



Janki Devi Bajaj Government Girls College, Kota



Self-Study Report Criterion -3

3.3.1. Number of research papers published per teacher in the Journals notified on UGC care list during the last five year

S. N.		Content	Page No
1	Jan 2021-Dec 2021	Number of research papers published per teacher in the Journals notified on UGC care	1-16

3.3.1. Number of research papers published per teacher in the Journals notified on UGC care list during the last five year

Jan 2021 to Dec 2021

Water quality and pollution status of kalishindh river, jhalawar region.

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ABSTRACT

Water, a prime natural resource, a basic human need and is indeed required in all aspects of life and health for producing food, agricultural activity, energy generation and maintenance of environment and a substance of life and development. The physico-chemical characteristics of kalishindh river water. The study conducted in different sites of Jhalawar district, Rajasthan, India. Jhalawar district is located between 23° 45'20" and 24° 52'17" north latitude and 75° 27'35" and 76° 56'48" east longitude. Water body selected after the physico-chemical and ecological study of three sites in Jhalawar district of Rajasthan, 1. Teendhaar 2. Munderi 3. Gagron. The collection of water samples during April, 2019 to March, 2020. The water quality parameters namely transparency (12.00-120.00 cm), turbidity (1.0-140 NTU), electrical conductivity (100-600 $\mu\text{S cm}^{-1}$), total dissolved solids (235-500 mg/l), pH (7.80-9.50), dissolved oxygen (5.00-14.00 mg/l), free carbon dioxide (0-10 mg/l), total alkalinity (70-300 mg/l), total hardness (40-150 mg/l), chloride (15.62-80.94 mg/l), nitrate (0.008-0.025 mg/l), nitrite (0.002-0.022 mg/l), sulphate (3.5-45.00 mg/l), potassium (1.8-5.3 mg/l), biochemical oxygen demand (0.50-6.00 mg/l), chemical oxygen demand (2.50-27.00 mg/l), ammonia (nil-0.49 mg/l), sodium (10.80-41.50 mg/l) and potassium (1.8-5.3 mg/l) reflects on the pristine nature of the river. On the basis of various parameters studied, kalishindh river in this stretch can be placed under the category of oligosaprobic. The water quality analysis, indicated that the river water pollution free and can serve as a good habitat for many aquatic animals including endangered species.

Keywords: Kalishindh river, Water quality, Pollution status.

INTRODUCTION

Natural resources are the important wealth of our country, water is one of them. Water is a wonder of the nature. "No life without water" is a common saying depending upon the fact that water is one of the naturally occurring essential requirement of all life supporting activities. The problem of water quality deterioration is mainly due to human activities such as disposal of dead bodies, discharge of industrial and sewage wastes and agricultural runoff which are major cause of ecological damage and pose serious health hazards (Meitei et al., 2004a). The degree of pollution is generally assessed by studying physical and chemical characteristics of the water bodies (Duran and Suicnz, 2007). Studies related to water pollution of rivers like Godavari, Krishna and Tungbhdra (Mitra, 1982), Cauvery (Somashekar, 1985; Batcha, 1997), Jhelum (Raina et al., 1984), Kosi (Bhatt and Negi, 1985), Morar (Kalpi) (Saksena and Mishra, 1991), Alaknanda (Tiwari et al., 1991), Brahamani (Panda et al., 1991; Mitra, 1997), Betwa (Datar and Vashishtha, 1992), Ganga (Pandey, 1985; Singh et al., 1999; Sahu et al., 2000; Rao et al., 2000), Godavari (Rao et al., 1993; --+565Rafeeq and Khan, 2002), Yamuna (Meenakshi et al., 2002; Anand et al., 2006), Pachin (Hussain and Ahmed, 2002), Irai (Sawane et al., 2004), Tansa (Shaikh, 2004) and Purna (Meitei et al., 2004a,b) have received greater attention from time to time and during recent years. An attempt has, therefore, been made to study water pollution in river kalishindh.

MATERIALS AND METHODS



Ecotourism: Nature and Prospects in Current Scenario

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ABSTRACT: Probably when man has learned to walk, he is travelling for food, safety and to earn resources (trade). Each improvement in technology increased opportunities for individuals to travel. Tourism is one of the largest industries in the world, which is connected to many other major sectors of the world's Economy. Although Ecotourism has short history when this term first appeared about 40 years ago. It changed its appearance over time. However Ecotourism, as a field of academic inquiry, is still in a state of adolescence. It has been a matter of discussion since the beginning due to the inclusion of two key words inside it i.e. tourism and conservation. Tourism is a matter of interest while conservation is a matter of responsibility. Due to its inclusive nature, it has attracted tourists as well as governments, bloggers, environmentalists and even a common traveller. Currently, the impression that Ecotourism has left is that all the developing countries are including it in their financial plans. Ecotourism norms are needed to protect the interests of indigenous people, and to preserve the beautiful, fragile environment where they live. In this article author compares these two concepts i.e. tourism and ecotourism and have tried to explain its nature and philosophical basis of ecotourism which has changed with the passage of time.

KEYWORDS: Ecotourism, Tourism, philosophical basis, Economy.

I INTRODUCTION

1.1 Definition

Ecotourism became an official definition in 1982 when it was included in the Oxford Dictionary as "Organized holidays that are designed so that the tourists damage the environment as little as possible, especially when some of the money they pay is used to protect the local environment and animals."

According to The International Ecotourism Society (TIES) Ecotourism is defined as "Responsible travel to natural areas that conserves the environment, sustains the well being of the local people and involves interpretation and education". (TIES 2015)

1.2 Origin of the term Ecotourism

Ecotourism was first conceptualized in the early 1980s as a kind of travel in which people enjoy it without harming nature and to study the culture of that tropical place. As Weaver and Lawton (2007) state, the term ecotourism began to appear in tourism magazines in the late 1980s and there has been minimal attention in the critical areas like quality control, the industry, external environment even as the components and the parameters of ecotourism are being extended. Ecotourism, as a field of academic inquiry, is still in a state of adolescence. Ecotourism has reached in juncture in its development (Arlen 1995).

II TOURISM

Tourism is one of the largest industries in the world (WTO 1991; WTTC 1993); but its environmental related issues are poorly studied (Buckley and Pannell 1989; Butler 1991; Westcott and Molinski 1993; WTTTC 1993). Ecotourism is arguably its fastest growing subsector (Matthews 1993), but poorly defined. At 4.1% growth rate, tourism is expected to generate 1.6 billion tourists by the year 2020 (Christie, Fernandes, Messerli, & Twining-Ward, 2014).



Floral biology, pollination mechanism and breeding system in *Milletia pinnata* (L.) Panigrahi (Fabaceae)

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ABSTRACT

Milletia pinnata syn. *Pongamia pinnata* (L.) is one of the few nitrogen fixing trees commercially known as Karanj. The seeds of the plant produce 30-35 % oil, is called Karanj oil or Honge oil. It is being considered as an alternative source for biodiesel. Its root, bark, leaf and flower of the tree have medicinal properties. It is an ornamental perennial tree. Its flowers are pentamerous, hermaphrodite and complete. Phenological studies indicate that it flowers twice in a year, in late spring to early summer and in autumn. First flush of flowers occurs in March-April and extend up to May and a second flush of flowers occurs in September to November. Anthesis occurs between 07:00 h-07:30 h. Papilionaceous structure of flower facilitates self-pollination but white tinged with pink or purple flowers displayed in pendulous raceme and sweet fragrance attract several visitors. P/O ratio is 25,625. High P/O ratio in this plant indicates that species is xenogamous. Fruits are hard, thick, almond coloured indehiscent pod which remain attached to the trees and fall down in April to July of the next year.

Keywords : Karanj, Anthesis, Biodiesel, Hermaphrodite, Phenology.

A variety of approaches and techniques have been proposed and implemented for conservation of plant resources. These techniques would not be successful without information about the reproductive features of plant. The understanding of various aspects of reproductive biology including pollination, breeding system of flowering plants is important for biodiversity conservation (Moza and Bhatnagar 2007, Chauhan and Chauhan 2013). Reproductive biology has been largely studies in herbaceous crops and trees have not received much attention due to their large size, long life cycles, and inaccessible flowers in conducting researches (Tandon *et al.* 2005). The techniques of conservation of biodiversity include *in situ* and *ex-situ* conservation. In vitro conservation techniques include tissue culture. Many of the micro propagation protocols that produce positive results in laboratories fail to take off in the field because of lack of information about the reproductive features. It has been observed that reproductive Biology is very important to determine the seed and fruit set, conservation and for understanding pollination and breeding systems that regulate the genetic structure of populations.

Milletia pinnata (L.) Panigrahi. syn. *Pongamia pinnata* (L.) Pierre (family-Fabaceae) is native to eastern and tropical Asia, Australia and Pacific islands, almost found along sandy beds of streams and the sea coast. *M. pinnata* originated from India (Sujatha *et al.* 2008) and spread across Asia into the Pacific Scott *et al.* 2008). This ornamental flowering tree is commonly called as Karanj, Pongam, Honge tree or Indian beach tree and it is cultivated as a road side tree. It is

medicinally important and its root bark, leaves and flowers are used to cure skin diseases, rheumatism, whooping cough, malaria and ulcers. Aqueous extract of seed, flower and pericarp show significant antipyretic, anti-inflammatory, anticancer, analgesic, anti-diabetic activities (El-shabrawy *et al.* 2007). The wood is used as fuel and agricultural implements etc. It is preferred species for controlling soil erosion. Seeds of Karanj contains 30- 35% oil and its physical and chemical properties are almost similar to the diesel . Pollination and reproductive biology of *Pongamia pinnata* L. (Fabaceae) have earlier been studied by and Kukade and Tidke, (2013) and Veereshkumar *et al.* (2021).

The present study deals with the floral biology, pollination mechanism and breeding system in *Milletia pinnata* (L.) Panigrahi growing as an avenue tree in Kota (Rajasthan).

MATERIAL AND METHODS

Study site — The study site is Chhatra Bilas Garden, located in Kota city. Kota is one of the eastern district of Rajasthan. It is situated between 75°37' to 77°26' east longitude and 24°25' to 25°51' north latitude. There are about 150 *M. pinnata* trees in garden.

Phenology and floral biology — Ten marked trees (P1–P10) were selected for study. Phenological events like flowering, fruiting, leaves shedding, emergence of fresh leaves, fruit dispersal were recorded over a period of two flowering seasons. Observations were made every day during the flowering time. Fruit maturation and dispersal were recorded once a week.



Phenology and floral biology of *Lagerstroemia speciosa* (Linn.)Pers. Family -Lythraceae

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Abstract:

The information on reproductive biology of plant is essential for biodiversity conservation. Present communication deals with the phenology, floral biology of an ornamental tree *Lagerstroemia speciosa* (Linn.)Pers. is grown as avenue tree and for decoration in gardens .

It is a tall perennial, deciduous tree with branched cylindrical stem, simple leaves and panicle inflorescence. Flowering period, the beginning, peak and end of flowering as well as longevity was registered. Ovules per flower, pollen germination, stigma receptivity, number of pollen/flower, pollinators and fruit/seed dispersal mechanism, pollen /ovule ratio were also studied. In *L. speciosa*, anthesis occurs before 6 a.m., anther dehiscence between 9.30 – 10.30 a.m. Duration of stigma receptivity is 12 hrs. and pollination is entomophilous.

Keywords: Anthesis, Entomophilous, Floral morphology, Pollen/Ovule ratio.

Introduction: Survival of any plant in a particular region is determined by the efficiency of their reproductive performance. Due to large size, long life cycles and inaccessible flowers, trees have not received the attention they deserve in conducting researches. Less work has been done on reproductive biology of trees. Climate change, pollution, deforestation, habitat fragmentation, use of pesticides affecting plants and pollinators. Reduced pollination decreases the fruit set. Researches on reproductive biology is today's need to understand breeding systems, plant pollinator relationship, pollination mechanism and fruit set success.

Lagerstroemia speciosa (Linn.) Pers. (Family-Lythraceae) is named after a Swedish botanist, magnus V. Lagerstrom. It is commonly called as Pride of India, Queen's crepe myrtle and Jarul in Hindi, also called as Banaba (Merrill, 1923). It is native to Asia, Australia and East Indies, widely distributed in India in wet forest of Western Ghats, Punjab, U.P., Rajasthan, Madhya Pradesh, Orissa, Karnataka and forest of Assam and Kerala

It is grown as an ornamental plant in gardens for its ornamental value serving an aesthetic rather than a useful purpose but it is also important for its economic uses. It bears large mauve purple flowers. Quality of its wood is similar to teak and very useful for boat building and carts etc. Roots are astringent and seeds are narcotic whereas the bark and leaves are purgative. In Andaman the fruit is used for curing ulcers in the mouth, leaves and fruits are used for preparing tannin extract. It has been used in Southeast Asia for centuries as a medicinal plant particularly in the treatment of diabetes and kidney related disease (Klein *et al.*2007). Its large leaves called Banaba are dried ground and made into tea that until recently has been confirmed to have chemical properties and effects similar to those of insulin.

Lagerstroemia speciosa (Linn.) Pers. is a perennial tall tree with branched stem, simple leaves and panicle inflorescence. Present investigation was undertaken to obtain information on the phenology and pollination biology of *Lagerstroemia speciosa* growing in Chhatra Vilas garden of Kota. It bears beautiful, large mauve purple flowers. Its wood is similar to teak and very useful for boat building and carts. Roots are astringent and seeds are narcotic whereas the bark and leaves are purgative. In Andaman the fruit is used for curing ulcers in the mouth, leaves and fruits are used for preparing 10 in extract it has been used in South and Southeast Asia for centuries as a medicinal plant particularly in the treatment of diabetes and kidney related disease (Klein *et al.*2007). Its large leaves called Banaba are dried ground and made into ITI that until recently has been confirmed to have chemical properties and effect similar to those of insulin.

It is cultivated for the beauty of its flowers can easily be grown from seed. The growth is slow in the first year but improve in the next year. It flowers 3-5 years after planting. Improvement, protection and management of plants particularly of tree species, are impossible

Mycorrhizal Association in Industrial Wastelands in Kota, Rajasthan, India

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ABSTRACT

Mycorrhizal symbiosis occurs between arbuscular mycorrhizal fungi and most of the vascular plants and is a highly evolved mutually beneficial relationship occurring within the rhizosphere of the vascular plants. The host plants are directly conferred benefits to the growth and development due to this symbiotic association. Their function ranges from stress alleviation to bioremediation in polluted soils besides their importance in the restoration of degraded wastelands. In this investigation colonization percentage and spore density of VAM fungi were studied in industrial waste dump sites and soil having natural vegetation. Industrial waste dump sites are characteristically dominated by *Glomus*. Mycorrhizal association and spore formation potential of AMF was significantly lowered in soil disturbed due to industrial waste dumping.

Keywords- Arbuscular mycorrhizal fungi, wastelands, mycorrhizal association, spore density, *Glomus*.

I. INTRODUCTION

About 93% of the flowering plant's families (Brundrett, 2009) and 92% of families of the total terrestrial plant (Wang and Qiu, 2006) are estimated to have mycorrhizal associations in their rhizosphere and form mutualistic associations with the roots of most land plants. Arbuscular mycorrhizal fungi (AMF) are obligate symbiotic fungi belonging to the phylum *Glomeromycota* (Schubler *et al.*, 2001) that are found in the rhizosphere. Mycorrhiza is the essential component of microbial soil community which forms the most common symbiotic relationship with the roots of the majority of land plants (Wang *et al.*, 2008).

AMF's has an important role to play in the restoration and recovery of disturbed lands and this great potential can be used in the reclamation of wastelands. By their ability to increase the roots surface and mineral uptake efficiency, mycorrhizal associations help the host plants to thrive in adverse soil conditions and drought situations prevailing in disturbed and degraded land. Mycorrhiza increases the absorbing surface area of the root by 100 or even 1000 fold (Larcher, 1995) thus increasing the plant's nutrient uptake and water relations (Birhane *et al.*, 2010; Banerjee *et al.*, 2013; Birhane *et al.*, 2015). AMF not only improves soil structure, but

soil water relations resulting in increased nutrient supply to the plant. Thus accelerating growth and yield, reproductive success, tolerance of the plant to biotic and abiotic stresses, and also reduces the requirement of the fertilizer (Finlay, 2008; Gianinazzi *et al.*, 2010; Simard and Austin, 2010; Barea *et al.*, 2011; Soka and Ritchie, 2014). In this way, AMF can improve field survival of the seedlings and their establishment (Pouyu-Rojas and Siqueira, 2000; Habte *et al.*, 2001; Ouahmane *et al.*, 2006; Dag *et al.*, 2009; Kapulnik *et al.*, 2010; Karthikeyan and Krishnakumar, 2012; Manaut *et al.*, 2015) on degraded lands.

Mycorrhiza plays an important role in the ecological restoration of degraded land *vis-a-vis* degraded vegetation. During the natural regeneration process, AMF influence the community structure of vegetation (Van der Heijden *et al.*, 1998; Hartnett and Wilson, 1999; Renker *et al.*, 2004; Heneghan *et al.*, 2008; Lin *et al.*, 2015) and are thus considered to have a pivotal role in the establishment of plant community and their assembly and succession (Janos, 1980; Renker *et al.*, 2004; Kikvidze *et al.*, 2010). Not only natural vegetation but agriculture is also affected by AMF diversity and distribution. Studies on agricultural fields have shown that disturbance in soil not only reduces abundance, diversity, and infectivity of AMF but also results in a drastic shift in the mycorrhiza community (Schnoor *et al.*, 2011).

Kota in Rajasthan, India is an industrial city (cartographic coordinates; 24°33' - 25°50' N latitude and 75°37'-76°31' E longitude), building limestone (*Kota Stone*) mining being the most important industry in this area. The thermal power station and fertilizer industry are other industries of major importance as the district is surrounded by five power stations within a 50 km radius. These industries create a huge amount of waste that is dumped in the surrounding area. The present study was conducted to evaluate the mycorrhizal association and spore density of AMF in natural vegetation areas and vegetation available on waste dump sites.

II. METHODOLOGY

In the present study mycorrhizal association between plants occurring on varying natural regeneration stages on wastelands is studied. Laboratory experiments



Plant Extract Mediated Synthesis of Transition Metal Nanoparticles: A Review

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Abstract: Green technology is a fast evolving scientific topic that has attracted a lot of attention in recent years due to its wide range of applications. It is a multidisciplinary field that is safe, non-hazardous, and ecologically friendly, in contrast to chemical and physical approaches for nanoparticle synthesis. Because the existing biomolecules in plant extract act as both a reducing and capping agent, the produced nanoparticles are very stable. As a result, nanoparticles that have been manufactured have a wide range of potential applications in the environmental and biomedical domains. The current report contains current information on numerous green synthesis methods that rely on different plant parts for green transition metal nanoparticles synthesis.

Keywords: Green synthesis, Nanotechnology, Transition Metal nanoparticles, Plants extract, Biomolecules.

I. INTRODUCTION

Nanotechnology is concerned with nanoparticles with at least one dimension of 1 to 100 nanometers. Nanotechnology has a wide range of applications, and producing functional nanomaterials for a variety of uses from biogenic resources is usually seen as a sustainable strategy [1]. Nanomaterials have automatically permeated every part of human existence, beginning with fabrics and progressing to more concerned applications such as the Agri-food, automobile, biomedical, and wastewater industries [2], with advancements of equipment to visualize and characterize them. Nanoparticles' application and exploitation provide superior features not seen in bigger size scales; therefore, nanotechnology is booming [3]. The majority of these applications have emphasized the importance of nanomaterials for increased efficiency and production. Metal nanoparticles are the fundamental building blocks of nanotechnology since they are the primary source of nanostructured devices and materials. Metal nanoparticles have been synthesized using a variety of procedures. The top-down and bottom-up strategies are the two basic methodologies used to synthesis particles. Nanomaterials can be made inadvertently, via physical or chemical means, or naturally, and their enormous demand has led to large-scale manufacturing using toxic solvents or high-energy processes [4], as shown in Fig.1. However, as public awareness of environmental and safety issues has grown, it has become necessary to adopt clean, nontoxic, and environmentally friendly methods to create metal nanoparticles. The exploitation of biological resources, such as, has risen in popularity as a method of producing transition metal nanoparticles. This biogenic synthesis is nontoxic, non-polluting, and environmentally beneficial. Biogenic synthesis is nontoxic, environmentally band cost-effective. This article also discusses numerous easy, cost-effective, environmentally friendly, and scalable tactics that have been developed using various greener approaches.

Experimental Investigation on Green Synthesis of FeNPs using *Azadirachta indica* Leaves

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Abstract

In nanotechnology, developing an environmentally friendly method for synthesizing iron nanoparticles (FeNPs) is an important aspect. According to recent studies, the use of secondary metabolites from plant leaf extract has recently emerged as a novel technology for synthesizing various nanoparticles. The leaf extract of *Azadirachta indica* was used to synthesize iron nanoparticles in this research. The effects of reactant concentrations, reaction temperature, and pH of the solution on the synthesis process of iron nanoparticles were studied. A UV-Visible Spectrophotometer that analyzed absorbance spectra was used to monitor the formation of iron nanoparticles in dispersion. Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) characterized the morphology of iron nanoparticles, and results reveal the particles are spherical with an average size of 48 nm. The optimum conditions for synthesis are as follows: 15 % leaf extract, $[\text{FeCl}_3] = 1.0 \text{ mM}$, pH 6.0, and temperature 60°C . The FTIR technique confirms that plant biomolecules induce the reduction of Fe^{3+} ions to FeNPs and act as a capping and stabilizing agent. Therefore, they have good stability for various applications.

Keywords: Green synthesis; *Azadirachta indica*; Iron nanoparticles; Experimental investigation.

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1. Introduction

Iron nanoparticles (FeNPs) are among the most promising metallic nanoparticles for various applications due to their reactivity and high surface area to volume ratio [1]. Several physical and chemical methods are used to synthesize iron nanoparticles, such as co-precipitation [2], sol-gel [3], hydrothermal [4], micro-emulsion [5], and sonochemical method [6]. The physical technique includes high energy, pressure, and temperature intake, while the chemical technique requires dangerous and harmful chemicals that lead to environmental contamination [7]. Research is focused tirelessly on achieving a green nanoparticle synthesis process that is easy, efficient, and accurate. Several species serve as safe, environmentally friendly, and green precursors to develop stable and well-defined functionalized nanoparticles. [8]. Biosynthesis of nanoparticles using microorganisms and

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Eco- Friendly Applications in Presence of Biosynthesized Metal Nanoparticles

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Abstract: *Green chemistry has proven to be an effective way to synthesize metal nanoparticles. Nanoparticles are very important for the development of sustainable technology for the future, for humans and the environment. The synthesis of nanoparticles from plants is a green chemical approach that combines nanotechnology and plant biotechnology. The plant extract is used for the bio-reduction of metal ion to produce nanoparticles. Plant metabolites have been shown to play an important role in reducing metal ions to nanoparticles and aiding their subsequent stability. Conventional methods for synthesis of nanoparticles uses harmful chemicals, generate serious attention to the development of ecological processes. Therefore, green synthesis uses extracts from biological sources from plant sources, which are superior to conventional methods. Over the past decade, it has been shown that many biological systems, including plant extract such as Steams, leaves, latex, flower, seeds can convert inorganic metal ion into metal nanoparticles. The many plants and plant parts have been used successfully in the synthesis of several green Metal nanoparticles such as Ag, Cu, Fe, Au, Pd Nanoparticles have been confirmed by various instrumental techniques. NPs are widely used in areas such as magnetic devices, photocatalysts, microelectronic devices, anti-corrosion coatings, biomedical and electrocatalysts. Here we report the biosynthesis of FeNPs and their catalytic activity was tested for degradation kinetics for Malachite green dye (MG).*

Keywords: Nanotechnology, Biosynthesis, Metal Nanoparticles, Characterization, Catalytic applications

I. INTRODUCTION

The environmental impact of colorants is a concern over the last few decades. Industries such as textile, leather, paper, plastic and pharmaceutical produce a great amount of waste water contaminated with dyes in the world [1][2]. Among all synthetic dyes, azo dyes are the largest and most important class of dye for industrial application [3]. The presence of dyes not only highly colors the effluent even at low concentration; it also causes environmental problems due to their toxic and carcinogenic characteristics [4].

Azo dyes are difficultly degraded by conventional treatment methods because of their complex structure and stability. The different treatment methods such as adsorption and flocculation are not efficient because they generate solid waste; this creating another environmental problem requires further treatment [5]. Among various treatment methods, advance oxidation processes (AOR) are considered as one of the most effective methods to degrade azo dyes, which involves the generation of powerful oxidizing species such as sulfate radicals ($SO_4^{\cdot-}$) that attack the dye molecule [6], and degrade into harmless products. The advanced oxidation process (AOP) is the name given to several oxidation methods that are based on the generation of strong free radicals for destroying organic pollutants present in anthropogenic sources. In the past years, persulfate such as peroxomonosulphate (PMS, HSO_5^-) and peroxodisulfate (PDS, $S_2O_8^{2-}$) have attracted increasing attention because they show more stability than hydrogen peroxide. Furthermore, persulfate and their product ($SO_4^{\cdot-}$) have the least effect on natural organisms⁷. Additionally, the sulfate radical ($E^0 = 2.5-3.1$ v) generated in activated persulfate systems is more selective than the hydroxyl radical ($E^0 = 1.8-2.7$ v) for the degradation of organic compounds with carbon-carbon double bond and aromatic rings⁸. Thermal radiation⁹, U.V. light¹⁰ and transition metal¹¹ are the main technologies for persulfate activation. Moreover, the higher energy needs for thermal, U.V. light radiation and the risk of secondary pollutants compel further application of these methods. Therefore, it is a

Degradation of Organic Pollutants using Green Synthesized Bimetallic Nanoparticles: A Kinetic Study

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Abstract: *Nanotechnology is an interdisciplinary field that encompasses various disciplines of engineering, biology, physics and chemistry, which deals with nanoscale materials. It is a multiple areas field which covers diverse domains from the synthesis of nanoparticles (NPs) from plants is a green chemical approach that combines nanotechnology and plant biotechnology. Plant metabolites such as sugars, terpenoids, polyphenols and others play an important role in reducing metal ions to nanoparticles. So to complete the goal; a biological approach to filling in the gaps is imminent; For example, green synthesis uses extracts from biological sources from plant sources, which are superior to chemical and biological methods. Water pollution is defined as the existence of toxic biological agents and chemicals that exceed the normal level of water and may pose a detrimental effect to human health and the environment. In the current report, here we synthesized silver, copper bimetallic nanoparticles (BMNPs) via a novel, robust, and inexpensive method using leaf extract of Azadirachta Indica as reducing as well as capping agent. The synthesized Ag-CuNPs was tested for degradation and degradation kinetics using Methyl Orange dye (MO) through an advanced oxidation process (AOP). The obtained kinetic result indicates the rate of degradation of MO induces significantly in presence of small concentration of BMNPs ($1 \times 10^{-8} \text{ s}^{-1}$) and UV-Visible spectrum changes are used to analyze the structure of intermediate and end products during the degraded process. This work promises good environmental safety against dye contamination in water based systems.*

Keywords: Nanotechnology, Green Synthesis, Bimetallic Nanoparticles, Degradation.

I. INTRODUCTION

The issue of emissions of harmful organic pollutants being released into the aquatic environment has received a lot of attention in recent years and is now considered one of the most important problems facing scientists. Even Industries that handle pollutants rigorously dealing with harmful materials such as dyes, smelters, tanneries and paper mills release highly waste water into ecosystem, causing pollution. Intense colour that the dyes impart to the aquatic ecosystem is an aesthetic and serious ecological concern [1]. Because most dyes are resistant to light, water and oxidizing chemicals, making them difficult to degrade if once they are discharged into the environment. Azo dyes that include one or more azo linkages (-N=N-) are known to be extremely hazardous and carcinogenic [2]. Advanced oxidation techniques have garnered a lot of attention in recent decades as a cutting-edge wastewater treatment technology for removing organic contaminants into less dangerous compounds [3, 4, 5, 6]. Several reactive oxidative species such as $\text{OH}\cdot$, $\text{O}_2\cdot^-$, $\text{HO}_2\cdot$ can be made in AOP and are usually very effective for bleaching colour and even mineralization. Recently, AOPs based on sulphate radicals ($\text{SO}_4\cdot^-$) have attracted great scientific and technological interest in their environmental applications [7]. By activating sulfate-based oxidants (PMS, PDS) with thermal, ultraviolet, microwave, and ultrasonic radiation and/or transition metal ions, sulphate radicals (SR) with a reduction potential of +2.6 V relative to NHE can be generated. As a result, it is envisaged that $\text{SO}_4\cdot^-$ will be an excellent oxidising agent in contaminated water for decomposition of refractory organic molecules [8]. Plant extracts have been established in a number of recent studies to be safe precursors for the production of nanomaterials. Both technologically and scientifically, bimetallic nanoparticles (BMNPs) have gained more interest than monometallic nanoparticles, as BMNPs have better properties in many applications, especially in dye degradation, due to their synergistic

Research Article

Single-Step Green Synthesis of Iron Nanoparticles in the Aqueous Phase for Catalytic Application in Degradation of Malachite Green

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Abstract: The goal of the research was to devise a simple and environment-friendly approach to synthesize iron nanoparticles (FeNPs) and evaluate the catalytic activity of biosynthesized FeNPs for the degradation of the cationic dye Malachite Green (MG) in the presence of Peroxomonosulphate (PMS). Different instrumental approaches were used to characterize green produced FeNPs, and the results show that the NPs are spherical and 48 nm in size. Increasing the concentrations of nanoparticles ($0.5 \times 10^{-8} - 2.0 \times 10^{-8}$ mol/dm³), Peroxomonosulphate ($1.0 \times 10^{-4} - 5.0 \times 10^{-4}$ mol/dm³), dye ($1.0 \times 10^{-5} - 5.0 \times 10^{-5}$ mol/dm³), pH (5), and high temperature (25-35 °C) enhanced the degradation kinetics of MG. Pseudo-first-order kinetics were used to describe the degradation of MG in the FeNPs/PMS system, and activation parameters were derived. The maximum MG degrading efficiency for the FeNPs/PMS system was 88% in 60 minutes under optimum reaction conditions. The structure of intermediates formed by MG degradation by FeNPs/PMS was determined using UV-vis spectrum analysis. The application of synthesized FeNPs to improve Peroxomonosulphate oxidation potential for MG degradation is a unique, efficient, promising, and eco-friendly technology because it does not require any expensive reagents.

Keywords: green synthesis, iron nanoparticles, Peroxomonosulphate, catalysis, Malachite Green

1. Introduction

FeNPs have recently attracted a lot of attention because of their versatile properties, such as high catalytic activities and higher intrinsic reactivity of their surface sites, which have applications in a variety of fields, including the food industry [1], medical science [2], biosensing [3], catalysis [4], magnetic field-assisted separations [5], and analyses [6]. Shape and size of nanoparticles are important properties in their fabrication, processing, and applications due to their large surface area, electron transport, and electrical conductivity that lead to their high catalytic reactivity [7-8].

For the production of iron-based nanoparticles and the modification of their surface properties, many chemical and physical approaches have been established [9]. In physical and chemical procedures, toxic chemicals are used as reducing agents, organic solvents, or non-biodegradable stabilizing agents, making them potentially harmful to the environment and biological systems. The use of microorganisms and plant extracts in the biosynthesis of FeNPs has been suggested as a viable environmentally benign alternative to chemical and physical approaches [10]. Plant extracts commonly contain flavonoids, proteins, terpenoids, polyphenols, and other biomolecules that act as metal ion reducers

CHANGES IN HEMOGLOBIN PERCENTAGE AFTER CADMIUM CHLORIDE EXPOSURE IN MOUSE

Dr. Jaihere Daverey*

ABSTRACT

Heavy metals are naturally occurring elements that are widely distributed in the earth's crust. Excessive levels of trace elements may occur naturally as a result of geological phenomenon such as ore formation, weathering of rocks and leaching. Human activities, for instance, burning of fossil fuel, mining, smelting, discharging industrial, agricultural and domestic waste are far more responsible for the presence of heavy metals in the atmosphere than the natural geological phenomenon. Cadmium as an industrial pollutant has aroused a great concern due to its toxic effects on the various body tissues. Therefore, an attempt has been made to study the changes in the values of hemoglobin of Swiss albino mice after cadmium chloride exposure. For the experiment, adult healthy male Swiss albino mice (6-8 weeks old) were used for the experiment. The aqueous solution of the cadmium chloride was prepared by dissolving 20 mg of cadmium chloride in 1000 ml of the glass distilled water, thus giving the concentration of 20 ppm and then administered orally in drinking water. Animals were autopsied by cervical dislocation at each post-treatment interval of 1, 2, 4, 7, 10, 14 and 28 days. Immediately after autopsy, the blood was collected by cardiac puncture in heparinized tubes for studying haemoglobin percentage. The present investigation revealed decrease in haemoglobin values continuously upto day-4 after cadmium exposure and increasing thereafter. Cadmium interferes with the formation of haemoglobin, almost certainly in the bone marrow and intoxication by cadmium can hinder the resorption of iron resulting in an iron deficiency anaemia.

Keywords: Cadmium Chloride, Haemoglobin, Haemolymph.

Introduction

Environmental pollution is an undesirable change in physical, chemical and biological characteristics of water, air and soil that is harmful for all living organisms including plants. Most of the pollution problems which we face today stem from the overexploitation of our natural resources, technological advancement, urbanization and industrial revolution. Human activities, for instance, burning of fossil fuel, mining, smelting, discharging industrial, agricultural and domestic waste are far more responsible for the presence of heavy metals in the atmosphere than the natural geological phenomenon. Cigarette smoking can cause significant increase in the concentrations of cadmium in kidney, the main target organ for cadmium toxicity. [1] Once perpetuated in the environment, metals are not readily detoxified by metabolic activity. As a result they get accumulated contributing to potential environmental hazard. Some of the most common toxic metals are lead, mercury, chromium, cadmium, arsenic are highly toxic in minor quantities [2]. These metallic elements are considered systemic toxicants that are known to induce multiple organ damage, even at lower levels of exposure [3]. In the human body, these heavy metals are transported and compartmentalized into body cells and tissue binding to proteins, nucleic acids destroying these macromolecules and disrupting their cellular function [4]. Cadmium as an industrial pollutant has aroused a great concern due to its toxic effects on the various body tissues.

Therefore, an attempt has been made to study the variations in the values of haemoglobin content of Swiss albino mice after cadmium chloride exposure.

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INTEGRATED PEST MANAGEMENT TECHNIQUES OF BLACK PEPPER SEED EXTRACTS AGAINST *CALLOSBRUCHUSMACULATUS* (FAB.)

Mosmee Meena*

ABSTRACT

Cultural Control plays a key role in keeping down the number of *callosobruchus maculatus*(F.) carry-over between cowpea seeds. The use of chemicals in agriculture fields for the management of various insect pest populations created many unwanted effects. Present study was based on integrated pest management techniques.

Keywords: *Callosobruchus Maculatus*, Black Pepper, Antifeedent Activities etc.

Introduction

The pulse beetle *callosobruchus maculatus*(Fab.) has consume, destroy and damage all kinds of growing crops and their valuable vegetation. In recent years, it has been realized that major emphasis should be given to plant-based grain protectants. Thus, this study is aimed at search of an eco-friendly pesticide as black pepper seed Kernel extract against *Callosobruchus maculatus*.

To combat these notorious insects, man has relied on the use of various measures such as mechanical, physical, biological and chemical control method.



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EFFECT OF CADMIUM CHLORIDE ON HAEMATOPOIETIC ORGAN: THYMUS

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ABSTRACT

Since there is a constant release of trace elements in unnaturally higher concentrations and often in unusual physio-chemical state, the fear of them being hazardous to human health is now an indisputable truth. Once perpetuated in the environment, metals are not readily detoxified by metabolic activity. As a result, they get accumulated contributing to potential environmental hazard. In the present study, the effect of cadmium chloride on thymus of mice has been investigated. For the experiment, adult healthy male Swiss albino mice were fed with aqueous solution of $CdCl_2$ prepared by dissolving 20mg of $CdCl_2$ in 1000ml of distilled water, thus giving a concentration of 20ppm and then administered orally in drinking water *ad libitum* continuously till the end of experiment. Animals were autopsied by cervical dislocation at each post-treatment interval of 1, 2, 4, 7, 10, 14 and 28 days. Thymus was taken out after autopsy, weighed and fixed in Bouin's fluid. Then the tissue was dehydrated and embedded in paraffin wax and transverse sections were cut at 5 μ and stained in Harn'shaematoxylin-eosin stain for histopathological studies. After cadmium chloride treatment, thymus showed a significant decline in the organo-somatic index value continuously till day 10, and recovering thereafter. Pathological changes after $CdCl_2$ treatment include necrosis of thymocytes, fibrous tissue proliferation, Pyknosis, Karyolysis, and distortion of Hassal's corpuscles. Recovery started at a much later interval, and was probably due to the binding of intracellular cadmium to metallothionein which protects the tissue against the cadmium toxicity.

Keywords: Karyolysis, Pyknosis, Metallothionein, Thymocytes, Cadmium Toxicity.

Introduction

Heavy metals are the most toxic, non-biodegradable intrinsic component of earth's crust. With technological advancement and diversification of industries, combined with specialization in all fields, the volume and complexity of metals is also increasing day by day. Due to their toxicity, heavy metals are well known environmental pollutants persisting in the environment, contaminating the food chains and causing different health hazards^[1]. Most of the pollution problems which we face today stem from over exploitation of our natural resources and/or heedless disposal of waste material in the environment. Once perpetuated in the environment, metals are not readily detoxified by metabolic activity. As a result, they get accumulated contributing to potential environment hazard. Cadmium as an industrial pollutant has aroused a great concern due to its toxic effects on various body tissues. Cadmium enters animal tissues via inhalation, ingestion, cigarette smoking or occupational exposures. Tobacco smoking is one of the largest single source of cadmium exposure in humans^[2]. An important route of exposure is the circulatory system and the blood vessels are considered to be the mainstream organ of cadmium toxicity^[3]. In the tissues, concentration of cadmium increases with the increased period of exposure to cadmium^[4]. However, their toxicity depends on several factors including the dose, route of exposure, age, gender and also nutritional status of exposed individuals. They disrupt cellular events including growth, proliferation, differentiation, damage-repairing process and apoptosis. Cadmium also causes genomic instability^[5]. Therefore, an attempt has been made to assess the effect of cadmium chloride on the thymus of Swiss albino mice.

Material and Methods

In the present study, the effect of cadmium chloride on thymus of mice has been investigated. For the experiment, adult healthy male Swiss albino mice were fed with the aqueous solution of the cadmium chloride. For preparing this solution, 20 mg of cadmium chloride was dissolved in 1000 ml of distilled water. This 20ppm cadmium chloride concentration solution was fed orally *ad libitum* in drinking

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DIVERSITY OF BIRDS AROUND THE KHANDIYA RESERVOIR, JHALAWAR, RAJASTHAN

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ABSTRACT:

Birds are distributed all over the world occupying various habitats. Birds are one of the indicators for environmental changes and play an important role in the control of insects or pests. As birds are important bio- indicators of nature, monitoring bird population is very important. These warm-blooded vertebrates have adapted to a wide range of environmental conditions and they also occupy diverse habitats. The present study has been conducted to record the Diversity of birds around the Khandiya Reservoir in the Jhalawar district of Rajasthan. Though many varieties of birds are seen in and around the Reservoir, no study has ever been conducted so far on the bird diversity of the area. After a study diversity of birds in this area about four months (i.e., January, February, March & April of year 2021) a total of 53 species, 49 genera, 33 families and 13 orders are recorded. It is observed that the avian diversity was higher in winter season and lower in summer season comparatively.

Key words: Birds, Diversity, Species, Genera, Khandiya Reservoir.

MATERIALS AND METHODS

Study area:

The area where the present study has been conducted is the Khandiya reservoir (24°34'32.2"N 76°10'16.9"E). Which is located in the Jhalawar district of the state of Rajasthan. The reservoir is mainly used for irrigation and pisciculture. Khandiya reservoir is a place of walking and draws many people every day due to its beautiful surroundings which is covered with lush green vegetation. January is the coldest month with mean daily average temperature of 22°C which reaches to a maximum of up to 40°C in April. The flora of the study area is predominated by plants like Tamarind (Tamarindus indica), Kusum (Schleichera oleosa), Sal (Shorea robusta), water lily (Nymphaeaceae), Lotus (Nelumbo nucifera), Safeda (Eucalyptus



Different Possibilities Associated with Vaccination Strategies of COVID – 19

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ABSTRACT: The origin of COVID-19 outbreak at the beginning of year 2020, caused by a novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), created an enormous need to gain insights into this new virus and to develop ways to control its spread. The development of a vaccine to prevent coronavirus disease 19 (COVID-19) became a global requisite, and defining the global challenges and potential hurdles became critical since regulatory and medical decisions are based on the risk-benefit calculations. If approximately 60 – 70% of people develop immunity against the pathogen the pandemic spread is restricted. Since the SARS-CoV-2 is new to human population, the consequences of repeated epidemics will be unacceptably high mortality, severe economic disruptions, and major adjustments to our daily lifestyle. Therefore, the benefit of developing a vaccine is enhanced as it was deployed in an unprecedented time to prevent the repeated or continuous epidemics. However, the target of most of the SARS-CoV-2 vaccine development globally is its receptor binding domain and according to the world health organization most of them are being delivered by intramuscular injections to achieve broadly neutralizing immunoglobulin G antibodies, yet a key question is can it provide a durable immunity as it is a rapidly evolving virus and furthermore the respiratory vaccines, in general, provide limited protection against viral replication and exfoliation within the airway, as this requires a local mucosal secretory IgA response, also at which extent it contributes to the antibody dependent enhancement.

KEYWORDS: Vaccination strategies for COVID-19, Antibodies and COVID-19 vaccine, ADE

I. REVIEW

Novel coronavirus pneumonia emerged in Wuhan city, China In December 2019. It was initially linked to animal-to-human transmission but, eventually, human-to-human transmission of the virus emerged, giving rise to a widespread respiratory illness in Wuhan and other urban areas of Hubei Province, China, Afterwards the virus then spread across China and all around the planet. On 11 February 2020, World Health Organization named the syndrome COVID-19 or coronavirus disease 2019, and the virus was named SARS-CoV-2. COVID-19 is marked by severe respiratory illness and remarkable mortality. Moreover, SARS-CoV-2 is highly transmissible and it has achieved a worldwide spread, and on March 11, WHO has characterized it as a pandemic. As COVID-19 is new to humankind it is essential to develop effective and safe vaccine strategies to control the pandemic, but most of the vaccines present against COVID-19 are strategized to target the receptor binding domain or the spike protein of the virus to achieve IgG antibody production against systemic viremia and aid to the mucosal immunity. The status of current COVID – 19 Vaccine within WHO prequalification and emergency use listing can be tracked with the help of link provided below as the landscape is updated twice a week. <https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines> However, the protection against the virus may not last long due to the rapid changes in the viral genome and its inability to generate mucosal IgA antibodies in the lungs consequently asymptomatic nasal viral shedding from vaccinated individuals, as a result, the protection against the virus becomes limited, also, there is a chance of induction of ADE (Antibody-dependent enhancement) because of which mankind can face a self borne adversity as SARS-CoV-2 has some degree of similarity from SARS-CoV and MERS which were observed to induce ADE, this creates an enormous need for some new vaccine strategies. To prevent viral replication credibly inside the mucosal primary target cells appropriate production of secretory IgA is required and this can be induced by mucosal route of vaccination, as the immune system of mucosal surfaces is mainly composed of MALT and contributes about 80% of immunocytes in the human body. Since SARS-CoV-2 is a respiratory disease the respiratory mucosal vaccination would be effective at



Substrate Evolution to Microstructural and Optoelectrical Properties of Evaporated CdS Thin Films Correlated with Elemental Composition

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Abstract

A typical high-efficiency solar cell device needs the best lattice matching between different constituent layers to mitigate the open-circuit voltage loss. In the present work, the physical properties of CdS thin films are investigated where films with 100 nm thickness were fabricated on the different types of substrates viz. soda–lime glass, indium-doped tin oxide (ITO)- and fluorine-doped tin oxide (FTO)-coated glass substrates, and silicon wafer using electron beam evaporation. The X-ray diffraction patterns confirmed that deposited thin films showed cubic phase and had (111) as predominant orientation where the structural parameters were observed to be varied with nature of substrates. The ohmic behaviour of the CdS films was disclosed by current–voltage characteristics, whereas the scanning electron microscopy micrograph revealed the uniform deposition of the CdS films with the presence of round-shaped grains. The elemental analysis confirmed the CdS films deposition where the Cd/S weight percentage ratio was changed with nature of substrates. The direct energy band gap was observed in the 1.63–2.50 eV range for the films grown on different substrates. The investigated properties of thin CdS layers demonstrated that the selection of substrate (in terms of nature) during device fabrication plays a crucial role.

Keywords CdS thin films · Substrate evolution · E-beam evaporation · Microstructural properties · Optoelectrical properties

1 Introduction

The increasing demand of energy in the era of cutting-edge technology and limited stock of fossil fuels have drawn kind attention for developing cost-effective and high-efficiency solar cell devices [1]. The silicon solar cell technology has been the champion ever since its invention while the thin film-based cost-effective technologies viz. CdTe, CIGS, organic, and perovskites have also come into existence with time which have their own merits and demerits. A solar cell device needs an optical window for ensuring the formation

of an asymmetric junction with a corresponding absorber layer in order to derive the generated charge carriers towards the electrodes concerned [2]. For the CIGS and CdTe technologies, the CdS is a well-studied optical window material as it is having the best lattice matching with these absorber materials. Recently, the perovskite solar cell technology has come into existence and received extensive attention owing to low cost, high efficiency, and ease of fabrication procedure [3]. The high power conversion efficiency of the perovskite solar cells is achieved by using a mesoporous TiO₂ electron transport layer (ETL) since the transport layers (viz. electron and hole transport layers) play an important role in the device performance. In such high-efficiency devices, the high-temperature annealing (> 450 °C) condition is required to crystallize the TiO₂ films. However, it has been reported that the light-induced degradation of the solar cells is due to light-induced desorption of the oxygen and light-activated catalytic effect of TiO₂, thus, the perovskite-based devices are facing stability problem. To reduce the degradation and enhance the stability, new materials for ETL have been proposed including ZnO, CdSe, CdS, SnO₂, graphene, etc. [4–7].

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