbicides, Mechanical Practices, Barley

***Correspondence**
Author: Arnab Khanda
Email: arnabkhanda@gmail.com

Introduction

Barley (*Hordeum vulgare* L.) is an agricultural commodity farmed around the world in subtropical and temperate climates. Barley is one of the earliest cultivated grain crops, and it currently ranks fourth in terms of land and crop global production, behind rice, wheat and maize. It is primarily grown in areas with harsh climate and soil factors. It can endure unfavourable agro-environments such as droughts, alkalinity, salinity, diverse terrain such as flat and hills, rainfed and irrigated conditions due to its hardy nature [1]. Weeds are well known pests that diminish agricultural productivity by competing for nutrients, moisture, light and space with crops. [2] found that depending on the extent of weed infestation, barley yield decreased from 20.9 percent to 58.3 percent in experimental results. The weed flora is altering in a very way that several different forms of weeds are infesting crops at the same time. Because of higher dose required for raising the weed death spectrum, just no herbicide will just able to suppress many different kinds of weeds without causing crop injury. Some weeds like *Cirsium arvense* and *Convolvulus arvensis* are resistant to herbicides that kill grasses, and the use of isoproturon has inflated the intensity of *Anagallis arvensis* in the treated fields [3]. Herbicides combined with mechanical techniques like as hand weeding aid in crop quality management as well. During the *Rabi* season of 1999 and 2000, [4] carried out a 2-year field study to evaluate the effectiveness of two barley genotype and their responses to hand-weeding and spraying of the 2,4-dichlorophenoxy acetic acid (2,4-D) at critical growth stages. In both seasons, there were vast variations in weed quantity and fresh weight among the treatments. Weeding by hand was found to be the most effective way of weed management. Hand-weeding treatment was more effective than 2,4-D applications in suppressing weed growth. Keeping the above facts in view, the present study was conducted to study the effect of chemical herbicides and mechanical practices on yield, yield attributes and economics of barley crop.

Methods and Material

The field trail was conducted during winter (*Rabi*) season 2020-21 at experimental field of Dolphin (P.G.) Institute of Biomedical & Natural Sciences, Manduwala (Dehradun) Uttarakhand on barley cv. RD-2035 with 8 treatments viz. Clodinafop @ 50 gm a.i./ha at 25 DAS (T_1), Clodinafop @ 50 gm a.i./ha at 25 DAS + 1 hand weeding at 50 DAS (T_2), 2,4 D @ 500 gm a.i./ha at 25 DAS (T_3), 2,4 D @ 500 gm a.i./ha at 25 DAS + 1 hand weeding at 50 DAS (T_4), Metribuzin @ 180 gm a.i./ha at 25 DAS (T_5), Metribuzin @ 180 gm a.i./ha at 25 DAS + 1 hand weeding at 50 DAS (T_6), Two hand weeding at 25 DAS and 50 DAS taken as weed free (T_7) and weedy check (T_8). It was conducted in Randomized Block Design and replicated thrice. The climate of Dehradun is moderate with cool winters, warm summers, rainy monsoon and balmy spring due to hilly reason or cooler with increase with altitude. Crop was sown

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Laishram Bikash Singh
M.Sc. Student, Department of Agriculture, Dolphin (PG) Institute of Biomedical & Natural Sciences, Dehradun, Uttarakhand, India

Vikrant
Assistant Professor, Department of Agriculture, Dolphin (PG) Institute of Biomedical & Natural Sciences, Dehradun, Uttarakhand, India

Corresponding Author:
Laishram Bikash Singh
M.Sc. Student, Department of Agriculture, Dolphin (PG) Institute of Biomedical & Natural Sciences, Dehradun, Uttarakhand, India

Effects of seed treatment on termite damage in Wheat crop

Laishram Bikash Singh and Vikrant

Abstract
The research experiment was conducted at Rajawala field which is located near ICFAI University during Rabi season of 2020-21. The experiment consisted of eight treatments (T_1) RDF 100%, (T_2) Seed treatment with *Azotobacter* and 100% RDF, (T_3) Seed treatment with PSB and 100% RDF, (T_4) Seed treatment with *Azotobacter* + PSB and 100% RDF, (T_5) Seed treatment with *Azotobacter* + PSB and 75% RDF, (T_6) Seed treatment with *Azotobacter* + PSB and 50% RDF, (T_7) Seed treatment with *Azotobacter* + PSB + Thaimethoxam 35 FS and 100% RDF, (T_8) Seed treatment with *Azotobacter* + PSB + Chlorpyriphos 20 EC and 100%RDF) arranged in a Randomized Block Design with three replications. The wheat variety used in the experiment was "PBW 226". Total termite infested plants were counted at weekly interval. It was found that treatments have significant effect on termite damage in plants. T_8 (Seed treatment with *Azotobacter* + PSB + Chlorpyriphos 20 EC and 100% RDF) showed minimum termite damage followed by T_7 (Seed treatment with *Azotobacter* + PSB + Thaimethoxam 35 FS and 100%RDF) and the maximum termite damage were observed in T_1 (RDF 100%) followed by T_3 (Seed treatment with PSB and 100% RDF).

Keywords: Insecticides, efficacy, wheat, termite, seed treatment

Introduction
Wheat (*Triticum aestivum* L.) ranks first among world food crops. Wheat is the second most important staple food of India after rice. Its importance comes from using grain as a main source for human and straw as feed for livestock. In India wheat crop is cultivated in Rabi season. It is normally sown during November and harvested between March and April. It is the most important staple food of about billion people (36% of the world population) and it is the most significant cereal food crop in the world.) Wheat crop is India's prime most staple harvest, placed second only to rice. It is mostly consumed in the north and north-west parts of the country. Being rich in protein, vitamin and carbohydrates, it provides a balanced food to millions of people each day. Wheat grown in central and western India is typically hard, with high protein and high gluten content. Having a significant share in consumption of food basket with a 36% share in the total food grains produced from India and ensuring not only food security but also nutrition security, wheat is extensively procured by the government and distributed to a majority of the population; it ensures not only food security but also nutrition security. The cereal is one of the cheapest sources of energy, provides a major share of protein (20%) and calorie intake (19%) from consumption. Wheat is often considered primarily as a source of energy (carbohydrate) and it is certainly important in this respect. However, it also contains significant amounts of other important nutrients including proteins, fiber, and minor components including lipids, vitamins, minerals, and phytochemicals which may contribute to a healthy diet.

Globally, it occupy total 221.1 million hectare area with an annual production of 697.8 million tonnes and average productivity of 3101kg/ha. It is considered one of the most important cereals not only in India but also in the world. India has largest area under wheat (29.58 m ha), but stands second position in production (99.70 MT) after China with the average productivity of 3371 kg / ha. (Anonymous, 2017-18) [1]. Uttar Pradesh, Punjab, Madhya Pradesh, Haryana, Rajasthan, Bihar, Gujarat, and Maharashtra are the states in which wheat is mainly cultivated. Among the different state of India, Uttar Pradesh has first position in area and production. Wheat crop in Uttarakhand state is cultivated on 358 thousand ha area with annual production of 858 thousand tonnes and productivity of 2.39 tonnes / ha during 2012-2013 (Anonymous, 2012-13) [2].

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Rahul Nayam
Department of Agriculture, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India

Pankaj Budakoti
Department of Agriculture, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India

Anuj Gupta
Department of Agriculture, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India

CS Pandey
Department of Agriculture, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India

Hunny Negi
Department of Agriculture, Maya College of Agriculture and Technology, Dehradun, Uttarakhand, India

Corresponding Author:
Rahul Nayam
Department of Agriculture, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India

Performance of paddy straw mulch and herbicides on weeds flora and yield of wheat (*Triticum aestivum* L.) variety HD3086

Rahul Nayam, Pankaj Budakoti, Anuj Gupta, CS Pandey and Hunny Negi

Abstract
A field experiment was conducted at experimental farm of Dolphin (PG) Institute of Biomedical and natural sciences, Dehradun during 2021. To study the effect of paddy straw mulch and herbicides on weed and crop yield of wheat. The treatments were weedy check, hand weeding/weed free, pre-emergence application of Pendimethalin and Isoproturon, post emergence application of Clodinafop propargyl, metsulfuron methyl, pinoxoden, 2, 4-D and paddy straw mulch. *Cynodon dactylon, Chenopodium album, Fumaria parviflora* and *Polygonum aviculare* were the dominant species. The studies envisaged that the wheat crop covered with paddy straw mulch showed better results in terms of weed density at different days, weed control (WCE, WI and Dry weight of weed) and crop growth parameters (spikelet's/tillers, grain yield and straw yield) as compared to the pre-emergence herbicide and post emergence herbicide.

Keywords: Paddy straw, Density, weed flora, WCE, WI, tillers, yield, pendimethalin, clodinafop propargyl, spikelet's

1. Introduction
Wheat (*Triticum aestivum* L.) is the second most important staple cereal food in India, next after rice. The wheat crop is mainly grown in the Northern States and Uttar Pradesh is at top with total production of wheat in India. World wheat production was 731.1 MT. Wheat is sown from the month of September to December in various states of India and harvesting is done from February to May. Weed infestation is very important factor responsible for low yield in wheat. Weeds cause approximately 70% reduction in yield in wheat crop. Weeds not only compete with main crop plants for water, space, nutrients and light but also release some allele chemicals which harm growth of main crop. Weeds not only reduce the yield but also make the harvesting operation difficult. There are many methods like cultural and chemical methods to control weed. But on long term usage they have side effects on the soil and environment. Therefore, the need was felt to study the effect of paddy straw mulch on weed and crop yield of wheat, as they are easy to apply, eco-friendly and cheap.
The objective of this study was to evaluate the effect of Paddy straw mulch in comparison to other weed control strategies like hand weeding, pre- emergence herbicide and post emergence herbicides.

2. Materials and Methods
The mulching experiment was initiated to evaluate its effect on weed control and crop growth parameters of wheat at Dolphin (Pg) institute of Biomedical and natural sciences, Manduwala, Dehradun farm in winter season during 2021-2022. data were collect one year season. The experiment was laid out in RBD with plot size of 5 x 3m and the row spacing 20 cm. The variety use was HD 3086. The seed rate was 125 kg ha^{-1} due to late sowing. Chemical fertilizer was applied at the rate of Nitrogen (90 kg ha^{-1}), Phosphorus (60 kg ha-1), potash (40 kg ha^{-1}). Nitrogen was given in two split doses of basal and foliar application into two equal halves. The treatment combinations were weedy check, weed free/hand weeding, pre-emergence application of Pendimethalin 30% EC 1 kg ha^{-1} and Isoproturon 75% WP 1 kg ha^{-1}, post emergence application of Clodinafop propargyl 75% WP @ 0.4 kg ha^{-1}, Methsufuron methyl 20%WP 0.004 kg ha^{-1}, Pinoxoden 5.1% EC 0.045kg ha−1, 2,4D 58% SL 0.5kg ha^{-1} and one paddy straw mulch applied @ 5-6 t ha-1. 3-step irrigation was done in the field.

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G6PD Deficiency in Dehradun Population

21-22

[1]Rashmi, [2]D.K.Awasthi, [3*]Gyanendra Awasthi

[1]Department of Medical Lab Technology, Sanskriti Univeristy, Mathura, India
[2]Department of Chemistry, JNM (PG) College, Lucknow, India
[3]Department of Biochemistry, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, India
*Corresponding Author E-mail: gyanendra_kkc@rediffmail.com

Abstract **- *Glucose-6-phosphate dehydrogenase (G6PD)* deficiency increases the vulnerability of erythrocytes to oxidative stress. Clinical presentations include acute hemolytic anemia, chronic hemolytic anaemia, neonatal hyperbilirubinemia, and an absence of clinical symptoms. The present study on incidence of *Glucose 6 phosphate dehydrogenase* was carried out in population of Dehradun region. The study of *glucose 6 phosphate dehydrogenase* enzyme on the 300 cases was done with the help of commercially available kit for detecting erythrocyte *glucose 6 phosphate dehydrogenase enzymes*. Present study concludes that *G6PD* deficiency is prevalent in population of Dehradun, region, it is of mild type. It is recommended that every subject should get tested for G6PD deficiency and carry G6PDstatus card while visiting doctor.**

Keywords: *Glucose-6-phosphate dehydrogenase (G6PD)* deficiency, oxidative stress, anaemia.

I. INTRODUCTION

Glucose-6-phosphate dehydrogenase (G6PD) deficiency increases the vulnerability of erythrocytes to oxidative stress. Clinical presentations include acute hemolytic anemia, chronic hemolytic anaemia, neonatal hyperbilirubinemia, and an absence of clinical symptoms. The disease is rarely fatal.

G6PD deficiency occurs with increased frequency throughout Africa, Asia, the Mediterranean, and the Middle East. In the United States, black males are most commonly affected, with a prevalence of approximately 10 percent. Prevalence of the deficiency is correlated with the geographic distribution of malaria, which has led to the theory that carriers of G6PD deficiency may incur partial protection against malarial infection. **(Ruwende C and Hill A; 1998; Mockenhaupt FP *et al*; 2003)** Cases of sporadic gene mutation occur in all populations.

The gene mutations affecting encoding of G6PD are found on the distal long arm of the X chromosome. More than 400 mutations. Have been identified, most being missense mutations. Most of the variants occur sporadically, although the G6PD Mediterranean and the G6PD A– variants occur with increased frequency in certain populations **(Beutler E; 1994).**

The diagnosis of G6PD deficiency is made by a quantitative spectrophotometric analysis or, more commonly, by a rapid fluorescent spot test detecting the generation of NADPH from NADP. The test is positive if the blood spot fails to fluoresce under ultraviolet light. In field research, where quick screening of a large number of patients is needed, other definitive testing to confirm an abnormal result. Tests based on polymerase chain reaction detect specific mutations and are used for population screening, family studies, or prenatal diagnosis.6In patients with acute hemolysis, testing for G6PD deficiency may be falsely negative because older erythrocytes with a higher enzyme deficiency have been hemolyzed. Young erythrocytes and reticulocytes have normal or near-normal enzyme activity. Female heterozygotes may be hard to diagnose because of X-chromosome mosaicism leading to a partial deficiency that will not be detected reliably with screening tests.**(Reclos GJ *et al*;2007).** G6PD deficiency is one of a group of con-genital hemolytic anemias, and its diagnosis should be considered in children with a family history of jaundice, anemia, spleno-megaly, or cholelithiasis, especially in those of Mediterranean or African ancestry. 13Testing should be considered in children and adults (especially males of African, Mediterranean, or Asian descent) with an acute hemolytic reaction caused by infection, exposure to a known oxidative drug, or ingestion of fava beans. Although rare, G6PD deficiency should be considered as a cause of any chronic nonspherocytic hemolytic anemia across all population groups. Newborn screening for G6PD deficiency is not performed routinely in the United States, although it is done in countries with high disease prevalence. The World Health Organization recommends screening all newborns in populations with a prevalence of 3 to 5 percent or more in males.

Neonatal Hyperbilirubinemia: The prevalence of neonatal hyperbilirubinimia is twice that of the general populationin males who carry the defective gene and in homozygous females. It rarely occurs in heterozygous females. **(Corchia C *et al*; 1995).**

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Review Article

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WJPMR

IRON DEFICIENCY ANEMIA: A REVIEW

Vineet Vishnoi*[1], D. K. Awasthi[2] and Gyanendra Awasthi[3]

[1]Department of Chemistry, DAV (PG) College, Dehradun.
[2]Department of Chemistry, JNM(PG) College, Lucknow.
[3]Department of Biochemistry, DIBNS, Dehradun.

***Corresponding Author: Vineet Vishnoi**
Department of Chemistry, DAV (PG) College, Dehradun.

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ABSTRACT

Anaemia is a condition in which the number of red cells necessary to meet the body's physiological requirements is insufficient .Iron deficiency anaemia is the one of the common cause of anaemia worldwide. This review will primarily focus on magnitude of the problem, causes and solutions and role of Iron studies in the diagnosis of Iron deficiency anaemia.

INTRODUCTION

Iron comprises 5% of the earth's crust. Its redox states make iron useful for evolving biological processes. Growing lists of biomolecules that bind or incorporate iron are being catalogued according to their structural similarities. Four general categories of proteins contain iron:

(1) mononuclear iron proteins (e.g., superoxide dismutase),
(2) diiron-carboxylate proteins (e.g., ribonucleotide reductase, ferritin),
(3) iron-sulfur proteins (e.g., aconitase), and
(4) heme proteins (e.g., hemoglobin).

Among these four categories, the first three protein groups are detected at lower levels, but they are functionally important. Hemoglobin is the most abundant iron-containing protein in humans. More than one-half of total-body iron is contained within hemoglobin. Based on the location of hemoglobin in erythrocytes, anemia is a characteristic trait of iron deficiency. Despite iron's plentifulness on earth, iron deficiency is extremely common in humans, and is the most prevalent cause of anemia worldwide. To more fully understand iron deficiency anemia, consideration must be directed toward concepts of iron supply and demand for the production of erythrocytes. Erythropoiesis related demands for iron are created by three variables: tissue oxygenation, erythrocyte turnover, and erythrocyte loss from hemorrhage. Tissue oxygenation requirements and erythrocyte production generally remain stable during adulthood in the absence of hemorrhage, disease, or altered physical activity. As such, iron homeostasis (Fig. 1) also remains stable.

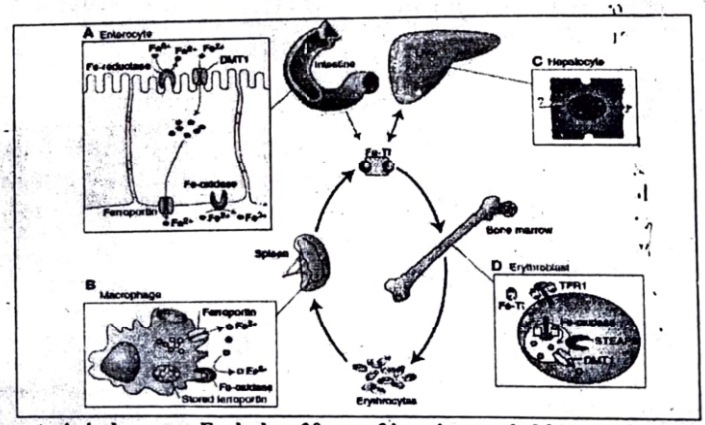

Figure 1: Iron homeostasis in humans. Each day, 20 mg of iron is recycled between circulating transferrin (Fe-Tf) and erythrocytes. This recycling pathway is supported by (A) intestinal iron absorption, (B) erythrophagocytosis, (C) hepatic iron stores, and (D) iron incorporation into hemoglobin.

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RED CELL VARIABLES IN YOUNG FEMALE POPULATION OF DEHRADUN REGION

Vineet Vishnoi[1], Upsana Raturi[2], D. K. Awasthi[3] and Gyanendra Awasthi*[2]

[1]Department of Chemistry, DAV (PG) College, Dehradun.
[2]Department of Biochemistry, DIBNS, Dehradun.
[3]Department of Chemistry, JNMPG College, Lucknow.

***Corresponding Author: Gyanendra Awasthi**
Department of Biochemistry, DIBNS, Dehradun.

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ABSTRACT

Background: This study aimed to assess the basic red blood cell variables and hematological indices in Young Female population of Dehradun region. **Methods:** In this cross-sectional study, blood samples of 30 female volunteers studying in Dolphin Institute, Dehradun were collected from May to August, 2022. Capillary blood samples were drawn and following hematologic parameters were measured: the red blood cell count (RBC), hemoglobin concentration (Hb), hematocrit level (Hct) and hematological indexes: mean corpuscular volume (MCV), mean hemoglobin concentration (MCH) and mean corpuscular hemoglobin concentration (MCHC). **Results and Conclusion:** All the Hematological parameters of young female students is found to be within the reference range of Indian healthy population and none of the parameter was too high or too low. Thus, as per our study the young female students were having normal hematological profile. The main Drawback of the study was that sample size was low and larger sample size is required in order to find out the reference range in the above region.

KEYWORDS: Red blood cells, Hemoglobin, Haematological indices, Anemia.

INTRODUCTION

Having excellent knowledge of the referent values of red blood cells (RBCs) variables with children and adolescents is profoundly important for proper interpretation of the results of complete blood count. Reference values for RBCs variables are lower with children in comparison with the adults.[1] Several studies which investigated hematologic parameters have been done in different populations, racial, ethnic and gender subgroups, even in different seasons.[2-5] In most of these studies, age, ethnic and sex differences were significant and therefore it was stressed the need for establishing normal reference values for different populations.

RBC variables are fairly stable through adult life, but significant differences exist in the pediatric population. The new born infant, older child, and adult show profound differences.[6] Because hemoglobin level and red cell indices vary with age, it is crucial to take as reference standards that change in each period of life, from fetal life to adolescence. Adult value will be reached gradually during the second part of childhood, around 15 yr of age.[7] To ensure that interpretation of hematology results in children are appropriate, the laboratory has to have established age-specific reference ranges.[8]

The sex differences in hemoglobin level in adults are well documented, and the underlying mechanisms are probably a direct effect of sex hormones, both estrogen and androgens on erythropoiesis.[9] "In pre-pubertal humans no major differences can be found between the sexes in red blood cell count or hemoglobin and serum ferritin concentrations".[10] "The difference in hematological variables between sexes emerges after onset of menstruations and persistent until 10 yr after the menopause".[9,10] Menstruation and nutritional intake are principal reasons for lower values of hemoglobin and iron of women regarding men.[11]

The total amount of hemoglobin increases more in boys than in the girls in the period of puberty.[12] Among children 6–14 yr old the values increased from about 12 to about 14 gr per 100 ml of blood. In girls between 14 and 20 yr of age, the hemoglobin values decreased slightly, reaching 13gr/100ml. In boys of corresponding ages, there was an increase to about 15gr/100ml. In both sexes, these values were attained at about 20 yr of age and remained characteristic of the third decade of life.[13]

The aim of this paper was to determine the values of RBC variables in female young population studying in Dehradun region.

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Bio-flocculation of oleaginous microalgae integrated with municipal wastewater treatment and its hydrothermal liquefaction for biofuel production

Krishna Kumar Jaiswal [a,b], Vinod Kumar [c,d,*], Prateek Gururani [e,f], Mikhail S. Vlaskin [f], Afreen Parveen [c], Manisha Nanda [g], Anna Kurbatova [h], Pankaj Gautam [c], Anatoly V. Grigorenko [i]

[a] Institute for Water and Wastewater Technology, Durban University of Technology, Durban, 4000, South Africa
[b] Department of Green Energy Technology, Pondicherry University, Puducherry, 605014, India
[c] Algal Research and Bioenergy Laboratory, Department of Life Sciences, Graphic Era (Deemed to Be University), Dehradun, Uttarakhand, 248002, India
[d] Peoples' Friendship University of Russia, (RUDN University), Moscow, 117198, Russian Federation
[e] Department of Biotechnology, Graphic Era (Deemed to Be University), Dehradun, Uttarakhand, 248002, India
[f] Joint Institute for High Temperatures of the Russian Academy of Sciences, 13/2 Izhorskaya St, Moscow, 125412, Russia
[g] Department of Biotechnology, Dolphin (P.G.) Institute of Biomedical and Natural Sciences, Dehradun 248007, India
[h] Department of Environmental Monitoring and Forecasting Ecological Faculty, Peoples' Friendship University of Russia, (RUDN University), Moscow, 117198, Russia

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ABSTRACT

The cultivation of microalgae integrated with the treatment of wastewater has been developed for the generation of sustainable biomass and the remediation of wastewater. However, harvesting microalgae biomass from the culture system remains an energy-intensive challenge. In this research work, we have investigated the integration of microalgae culture with municipal wastewater (MWW) treatment and biomass bio-flocculation by filamentous fungi. A drop in the high nutrient load in terms of TKN (95.40%) and IP (97.11%) was noticed at 14 days in MWW integrated with microalgae culture. Also, the synergistic influence of microalgae and indigenous bacteria in MWW leads to the deduction of BOD (81.78%), COD (83.67%), and TOC (70.26%). The bio-harvested biomass was used to produce biofuel via hydrothermal liquefaction (250–350 °C). The natively adapted filamentous fungi (*A. niger* Ind-Jiht-5) were isolated from the substrate of the wastewater habitats. The results have shown that microalgae have adapted well to MWW and have improved biomass production by approximately 29%. This bio-flocculation denotes a facile bio-harvesting technique with a maximum efficiency of ~90% in 24 h using granulated filamentous fungi. Moreover, the bio-harvested microalgae biomass has been accompanied by a lipid increase of ~26%. The maximum yield of bio-oil (~17%) in the bio-harvested microalgae biomass was obtained at 350 °C. The C (~61%) and HHV (~29%) content of the bio-oil was greater than the biomass and biochar. The bio-flocculation approach has demonstrated an efficient and sustainable technique to harvest biomass to produce renewable biofuels *via* hydrothermal liquefaction.

* Corresponding author at: Algal Research and Bioenergy Laboratory, Department of Life Sciences, Graphic Era (Deemed to Be University), Dehradun, Uttarakhand, 248002, India.
E-mail address: vinodkdhatwalia@gmail.com (V. Kumar).

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Plant Gene

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CRISPR-Cas9 mediated genome tailoring to improve nutritional quality and shelf life in crops: A review

Manami Chakravorty [a], Manisha Nanda [a], Neha Arora [b], Shalini Singh [a], Vinod Kumar [c e], Sandhya Deshwal [d]

[a] Department of Biotechnology, Dolphin (PG) Institute of Biomedical & Natural Sciences, Dehradun 248007, India
[b] Department of Cell, Microbiology and Molecular Biology, University of South Florida, USA
[c] Department of Life Sciences, Graphic Era (Deemed to be University), Dehradun, Uttarakhand 248002, India
[d] Polymer, Plastics and Composites Divison, CSIR-Central Building Research Institute, Roorkee 247667, India
[e] Peoples' Friendship University of Russia (RUDN University), Moscow 117198, Russian Federation

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Abstract

The ever-increasing population, combined with the agriculture sector's ongoing challenges, necessitates the use of plant genome modifying technologies to improve nutritional quality as well as crop yields. In this regard, the CRISPR/Cas system has evolved into a game-changing genetic modification technique for increasing crop yield and pest resistance in a variety of agricultural crops. In prokaryotes, the CRISPR/Cas system serves as a line of defense against pathogens. In the genetic engineering system, the protein Cas9 endonuclease and a guide RNA reaches the target site and modifies the target gene. This review focuses on the CRISPR/Cas9 system's action pathway, recent advancements, applications, and future prospects in redesigning the plant genome for crop improvement.

Introduction

According to the World Population Prospects 2019: Highlights (United Nations, 2019) the ever-increasing world population is likely to reach 8.5 billion and 9.7 billion by 2030 and 2050, respectively. This suggests

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Sustainable algal biorefineries: capitalizing on many benefits of GABA

Neha Arora • Manisha Nanda • Vinod Kumar

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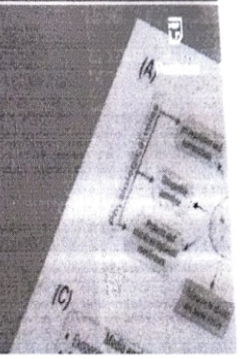

Abstract

We provide on biological and metabolic insights into the complex role of γ-aminobutyric acid (GABA) in fine-tuning algal metabolism to improve productivity. Genetic engineering strategies to improve algal GABA biosynthesis are also discussed. Our aim is to provide an understanding of how GABA can be used for cost-competitive algae-based biofuels and bioproducts.

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OBSERVATIONAL STUDY OF HUMAN SPERM SURVIVAL & MOTILITY IN TWO DIFFERENT MEDIUMS: A COMPARABLE ANALYSIS

Amar Chaudhary[1], Ram Dayal[2*], Deepika Verma[3], Kamla Singh[4], Jeetendera Verma[5]
[1]PG Scholar Biotechnology, Dolphin PG Institute of Biomedical and Natural Sciences, Dehradun, UK, INDIA
[2]Director and Scientist Sr. Embryologist, IRCC IVF Centre, Panchkula, Haryana, INDIA
[3]UG Scholar (B.Sc. Medical), Sector-14, Government Postgraduate College for Women, Panchkula, HR, INDIA
[4]Consultant in Fertility (IRCC Hospital) and Ex. DGHS, Haryana, INDIA
[5]PG Scholar Zoology, ANDK P.G. College, Babhnan, Gonda, U.P, INDIA

Corresponding Author Email id: ramdayal2509@gmail.com[2*]

ABSTRACT:

Objective: To compare the rate of human sperm survival and motility in two different mediums (HTF and CSC) during infertility treatment in sibling's sample. **Methodology:** In this two-way observational research, the semen quality for infertility therapy was assessed in 45 patients who received infertility treatment at the Institute of Reproduction and Child Cares & IRCC IVF Center in Panchkula, Haryana. The study was conducted between December 2021 and June 2022. The semen analysis, preparation of semen, and survival of sperm were considered for 20 of these patients (44.44%). The remaining 12 patients (26.66%) had poor sperm counts and motility and were excluded from the study. Moreover, 13 (28.88 %) patients, did not agree to give consent for this study and they were excluded from this review. Semen planning was done in view of sperm motility and count . We mixed one pellet in the 2-ml HTF medium and another one in 2 ml CSC medium and observe sperm survival and motility after 12 hours of sperm preparation in sibling's semen sample also, recorded the sperm endurance and motility. Results: We saw that sperm endurance and motility were 66.40 % in HTF medium and 84.25 % in CSC medium. According to the results of the comparison between HTF and CSC, there was a 17.85 % difference in sperm survival and motility. **Summary:** Based on the results of this study, the sperm's survival and motility rates are higher in CSC medium than HTF medium. In order to improve the survival and motility of sperm, more accurate and reliable methods are required.

Keywords: CO2 Incubation, Sperm Survival, Sperm Motility, HTF Medium, CSC Medium and Semen Analysis

Introduction:

There are approximately 15% of couples worldwide who suffer from infertility due to male factors alone or a combination of male and female factors, which contributes to 50% of cases (Zegers-Hochschild F, et. al, 2017). A pair is deemed infertile if they have engaged in unprotected sexual activity for at least a year without succeeding in conceiving naturally (TTP > 12 months, WHO, 2010 & 2021). Over the past few decades, the incidence of infertility in India has increased from 30% to 50% (Niharika Tripathi, 2011) due to late marriage, life style, low sperm count, poor sperm morphology, poor sperm motility, and poor sperm survival rate. In some cases, the ejaculate contains no sperm (azoospermia) and surgically sperm take from the testes (called TESA- testicular sperm aspiration). Sometimes the ejaculate contains 100% immotile

RESEARCH ART

Enhancement of Carbon Assimilates and Macronutrients in Legumes under Elevated CO_2 Concentration

Sonali Mehrotra[1]*, Karunaker Prasad Tripathi[2]

DOI: 10.18811/ijpen.v8i01.06

Abstract

Impact of elevated carbon dioxide (Free Air Carbon dioxide Enrichment) was studied on the plant chlorophyll, plant growth, plant macronutrients, total starch, total carbohydrate and the activity of phosphoenol pyruvate carboxylase (Pep C) enzymatic assays in leaves, pods and seeds in leguminous plant *Cyamopsis tetragonoloba*. Plants of *Cyamopsis tetragonoloba* (C_3) were exposed to different atmospheric CO_2 concentrations 420 ± 20 ppm (ambient) and 550 ± 20ppm (elevated). An average increase in the plant total chlorophyll (+39.17%), total starch (+43.73%, +25.44% and +26.35% in leaves, pods, and seeds), sucrose (+69.77%, +22.27% and +33.77% in leaves, pods and seed) and total carbohydrate (+58.88%, +30.54% and +28.38 % in leaves, pods and seeds) content were found in plant grown under elevated condition when compared to ambient counterpart. More over overall plant growth (+40% height and +25% biomass) increased in e[CO_2] concentration. Plant total nitrogen (N) content decreased (−12.55% in leaves) under the elevated condition where as total phosphorus (P) decreased (−3.15% in leaves) along with total potassium (K) (−46.63% in leaves). In soil, total potassium (+60.23%) and phosphorous (+48.88%) were found to increase with (−16%) decrease in soil nitrogen content. In seed total nitrogen content increased (+18.15%) on an average with no significant change in total potassium and phosphorus content under e[CO_2]. Phosphoenolpyruvate carboxylase enzyme (Pep C) (+139.5% in leaves) activity and total organic carbon (TOC) (+19.12%, +17.85% in leaves and seeds) increases in elevated concentration thus promoting and indicating higher photosynthesis via enhanced CO_2 fixation. Thus our studies showed that e[CO_2] positively promotes sugars, carbohydrates synthesis, translocation and partitioning in plant tissues and enhanced macronutrients level in leaves and seeds tissue which is contradictory to other C_3 plants. Thus e[CO_2] works as the boon for *Cyamopsis* varieties and the seeds are nutritionally rich, healthy, balanced in proteins and carbohydrates (C/N) and so these varieties have future implication for industrial use in the agricultural country like India.

Keywords: Pep C, *Cyamopsis tetragonolaba*, NPK, TOC, e[CO_2], a[CO_2].

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Introduction

Plant growth and biomass contrast between elevated atmospheric carbon dioxide (eCO_2) concentration and current ambient concentration (aCO_2) that affects the plant tissue biochemistry. Climate change, plant growth, plant macro and micronutrients, carbohydrates, sugars and their interactive effects are the future challenges for plant biologists and physiologists. The concentration of carbon dioxide is increasing globally at an alarming rate and plant adaptation to changing carbon dioxide concentration is a major scientific problem. Various human anthropogenic activities, industrialization and emission of carbon dioxide, methane, halocarbons (CFCs) and N_2O are the major sources of this abrupt increase in surface warming and climate change (IPCC 2013). Previous studies demonstrated that the concentration of atmospheric carbon dioxide was 280ppm before industrialization in the 19th century and is 400ppm in 2015 and is expected to reach 450ppm-600ppm by the year 2050 (IPCC 2007) and 650ppm to 900ppm by 2100.

Now it is interesting and challenging to understand how the plant will behave and adapt to this rapidly changing carbon dioxide concentration and predicting about their ability to adapt, is the primary step in understanding while keeping in mind about all multiple interacting factors globally and their impact on the ecosystem.

Previous experiments being conducted and earlier studies reveal that although carbon dioxide elevation stimulates and promotes biomass and growth enhancing responses in some leguminous varieties it also showed a neutral effect on some varieties. In the last two decades, it was being summarized by different researchers about the aspects of the main effects of growing legumes at elevated CO_2. Among them, improvements of photosynthetic rates and increases in vegetative growth in short-term experiments are highlighted without emphasizing much on long term exposure basis experimental plans. However, the legume responses to elevated CO_2 are strongly modulated by many other such as excess temperature, water, and nutrient availability, etc. The increased biomass and growth in plant is

[1]Department of Life Science, Uttarakhand Technical University, Suddhowala, Chakarata Road, Dehradun, Uttarakhand, India,

[2]Department of Botany, Dolphin (PG) Institute of Biomedical and Natural Sciences, Manduwala, Chakarata Road, Dehradun, Uttarakhand, India.

***Corresponding author:** Sonali Mehrotra, Department of Life Science, Uttarakhand Technical University, Suddhowala, Chakarata Road, Dehradun, Uttarakhand, India, Email: sonali.mehrotra412@gmail.com,tripathikp2001@rediffmail.com.

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SHORT COMMUNICATION

JOURNAL OF NON-TIMBER

Biodiversity of Oak (*Quercus leucotrichophora*) dominated forest stands in Garhwal Himalaya, Uttarakhand, India

Vikaspal Singh[1]✉, Sunil Prasad[2] and Dhanpal Singh Chauhan[3]

[1]*Department of Forestry, Dolphin (PG) Institute of Bio-medical & Natural Sciences, Manduwala, Dehradun- 248007, Uttarakhand, India*
[✉]vikaspals@gmail.com

[2]*Ecology & Biodiversity Services (EBS), Indraprasth, Lane-1, Ring Road, Dehradun- 248007, Uttarakhand, India*
[3]*Department of Forestry & Natural Resources, HNBGU, Srinagar, Garhwal- 246174, Uttarakhand, India*

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Altitudinal diversity, Genera, Gradient, Indian Himalayan region, Wildlife

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ABSTRACT

Present study was conducted from warm temperate zone to cold temperate zone covering the altitudinal ranges of 1500 to 2500 m and to study the diversity of plant species in the oak stands of Garhwal Himalaya, Uttarakhand. The altitudinal diversity represents good number of genera and family at all Oak stands, many of them useful in various ways.

INTRODUCTION

About 45% of geographical area of Uttarakhand is under forest cover and a major portion of this forest cover is distributed between 1000-3000 m of altitudinal ranges (ISFR, 2021). Various studies reported a number of trees, shrubs, herbs and climbers of ecological and economical potential. Indian Himalayan Region represents the unique biological diversity (Dhar, Rawal & Samant, 1997; Maikhuri, Rao & Semwal, 2001). It includes around 9000 species of angiosperms and is considered hotspot of biodiversity. About 3470 species are considered exclusively endemic to the Himalayas (Kumar et al., 2001). Oaks (*Quercus* species) are among the dominant vascular plants of the Himalayas, growing from the subtropical to the sub-alpine zones. They play an important role in maintaining ecosystem stability, also, protect soil erosion and local biodiversity. They are also one of the most over-exploited species and fail to regenerate adequately in disturbed or undisturbed natural habitats (Shrestha, 2003). *Quercus leucotrichophora* is a moderate or large sized evergreen tree which is found in North western Himalayan region from Kashmir to Nepal between 1000-2400 m. It plays subsistence role in the economy of rural population, being mainly used as fodder, fuelwood and for making agricultural implements (Gautam & Bhandari, 2006).

In the Garhwal Himalaya various workers have explored the flora, fauna and their potential importance and different uses. The Kedarnath valley of Garhwal Himalaya, was accessed for ethno botanical study, wild edible plant resources and plant diversity respectively (Prasad, Sharma & Kumar, 2021a,b; Prasad & Sharma, 2018; Rawat et al., 2013). The phytomedicine and medicinal values of plant species have also been documented in the region of Garhwal Himalaya (Tiwari, Ballabha & Tiwari, 2010). On the other hand, studies carried out by Singh et al. (2021); Prasad, Sharma and Kumar (2021a,b); Ahmed et al. (2018); Ahmed, Bargali and Khan (2019); Joshi and Bhatt (2013); Naithani and Bhatt (2012); Singh, Chauhan and Dasgupta (2019); Singh et al. (2015) in different parts of Garhwal Himalaya, demonstrate greater faunal diversity associated with different forest composition.

In any natural forest, the existence of trees, shrubs, herbs, climbers, grasses, etc. determines the sustainability and balanced ecosystem, as these plant life forms control the structural and functional status of that ecosystem. The under-storey vegetation (shrubs, herbs, climbers, grasses, etc.) prevents soil erosion as well as provides habitat, food and nesting place to a number of faunal species. The herbivore

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DIGITAL LIBRARY RESEARCH USING OPEN SOURCE TECHNOLOGY

Amit Sanotra,
Research Scholar Shri University Venkateshwara University Gajraula, Distt.- Amroha (U.P.)

amitsanotra34@gmail.com

Dr. Sanjay Kumar Aggarwal,
Research Guide HOD ,Department of Mathematics, Dolphin Institue Dehradun (UK.)

dragarwalsa@gmail.com

Abstract:

While some confrontation exists among the free and open supply software program network as to the definitions of loose smooth- ware in place of open supply software program (www.Fsf.Org/philosophy/ free-software program-for-freedom.Html). I will not live on that here. I first propose a framework to represent the initial free and open supply software program (FOSS) phenomenon. While the shift to OSS 2.0 might also appear incremental, I use this framework to illustrate the deep nature of the transformation. I additionally choose out key stressful conditions for studies and practice that upward push up due to the emergence of OSS 2.Zero. For the ones working in library and facts professions in better education. In this paper we offer useful data approximately software program for educational establishments introducing virtual library .

Keywords: Digital libraries; Computer software; Information services; License type;

1.*Introduction* : .

A characteristic of the software program global over the past years has been the upward push of Open Source Software (OSS) which includes the use of and developing OSS-names like Google, eBay and Face ebook [1]. Now, such software program is growing being used within the library environment. Today's libraries are confronted with the challenges of integrating traditional and rising codecs, balancing aid allocation between conventional and upcoming technologies and

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Antibacterial activity and hormetic response of silver nanoparticles synthesized using leaflet extract of wheat (*Triticum aestivum*) and rice (*Oryza sativa*) crop plants

Vikas Pahal[1]*, Pankaj Kumar[2], Parveen Kumar[3], Vinod Kumar[4]

[1]Department Of Microbiology, Dolphin PG College of Science and Agriculture, Chunni Kalan, Fatehgarh Sahib, Punjab, India.
[2]Department Of Microbiology, Dolphin PG Institute of Biomedical and Natural Sciences, Dehradun, India.
[3]Bio-nanotechnology Lab, Central Scientific Instruments Organization, Chandigarh, India.
[4]Department of Pharmacology and toxicology, National Institute of Pharmaceutical Education and Research, S.A.S. Nagar, Mohali, India.

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ABSTRACT

The application of silver nanoparticles (AgNPs)-based antibacterial therapeutics has emerged as a feasible alternative to traditional antibiotic therapy due to cost-effectiveness and lower possibility of non-evolution of resistant strains. In the present paper, the aqueous extract of wheat (*Triticum aestivum*) and rice (*Oryza sativa*) leaflets were used for the fabrication of well-dispersed AgNPs of average size 19.11 and 33.85 nm, respectively, under the controlled condition of pH 10.0 ± 0.1 and temperature 80°C ± 1°C. This bottom-up approach of AgNPs production was simple, eco-friendly, inexpensive, and highly reproducible. The synthesized AgNPs were characterized by UV-Visible spectroscopy, dynamic light scattering, fourier transform infrared spectroscopy, high-resolution transmission electron microscopy, and energy-dispersive X-ray. Agar-well diffusion and (2, 3-bis [2-methyloxy-4-nitro-5-sulfophenyl]-2H-tetrazolium-5-carboxanilide) (XTT) colorimetric methods revealed the bactericidal potential of synthesized AgNPs against Gram-positive and Gram-negative pathogenic bacteria with minimum inhibitory concentration (MIC) values ranges from 125 to 500 µg/ml. AgNPs presented better potency against Gram-negative bacteria compared to Gram-positive bacteria. Interestingly, *Staphylococcus aureus*, *Klebsiella pneumoniae*, and *Escherichia coli* demonstrated a hormetic response (positive stimulated growth) at a sub-lethal concentration (<7.81 µg/ml) of AgNPs, which were 0.39%–1.56% of MIC values of the respective bacterial strains.

1. INTRODUCTION

One of the striking and developing areas of nanotechnology deals with the production of metallic nanoparticles (NPs) of variable shapes, sizes, and chemical compositions. Owing to their ultra-small size, elevated reactivity, and substantially large surface area-to-volume ratio, NPs display astonishing physicochemical, optical, magnetic, thermal, electronic, and biological properties markedly different from their respective bulk counterparts [1–3]. These inherent properties have tremendous applications in various fields of science and technology such as electronics, biotechnology, sensors, drug delivery, DNA labeling, cosmetics, coatings, packaging, etc. [4,5]. Among various metallic NPs, nanocrystalline silver or silver nanoparticles (AgNPs) have found incredible applications in the field of catalysis [2], detection, bioremediation [1,3], diagnostic, biosensors, micro- and opto-electronics [4], antimicrobials, medical implants, and therapeutics [6,7]; and hence account for more than 55% of total nano-material-based commercial products [8].

Various physical, chemical, and hybrid methods are developed for the fabrication of AgNPs. However, the key challenges that remain with these methods are their toxicity, expensiveness, high energy consumption, and time along with several procedural complications [9]. Green chemistry procedures, which involve the synthesis of NPs using biological entities like bacteria,

*Corresponding Author
Vikas Pahal, Department Of Microbiology, Dolphin PG College of Science and Agriculture, Chunni Kalan, Fatehgarh Sahib, Punjab, India.
E-mail: vikaspahal3@gmail.com

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EXPERIMENTAL ARTICLES

Pesticide-Degrading and Phosphate-Solubilizing Bacilli Isolated from Agricultural Soil of Punjab (India) Enhance Plant Growth

P. Kumar[a, b, *], A. K. Rai[c], A. Gupta[d], H. Phukon[e, f], A. Singh[g], D. Kalita[e, f], S. Sharma[a], K. Harshvardhan[e], and R. C. Dubey[h]

[a] *Department of Microbiology, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, 248007 India*

[b] *Department of Microbiology, Dolphin (PG) College of Science and Agriculture, Fatehgarh Sahib, Chandigarh, Punjab, 140307 India*

[c] *Department of Biochemistry, College of Medicine Imam Abdulrahman Bin Faisal University, Dammam, 31441 Saudi Arabia*

[d] *Department of Zoology, Sri Avadh Raj Singh Smarak Degree College, Gonda, Uttar Pradesh, India*

[e] *Academy of Scientific and Innovative Research, CSIR-NEIST Campus, Jorhat, Assam, 785006 India*

[f] *Cellulose Pulp and Paper Group, MSTD, NEIST, Jorhat, Assam, 785006 India*

[g] *Department of Food Technology, Mata Gujri College, Fatehgarh Sahib, Punjab, 140406 India*

[h] *Department of Botany and Microbiology, Gurukul Kangri Vishwavidyalaya, Haridwar, Uttarakhand, 249404 India*

**e-mail: guptapankaj23@gmail.com*

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Abstract—The study was designed in order to isolate the pesticide-degrading beneficial bacteria from agricultural land of Punjab, India. Among the isolated bacterial strains, two were capable of solubilizing tricalcium phosphate on Pikovskaya's agar. They also had the potential to degrade all the three selected pesticides viz., 20% metsulfuron-methyl (Knockout), 25% propiconazole (Shine) and 15% clodinafop-propargyl (Clo). These promising isolates were identified as *Bacillus* sp. SWP1 and *B. safensis* SWP5 on the basis of 16S rRNA gene sequencing. Pesticide degradation by both SWP1 and SWP5 strains with and without the pesticide clodinafop-propargyl applied on *Zea mays* was evaluated under pot experiment. Treatment of maize seeds with SWP5 resulted in 100% seed germination without pesticide and 93% with pesticide while treatment with SWP1 resulted in 86 and 80% germination with and without the pesticide, respectively. The physical and chemical properties of soil were also improved after treatment with both SWP1 and SWP5. The other plant parameters, such as length and weight, were considerably enhanced upon the application of SWP1 and SWP5. The results of this study indicate that both pesticide-degrading bacilli may be employed as bioinoculants for improving the production of several crops along with the reduction of the level of pesticides present in agricultural soil of Punjab.

Keywords: *Bacillus* sp., pesticides, *Zea mays*, 16S rRNA gene sequencing, phosphate solubilization, growth promotion

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Pesticides are synthetic chemical compounds used in agriculture to prevent the infestation of pests and increase the yield of crops (FAO, 2019). They belong to several types, such as insecticides, fungicides, herbicides, disinfectants, etc. and are applied before or after harvesting of crops. About 5.6×10^9 pounds (1 pound is equal to 0.0005 tons) pesticides are used globally, whereas the total consumption in India was 57, 353 MT (Ministry of Agriculture, India, 2015), which is very high compared to the recommended doses and results in high quantities of residual chemicals in soil, which may affect the agricultural lands, water resources, and human health.

In India, all states (except Sikkim) use several types of pesticides. Punjab is one of the top users of pesticides in India (Devi et al., 2017). The Malwa (locally called "Makheon Meetha," which means sweeter than honey) district of Punjab is at high risk due to excessive and unsafe use of pesticides and other synthetic chemical fertilizers. Surprisingly, Malwa covers less than 15% of the total geographical area of Punjab, but consumes approximately 75% of all the pesticides used in Punjab. Due to extensive use of organophosphate- and carbamate-like pesticides, the microbiota of diverse ecological niches have developed tolerance to these pesticides and even ability to degrade these compounds. Some microorganisms may utilize these organic pesticides as growth substrates.

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RESEARCH ARTICLE

Phytofabrication of gold and bimetallic gold-silver nanoparticles using aqueous extract of wheatgrass (*Triticum aestivum* L.), their characterization and assessment of antibacterial potential

Vikas Pahal[1]*, Pankaj Kumar[2], Parveen Kumar[3] & Vinod Kumar[4]

[1]Department of Microbiology, Dolphin (P.G) College of Science and Agriculture, Chunni Kalan, F.G. Sahib, Punjab, India
[2]Department of Microbiology, Dolphin (P.G) Institute of Biomedical and Natural Sciences, Manduwala, Dehradun, Uttarakhand, India
[3]Bio-Nanotechnology Lab, Division: H-1, Central Scientific Instruments Organization (CSIO), Chandigarh (U.T), India
[4]HR-TEM Facility Lab, National Institute of Pharmaceutical Education and Research (NIPER), SAS Nagar, Punjab, India

*Email: vikaspahal3@gmail.com

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Abstract

In the present study, gold (AuNPs) and gold-silver bimetallic nanoparticles (Au-Ag BMNPs) were fabricated by using aqueous leaf extract of *Triticum aestivum* L. - a crop plant, and their bactericidal potency was checked against selected pathogenic bacterial strains. The phytofabricated AuNPs and BMNPs were analyzed for their physical attributes using UV-Visible and Fourier transformed infrared spectroscopy (FTIR), Dynamic light scattering (DLS), High-resolution transmission electron microscopy (HRTEM), and Energy-dispersive X-ray spectroscopy (EDX). Bactericidal efficiency of synthesized NPs was evaluated using agar-well diffusion and XTT (2,3-Bis-(2-Methoxy-4-Nitro-5-Sulfophenyl)-2H-Tetrazolium-5-Carboxanilide)-colorimetric assays against *Klebsiella pneumoniae*, *Salmonella typhimurium*, *Enterobacter aerogenes*, *Escherichia coli*, *Micrococcus luteus*, *Staphylococcus aureus*, *Streptococcus mutans* and *Staphylococcus epidermidis*. HRTEM analysis revealed that both kinds of nanoparticles (NPs) were highly crystalline in nature and of spherical to oval-shaped. AuNPs size was found in the range of 5-40 nm, whereas BMNPs showed their size in the range of 5-30 nm. HRTEM results were corroborated by DLS results which revealed the average hydrodynamic diameter of AuNPs and BMNPs in the range of 29.08 and 26.56 nm respectively. UV-visible spectroscopy showed high-intensity single spectral peaks at 540 and 480 nm for AuNPs and BMNPs respectively. FTIR analysis demonstrated that protein, flavanones, hydroxyl, carboxylate groups and reducing sugars were responsible for reducing and capping of both NPs. *K. pneumonia* and *S. typhimurium* were found to be the most sensitive bacteria towards BMNPs-mediated (MIC: 400 µg/ml) and AuNPs-mediated toxicity (MIC: 800 µg/ml). It was observed that BMNPs generally possessed more powerful bactericidal effect against all bacterial strains in comparison to AuNPs. Minimum inhibitory concentration (MIC) and Minimum bactericidal concentration (MBC) values were observed in the concentration range of 400 µg/ml-1.5 mg /ml for different bacterial strains. Furthermore, it was demonstrated that phytosynthesized AuNPs have their own bactericidal effect, but at higher concentrations (>100 µg/ml) and bactericidal effect of BMNPs was due to the synergistic effect of both Ag and Au ions, which was also observed to be dose-dependent.

Keywords

AuNPs, Ag-Au BMNPs, bactericidal effect, NPs, XTT-colorimetric assay

PLANT CELL BIOTECHNOLOGY AND MOLECULAR BIOLOGY

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PATHOPHYSIOLOGY OF SARS -nCoV-2: STRUCTURE, MODE OF INFECTION AND POSSIBLE TREATMENTS

NEHA SAINI ; YUNUS ALI ; ANJALI THAPA ; PRIYANKA BANKOTI ; AASHI SHARMA ; PRIYANSHI SHARMA ; AMANPREET KAUR ; NAVEEN GAURAV ; PANKAJ KUMAR

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PANKAJ KUMAR
Department of Microbiology, Dolphin (PG) Institute of Biomedical and Natural Sciences, Majhiguwala, Dehradun, 248007, Uttarakhand, India.

Abstract

Rapid advancement in technology had made the smooth survival of the human race in this 21st century. Besides these serious global disastrous diseases, hazards often emerged out. The human race has faced a serious health emergency due to the emergence of coronavirus first recognized in 2019 which is characterized by pneumonia, lymphopenia, dead lymphocytes, and a cytokine gust or infusion reaction. SARS-CoV-2 belongs to the Coronaviridae family, a family of pleomorphic ss (+) RNA viruses. Its genome is associated with the N protein forming the nucleocapsid, coated with a spike glycoprotein-adorned membrane. It is reported that COVID-19 is primarily transmitted human-to-human via oral and respiratory aerosols and droplets with the virus-contaminated environment play a lesser role in the propagation of disease. Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is rapidly spreading worldwide, and WHO declared the outbreak of this disease a pandemic on March 11, 2020.Before curative drugs or vaccines are available, most countries implement a series of non-pharmaceutical interventions (NPIs) including wearing masks, testing and tracing suspected cases, social distancing and even locking down COVID-19 epidemic centers. Although these NPIs have appeared to be effective in mitigating the initial wave of COVID-19, continually emerged COVID-19. Hence, in the current scenario, is has now become essential to control and finally irradicate this deadly disease using an effective vaccine. Researchers are engaged in the study of this life-threatening virus, and also they are successful to develop vaccines, UK has become the first to approve Pfizer/ BioNTech COVID-19 vaccine and in India the first is Covi-shield (Adenovirus vector-based by Serum Institute of India Astra Zeneca based model with Research name: AZD1222 (ChAdOx1).The second is Covaxin (on Astra Zeneca model-based developed by Bharat Biotech). In approximately about two years globally every country got suffered from this pandemic. This document provides a clear understanding of the structure and organization of coronavirus with all the possible remedies/drugs recommended for its proper treatment. Moreover, this document addresses all the protective ventilation mechanisms given to a patient at the time of a health emergency.

Keywords: COVID-19; lymphopenia; life-threatening; ventilation; immunized

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Effects of Corona Pandemic on Global Environment and Economy

Naveen Gaurav [a*], Anjali Thapa [b], Yunus Ali [b], Ashish Kulshrestha [c], Neha Saini [a], Pramod Kumar Joshi [a], Himani Rawat [a], Amanpreet Kaur [a] and Pankaj Kumar [d*]

[a] Department of Biotechnology, Shri Guru Ram Rai University, Patel Nagar, Dehradun, 248001, Uttarakhand, India.

[b] Shri Guru Ram Rai P.G. College, Dehradun, 248001, Uttarakhand, India.

[c] Department of Mass Communication, Shri Guru Ram Rai University, Pathri Bagh, Dehradun, 248001, Uttarakhand, India.

[d] Department of Microbiology, Dolphin (PG) Institute of Biomedical and Natural Sciences, Manduwala, Dehradun, 248007, Uttarakhand, India.

Authors' contributions

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

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ABSTRACT

The COVID-19 pandemic is draw into concern as the most reproving international fitness tragedy of the century since December 2019, the era of Second World War. A new transmissible respiratory disease comes in existence in Wuhan, Hubei province, China and the World Health Organization named it as COVID-19 (corona virus disease 2019). For the quarter of 2020 the corona virus epidemic has swamp the international locations of the sector and changed the pace, material and nature of our lives. In this evaluation accompanying, we inspect some of the various social, environmental and economic issues influenced by COVID-19. The COVID-19 epidemic has ended in over 4.3 million confirmed instances and over 290,000 deaths globally. The Indian economy as with the global economy, was faced with multiple curtailment too when the pandemic emerged. Advance estimation recommend that the Indian economy is anticipate to witness real GDP augmentation of 9.2 per cent in 2021-22 after reducing in 2020-21. This implicit that overall

**Corresponding author. E-mail: guptapankaj23@gmail.com, naveensn17@gmail.com;*

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RESEARCH ARTICLE

Plant growth promoting and antagonistic *Enterobacter* sp. EPR4 from common bean rhizosphere of Garhwal Himalayan inhibits a soil-borne pathogen *Sclerotinia sclerotiorum*

Pankaj Kumar[1,2*], Ramesh Chandra Dubey[2] & Ashutosh Kumar Rai[3]

[1]Department of Microbiology, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun – 248 007, Uttarakhand, India (Present address)
[2]Department of Botany and Microbiology, Gurukul Kangri Vishwavidyalaya, Haridwar – 249 404, Uttarakhand, India
[3]Department of Biochemistry, College of Medicine Imam Abdulrahman Bin Faisal University, Dammam, 31441 Saudi Arabia

*Email: guptapankaj23@gmail.com

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Abstract

Plant growth stimulating and antagonistic properties of 7 bacterial isolates of beneficial *Enterobacter* spp. (EPR1- EPR7) screened from the rhizospheric soil of *Phaseolus vulgaris* plants growing in Garhwal Himalaya, Uttarakhand, India was studied against soil borne phytopathogen *Sclerotinia sclerotiorum* causes root rots in various crops. Among the isolates, EPR4 showed 64.8% reduction in colony growth of the fungal pathogen in dual culture. All seven isolates are capable of producing Indole Acetic Acid (IAA), but EPR4 also produced cyanogens, solubilized inorganic and organic phosphate, siderophore, ACC (1-aminocyclopropane-1-carboxylic acid) deamininase, and extracellular enzymes like chitinase which inhibited the phytopathogen. For the EPR4 strain, 16S rRNA gene sequencing was followed by NCBI - BLAST similarity showed the maximum sequence similarity (100%) with the species of *Enterobacter* (available on NCBI data base), and recognized as *Enterobacter* sp. EPR4 (GenBank accession number JN225424). The *Enterobacter* sp. EPR4 has the potential to be used as a biocontrol agent against *S. sclerotiorum* as well as a good plant growth promoter for common bean and other crops grown in India's Garhwal Himalaya.

Keywords

Enterobacter sp., Biocontrol, PGPR, *Phaseolus vulgaris*, *Sclerotinia sclerotiorum*

Introduction

The average growth rate of worldwide populations is 1% per year, while a few number of countries having more growth rates (1). Food supply has also increased parallel to population growth, but concern has been expressed as to whether this parallel increase can be continuing with current agricultural practice (2). This demand can be met by a sustainable agricultural method that not only maintains crop output to fulfill the needs of growing populations, but also avoids ecological disruption without depleting natural resources. Thus, agricultural scientists become more attentive towards the beneficial soil bacteria as a better alternative of chemical or synthetic fertilizers to facilitate eco-friendly biological control of soil and seed borne phytopathogens.

Generally, only 2-5% of rhizospheric bacteria are beneficial for plant and are known as Plant Growth Promoting Rhizobacteria (PGPR) which stimulate plant growth either by direct and/or indirect methods (3). Direct mechanisms can be demonstrated in absence of plant pathogen or other

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Article

Chemical Composition, Antioxidant and Antimicrobial Potential of the Essential Oils from Aerial Parts of *Tagetes patula* L. at Different Phenological Stages

Meena Kafaltiya [1]*, Hema Lohani [2], Ujjwal Bhandari [2], S. Zafar Haider [2], Nirpendra Chauhan [2], Tripti Malik Ahuja [3], Shailja Pant [3] and Neeta Joshi [4]

[1] Department of Chemistry, Motiram Baburam Government Post Graduate College, Haldwani, Uttarakhand, India

[2] Centre for Aromatic Plants (CAP), Industrial Estate, Selaqui-248011, Dehradun, Uttarakhand, India

[3] Department of Microbiology, Dolphin P.G. Institute of Biomedical & Natural Sciences, Dehradun, Uttarakhand, India

[4] Department of Chemistry, Lalit Mohan Sharma PG College, Shri Dev Suman University Rishikesh, Dehradun, Uttarakhand, India

* *Corresponding Author: m.kafaltiya@rediffmail.com (Meena Kafaltiya)*

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Abstract: The current study aims at determining the variability in composition, antibacterial and antioxidant properties of the essential oils extracted from aerial parts of *Tagetes patula* at different phenological stages of plant growth i.e., the vegetative, full blooming and seed setting stages. The maximum average yield of hydrodistilled essential oils was obtained as 0.083 ± 0.003% (seed setting), 0.068±0.007% (full flowering) and 0.059±0.005% (pre flowering). (*Z*)-*β*-ocimene was found to be most abundant compound of essential oil of *T. patula*, and *α*-terpinolene, piperitenone, limonene and propanedinitrile, dicyclohexyl were found as major compounds in oil extracted at different phenological stages of plant. Contribution of (*Z*)-*β*-Ocimene was highest in full flowering stage (18.27±3.14%) as compared to other two stages where its amount ranged from 12.03-17.17 %. α-Terpinolene the second major component was found highest in the pre-flowering stage (13.86±1.15 %) compared to other stages. Significant variation was observed in the percent content of piperitenone during all three phenological stages The antioxidant (DPPH radical scavenging) assay showed that *T. patula* oils have maximum activity at the pre-flowering stage. Antibacterial activities of the essential oils were observed at the pre-flowering stage against different bacteria; i.e., *Bacillus* sp., *Escherichia coli, Listeria monocytogenes, Pseudomonas aeruginosa, Staphylococcus aureus* and exhibited promising values of MIC (0.125 % v/v -0.5 % v/v) and MBC (0.25 v/v to 1% v/v) against bacterial cultures.

Keywords: *Tagetes patula* L., Essential oil, Phenological stages, (*Z*)-*β*-Ocimene, Antibacterial, Antioxidant.

Introduction

Tagetes patula L. (Asteraceae), commonly known as 'French Marigold' or 'Genda' is a well-known member of genus *Tagetes* [1]. In India, major states growing genus *Tagetes* are Maharashtra, Karnataka, Gujarat, Haryana, Uttar Pradesh, Jammu and Kashmir, Andhra Pradesh, Chhattisgarh, Puducherry, Andaman Nicobar, Arunachal Pradesh, West Bengal, and Tamil Nadu [2]. The plant is herbaceous, branched, glabrous,

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Article

Phenological Stage Specific Variations in Chemical Composition, Antioxidant and Antimicrobial Properties of the Essential Oils of Aerial Parts of *Monarda didyma* L. Cultivated Under Doon Valley Climatic Conditions of Uttarakhand, India

Meena Kafaltiya [1]*, Hema Lohani [2], S. Zafar Haider [2], Nirpendra Chauhan [2], Tripti Malik [3], Neeta Joshi [4], Shailja Pant [3]

[1] Department of Chemistry, Motiram Baburam Government Post Graduate College, Haldwani, Uttarakhand, India

[2] Centre for Aromatic Plants (CAP), Industrial Estate, Selaqui-248011, Dehradun, Uttarakhand, India

[3] Department of Microbiology, Dolphin P.G. Institute of Biomedical & Natural Sciences, Dehradun, Uttarakhand, India

[4] Department of Chemistry, Pandit Lalit Mohan Sharma PG College, Shri Dev Suman University Rishikesh, Dehradun, Uttarakhand, India

`*Corresponding Author: m.kafaltiya@rediffmail.com (Meena Kafaltiya)*

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Abstract: This study aims to evaluate the variations in yield of essential oil, chemical constituents, antimicrobial and antioxidant potential of *Monarda didyma* L. (aerial parts) at three different phenophases, namely vegetative stage, full blooming and maturity (seed setting) stages. The essential oil content ranged from 0.62-0.75% in whole aerial parts, with the highest yield in the full flowering (0.75 ± 0.042%), followed by pre flowering (0.70 ± 0.033%) and seed setting (0.62 ± 0.052%) stages. Linalool was found as the major compound followed by γ-terpinene, thymol methyl ether, p-cymene and thymol in the oils during different phenophases of plant. Linalool was maximum in vegetative (pre flowering) stage (60.15 ± 1.56%) as compared to full blooming (44.32 ± 2.55%) and seed setting (46.49 ± 1.63%) stages respectively. γ-Terpinene, the second major constituent was found to be maximum in full blooming stage (21.06 ± 3.06%) as compared to the other stages, and showed cogent variations in percent composition of γ-terpinene during different phenological stages. In thymol methyl ether content, significant variation was observed during all three phenophases of plant. The antioxidant (DPPH assay) activity showed that *M. didyma* oil has maximum activity at seed setting stage. The maximum antimicrobial activities in oil was active at vegetative phase of plant against bacteria and yeast *i.e.*, *Bacillus* sp., *E. coli*, *L. monocytogens*, *P. aeruginosa*, *S. aureus*, *C. albicans* and revealed favourable values of MIC (0.5% to1% v/v) and MBC/MFC (0.5 to 2% v/v) against bacterial and yeast cultures.

Keywords: *Monarda didyma* L., essential oil, phenological stages, linalool, γ-terpinene, thymol, antimicrobial, antioxidant.

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Phytochemical Investigation and Evaluation of Antioxidant and Antimicrobial Potential of *Ardisia solanacea* Leaf Extract

❖ **Kanwal Jeet[1] Versha parcha[1], Sas Bswas[2], and Sukanya Chettri[1]**

1Department of Pharmaceutical Chemistry& Chemistry DIBNS Dehradun 2 Department of forestry DIBNS Dehradun Uttrakhand, India

ABSTRACT

Introduction: *Ardisia solanacea* (Poir.) Roxb. commonly called *shoebutton*, being a useful medicinal plant constitutes various phytochemicals which are supposed to give anthelmintic, thrombolytic, antimicrobial and cytotoxic effects, rheumatic arthritis, gout, dysmenorrhea, mental fatigue, diarrhea and vertigo along with some common carminative, antacid and stimulant properties. Plant has become an invasive in sal (*Shorea robusta* Gaertn.) forest of Manduwala in Dehradun Forest Division. Keeping in view of medicinal properties associated with the plant, the present study was carried out with following objectives:

Objective: To carry out systematic analysis of phytochemicals, antioxidant activity and antimicrobial activity of various extracts of aerial parts of the plant.

Method: *Ardisia solanacea* plant was collected from the forests near Suddhowala, Dehradun district of Uttarakhand. The plant was located and subsequently identified by Dr. Sas. Biswas, HoD, Department of Forestry, Dolphin Institute Biomedical and Natural Sciences, Dehradun. After drying aerial part was extracted with solvents with increasing polarity like petroleum ether, chloroform, ethyl acetate and methanol using Soxhlet apparatus, and phytochemical investigation of all the extracts were carried out.

For antioxidant activity of these extracts, two different methods of were carried out.Total phenolic content responsible for antioxidant activity was determination by Folin-Ciocalteu method and DPPH free radical scavenging activity were performed by the standard methods. The standard was taken ascorbic acid for DPPH free radical scavenging activity.

The antimicrobial activity of the different extracts of *A. solanacea* was determined by the standard disc diffusion method . The bacterial and fungi cultures were kept at their optimum temperature and the turbidity was adjusted to 0.5MCfarland[12].

Results: The four extracts viz. petroleum ether extract, chloroform extract, ethyl acetate extract and methanolic extract were subjected to phytochemical evaluation in which petroleum ether and chloroform gave negative tests for majorly all the phytochemicals whereas ethyl acetate extract gave moderately positive test and methanol extract gave highly positive test for presence of phenolics, carbohydrates and proteins. The four extracts were subjected to the total phenolic content determination by the Folin-Ciocalteu method. At 250ppm concentration value for the PEAS Gallic acid equivalent (GAE) (µg/mg) value is found to be 69.422(µg/mg). For Ethyl acetate extract GAE value is 62.654 (µg/mg) and for methanol extract GAE value is 57.048(µg/mg).The different extracts of the plant leaves were subjected to the DPPH free radical scavenging activity with the reference standard as ascorbic acid. The highest value is found to be in methanol extract at 53.02 (µg/ml) as compared to that of ascorbic acid. The extracts were also evaluated for antimicrobial potential and highest zone of inhibition was observed in methanol extract 19 mm against *Escherichia coli* and very less effective against fungal strain.

Conclusion for integrated studies: From the study it could be concluded that methanol extract is rich in phenolics with good antioxidant and antimicrobial potential. The plant being an invasive growing gregariously and having good biomass has potential for commercial exploitation.

Key Words: *Ardisia solanacea*, Antioxidant activity,DPPH, Antimicrobial, Gallic acid

INTRODUCTION

In all over the world, men have been using the medicinal plants and animal extracts since ages, to treat and prevent various ailments [1,2]. According to USDA forest services around 40 -45% 0f modern European medicinal drugs have a basic moiety derived from different phytochemical constituents of medicinal plants. According to WHO reports, about 75-80% of population around the globe is still using raw medicinal plants for their therapeutic purposes in one way or other[1]. Several plants like Taxus bravifolia and Taxus baccata for anticancer properties and cinchona bark for healing malaria are already a primitive source of their respective drugs.

Ardisia solanacea is a plant of Ardisia genus and is very common in Himalayan region, India, China, Nepal and Bangladesh. It's 4-6m in height evergreen shrub of broad shoe like leaf found from 100-1100m above sea level. *A. solanacea (shoebutton)* being a useful medicinal plant constitutes various phytochemicals which are supposed to give anthelmintic, thrombolytic, antimicrobial and cytotoxic effects[2-5]. It is still being used by indigenous people to treat diseases like rheumatic arthritis , gout , dysmenorrhea , mental fatigue , diarrhea and vertigo along with some common carminative , antacid and stimulant properties[6] .Due to its Carminative properties it prevents the formation of gas in gastrointestinal track thereby combat flatulence[7]. *A. solanacea* has also antimicrobial properties therefore it prevents the microbial growth along with antioxidants which are good for skin and prevents

Overview: Insights on the Phytochemical, Pharmacological, and Biological Aspects of *Acorus calamus* and *Artemisia roxburghiana*: Wild Aromatic Plant Species of Himalayan Region of Uttarakhand

❖ *Versha Parcha1, Sukanya Chhetri,[1] Deepak Kumar1 and Rajendra Rana[2]*

1Department of Chemistry & Pharmaceutical Chemistry

Dolphin (PG) Institute of Biomedical & Natural Sciences, Manduwala, Dehradun

2 USERC, , Dehradun, Uttarakhand

Abstract

The Himalayas have an extraordinary abundance of therapeutic plants and customary resortative information. The Middle Himalayan locale covers the new territories of India, provides an amazing freedoms for examining the tractional information. Uttarakhand is a storage facility of rich assortment of herbs and resortative and aromatic plant species. The wild plant species namely Artemisia roxburghiana Wall. ex Besser and Acorus calamus commonly found in the Uttarakhand Himalayan regions are of importance in Ayurvedic system of medicines. The fundamental phytoconstituent isolated and recognised from various parts like leaves, fruits, flowers, roots, seeds, barks etc., has been accounted for a few time in different amount by utilizing distinctive extraction methods. The chemical constituents isolated were assessed for their pharmacological activities. Basis on their revealed pharmacological activities, these manufacture several medicinal preparations. As a few investigates has been accounted for their finding on the essential oils from such plants for various reasons so such analysts are extremely needed to be brought in information of every concern scientists. This review is an effort to explore the different phytoconstituents and pharmacological activities of Acorus calamus and Artemisia roxburghiana.

Key words: Acorus calamus, Artemisia roxburghiana, Ayurvedic systems, Phytoconstituents, Pharmacological activities.

❖ Corresponding Author Versha Parcha

Introduction

Aromatic and medicinal plants are important sources of secondary metabolites, which have a wide scope of applications in control of plant and human diseases, cosmetics, as well as in the pharmaceutical industry. Medicinal plants are the nature's gift to individual to make disease free sound life. The medicinal characteristics of plants have been investigated in the new logical advancements throughout the world, because of their potential activity against few illnesses, without incidental effects and financial practicality (Bhanot *et al.*, 2011) [1]. A few bioactive compounds widely distributed in plants which have been accounted for to apply multiple biological effect, including antioxidant, anti-inflammatory, anti-carcinogenic etc.

Original Article

Synthesis and Antihistaminic Potential of Some Novel Substituted Dinitrophenothiazine Derivatives

Dheeraj Bisht, Anita Singh, Ashok Sharma[1], Versha Parcha[2]

Department of Pharmaceutical Sciences, Sir J. C. Bose Technical Campus Bhimtal, Kumaun University, Nainital, [1]Department of Pharmaceutical Sciences, SBS University, Dehradun, [2]Department of Pharmaceutical Chemistry & Chemistry, Dolphin Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India

Abstract

Background: Phenothiazine consists of a three-ring structure compound in which two benzene rings are connected with nitrogen and sulfur atoms at nonadjacent sides. Phenothiazine and its substituted derivatives are abundantly able to produce a variety of important pharmacological and valuable therapeutic effects, and till now, these are under profound investigational processes. **Objective:** To synthesize and evaluate the antihistaminic potential of some newly synthesized dinitrophenothiazine derivatives. **Materials and Methods:** Different derivatives have been synthesized by the appropriate chemical scheme using dinitrophenothiazine as a basic nucleus. The completion of the chemical reactions has been monitored by thin-layer chromatography. The chemical structures of the newly synthesized products (P1–P25) were affirmed by elemental analysis and by spectral (infra-red, ^{1}H nuclear magnetic resonance, and mass spectroscopy) findings and further examined for antihistaminic potential in guinea pigs. The synthesized products were also evaluated for their acute toxicity study and were found nontoxic. **Results:** The majority of the synthesized products of the dinitrophenothiazine series, namely, P07, P11, P12, P13, P15, P16, P17, P18, P19, and P20, have shown antihistaminic activity and compared with mepyramine (standard drug) at 0.8 µg/mL. Among the synthesized products, P18 was found to exhibit maximum antihistaminic activity. However, all the synthesized compounds were found to elicit a significant antihistaminic effect when compared with the standard drug. **Conclusion:** Therefore, dinitrophenothiazine compounds could be a good starting point to develop efficacious and potent analogues, as an antihistaminic agent in the treatment of allergic disorders.

Keywords: *Antihistaminic activity, dimethylformamide, dinitrophenothiazine, diphenyl ether, mepyramine*

Introduction

Histamine modulates the physiological activities in the gut and also functions as the neurotransmitter.[1,2] It is reported to elevate the capillaries' permeability to some proteins and leukocytes and also permits them to combat the pathogens in the site of infected tissues.[2] Histamine is a key mediator in allergic disorders where it generates most of its actions through H_1 receptors. H_1 antihistamine manifests rapid relief from various allergic symptoms and is well authenticated as the main therapeutic agent in the treatment of several allergic problems.[3] The role of histamine in inflammation and gastric acid suppression is terrifically expressed in the human body.[4]

Phenothiazine and its numerous derivatives possess important medicinal properties, and alkyl substituent on heterocyclic nitrogen atom accounts for their diversified biological activities,[5-7] such as neuroleptic, antihistaminic, antimicrobial, anticancer, antimalarial, antitubercular, analgesic, and anti-inflammatory.[8-11] It has been well evidenced that the therapeutic effect of phenothiazine-derived drugs is mainly due to inhibition of the dopamine receptors in the central nervous system. However, several kinds of shortcomings arise while using phenothiazine-originated drugs. The major adverse effect was seen, i.e., extrapyramidal manifestation accompanying tardive dyskinesia, dystonia, akathisia, parkinsonism, and weight gain. Moreover, the minor adverse effect is also seen such as sedation, constipation, pruritus, dry eyes, dry mouth, photosensitivity, urinary retention, etc.[12-16] Phenothiazine derivatives are also availed as an antipsychotic drug; a hydrogen atom attached with the carbon-2 (C-2) and nitrogen-10 (N-10) atoms have been substituted with numerous chemical groups and the side chain attached at the N-10 position of the phenothiazine ring, i.e., aliphatic side chain, piperazine, or piperidine moiety.[17-20] It was speculated that a 200 mg/kg dose was considered an effective dose with

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Address for correspondence:
Dr. Versha Parcha,
Department of Chemistry & Pharmaceutical Chemistry, DIBNS, Dehradun, Uttarakhand, India.
E-mail: vershaparcha@gmail.com

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Unravelling the therapeutic potential of orchid plant against cancer

Monu Kumar Shukla[a,1], Monika[a,1], Ashima Thakur[a], Rachna Verma[b], H. Lalhlenmawia[c], Sanjib Bhattacharyya[d], Dheeraj Bisht[e], Anita Singh[e], Versha Parcha[f], Deepak Kumar[a,*]

[a] Department of Pharmaceutical Chemistry, School of Pharmaceutical Sciences, Shoolini University, Solan, Himachal Pradesh 173229, India
[b] School of Biological and Environmental Sciences, Shoolini University, Solan, Himachal Pradesh 173229, India
[c] Department of Pharmacy, Regional Institute of Paramedical and Nursing Sciences, Zemabawk, Aizawl, Mizoram 796017, India
[d] Department of Pharmaceutical Sciences and Chinese Traditional Medicine, Southwest University, Chongqing 400715, PR China
[e] Department of Pharmaceutical Sciences, Kumaun University, Bhimtal Campus, Nainital, Uttrakhand 263136, India
[f] Department of Pharmaceutical Chemistry and Chemistry, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun 248007, India

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ABSTRACT

Cancer is one of the deadly diseases all over the world which is defined as unregulated growth and division of the cells. Natural remedies, particularly derived from plants, were used to treat a range of illnesses for thousands of years, including cancer. Several orchid species have been reported as a cure to treat various types of cancers. Orchids are huge family of flower bearing plants. They are traditionally used in folk medicine for the cure of various infectious diseases and tumour. Many of bioactive compounds isolated from orchid plants such as *Dendrobium longicornu Lindl., Dendrobium transparens, Rhyncostylish retusa, Vanda cristata, Anoectochilus formosanus* etc. possess anticancer activities via modifying the biotransformation of potential carcinogens by xenobiotic-metabolizing enzymes, alteration of hormone synthesis, inhibition of cancer cell proliferation, suppression of protein expression, impede of cell cycle and impairment of cell growth. In actual circumstances active constituents present in orchidaceae family are not so explored. So, in this review we covered the article published till 2022 using different electronic databases PubMed/ MEDLINE, Scopus, Web of Science, and Google Scholar. The present review highlights the orchid plant family and its bioactive constituents with anticancer activity via various signalling pathways, as well as their possible mechanisms of action.

1. Introduction

Cancer is one of the most prevalent causes of mortality after cardiovascular illnesses, with an expected 9.56 million deaths globally in 2017. Between 1990 and 2017, the incidence of cancer fatalities climbed by 66%. Cervical cancer was responsible for 2,59,671 fatalities globally in the same year, while central nervous system malignancies were responsible for 247,143 deaths. As per the World Health Organization (WHO), one in six women and one in five men would get cancer. Globally, in every five-year the number is predicted approximately 43.8 million cases, with 22 million cases expected to be added per year consequently two decades (Bray et al., 2018). On the 14th of December 2020, the International Agency for Research on Cancer (IARC) amended global data, suggesting that the global cancer burden had climbed to approximately 10 million deaths and 19 million new cases in 2020 (Siegel et al., 2020). Current treatment with conventional anticancer drugs associated with chemotherapy and radiation therapy are associated with lots of severe side effects (Kumar et al., 2022). As a result, new cytotoxic drugs with significant effectiveness, innovative mechanisms of action, low toxicity, and tractability to targeted therapy are needed (Guilbaud et al., 2001; Greenwell Rahman, 2015; Moraes et al., 2017).

From many years, plant derived products have been utilised to cure a variety of illnesses with constantly prices rise (Musaeva et al 2021; Pundir et al., 2022; Singh et al., 2021). The global market for medicinal plants and their products is expanding. The need for medicinal plants used by ancient Ayurveda and Modern Pharmaceutical Corporation as a source for innovative medication candidates is increasing. As a result, medicinal plant commerce becomes a significant source of income for communities, particularly in rural areas. Medicinal plants offer a wide variety of medicinal uses with few side effects (Bisht et al., 2021; Sukhadiya et al., 2021; Rawat et al., 2022; Sharma et al., 2022; Shukla et al., 2022). When cytotoxic vinca alkaloids (vinblastine and vincristine) and podophyllotoxins (etoposide and teniposide) were identified in the 1950s, the investigation for anticancer medicines from the plant sources began. Plant derived agents for anticancer activity

* Corresponding author.
E-mail address: guptadeepak0026@gmail.com (D. Kumar).
[1] These authors contributed equally to this work.

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Development of biochar from crofton weed & relationship between biochar properties and its applicability as a heavy metal removal activity

*Versha Parcha, Pankaj Bhandari and Amita Sati
Department of Pharmaceutical Chemistry & Chemistry Dolphin (PG) Institute of Biomedical & Natural sciences, Manduwala, Dehradun, Uttarakhand, India
*Email: vershaparcha@gmail.com

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Abstract - Biochar is a pyrogenic black carbon produced from thermal degradation of carbon-rich biomass (<700°C) in an oxygen-limited environment, and usually has a porous structure, a surface rich in oxygenated functional groups, strong adsorption capacity, and a certain degree of surface area and stability. Biochar has multiple uses, including agricultural applications for soil remediation and pollution control in water and soil. Biochar has several significant socioeconomic and environmental benefits such as carbon sequestration, pollutant removal, and soil improvement. Pyrolysis temperature affects biochar properties, which in turn determines its application potential. The collected Crofton weed (except for the roots) was washed, air-dried at room temperature, and crushed for passage through a 10-mesh sieve. Here, we examined the properties of Crofton weed biochar (C-BC) produced at different pyrolysis temperatures of 300°C, 400°C, 500°C, and 600°C. We measured the yield, ash content, pH, iodine sorption value (ISV), and elemental composition of C-BC. We also characterized C-BC using scanning electron microscopy (SEM), as well as its ability to remove $Pb^{2+}$and Cd^{2+}contaminantsfrom an aqueous solution. C- BC yield decreased with increasing pyrolysis temperature, whereas ash content and pH increased. ISV first increased at 300–400°C and decreased at 500–600°C. For C-BC produced at pyrolysis temperatures 300–600°C (C-BC300 to C-BC600, respectively), H, N, and O content decreased, but C, Ca, Mg, P, and K content in- creased with increasing temperature. All C-BCs had a certain number of pore structures. Increasing pyrolysis temperatures decreased the amount of -OH, -COOH, aliphatic C-H, and polar C-O on the C-BC surface. The percentage of $Pb^{2+}$and Cd^{2+}removed increased with increasing pyrolysis temperatures. Overall, for C-BC, a low pyrolysis temperature was beneficial for producing a more porous biochar and increased content of water-soluble calcium, magnesium, nitrogen, and phosphorus, whereas high pyrolysis temperatures yield biochar that had high alkalinity, aromaticity, and stability, as well as heavy metal removal activity

Keywords: Pyrolysis, Eupatoriumadeno-phorum Spreng, Iodine Sorption Value

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RESEARCH ARTICLE

Antioxidant Potential of different extracts of *Xanthium strumarium* leaves

Deepak Kumar[1]*, Ashwani Sanghi[2], Shefali Arora[3], Shobhit Vidyarthi[1]

[1]Department of Pharmaceutical Chemistry, Dolphin PG Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India.

[2]Department of Biochemistry, Dolphin PG Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India.

[3]Department of Chemistry, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, India.

*Corresponding Author E-mail: **deepsingh2304@gmail.com**

ABSTRACT:

The use of herbal medicine for the treatment of diseases from centuries in all over the world because of safety, efficacy, cultural acceptability and lesser side effects. In comparison of herbal medicine, synthetic medicines have side and toxic effects. That is why herbal medicines have huge demand and popularity in world market. In the present study different extracts of leaves of *Xanthium strumarium* were prepared and evaluated their antioxidant potential. Evaluation of antioxidant activity is done by DPPH method. All extract were tested for presence of phytoconstituents i.e., alkaloid, carbohydrate, sterols, proteins, amino acids, saponin, and phenolic compounds in different extracts. From the results, we foundout that acetone and methanol extracts were the richest extract for phytoconstituents. Acetone extract showed maximum antioxidant potential (54.01±1.09%).

KEYWORDS: Antioxidants, *Xanthium strumarium*, DPPH, Ascorbic acid.

INTRODUCTION:

Many chronic and degenerative diseases including at herosclerosis, ischemic heart disease, ageing, diabetes, cancer, immunosuppression, neurosuppression, neurodegenerative diseases are due to oxidative stress[1]. The imbalance between oxidants and antioxidants that causes damage of biomolecules which refers as oxidative stress[2]. In living system, free radicals are produced by oxidation of food[3]. Antioxidant defence mechanism is the effective path of eliminate the action of free radicals which cause the oxidative stress. Antioxidants have the properties to breaks the free radicals chain reactions. Recently search of medicinal plants with antioxidant potential has been increased[4]. *Xanthium strumarium* L. is also known as cocklebur belongs to asteraceae family and widely destributed throughout tropical part of India[4]. The whole plant is upto 1m in height and used as a medicine. In ayurveda, the medicinal properties like antipyretic, anthelmintic, cooling, fattening, complexation and memory and fattening has been reported[5].

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Various parts of plant has been used for treatment of various like leaves possesses antirheumatic, diuretic, antisyphilitic, appetiser, emollient, laxative and sedative activities. The fruits possesses antibacterial, cytotoxic, antifungal, antirheumatic antimalarial, hypoglycaemic, antispasmodic and stomachic activities[5]. The research has been done on many medicinal properties like antitumor[6], diuretic[7], antifungal[8], antioxidant[9], antitussive[10], antiplasmodial[11], antimitotic[12], antinociceptive[13], insecticidal[14], antibacterial and antifungal[15], anti-inflammatory[13] and anticancer[16]. Hence the present study was aimed to evaluate antioxidant activity of different extracts of leaves of *Xanthium strumarium*.

Experimental:

Collection and Identification of leaves of *Xanthium strumarium*:

Leaves of *Xanthium strumarium* were collected from locality of Dehradun (India). Plant material was authenticated by S. K. Srivastava (Scientist D/HOD), in Botanical Survey of India, Northern regional centre, Dehradun (BSI). Authenticated specimen no is – 114541.