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1	Prof Bhagwati P Sharma	11	-	-
2	Dr. Sarwan Kumar	2	-	-
3	Prof. Rajni Chaudhary	1		-
4	Dr. Mala Sharma	3	--	-
5	Prof Ruchi Sangal	2	-	-
6	Prof. Abhinandan Jain	1	-	-
7	Dr. Rajesh Kumar	1		

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SHORT COMMUNICATION

Rediscovery of *Premna herbacea* Roxb. from Himachal Pradesh, India After 90 Years

Bhagwati P. Sharma[2] · Kuldip S. Dogra[1] · Sangeeta Chandel[3] · Kumar Ambrish[1] · Ritesh K. Singh[1] · Brajesh Meena[1] · Sanjeev Kumar[1]

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Abstract *Premna herbacea* Roxb. (Lamiaceae) commonly known as Bharangi is rediscovered from Hamirpur district of Himachal Pradesh, India after 90 years. *P. herbacea* was previously collected by Walter Koletz from Bhadwar, tehsil Nurpur, district Kangra (H.P.) in 1933. Presently, this is also a new addition to the flora of Himachal Pradesh. The representative specimens are catalogued in Botanical Survey Solan (BSS) herbarium (Botanical Survey Solan Herbarium) for future reference.

Keywords Bharangi · *Premna herbacea* · Flora · Himachal Pradesh

Introduction

The genus *Premna* Linnaeus was traditionally included under the family Verbenaceae but in the recent classifications (APG IV) of flowering plants it is treated under the family Lamiaceae [2]. It was first described by Linnaeus in 1771 for modern science [5]. It has wide distribution through tropical and subtropical regions in Africa, southern Asia, northern Australia, various islands in the Pacific and Indian Oceans [6]. The genus represented by mostly trees, shrubs, or subshrubs, erect or rarely climbing plants and have a total of 200 species in the world (2). Thirty-one (31) species and six (06) varieties of *Premna* are reported from India [7]. There are only two species of genus *Premna* (*P. barbata* Wall. ex Schauer and *P. mollissima* Roth.) have been included in the flora of Himachal Pradesh [1, 4, 8, 9]. During field survey in the burnt Pine (Chir) forests in Hamirpur district of Himachal Pradesh, an interesting plant was collected in the month of June, 2023. There was a patch of many small plants of this species growing in the sandy soil habitat. The present species was photographed, and collected specimens were preserved systematically following standard herbarium techniques. The specimens were deposited at the herbarium of Botanical Survey of India, High Altitude Western Himalayan Regional Centre, Solan (BSS-Botanical Survey Solan). After a close observation, exhaustive study of herbarium specimens and literature review, the identity of the unknown plant specimens was ascertained. The plant is *Premna herbacea* Roxb. (Lamiaceae) which was previously collected by Walter Koletz from village Bhadwar, Tehsil Nurpur, district Kangra, Himachal Pradesh in 1933 with the cooperation of Cranbrook Institute of Sciences during the Botanical collections in Northwestern India under the auspices of the University of Michigan, United Kingdom (Fig. 1). The specimen of the species was deposited in the herbarium of Michigan University (MICH), United Kingdom. After collection by Walter Koletz, it was not reported from any district of Himachal Pradesh before the present collection in June, 2023 from district Hamirpur. Therefore, it is a new addition to the flora of Himachal Pradesh.

P. herbacea is known for its medicinal uses in the Indian traditional medicines systems of ayurveda. The roots of *P. herbacea* are used for the treatment of rheumatism, inflammation, bronchitis, piles, fever, and tumors. Despite this, it is also used as the anti-diabetic, anti-inflammatory, anti-psoriasis and hepatic steatosis in the ayurvedic medicines in India [3].

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(V)
Symphyotrichum subulatum (Michx.) G.L. Nesom (Asteraceae): Addition to the Flora of Himachal Pradesh, India.

Genus *Symphyotrichum* Nees rapidly invading in Himachal Pradesh, which was earlier reported from Jammu & Kashmir (Gulzar *et al.*, 2021), Uttar Pradesh (Tripathi and Sharma, 2019), and as a new record to India from the tropical to subtropical areas of the Gangetic Plains biogeographical zone (Sharma *et al.*, 2012; Kartikeyan *et al.*, 2020). During the recent plant exploration tour, authors collected one abundantly occurring plant species *Symphyotrichum subulatum* (Michx.) G.L. Nesom of family Asteraceae from Hamirpur district in Himachal Pradesh which is now reported as a new addition to the flora of Himachal Pradesh.

The species is actually native of New World with distribution range from eastern Canada to Mexico and the Caribbean region. Detailed taxonomic description based on the voucher specimens collected from Himachal Pradesh along with photographs (A&B) for its easy identification and to locate it in other parts of India.

Symphyotrichum subulatum (Michx.) G.L. Nesom in Phytologia 77: 293.1995; Brouillet *et al.*, Fl. North America 20: 480. 2006; Y. Chen *et al.*, & L. Brouillet in Z.Y. Wu *et al.*, Fl. China 20-21: 652. 2011; Kartikeyan *et al.*, in Fl. Pl. India, Annot. Checklist (Dicot. Vol. I) 794. 2020. *Aster exilis* var. *australis* A.Gray in Syn. Fl. N. Amer. 1(2): 203. 1884. *Aster subulatus* Michx. in Fl. Bor.-Amer. 2: 111.1803.

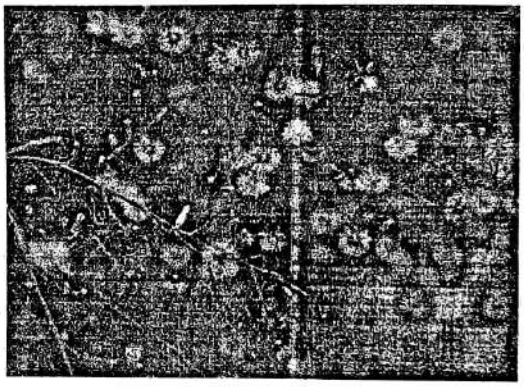
Annual herb, 1-1.5 m tall. Stems erect, branched with prominent single main stem, glabrous, green. Leaves petiolate or sessile; basal leaves petiolate, lanceolate, glabrous, 2-8×0.1-1.5 cm, base attenuate, margin entire or crenulate; cauline leaves sessile, linear to narrowly lanceolate, glabrous, descending towards apex of the branches, 2-14×0.1-1 cm, base attenuate, margin entire, apex attenuate. Capitula in paniculiform syninflorescences; peduncles 2-8 cm. Involucre cylindrical, phyllaries in 3-4 series, unequal, linear, 2-5 mm, apex acute-acuminate, entire, glabrous, yellowish-green. Ray florets 25-30, 5-6 mm long, pinkish white, glabrous. Disc florets 8-14, yellow, 3-5 mm long, yellow, glabrous. Stamens 5, syngenesious, 1.8-2.2 mm long. Gynoecium 5 mm long; stigma bifid. Fruit cypsela, oblanceoloid, brown, 5-6 ridged, strigillose, 1.5-3×0.4-0.8 mm, bristly pappi 3-4 mm long, white.

Flowering and Fruiting: July-October.

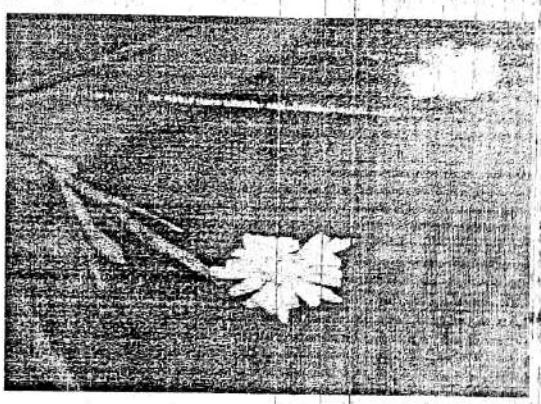
Habitat: Growing abundantly as monoculture around the agriculture fields near the edge of Forest areas.

Distribution: INDIA: Jammu & Kashmir, Punjab and Himachal Pradesh (Present report); WORLD: Australia, China, New-Zealand, Pakistan, Palestine, Taiwan, Tasmania, Turkey, United States.

Specimen examined: Village Gharana-Masanda, district Hamirpur, Himachal Pradesh, altitude 879 m, latitude & longitude 30°69" N 76°.51" E, 12.08.2023, Bhagwati Prashad Sharma & Sangeeta Chandel 720 (BSS) Fig. 1.



A. Whole plant



B. Closeup of inflorescence

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RESEARCH ARTICLE

An ethnomedicinal study on climbers and lianas of Changar region in district Kangra of Himachal Pradesh, India

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ABSTRACT

Climbers and lianas serve as important sources of ethnomedicines, in addition to their role in ecosystem services and vegetation distribution. But, in the present era, traditional knowledge and ethnomedicinal practices of these plants are disappearing rapidly. So, current survey was aimed to record traditional medicinal uses of climbers and lianas in Changar region of district Kangra, Himachal Pradesh, India. Interview method and semi-structured questionnaires were used to document findings followed by collection and identification of plants. Current study documented 52 plant species related to 43 genera of 21 families, utilized to cure 45 types of ailments. Plant parts were consumed directly (26%), followed by preparation of paste (17%) and decoction (13%). Quantitative methods including fidelity level, informant consensus factor, relative frequency of citation and use value were applied to gather information on medicinal plant use. Highest fidelity level (100%) as well as highest use value (0.95) were obtained for *Clematis gouriana* and *Tinospora cordifolia*.

INTRODUCTION

Climbers and Lianas or woody climbers are important constituent of diverse plant kingdom. As per Botanical Survey of India, out of 18000 species of angiosperms, 8000 species are medicinally significant, including many climbers. Medicinal properties of climbers also find mention in Ayurveda, Siddha and Unani healthcare systems of medicine that portray significance of climbers in Indian culture (Kalam & Ahmad, 2016). The traditional Chinese medicine system mentions analogy between climbers and, meridians and collaterals system of human body, and mention that medicines derived from them can open blockage in this system, especially joint system of body (Ding et al., 2024; Zhang et al., 2015).

Climbers are soil rooted weak stemmed plants which need assistance for delicate and weak stems (Richards, 1952). The climbing plants possess various specialized organs for attachment like hooks, spines, thorns, tendrils etc. to facilitate climbing on support for proper growth and development. Schimper (1903) grouped climbers into twining climbers, tendril bearing climbers, adventitious root bearing climbers and, thorn, spines or prickles bearing scramblers. While, word Liana refers to woody climber, the word vine refers to climber (Kelly, 1985). Climbers either twin around support or climb with help of tendrils, which may be modified shoot, leaf, petiole or inflorescence, or ascend via accessory clinging roots or other means. Presently, climbers are grown as ornamental plant and are also utilized by indigenous communities to treat sickness, diseases and other disorders.

Climbers and lianas are important constituent of biodiversity in forests. They affect distribution of other forest plant species (Chaudhary et al., 2023) and are crucial to interactions and structure in ecosystem (Rahman et al., 2020). Climbers reduce light reaching forest floor, increase humidity and therefore play role in regulating cycling of nutrients and diverseness of soil organisms (Manna et al., 2021; Schnitzer & Bangers, 2002). Apart from contributing to biological diversity in forest (Gentry, 1991; Hegarty & Caballe, 1991; DeWalt et al., 2006), they play important role in forest regeneration, ecosystem services, carbon sequestration, soil erosion control and biomass addition (Klinge & Rodriguez, 1973; Ogawa et al., 1965; Putz, 1983).

Indian Himalayan region possesses diverse medicinal flora (Jain, 1991; Marpa et al., 2020; Rana & Samant, 2011; Singh, Lal & Samant, 2009) and 37 percent of total medicinal plants of this region are reported from Himachal Pradesh, and 65 percent of the plant species grow in altitude zone of less than 1800 metres (Samant, Dhar & Palni, 1998). The study area Changar region of district Kangra falls in this zone and is the least surveyed area in Himachal Pradesh, as far as the ethnomedicinal data is concerned. The present study is the first extensive work and record of ethnomedicinal importance of climbers and lianas in this part of Indian Himalayan region. Kharwal and Rawat (2017)

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African Journal of Biological Sciences

Identification of New Localities of *Gastrochilus calceolaris* (Buch.-Ham. Ex J.E. Sm.) D.Don. – A Critically Endangered Orchid Species, In Himachal Pradesh, India

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Abstract

The present study deals with the identification of new locationsof a critically endangered epiphytic orchid *Gastrochilus calceolaris* in Kangra and Mandi districts of Himachal Pradesh, India. During the field visits in two consecutive years 2023 and 2024, ten to fifteen new prominent locations of this critically endangered orchid have been Identified. The habitat of *G. calceolaris* isunder various natural and anthropogenic threats leading to shrinkage of the natural habitat of the orchid. Special efforts should be considered to preserve these sites, as most of the identified sites are in private areas or along roadsides or restore in other suitable areas.

Keywords: *Gastrochilus*, Critically Endangered, Epiphyte, Habitat, Himachal Pradesh

Introduction

Orchids are a diverse group of plants belonging to the family Orchidaceae that represents one of the largest families among phanerogams comprising 703 genera (POWO, 2023) and about 29481 species (WFO, 2023). They are specifically epiphytes and facing high incidences of extinction due to various climatic and anthropogenic factors (Swarts & Dixon, 2009; Tiruwa et al., 2024). The study on their distribution, and association with host plants and other taxa is compulsory for devising future conservation strategies (Marwah et al., 2021). Therefore, keeping this in view, the present study was conducted to identify new localities of *Gastrochilus calceolaris*, a critically endangered epiphytic orchid species in Himachal Pradesh, India (Agoo et al., 2009; Baillie et al., 2004). The genus *Gastrochilus* D. Don (Epidendroideae; Vandeae; Aeridinae) founded in 1825, bears immobile bipartite labellum with a saccate hypochile and noticeable epichile. The epichile bears many long and prominent papillose hairs; slender stipe bears globose pollinia and viscidium is bifurcate (Christenson, 1985;Seidenfaden, 1988;Tsi, 1996). It includes about 55 species

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Medicinally Important Plants of Bignoniaceae Family and their Pharmacological Potential

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Abstract

The Bignoniaceae family is one of the most medicinally diverse families in the plant kingdom and is a rich source of drugs that have found use both traditionally and in conventional medicine. This family consists of trees or lianas, with occasional occurrences of shrubs and infrequently herbs. About 110 genera and 827 species belonging to this family have been collected and identified till date. Bignoniaceae family plants are also widely used in traditional medicinal systems of a number of countries worldwide. In various regions, folk and tribal healers utilize numerous species for the treatment of a wide range of ailments. This study lists 20 Bignoniaceae species found in India, detailing their key morphological characteristics and applications based on field observations and literature review. Photographic documentation is included for easy identification. The research emphasizes the importance of future ethnopharmacological and ecological investigations.

Keywords: Bignoniaceae, morphology, medicinal uses, pharmacology

Introduction

Bignoniaceae is a flowering plant family, comprising 110 genera and 827 species, and commonly known as the Trumpet Creeper family, Jacaranda family, Bignonia family, or the Catalpa family, an important component of neotropical forests, making a small contribution to the tropical forest of Africa, Madagascar, and Southeast Asia (Olmstead et al., 2009; Mahmoud et al., 2019). The members of this family are trees or lianas, with occasional occurrences of shrubs and occasionally herbs. Leaves opposite, sometimes verticillate, rarely alternate, 2-3-foliolate, pinnate or palmate, less often simple, terminal pinna of liana species often modified into a tendril; axillary bud scales (pseudostipules) often present. Flowers may be seen in thyrses, racemes or solitary, terminal or axillary, usually conspicuous. Calyx found with five sepals, sometimes bilobed or unlobed, rarely with calyptra. Corolla consists of five petals, often 2-lipped, rarely subrotate, imbricate or rarely

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RESEARCH NOTES

(I)

Indigenous traditional practices of *Madhuca longifolia* (L.) J. F. Macbr.

Madhuca longifolia is also known as "Mahua" and 'Butter nut tree'. It is one of those multipurpose forest trees that provide an answer for the three major 'Fs' *i.e.*, food, fodder, and fuel. It is used to cure many health problems. Therefore, it is also termed as "Universal Panacea of Ayurvedic Medicine" (Mishra and Padhan, 2013). It is also used as nutraceutical (Dalvi *et al.*, 2022). In the folk medicinal system in different regions of Odisha, Jharkhand and Chhattisgarh states, parts of the plant are used for curing many health problems. The different ailments treated by Mahua include tuberculosis (Khare *et al.*, 2018), rheumatoid arthritis (Shaheen *et al.*, 2021), cholera (Khare *et al.*, 2018), paralysis, snake-bite (Silva *et al.*, 2017), debility, tonsillitis, influenza, piles, helminthiasis, low semen count (Saif *et al.*, 2018), headache, flatulency, and skin infections (Sunita and Sarojini, 2013). It has also ecological and economic values. The above reports bring attention towards the compilation of its ITK for making policies in conservation, cultivation, and value addition. With these objectives an exploration survey was undertaken for collection of ITK from the indigenous people of different regions of Jharkhand, Bihar, Odisha and Chhattisgarh states, India.

During the forest fire survey in Odisha (2021-2023), the information was collected on *Madhuca longifolia* through semi-structured questionnaire (Kumar *et al.*, 2021). The other authors collected the information on Mahua from Bihar, Jharkhand, and Chhattisgarh. The data was also collected from available literature.

Traditional uses

Through field and literature survey, it was observed that in traditional and folklore medicine, *Madhuca longifolia* plays an immense role for the prevention and cure of many diseases. Tribal communities of study areas use the seed oil as vegetable oil and to cure skin infections. Various part of this plant shows different pharmacological activity (Mishra *et al.*, 2023). The flowers have been used for bronchitis, demulcent (Keri, 2022), diuretic (Khare *et al.*, 2018), analgesic, as cooling agents, and tonic (Patel and Naik, 2010). It is also used for treatment against helminths infestation as well as pharyngitis and shows aphrodisiac activity (Sunita and Sarojini, 2013). The bark is used for rheumatism, chronic bronchitis, and diabetes mellitus. The leaves are used in, gastropathy, constipation, dermatopathy and haemorrhoids (Ramadan and Hamed, 2020; Jha and Majumadar, 2018). The seed fat has emuluscent property, used in skin disease, headache, laxative, piles and sometimes as galactagogue. The bark is good remedy for itch, swelling, fractures and snake-bite poisoning. Mahua tree is generally valued for its seeds which have abundant amount of oil-bearing capacity and flowers are a rich source of sugar, (they could be used as a sugar substitute), mostly used in the production of the alcoholic beverages and sweet candy. Spent flowers (after fermentation) are also used as animal feed (Mukta and Sunil, 2009). The entire tree and its components are economically important but the two most important parts of the plant are the flowers (corolla) for the popular fermented drink (beverages) and seeds (kernels) for oil (Mukta and Sunil, 2009).

Nutraceutical values

Field and literature survey revealed that flowers and fruits are consumed by the ethnic group of study areas. The flowers and fruits having food and medicinal values. The plant parts of Mahua contain vitamins A & C. In addition, mahua butter has been used as substitute for cocoa butter (Ramadan *et al.*, 2016). The semisolid mahua fat is used in cooking, adulteration of ghee, and manufacturing chocolates (Ramadan and Hamed, 2020). Other value-added food products of mahua such as cake, cookies, jam, jelly, candy etc. having primary metabolites like sugar, minerals, carbohydrate, protein etc. are responsible for various pharmacological properties such as antidiabetic, antibacterial, anticancer, and antiulcer activities (Mishra *et al.*, 2023).

Uses of flowers

Flowering in *Madhuca longifolia* begins in the months of March and April. The flower is called '*mahua*' in the tribal language in Odisha, Jharkhand, and Chhattisgarh, while it is called '*pokka*' or '*ikku*' in Andhra Pradesh. The succulent creamish white corolla of the flower drops naturally and is collected early in the morning. It shrinks on drying and turns reddish brown in colour. The dried flowers are consumed directly or after cooking in water. They are also presented as offerings to deities during special occasions. The collected flowers form an important component of the barter system and

A REVIEW OF WORKING CAPITAL MANAGEMENT: A BIBLIOMETRIC STUDY FOR FUTURE DIRECTIONS

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ABSTRACT

Purpose: This study's goal is to analyze working capital management bibliometrically. This research covers the nation's scientific output between 2003 and 2024, including the quantity of articles published, the most influential papers, the most creative authors, and the most influential journals. In addition, one of the study's goals has been to identify gaps by utilizing various keywords.

Design/ Methodology: The study found 125 documents that were obtained from the Scopus database and analyzed bibliometrically using VosViewer and R-Studio.

Findings: With 23 publications, 2023 was the most productive year. Ahsan and Minhas Akbar were the most creative writers during that time. United Kingdom ranked first among influential countries, with 258 citations, followed by the Portugal . The publication that received the most citations was "Is Working Capital Management Value: enhancing Evidence from firm performance." In addition, the writers discovered that there was no keyword linkage to identify the research gap.

Research Implication: It provided guidance on the present status of the study to upcoming researchers and business owners.

KEYWORDS: Working Capital, Working Capital Management, Bibiometric Analysis

INTRODUCTION

Finance works like blood for any enterprise in today's era. For instance, if there is excess blood in a body, it has to be removed or drained and if there is less blood, it has to be put out of the body. Similarly, finance also has to be managed in the enterprise. Working Capital is an important part of these inevitable decisions (i.e. investment decisions) of finance decisions. Working Capital Management refers to managing finances related to day-to-day activities which include short-term assets (inventories, receivables, payables, and cash). Effective management of working capital components, or optimal working capital management, will supply the liquidity needed to finance the business's activities automatically (Aldubhani et al., 2022). Corporate managers should place a high priority on working capital management to boost business performance. Better governance will facilitate better-working capital management, which will boost performance overall (Naz et al., 2022).

Working capital is the money involved in a business's daily operations, according to PwC UK's Working Capital Report 2019–20: Creating Value through Working Capital. The analysis verified that, despite a more volatile international trade environment, regional differences in working capital performance still exist. These differences are primarily caused by differences in payment practices, cultural norms, and cash maturity levels (PwC, 2020).

Through concentrated efforts to optimize working capital operations, businesses can gain a competitive edge over their peers as well as long-term value (Deloitte research, 2023).

According to the EY Report from 2021, businesses must take a systematic approach to reducing working capital management problems, particularly in times of economic uncertainty. According to the report, Indian enterprises should prioritize optimizing their working capital. Working capital management, or the efficient administration of a company's current assets, is always essential to its survival and profitability (Aminu & Zainudin, 2015).

In addition to discussing the significance of working capital, corporate finance managers also need to take into account the impact of liquidity on profitability, as the company's limited cash reserves must be adequately utilized for investments. Investors might take into account funding decision elements related to debt percentage when choosing their financial strategy (Bintara, 2020).

This shows how important working capital management is for any firm as it is related to profitability (Deloof, 2003) (Lazaridis & Tryfonidis, 2006) (Raheman & Nasr, 2007) (Mathuva, 2009) (Gill et al., 2010). It is crucial to understand working capital management and the challenges that businesses face to manage working capital efficiently by going over the many components of working capital management.

To further this understanding in way that advances knowledge,

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REVIEW JoCC

The Role of Food Security in Ensuring a Sustainable Future for India

Mala Sharma[1,*],

Abstract

Food security is pivotal in shaping a sustainable future for India, a nation grappling with rapid population growth, environmental challenges, and resource constraints. This paper investigates the integral role of food security in promoting sustainable development across the Indian subcontinent. The study delves into the interplay between food security and various sustainability dimensions, including agricultural practices, climate resilience, and equitable distribution of resources. It evaluates current policies and programs aimed at enhancing agricultural productivity, reducing food waste, and building robust food supply chains. The research highlights innovative approaches and technological advancements that can bolster food security while supporting environmental sustainability. By analyzing recent trends and case studies, the paper illustrates how effective food security strategies can drive broader goals of sustainable development, such as poverty alleviation, health improvements, and ecological balance. The findings underscore the necessity of a holistic approach that integrates food security with broader environmental and social policies to foster long-term resilience. Ultimately, this paper provides actionable insights for policymakers, practitioners, and stakeholders on navigating the complex landscape of food security to achieve a more sustainable and equitable future for India.

Keywords: Food security, sustainable development, agricultural productivity, climate resilience, resource management

INTRODUCTION

The concept of food security has gained diversified dimensions after the first World Food Conference of 1974 held in Rome by the United Nation under the auspices of the UN Food and Agriculture Organisation (FAO). Food security is the ability of food to be affordable, available, and available to everyone at all times. Availability, accessibility, utilisation, and vulnerability are the four pillars that make up the larger idea of food security, and how these interact to determine a country's level of food security. Substantial progress and multiple initiatives has been taken to reduce food insecurity among the masses since the organisation of the first World Conference in 1974. However, ensuring household and national food security remains a significant concern for India, affecting political stability as well as the welfare of the populace. In its efforts to improve food security, the Government of India has adopted a number of strategies which include concerted efforts to increase foodgrain production, intervention in the grain markets and their modernisation, institution of public distribution system (PDS) and maintenance of reserve stocks for major foodgrains. The promulgation of the National Food Security Act (NFSA) in the year 2013 ensures targeted population in rural and urban strata for safe and nutritious food supplied through a chain of fair price shop throughout the country, so as to overcome the hunger and malnutrition of huge population of India. For the most populous and developing country like India, the undernourished people poses a great threat and the same is countered by the Government through incorporation of fortification of food grains as per

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Role of ICT based Teaching-Learning in Higher Education in India

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***Abstract*—Globalization and technological advancements have created a new global economy that is driven by knowledge, information and technology. Information and Communication Technology (ICT) has grown prominent in every aspect of life from eating habits to working habits, it has drastically changed everything. How can the educational system be an exception to this trend? Education is a highly social activity. The world is quickly shifting to digital media and information as we enter the twenty-first century, and ICT is essential to this transformation. In the twenty-first century, access, equity, and quality in higher education are all undergoing significant change in the country. The development of ICT-enabled workers who can make professional contributions in an ICT-enabled workplace is facilitated by ICT-enabled higher education systems. More access to information, improved communication, better cooperation and collaboration, and pedagogical advancement are all benefits of ICT in teaching and learning. By converting teaching and learning into an active process that is tied to real life, ICT may contribute to improving the quality of education. The learning experience in an ICT-based teaching-learning system is lifelong and is not limited by strict time or place restrictions. "Anytime education anywhere" and "learning on the web rather than learning about the web" are the phrases of the ICT-based educational system. In order to enable the teaching-learning community to participate in the global market with sustained growth and development, the Indian higher education system aims to impart the total development of individuals and society. This paper sheds ample light on the role of ICT in the Higher Education in India in the 21st century.**

***Keywords*—Information and Communication Technology (ICT), Teaching and Learning, Higher Education, 21st century**

I. INTRODUCTION

One of the most important systems for modern society and personal development is education. In developed and developing nations, education is a key tool for transformation. For every resident, it improves their living conditions and quality of life. People are prepared for both the present and the future through education, which also helps them get ready for employment. ICT plays a key role in the fast transition to digital media and information in the twenty-first century.In today's globalized culture, there is a constant need for qualified and competent labor. In light of this, universal access to high-quality higher education has become an essential component of economic development and progress. Therefore, ICT is essential for handling information and turning it into knowledge, which is a fundamental need for citizens to be responsible members of this modern technological and globalized world. In the twenty-first century, the nation's higher education system is undergoing significant change in terms of fairness, accessibility, and quality. One of the many ways to deliver education effectively and efficiently is through ICT. Several roles that ICTs can and do play in education have been proposed. These include enhancing educational results, expanding and raising the standard of education and learning (Wagner, 2001; Garrison & Anderson, 2003), producing the graduates and citizens required in an information-based society, and serving as a driving force behind an assessment of teaching methods(Flecknoe, 2002; McCormick & Scrimshaw, 2001).With ICT, classroom-based teaching and learning approaches give way to learner-centric ones, while wireless and e-learning technologies provide unlimited access. ICT use may change the teaching and learning process and provide effective learning environments, providing students to approach information in a proactive, self-directed, and effective manner (Volman & Van Eck, 2001; de Corte et al., 2003). Innovative ICT usage is thought to greatly improve the higher education system and solve the three main issues of staff and student information quality, equity and access.

ICT ENABLED EDUCATION

ULTRASOUND ACCELERATED GREEN OLEFINATION OF ALDEHYDES USING ZINC OXIDE NANOPARTICLE

Dhruva Kumar[1*], Rajesh Kumar[2] & Hardeep Singh[3]

Abstract

Olefination is the most important class of reaction in synthetic organic chemistry due to its wide range of applicability. Furthermore, zinc oxide nanoparticles (nano ZnO) serve as highly efficient catalysts. The current protocol offers an efficient method for the olefination of various aldehydes utilizing ZnO nanoparticles as catalysts in distilled water, providing a green reaction medium. Additionally, ultrasonication (US) is used as a green source of energy to accelerate the reaction.

Keywords: Ultrasonication, sonochemistry, green reaction media, nanoparticle, olefination, aldehydes, water.

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