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ISSN 2331-5083

Volume 8 Number 4 2020



Advances in Zoology and Botany

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Horizon Research Publishing, USA



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Journal Title: *Advances in Zoology and Botany*
 Journal's Homepage: http://www.hrpub.org/journals/adv_zo_bot.pdf
 Publisher: Horizon Research Publishing Co., Ltd
 Publication Frequency: bimonthly
 Electronic Version: finally online available at http://www.hrpub.org/journals/adv_zo_bot.pdf

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ISSN: 2334-5083

Table of Contents

Advances in Zoology and Botany

Volume 8 Number 4 2020

Study the Morphometry of Fresh and Cryopreserved Marrah Bull Spermatozoa (https://www.doi.org/10.13189/azb.2020.080401) Raveshwar S Rana, Jyoti Shukla, Ravinder S Rana	278
Survey of Soil Seed Bank in Two Secondary Forests in Nasrull Azkiwe University Awka, Nigeria (https://www.doi.org/10.13189/azb.2020.080402) K. U. Elewiler, C. F. Iroka, K. C. Okonkpe, H. N. Eze, W. C. Anyanwu	291
Isolation and Identification of Unique Arsenotolerant <i>Exiguobacterium indicum</i> BSAM62 from Arsenic Rich Environment (https://www.doi.org/10.13189/azb.2020.080403) Debasana Sengupta, Sakshartha Chakraborty, Sudakshya Shyua Choudhary, Sayak Ganguli, Arup Kumar Mitter	298
Taxonomic Update and Habitat Status to <i>Bytneria heriacea</i> from Peninsular India (https://www.doi.org/10.13189/azb.2020.080404) Subhash R. Samkawat	326
Diversity of Small Indigenous Freshwater Ornamental Fish under Grass Panties from Parha Medinipur, Paschim Medinipur and Bhargram Districts of West Bengal, India (https://www.doi.org/10.13189/azb.2020.080405) Goddadi Sri Arun Jena, Angustian Choudh	334
Hematological Parameters and Histopathological Alterations in the Gills of Fish, <i>Catla catla</i> Exposed to Azo Dye Acid Red -97 (https://www.doi.org/10.13189/azb.2020.080406) Aamir I. Pannar, Akash I. Shah	342
Nesting, Protective and Foraging Behavior of <i>Oecophylla smaragdina</i> (Weaver Ants) in Anand, Gujarat (https://www.doi.org/10.13189/azb.2020.080407) Divyanshi Patel, Nilanj Bharti	351
In-Vivo Study of <i>Boswellia serrata</i> for Modulating Immune System and Quenching Free Radicals (https://www.doi.org/10.13189/azb.2020.080408) Kamini Chahal, Megha Jha	358



Advances in Zoology and Botany (2020) 55(5-6A), 3108
 DOI: 10.13189/azb.2020.090408

<http://www.iqac.org>

In-Vivo Study of *Boswellia serrata* for Modulating Immune System and Quenching Free Radicals

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Received April 16, 2020; Revised May 11, 2020; Accepted June 16, 2020

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Abstract In several diseased conditions like asthma, allergy, ageing, arthritis, cancer etc., there is a production of reactive nitrogen and oxygen species, as well as our immune system also gets hampered. In order to stop or quench these harmful free radicals, antioxidants, which are the first line of defense, are used. And the immune system can be modulated to work properly by using natural agents like medicinal plants, having antioxidant property. In this context, the present study was undertaken to investigate the immunomodulatory activity and free radical quenching ability of the *Boswellia serrata* Root (BR) in murine model. This herb is known to afford protection to human physiological system against diverse stressors. It was tested at three dose levels of 50mg/kg of mice body weight, 100mg/kg of mice body weight, and 150 mg/kg of mice body weight for five consecutive days. Alpha-tocopherol (25 mg/kg of mice body weight) and Di-methyl Sulphonide (35mg/kg of mice body weight) were used as the reference standards. The extent of protection against immunosuppression was evaluated after 9 days of respective drug administration, by measuring macrophage phagocytic activity. A statistically significant antioxidant and immunomodulatory activity were shown by the extract of *Boswellia serrata* as evident by its effect on the activity of non-enzyme antioxidant reduced glutathione (GSE), antioxidant enzyme glutathione peroxidase (GPx), the degree of lipid peroxidation, and increase in the number of peritoneal macrophages.

Keywords *Boswellia serrata*, Antioxidant, Immunomodulatory, Glutathione Peroxidase, Lipid Peroxidation, Peritoneal Macrophages

1. Introduction

In case of chronic inflammatory conditions, the immune

system sometimes go out of the track and harm the host himself. Therefore, the modulation of immune responses becomes necessary. The immunological responsiveness of an organism can be increased by agents that can modulate the immune system by interfering with its regulatory mechanisms in a process called as immunomodulation [1-3]. Chronic inflammatory conditions also produce free radicals, which are unstable molecules, as a byproduct. In excessive amounts these free radicals are harmful for healthy tissues [4-6]. These radicals can be better scavenged by antioxidants, which is a mechanism of stopping or quenching harmful free radicals. Hence, for treating an inflammatory condition immunomodulation can go hand in hand with antioxidant activity [7-9].

There is an increasing concern about use of synthetic immunomodulating agents and antioxidants which has increased researcher's interest in finding out alternatives from natural sources [10-12]. As mentioned in Charaka Samhita [13], popularity of natural healthcare, side effects of synthetic drugs, better cultural acceptability, better compatibility with the human body and increased efficiency of plant derived drugs, prohibitive cost of allopathic drugs, and unavailability of allopathic drugs in remote areas, and a growing interest in preventing future health problems and a view to address specific health concerns, are the main reasons for the deviation of people towards plant-based medicines [14-16].

Boswellia serrata Roth. belongs to Burseraceae family and commonly known as Salai, Frankincense, Gupphaladya, Sallaki Guggul. *Boswellia serrata* Roth., is a large branching tree found in India, the Middle East & Northern Africa. The bark contains a gummy oleo-resin [17-19]. Oils, terpenoids, sugars, and volatile oils are also present along with pentacyclic terpenic acids, i.e. -boswellic acid, 3-acetyl-boswellic acid, 11-aceto-boswellic acid and 3-acetyl-11-aceto-boswellic acid [20-22]. The gummy resin has been traditionally used in the Ayurvedic system of medicine as an anti-arthritis,



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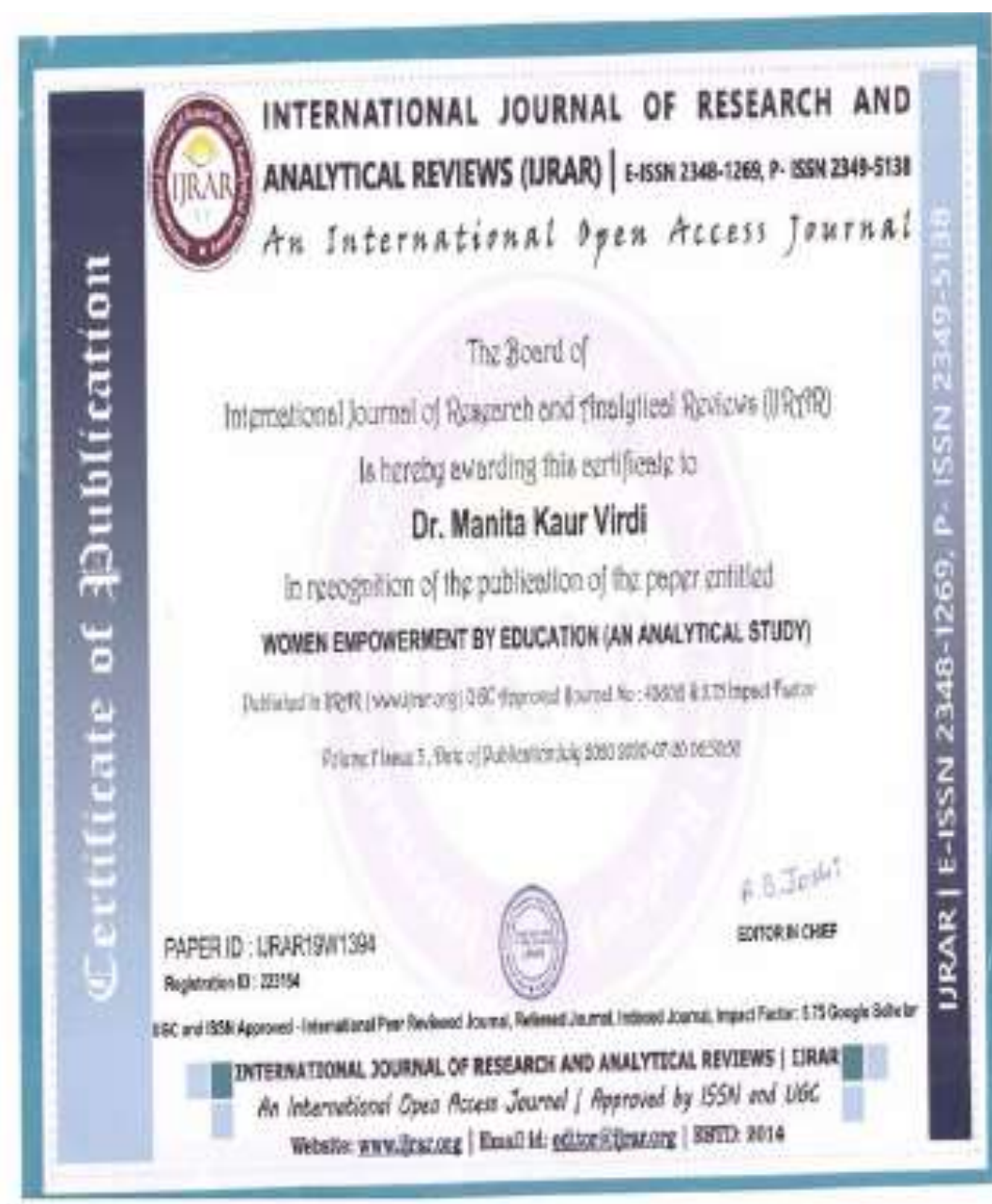
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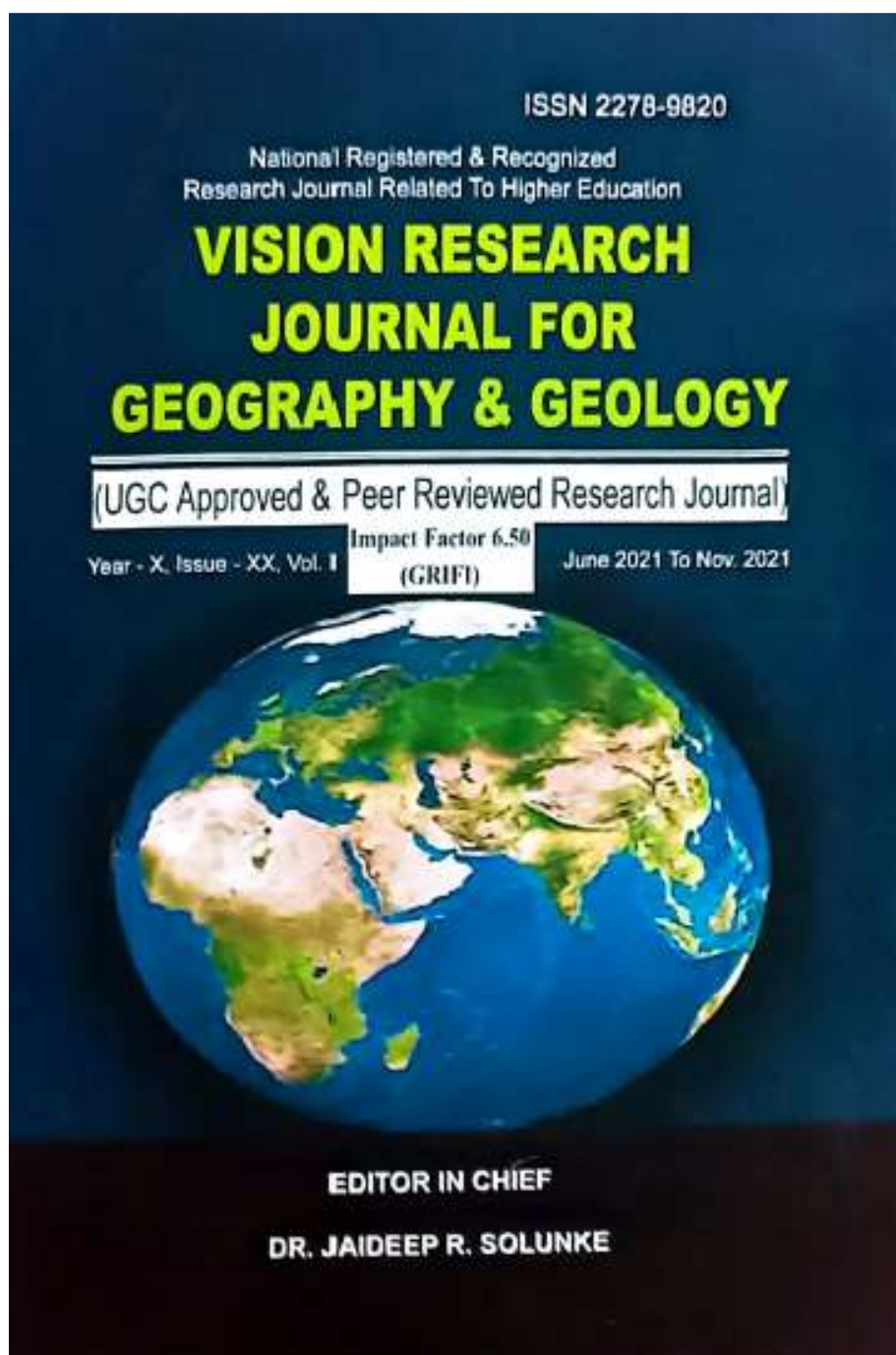


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Issue - XX, Vol.- I

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June 2021 To Nov. 2021

INDEX

Sr. No	Title for Research Paper	Page No
1	Educational status of scheduled tribes in Nashik District, Maharashtra Subhash Marshal Sonawane, Dr. Vikas A. Deshmukh	1
2	Geographical Analysis of Rainfall in Beed District: 2012-13 Dr. S.V. Sonwane	7
3	A Critical study of the Seasonal Migration of Tribal Labors in Nandurbar District. (Maharashtra) Dr. Sandip B. Garud	11
4	Tasar Silk Industry Dr. Kailas V. Nikhade	21
5	The Role of Women in Indian Agriculture Sector : A Geographical Study Dr. J. V. Ghodke	27
6	A Statistical Analysis Of Foreign And Domestic Tourist In India Bramhanand Jalindar Darade	36
7	Biodiversity "Maintenance, Needs and Challenges" Capt. B.T. Pote	47
8	Changing Trends in Tourism in the 21st century Dr. S.B. Deshmukh	53
9	Impact of Corona on Indian Industry Dr. Santosh H. Kanse	58
10	Impact of Corona on Indian Agriculture Balasaheb B. Gore	63
11	सिवनी जिले की कृषि व्यवस्था का भौगोलिक अध्ययन डॉ. शाहिदा बेगम मंसूरी	68