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ECONOMIC ANALYSIS OF CO-OPERATIVE MILK PRODUCER UNION IN KARAIKAL REGION

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ABSTRACT:

This study recognizes the Economic Analysis of Co-Operative Milk Producer Union in Karaikal Region. Data was collected from Karaikal Region Milk Producer Union during 2007 to 2016 years. Ratios analysis has applied to find out the performance of Milk Producer union. Descriptive research techniques were used to collecting the information from the balance sheets, profit and loss account cash flow statement. The convenient sampling technique is applied to decide the selection of the Co-Operative Milk Producer Union. It is found that consumer co-operative milk producer union milk met higher level risk towards working capital management.

KEYWORDS: *Economic Analysis, Ratio, Working Capital, Share Capital and Reserve Fund.*

INTRODUCTION

Dairy farming is class of agriculture concerned with production of milk for market. In India, farmers are having raising animals in small scale using traditional method of production. But even though being small scale, India tops the chart of milk production due to a large number of farmers engaged in dairying, (Hasan Cicek and Murat Tandogan, 2008). Ansari (2004) Dairy activities were traditionally been integral to India's rural economy. The India is the world largest producer of dairy products and too their largest consumer. India ranks first among the world's milk producing nations since 1998 and has the largest bovine population in the World with 57% of the buffaloes and 14% of the world's cattle population. Most of which are milch cows and milch buffaloes. India had a large livestock population base constituting 278 million livestock including 180.5 million cattle, 82.8 million buffaloes, 4 million sheep and 9.2 million goats. Ansari (2004) the large livestock population is raised primarily on crop residues and grazing in the common property including basement. India's dairy industry is considered as one of the most successful development programmes in the post-Independence period, (James et, al., 2016; Hasan Cicek and Murat Tandogan, 2008).

Milk production in India during the period 1950-51 to 2014-15, has increased from 17 million tonnes to 146.3 million tonnes as compared to 137.7 million tonnes during 2013-14 recording a growth of 6.26 %, (Hasan Cicek and Murat Tandogan, 2008). This milk production has increased to 163.6 million tonnes in 2016-17 from 137.7 million tonnes in 2013-14. It means that output has grown by 18.81 per cent during this period.

The country milk production grew at an annual rate of 6 per cent during 2014-17 as against 4 per cent during the previous three years 2011-14. Ansari (2004) Income of dairy farmers has increased by

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"FINANCIAL PERFORMANCE OF SALEM DISTRICT CENTRAL COOPERATIVE BANK LTD., SALEM"

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ABSTRACT

The present study is based on analytical in nature. The information related to the deposits, share capital, reserves and total assets of the DCC Banks in Salem have been taken into the present study. The data used in this study is secondary in nature which was collected from Annual and Audit reports of DCCB, Salem and report of National Federation of State Cooperative Banks Ltd. The study has been carried out to reveals the sources of funds used by the DCCBs for mobilizing the required funds and also to examine whether the growth of deposits accompanied by similar growth of owned funds and the total assets of the DCC Banks. By using the statistical tools namely Annual Growth Rate, Mean, Percentage etc., it is found that the bank had mobilized majority of funds through deposits from the general public and it had focused more on loan funds instead of share capital and deposits in order to balance the required funds. The trend line of Deposit to Total Assets Ratio shows that the deposits as a percentage of total assets has been increased significantly during the period 2013-14 which indicates that the bank mobilized the deposits with low cost in order to increase the return on assets. Further, the deposits to Owned Funds Ratio illustrates less fluctuation which indicates that the bank spent less cost, by means of brokerage and incentive, on mobilizing deposits from the members.

KEYWORDS: *National Federation , District Central Cooperative Banks (DCCBs) , Cooperative Societies Act.*

1. INTRODUCTION

The District Central Cooperative Banks (DCCBs) occupy a position of cardinal importance in three-tier credit structure. They came into existence due to the failure of PACS to collect the required resources of village community on one hand and to inspire the habit of thrift and savings among the members to provide strong capital base. Hence the DCCBs were started to tap the required finance from the members, higher financing institutions and individuals, in order to fulfill the credit needs of the affiliated societies.

In Uttar Pradesh, the PACS worked as DCC Bank in 1906. The first DCC Bank was started at Ajmeer in 1911. However, the Cooperative Societies Act of `1912 paved the way for the registration of DCCBs with an objective of providing financial assistance to primary societies. The policy of organizing a DCC bank for each district originated from a recommendation of Maclagan Committee on Cooperation in India in 1915. Thus, the origin of DCCBs took place during the period between 1906 and 1918 in various parts of the country.

2. ORIGIN AND GROWTH OF DISTRICT CENTRAL COOPERATIVE BANK IN INDIA

When the Cooperative societies act was passed in the credit year 1904, the first Central bank was started in 1910 Ajmer. The period from 1906 to 1918 may have caused the period of Central banks 1919 to1929. This was a rough the period during the end of the First World War Sinking the number of Central banks went off increasing between1919 to 1929.

PROGRESS OF MICRO INSURANCE IN INDIA – AN ASSESSMENT

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ABSTRACT

This paper attempts analyse and understand the progress of microinsurance in India. It is based on the secondary data collected and compiled from the published sources for the period of eleven year that is, from 2007-08 to 2017-18. The results of the study shows that the share of LIC in the total business is more than private insurers and the annual growth rate of both insurers are in fluctuating trend. It is highly relevant to note that the private insurers were able to register the high positive CAGR than LIC during the period under study.

Keywords: Microinsurance, Risk, Poor, Social security, Programmes

I. INTRODUCTION

Risk is ever present in the lives of the poor because most of them live in insecure conditions. Low-income individuals, households, and businesses are susceptible to the most common risks associated with their well-being, such as death, illness, injury, natural disasters, and theft. Microinsurance offered the ability to transfer risks to another party in a predictable and organized way in order for individuals to live their lives with more certainty. Experiences across countries in the world show that microinsurance has potential to reduce household risk impacts. In view of this, there is widespread interest in analyzing the marketing and outreach of microinsurance in India. The goal of social protection of governments and the discovery of business proposition in marketing insurance products by private players has led to the growth in the insurance business and evolution of various types of insurance covers.

II. REVIEW OF LITERATURE

Nearly all insurance schemes are linked with micro-financial services. Life and health are two most popular risks for which insurance is demanded (Ahuja, R. and Guha-Khasnobis, B. 2005). Linking insurance to the SEWA Bank has produced important benefits (McCord, Isern, &Hashemi2001; Chatterjee. and Vyas, 2005; Garand, 2005). Tanejaand Sihare, (2011) evaluated Rashtriya Swasthaya BimaYojana (RSBY) an innovative mass level micro health insurance initiative of the Indian Government and found that it provided positive results. Devadasan, (2011) evaluated two health insurance schemes and found that both are satisfactory. They found that uninsured also have same level of satisfaction, they as such suggested that to improve the quality of care for their clients, the scheme managers need to negotiate actively for better quality of care with empanelled providers. The determinants of health insurance are: amount of income, health care expenditure number of children in a family, age and perception regarding future health care expenditure (Bhat and Jain, 2006). Households with a sick house hold head do not purchase as they have less income flows in financing the insurance premium. Households with a higher ratio of sick members are more likely to purchase insurance (Ito and Kono, 2009). The low-income population is not familiar with insurance and intangible products and therefore there is a need to educate the client group to know what he or she is buying and understand the benefits that one can get from buying an insurance policy (Tinsy Rose Tome and Selvam, V.2012; Ayandev Saha, 2012). However, Kirti Singh and Gangal, (2013) on the other hand revealed 73.36% of the people are aware of microinsurance.

III. OBJECTIVES

1. To trace out the origin and development of microinsurance in India
2. To analyse and understand the progress of microinsurance in India.

IV. METHODOLOGY

The study is based on secondary data. The data have been collected and compiled from the Annual Reports of IRDA. The sources include books, journals, website and the like. As microinsurance act was implemented in India only during 2005, the study has taken into consideration eleven years from 2007-08 to 2017-18. The simple mathematical tools have been employed for the purpose of analysing the data.

V. EVOLUTION OF MICRO INSURANCE IN INDIA

The term microinsurance was derived from the older term 'Micro-finance' (Shwetha Rana, 2014). India has many informal insurance schemes. These schemes are often small, run by cooperatives, churches and non-

ROLE OF COOPERATIVES IN THE ECONOMIC EMPOWERMENT OF WOMEN IN KARAIKAL REGION OF PUDUCHERRY UNION TERRITORY

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ABSTRACT

Promoting women's empowerment is essential because in most cases women are responsible for their children and for their family, thus empowering women is empowering the society in large (World Bank, 2001). Cooperatives are arguably one of the most common approaches used to improve livelihoods across the globe (Birchall, 2004). Cooperatives can be used as breeding grounds to empower women by enhancing their specific knowledge and capacities. This paper examined the role of cooperatives in economic empowerment of women in cooperatives. The objectives of the study are; to study the economic empowerment of the women members in cooperatives and to assess the factors influence economic empowerment. Descriptive research design used and data were obtained from the 324 women members from four cooperative organisation by adopting multi stage random sampling. The result of the study is shows that the selected women are empowered economically and also increased their purchasing power more, than other factors of economic development.

Key words: Cooperative, Economic, Empowerment, India, Women

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Socio-Economic Development In India

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Many changes have taken place, some leading (and resulting) in progress, while few others resulting in destruction. The worst impact is on natural resource, especially water and the climate change. The unregulated growth of many cities has resulted in dense population in these cities with lack of infrastructural development to meet the rapidly growing population. Traffic congesting city roads, poor accessibility to drinking water in many areas in the cities (especially the newer extensions), frequent power cuts, increased migration to major cities leading to increased population resulting in high density of population? increased educated unemployment, and, lack of accessibility to health care at affordable cost are the major problems faced by residents of major cities and metropolitan areas of the country. Poor monsoon, indebtedness, lack of proper marketing facilities, lack of improvements in village industries are the major problems in rural areas.

Prime Minister Modi's government proposed to slightly lower the allocation in its Budget (announced on 5th July), for its flagship rural job and housing programmes (as reported in newspapers). Rs.60,000 crore has been earmarked for implementing the Mahatma Gandhi National Rural employment Guarantee Scheme in 2019-20 (Rs.1,084 crore less than the revised estimate in 2018-19). Finance Minister also proposed to bring down the allocation for the Pradhan Mantri Awas Yojana (Grameen) for 2019- 20 to Rs. 16,500 crore (from Rs. 18,900 crore in the revised estimates of 2018-19).

Water Problem

A timely and sufficient monsoon is crucial input for farmers, but, increasingly, because of climate change, the monsoon is becoming less reliable. Added to this is a set of policies which encourage water wastage, deepening the water crisis that threatens the livelihood and lives of millions in rural India. The latest data from the Indian Meteorological Department (IMD), suggests that this year could be another year of deficient rainfall.

Over the last 10 years, average rainfall across the country has fallen short of the normal level in all but one year. (Normal average rainfall-1202 mm). Some regions have been hit harder by the change in rainfall patterns. Parts of Uttar Pradesh, Chhattisgarh, Bihar and Maharashtra have seen a significant shortfall in rainfall over the last decade compared to

Title of the Paper:

MEMBER'S AWARENESS AND SATISFACTION TOWARDS COOPERATIVE MILK SOCIETIES WITH REFERENCE TO KARAIKAL REGION, PUDUCHERRY UNION TERRITORY

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ABSTRACT

Cooperatives can be used as breeding grounds to empower member of the societies by enhancing their specific knowledge and capacities. The Indian Government has been taking various efforts to accelerate systematic promotion of dairy cooperatives through financial and policy support. The study was conducted with the objectives of measuring the level of Awareness and Satisfaction of members towards milk societies and to analyse the influence of demographic factors on awareness and satisfaction towards milk societies. Descriptive research design used and data were obtained from the 150 respondents who are the members of milk societies. Simple random sampling method was adopted for designing the sample of respondents from population. Three milk societies were selected out of 19 societies based on the performance and number of members. From each society 50 members were contacted randomly and data collected from them through personally administered questionnaire. Hence the total sample size is 150. The result of the study is revealed that the sample respondents are aware and satisfied with the various aspects of milk societies. Educational qualification is the factor which can create a significant difference in the level of awareness towards milk societies and Gender is significant association with level of satisfaction which means gender difference can create a significant difference in the level of satisfaction.

Key words: Cooperatives, Milk Societies, Members, Awareness, Satisfaction,

CUSTOMER PERCEPTION TOWARDS URBAN CO-OPERATIVE BANK SIRKALI DURING THE PANDEMIC PERIOD

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Abstract

UCB sector is playing vital role in Indian economy. In the instance situation every individual is dealing with bank. Various banks are functioning in the country. UCB have their own distinctive role. A study on customer perception towards UCB Sirkali during the pandemic period. This is a study conducted on the customer perception level at UCBs. UCB have their distinctive roles in catering the financial needs and other banking services. The banking and financial services like loans, deposits, banking accounts etc. For the advancement of their performance or quality of service, the banks should measure how their products and services met or exceed customer expectations. Responses of 384 customer were randomly selected for knowing their experience with the bank. They found showed that and the customers of bank were highly satisfied with their services and attitude of the employees but they express their satisfaction towards the less technological advancements.

KEY WORDS: Urban Co-operative bank (UBC)- Customer Perception - Performance- Services.

Introduction

Today, business organizations are more customers-focused than ever before since customer perception is a competitive advantage which is sustainable over the long term. Customer perception in banking industry plays a vital role to create a healthy business status being service based industry. In any service based industry customer service is at highest priority. Customer service can be provided by well trained person in planned systematic manner or can be provided by means of well planned self-service. In banking industry customers are more directly linked with the bank's personnel for any kind of services or products. Therefore, Banks should always focus on training its employee so that they could understand each outlet and guide the customer in any matter.

DEFINITION

The term Urban Co-operative Banks (UCBs), though not formally defined, refers to primary co-operative banks located in urban and semi-urban areas. These banks, till 1996, were allowed to lend money only for non-agricultural purposes. This distinction does not hold today. These banks were traditionally centred around communities, localities and work place groups. They essentially lent to small borrowers and businesses. Today, their scope of operations has widened considerably

OPERATING ENVIRONMENT

The area of operation is visually restricted by its bye-laws to a municipal area or town. In some cases, it exceeds this area. The Urban Co-operative Bank in New Delhi for instance, had in 1963 the whole of the Union territory of Delhi as their area of operation. The speedy Group on credit Co-operatives in Non-Agricultural sector has recommended that normally, it would be advisable for an Urban Co-operative Banks to restrict its area of operation to the Municipality or the Taluk where it operates.

About The Bank

Sirkali UCB Ltd. is a bank in india. It has headquarter in Chennai. It has 0 branches and It provides all the financial services to its customers like saving deposit, fixed deposit, recurring deposit, loans, personal loan, PPF account, lockers, netbanking, mobile banking, RTGS, NEFT, IMPS, E-Wallet, Atal Pension Yojana, Pradhan Mantri Jandhan Yojana, Pradhan Mantri Suraksha Bima Yojana, Pradhan Mantri Jeevan Jyoti Bima Yojana and many more.

WORKFORCE MANAGEMENT IN AGRICULTURAL PRODUCER COOPERATIVE MARKETING SOCIETY NAGAPATTINAM DISTRICT

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ABSTRACT

This article describes the relationship between human resource practices and employees recruitment selection process in agricultural producer cooperative marketing society. The research reviews relevant literature to identify elements of HRM practices that influence human resources process. Over the past decade, the way in which people are managed and developed at work has come to be recognized as one of the primary factors in achieving improvement in agricultural producer cooperative marketing society.

KEYWORDS: Agricultural Producer Cooperative Marketing Society, HRM Practices, Cooperative Marketing

INTRODUCTION:

The concept of HRD in cooperatives means all the planned information, education, training, mobilization and manpower development activities undertaken by cooperatives so as to create economically efficient and a capable organization providing services required by their members. HRD acts as a booster to strengthen the efficient working of cooperative societies.

MEANING OF HUMAN RESOURCE DEVELOPMENT:

Human Resource Development is deeply concerned with developing and unleashing expertise and with the dynamic issues related to individual and organizational change. Human Resource Development (HRD) is the framework for helping employees develops their personal and organizational skills, knowledge, and abilities and also includes opportunities as employee training; employee career development so that the organization and individual employees can accomplish their work goals.

HUMAN RESOURCE DEVELOPMENT IN CO-OPERATIVES:

Effective Incorporation of the following Focused HRD Activities is done by the Co-operatives:

- ✓ Recruitment and placement of personnel.
- ✓ Personnel development and career planning.
- ✓ Systems of individual performance measures.
- ✓ Training and skills up gradation.

To strengthen rural infrastructure planned training and education programs need to be conducted by the government so that latest technological and management techniques can be incorporated in the working of cooperatives operating in rural areas.

TABLE - 1

TYPE OF SOCIETIES IN NAGAPATTINAM DISTRICT

SL.NO.	TYPE OF THE SOCIETIES	NOS
1	Primary Agricultural Cooperative Banks	122
2	Primary Cooperative Agricultural Rural Development Banks	3
3	Cooperative Marketing societies	3
4	Employee's Cooperative Societies	25
5	Primary Cooperative Stores	7

31

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Operators in 2-fuzzy $n-n$ inner product space

Thangaraj Beaula[1]* and Daniel Evans[2]

Abstract

In this paper various 2-fuzzy operators are introduced in 2-fuzzy $n-n$ inner product space and the properties of 2-fuzzy self-adjoint, 2-fuzzy normal, 2-fuzzy unitary and 2-fuzzy projection operators are studied.

Keywords

2- fuzzy $n-n$ inner product space, 2-fuzzy self-adjoint operator, 2-fuzzy normal operator, 2-fuzzy unitary operator, 2-fuzzy projection operator.

AMS Subject Classification

03E72.

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Contents

1. Introduction

Gahler [4] introduced the theory of 2-norm on a linear space in 1964. In 1984 Katsaras [7] gave the notion of fuzzy norm on a linear space. Further, fuzzy normed spaces were defined in various ways by Cheng and Mordeson [2] and by Bag and Samanta [1]. R.M. Somasundaram and Thangaraj Beaula [9] introduced the notion of fuzzy 2-normed linear space, $\{F(X),N\}$. The concept of 2-inner product space was introduced by C.R. Diminnie, S. Gahler and A. White [5]. Parijat Sinha, Ghanshayam Lal and Divya Mishra introduced the concept of fuzzy 2-inner product space and the notion of $\alpha-2$-norm in [8]. The notions of fuzzy inner product space and of fuzzy normed linear space were established in [6]. Also, Vijayabalaji and Thillaigovindan [10] introduced the fuzzy n-inner product space as a generalization of the concept of n-inner product space given by Y.J. Cho, M. Matic and J. Pecaric in [3]. Thangaraj Beaula and Daniel Evans introduced the concept of 2-fuzzy $n-n$ inner product space in [11] as an extension of [10]. In this paper operators are introduced in 2-fuzzy $n-n$ inner product space and their properties are studied.

2. Preliminaries

Definition 2.1. *Let $n \in N$ and X be a real linear space of dimension greater or equal to n. Then a real valued function $\|.,.,\ldots,.\|$ on X^n is called a n-norm on X, if it satisfies the following four properties*

i) $\|x_1,\ldots,x_n\| = 0$ *if and only if* $x_1,\ldots,x_n$ *linearly dependent.*

ii) $\|x_1,\ldots,x_n\|$ *is invariant under any permutation*

iii) $\|x_1,\ldots,\alpha x_n\| = |\alpha|\|x_1,\ldots,x_n\|$, *for any* α *is a real number*

iv) $\|x_1,\ldots,x_{n-1},y+z\|$
$\leq \|x_1,\ldots,x_{n-1},y\| + \|x_1,\ldots,x_{n-1},z\|$

The pair $(X,\|.,\ldots,.\|)$ *is called a n-normed linear space.*

Definition 2.2. *Let X be a nonempty set, let $F(X)$ be the set of all fuzzy sets in X and let K be the field of real numbers. Then $F(X)$ becomes a linear space over the field K, where the addition and scalar multiplication are defined by* $f+g = \{(x,\mu)+(y,\eta)\} = \{(x+y,\mu\wedge\eta) : (x,\mu)\in f \text{ and } (y,\eta)\in g\}$ *and* $kf = \{(kf,\mu) : (x,\mu)\in f,\}, \quad k\in K$.

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3.2

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A NEW APPROACH ON AGGREGATION OPERATORS OF INTERVAL-VALUED FUZZY SOFT MATRIX AND ITS APPLICATIONS IN MCDM

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ABSTRACT

Fuzzy Soft Set theory is a general mathematical tool for dealing with the uncertainties present in most of our real life situations. In our daily life we are facing some problems in which the correct decision making is essential. In other side we have confused about the correct solution. In this paper, to overcome this problem, the Multi-Criteria Decision Making (MCDM) approach based on aggregation operators of interval-valued fuzzy soft matrix have been discussed. Some relevant properties have also been studied. Finally the algorithm based on aggregation operators of interval-valued fuzzy soft matrix is proposed with example to illustrate the new approach.

Keywords: *Fuzzy Soft Set, Fuzzy Soft Matrix, Interval-Valued Fuzzy Soft Matrix, Aggregation Operators, Decision Making Problem.*

1. INTRODUCTION

Lotfi A.Zadeh [12] introduced fuzzy set theory in 1965, which is an excellent mathematical tool to handle the uncertainty arising due to vagueness. Fuzzy set theory has wider scope of applicability in almost all the branches of science. Molodtsov [8] introduced the concept of soft set that can be seen as a new mathematical theory for dealing with uncertainty. The soft set theory has been applied to many different fields with great success. Maji *et al.* [6] worked on theoretical study of soft set in detail and presented an application of soft set in the decision making problem using the reduction of rough sets. Soft set theory has a rich potential for applications in several directions, few of which has been explained by Molodtsov in his pioneer work. Ali *et al.* [1] introduced the analysis of several operations on soft set. Maji *et al.* [5] introduced the concept of fuzzy soft set (FSS) by combining fuzzy set and soft set. Cagman and Enginoglu [2] defined soft matrices which were a matrix representation of soft set and constructed a soft max-min decision making method. Cagman and Enginoglu [4] defined fuzzy soft matrices and constructed a decision making problem. Yang *et al.* [11] combined interval-valued fuzzy set and soft set models to introduce the concept of interval-valued fuzzy soft set (IVFSS). Mitra Basu *et al.* [7] presented the concept of Matrices in Interval-valued fuzzy soft set theory and its application. Rajarajeshwari *et al.* [9] have introduced a new concept by the combination of interval-valued fuzzy soft set and soft matrices with examples and different properties which are called Interval-Valued Fuzzy Soft Matrix (IVFSM). They also introduced some new operations on IVFSM such as arithmetic mean, weighted arithmetic mean, geometric mean, harmonic mean and weighted harmonic mean with some properties of IVFSM in decision making. Multiple criteria decision making (MCDM) problem is a well-known branch of decision theory. It has been found in real life decision situations. Stephen Dinagar and Rajesh [10] presented On t-Conorm operators of interval-valued fuzzy soft matrix and its application in MCDM. Cagman *et al.* [3] presented Fuzzy Soft Set Theory and its applications. Also in this work the concept of a new approach on aggregation operators of interval-valued fuzzy soft matrix and its applications in multi criteria decision making have been studied. In this paper the sections are organized as follows: In section 2, we considered some formal definitions and important notations that are very useful to develop the concept of this article. In section 3, we presented some basic properties of aggregation operators of interval-valued fuzzy soft set. In section 4, we presented algorithm based on aggregation operators of interval-valued fuzzy soft matrix. In section 5, application of a decision making problem is discussed. In section 6, we conclude the paper with a summary and outlook for further research.

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Characterization of fuzzy number fuzzy measure using fuzzy integral

D. Rajan[1]* and A. Beulah[2]

Abstract

By using the concepts of fuzzy number fuzzy measures [2] and fuzzy valued functions [3] a theory of fuzzy integrals is investigated. In this paper we have established the fuzzy version of Generalised monotone Convergence theorem and generalised Fatous lemma.

Keywords

Fuzzy number, Fuzzy-valued functions, Fuzzy integral, Fuzzy number fuzzy measure.

AMS Subject Classification

26E50, 03E72.

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Contents

1. Introduction

In this paper [2], we have introduced a concept of fuzzy number fuzzy measures, defined the fuzzy integral of a function with respect to a fuzzy number fuzzy measure and shown some properties and generalized convergence theorems. It is well-known that a fuzzy–valued function [3, 4] is an extension of a function (point-valued), and the fuzzy integral of fuzzy-valued functions with respect fuzzy measures(point-valued) has been studied [3]; so it is natural to ask whether we can establish a theory about fuzzy integrals of fuzzy valued function with respect to fuzzy number fuzzy measures, the answer is just the paper's purpose. In fact, it is also a continued work of [3]. Since what we will discuss in the following is a generalization of works in [2, 3].

Throughout the paper, R^+ will denote the interval $[0,\infty]$, X is an arbitrary fixed set, $\bar{A}$ is a fuzzy σ-algebra [1] formed by the fuzzy-subsets of X, $(X,\bar{A})$ is a fuzzy measurable space. $\mu : \bar{A} \to R^+$ is a fuzzy measure in Sugeno's sense, $\int_{\bar{A}} f d\mu$ is the resulting fuzzy integral [1]. Operation $E\{+,.,\vee,\wedge\}$, $F(x)$ is the set of all $\bar{A}$-measurable functions from x to R^+, $M(x)$ denotes the set of all fuzzy measures, (R^+) denotes the set of interval-numbers, R^+ denote the set of fuzzy numbers [2, 3], $\bar{F}(x)$ denotes the set of all $\bar{A}$-measurable interval-valued functions [3]. $\tilde{F}(x)$ denotes the set of all $\bar{A}$-measurable fuzzy valued functions [3]. $\tilde{M}(x)$ denotes the set of interval number fuzzy measures [2], $\tilde{M}(x]$ denotes the set of fuzzy Number fuzzy Measures [2], we will adopt the preliminaries in [2–4]. Here we omit them for brevity, for more details see [2–4].

2. Definitions and Properties

Definition 2.1. *Let $\tilde{f} \in \tilde{F}(x)$, $A \in \mathscr{A}$, $\tilde{\mu} \in \tilde{M}(x)$. Then the fuzzy integral of f and A with respect to $\tilde{\mu}$ is defined as $\int_A f d\mu = [\int_A f^- d\mu^- \int_A f^+ d\mu^+]$ where $\tilde{f}(x) = \inf \tilde{f}(x)$ and $f^+(x) = \sup f^+(x)\tilde{\mu}(x) = \inf \tilde{\mu}(x)$ and $\mu\mu^+(x) = \sup^+(x)$.*

Definition 2.2. *Let $\tilde{f} \in \tilde{F}(x)$, $A \in \mathscr{A}$, $\tilde{\mu} \in \tilde{M}(x)$. Then the fuzzy integral of $\tilde{f}$ and A with respect to μ is defined as $\int_A f d\mu(r) = \sup\{\lambda \in (0,1] : r \in \int_A f d\mu\}$, where $f_\lambda x = \{r \in (0,1] : f(x)(r) > \lambda\}$ and μ_λ is similar.*

Theorem 2.3. *Let $\varepsilon \in \tilde{f}\bar{F}(x), AA, \tilde{\mu}\varepsilon\tilde{M}(x)$. Then $\varepsilon \int_A f^- d\mu^- R^+$ and the following equation holds:*

$$\left(\int_A \tilde{f} d\tilde{\mu}\right)_\lambda = \int_A f_\lambda d\mu_\lambda \quad for \quad (0,1]. \tag{2.1}$$

Proof. The condition is sufficient. To prove that the condition is necessary it is enough to verity equation (2.1).

For a fixed $\lambda \in (0,1]$ let $\lambda_n = (1 - 1/n+1)\lambda$ then $\lambda_n \uparrow \lambda$.

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Some ranking indexes of stochastic orders and their applications

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Abstract

In this paper, we have recalled some of the known stochastic orders and the shifted version of them, and discussed their four relations and its properties. Also, we obtained some applications of proportional likelihood ratio ordering fuzzy hazard rate ordering and mean inactivity ordering and its applications.

Keywords

Fuzzy random variables, Fuzzy likelihood ratio order, Fuzzy Hazard rate order, Mean inactivity time order and their Shifted orders.

AMS Subject Classification

60E15, 62F07.

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Contents

1. Introduction

Stochastic orders have been proven to be very useful in applied probability, statistics, reliability, operation research, economics and other fields. Various types of stochastic orders and associate properties have been developed rapidly over the years. A lot of research works have done on, hazard rate and reversed hazard rate orders due to their properties and applications in the various sciences, for example hazard rate order is a well known and useful tool in reliability theory and reversed hazard rate order is defined via stochastic comparison of inactivity time. We can refer reader to the papers such as, Chandra and Roy [6], Gupta and Nanda [8], Nanda and Shaked [11], Kayid and Ahmad [10] and Shaked and Shanthikumar [13]. Ramos-Romero and Sordo-Diaz [12] introduced a new stochastic order between two absolutely continuous random variables and called it proportional Hazard Rate order (*PHR*) order, which is closely related to the usual Hazard Rate order. The proportional Hazard Rate order can be used to characterize random variables whose logarithms have log-concave (log-convex) densities. Many income random variables satisfy this property and they are said to have the increasing proportional Hazard Rate order (*IPHR*) and decreasing proportional Hazard Rate Order (*DPHR*) properties. As an application, they showed that the *IPHR* and *DPHR* properties are sufficient conditions for the Lorenz ordering of truncated distributions.

Jarrahiferiz et al. [9] studied some other properties of the proportional Hazard Rate Order, then extended hazard rate and reversed hazard rate orders to proportional state similar to proportional Hazard Rate order called them proportional (reversed) hazard rate orders, and studied their properties and relations.

Shifted stochastic orders that are useful tools for establishing interesting inequalities that have been introduced and studied. Also, they have been studied in detail four shifted stochastic orders, namely the up likelihood ratio order, the

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Solving Critical Path in Project Scheduling by using TOPSIS Ranking of Generalized Interval Valued Octagonal Fuzzy Numbers

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ABSTRACT

This paper presents TOPSIS ranking method using Octagonal fuzzy number applied in a critical path in fuzzy environment. Using the above said notion, we convert fuzzy critical activities into crisp critical activities. New algebraic arithmetic of Generalized Interval valued octagonal fuzzy numbers (GIOCFNs) is investigated. A suitable numerical example is discussed to understand the method.

Keywords: Octagonal Fuzzy numbers, Generalized Interval valued octagonal fuzzy number, Critical path method, Fuzzy project network, Fuzzy ranking method, Interval valued fuzzy numbers.

Mathematical Subject Classification (2010): 94D05

1. Introduction

In this work, by applying the procedure of the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), it is proposed a method based on GIOCFNs for solving critical path in project network.

In earlier, Parida and Sahoo [1] developed the procedure Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is multiple criteria decision analysis method (MCDA), which is chosen alternatives, is nearest to the positive ideal solution and farthest from negative ideal solution. A common generalization of TOPSIS is extensions of TOPSIS under fuzzy environment were identified to overcome the difficulties in exact data of real situation. Here, GIOCFNs were used to the interval valued fuzzy environment to improve the new approach based on actual procedure of TOPSIS.

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Distinct Methods for Solving Fully Fuzzy Linear Programming Problems with Pentagonal Fuzzy Numbers

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ABSTRACT

The focus of this paper is to find fuzzy optimal solution of fully fuzzy linear programming problems with pentagonal fuzzy numbers. New approaches for solving fully fuzzy linear programming problems with pentagonal fuzzy number have been proposed, based on distinct ranking functions. The proposed methods are very easy to understand.

Keywords: Linear programming problem, Fully fuzzy linear programming, Pentagonal fuzzy number, Robust ranking.

1. INTRODUCTION

The concept linear programming problem is to find out the best solution to the real-world problems where the available information is not exact or not precise. In that situation linear programming model helps lot.

First, the concept Fuzzy linear programming was proposed by Tanaka *et al.*[20]. It plays a vital role in Fuzzy modeling, which can formulate the uncertainty. Nasseri[17] has proposed a new method for solving the Fuzzy linear programming problems in which he has used the fuzzy ranking method for converting the fuzzy objective function into crisp objective function. Fuzzy linear programming was studied by many researchers[23,20,7,6,5]. Liou and Wang[15] discussed ranking fuzzy numbers with interval values. Verdegay[22] have proposed three methods for solving three models of fuzzy integer linear programming. Abbasbandy and

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Solving Fuzzy Transportation Problem with Harmonic Mean Approach

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Abstract: - **In this work a new notion namely Harmonic Mean Approach Method is utilized to minimize the cost to reach the optimal solution in transportation problem under fuzzy environment. In this paper the supply and demand are represented in terms of unique fuzzy number called Interval Valued Triangular Fuzzy Number (IVTFN). A relevant numerical illustration and the comparison are also included to justify the discussed notion.**

Keywords—Fuzzy transportation problem, Interval-valued triangular fuzzy number, Harmonic Mean Approach

I. INTRODUCTION

Transportation Problem is a modern class of Linear Programming Problem in which supply and demand of the commodities transported from several sources to different destinations with either minimum cost or minimum time. The supplies and demands may be tentative due to some strong factors. Zadeh [4] introduced fuzzy sets and its concepts. Bellman and Zadeh [7] announced the decision making in fuzzy environment. Zimmermann [3] have given the linear programming with several objective functions. Chanas and Kucha [8] improved a concept of the optimal solution of the transportation problem with fuzzy cost coefficient. Nagoor Gani and Stephen Dinagar [1] studied a special note on solving Linear Programming in fuzzy environment. Lin and Kao [10] projected solving fuzzy transportation problem based on extension principle. Stephen Dinagar and Keerthivasan [2] presented the best candidate method in fuzzy transportation problems with the interval valued triangular fuzzy number. Abdul Kalam Azad et al [9] reached solution with the average total opportunity cost method. Pandian and Natarajan [6] discussed transportation problem with mixed strategies. Palanivel and Suganya [5] introduced Harmonic mean approach in transportation problem with classical nature. This paper discovers optimize solution in fuzzy environment. In this paper, the fuzzy transportation problem using Interval Valued Triangular Fuzzy Numbers have been discussed. The new notion called Harmonic Mean Approach Method is utilized to find the optimal solution of the problem.

The organization of this paper is structured as follows, in section 1, we introduce some basic concepts related to Interval Valued Triangular Fuzzy Numbers (IVTFNs) and some arithmetic operations of the above said numbers. The notion of IVTFN-transportation problem is introduced in section 2. In section 3, the Harmonic Mean Approach method algorithm presented. The numerical illustrations are presented in section 4. The comparison table is in section 5. Finally, the conclusion part is included in section 6.

II. BASIC CONCEPTS

Definition 1.1

A fuzzy set $\tilde{A}$, defined on the universal set X is a set of ordered pairs: $\tilde{A}= \{(x, \mu_{\tilde{A}}(x)):x \in X\}$.Such that

$$\mu_{\tilde{A}}: X \rightarrow [0,1].$$

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A Methodology to Combine Interval Neutrosophic Focal Elements and Their Basic Probability Assignment in Evidence Theory

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ABSTRACT

In this paper, a method is proposed to combine interval neutrosophic focal elements and their corresponding Basic Probability Assignments (BPA) of three variables using Dempster Shafer Theory (DST) of evidence under ordinary arithmetic operations and Modified Arithmetic operations on interval numbers. The validity of the proposed method has been verified with the help of a numerical example.

Keywords: Dempster-Shafer Theory (DST), Basic Probability Assignments, Neutrosophic set, Interval Neutrosophic Number (INN), Modified arithmetic operations

Mathematical Subject Classification (2010): 60A86, 97K50, 11K65

1. Introduction

Probability theory is proposed only for randomness uncertainty and it is inappropriate to represent epistemic uncertainty. To overcome the constraint of probabilistic method, Dempster put forward a mathematical theory of evidence in 1976 and now it is known as Evidence Theory or Dempster-Shafer Theory (DST). In a finite discrete space, Dempster-Shafer Theory can be interpreted as a generalization of Probability theory where probabilities assigned to sets as opposed to mutually exclusive singletons. In traditional probability theory, evidence is associated with only one possible event. In Dempster- Shafer Theory, evidence can be associated with multiple possible events. Further, Evidence Theory is based on two dual non additive measures, namely Belief measure and Plausibility measure. Belief and Plausibility measures can conveniently be characterized by a function $m: \rho(X) \to [0,1]$ such that $m(\emptyset) = 0$ and $\sum_{A\in\rho(X)} m(A) = 1$. This function is known as Basic Probability Assignment (BPA). Every set $A \in \rho(X)$ for which $m(A) > 0$ is usually called a focal element of m. The Dempster Rule of combination is critical to the original conception of Dempster- Shafer theory. The measure of Belief and plausibility are derived from the combined basic assignments. Dempster's rule combines multiple belief functions through their basic probability

24 June 2020

5.1

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Some aspects of 2-fuzzy 2-metric projection operator of 2-fuzzy 2-Banach spaces

Thangaraj Beaula[1]* and R. Abirami[2]

Abstract

In this paper, continuous homogeneous selection and continuity for the set valued 2-fuzzy 2-generalized inverse in 3-strictly 2-fuzzy 2-convex space are investigated using fuzzy continuity of metric projection. Hence approximative compactness of 2-fuzzy 2-Banach space is not necessary for the 2-fuzzy 2-upper semi continuity of the set valued 2-fuzzy 2-metric generalized inverse.

Keywords

2-fuzzy 2-H-Property, 2-fuzzy 2-Continuous Selections, 2-fuzzy 2-Chebyshev Subspace, 2-fuzzy 2-Metric Generalized Inverse.

AMS Subject Classification:

03E72, 46A19, 46B20, 46B50.

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Contents

1. Introduction

The concept of fuzzy set was first introduced by L.A. Zadeh [13] in 1965. Many mathematicians considered fuzzy metric in different views [3, 6–8, 13]. George and Veeramani [6] defined fuzzy metric space in a new way. Various definitions of fuzzy norms on a linear space were introduced by different authors [1, 2, 4, 9, 10]. Rano and Bag [11] introduced the definition of fuzzy norm following the notion introduced by Bag and Samanta[1].

A satisfactory theory of 2-norm on a linear space has been introduced and developed by Gahler[5]. Somasundaram and Thangaraj Beaula [12] introduced the concept of 2-fuzzy 2-normed linear space and gave the notion of α-2-norm using the ideas of Bag and Samanta [1].

In this paper, continuous homogeneous selection and continuity for the set valued 2-fuzzy 2-generalized inverse in 3-strictly 2-fuzzy 2-convex space are investigated using fuzzy continuity of metric projection. Hence approximative compactness of 2-fuzzy 2-Banach space is not necessary for the 2-fuzzy 2-upper semi continuity of the set valued 2-fuzzy 2-metric generalized inverse.

2. Preliminaries

Definition 2.1. *Let X be a universe of discourse a fuzzy set is defined as $A = \{x, \mu_A(x) : x \in X\}$ which is characterized by a membership function $\mu_A(x) : X \to [0,1]$ where $\mu_A(x)$ denotes the degree of membership of the element x to the set A.*

Definition 2.2. *Let X be a non empty and $F(X)$ be the set of all fuzzy sets in X. If $f \in F(X)$ then $f = \{(x,\mu)/x \in X$ and $\mu \in (0,1]\}$. Clearly f is bounded function for $|f(x)| \leq 1$. Let K be the space of real numbers then $F(X)$ is a linear space over the field K where the addition and scalar multiplication are defined by*

$f+g = \{(x,\mu)+(y,\eta)\} = \{(x+y),(\mu,\eta)/(x,\mu) \in f$ *and* $(y,\eta) \in g\}$

and

$$kf = \{(kf,\mu)/(x,\mu) \in f\}$$

where $k \in K$.

The linear space $F(X)$ is said to be normed space if for every

5.2

Aug 2020

METHOD TO FIND EXTREMUM VALUES OF FUZZY NON-LINEAR EQUATIONS

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Abstract

In this paper a partial derivative method is introduced to find extreme values of fuzzy nonlinear equations with the decision parameters as triangular fuzzy numbers. The extreme values are obtained by converting fuzzy nonlinear equation to its parametric form. The proposed method is illustrated by an example.

1. Introduction

Nonlinear programming is the process of solving an optimization problem where some of the constraints or the objective function are nonlinear. An optimization problem is one of calculation of the extrema (maxima, minima or stationary points) of an objective function over a set of unknown real variables . In practical problems there exist uncertainties and to overcome such uncertainties fuzzy approaches are used.

Many researchers proposed fuzzy mathematical programming concepts with respect to uncertain constraints. Bellman and Zadeh [5] published his paper in the concept of decision making under fuzzy environments. Goutam Kumar Saha [9] developed a new approach to fuzzy non linear equations using fixed point iteration. S.Abbasbandy [3] proposed Newton's method for solving a system of fuzzy non linear equations. Angel Garrido [4] analyzed fuzzy extrema via measure theory.

Abbas Akrami [2] proposed an interval nonlinear programming approach for solving a class of unconstrained nonlinear fuzzy optimization problem. Behra, S.K.Nayak [6] studied fuzzy nonlinear programming with linear constraints. An optimal solution of fuzzy non linear programming problems introduced by A.Kumar and J.Kaur [11]. V.D.Pathak and U.M. Pirzada [13] investigated the optimality conditions for nonlinear fuzzy optimization problems.

In this paper, a partial derivative method is proposed to find the extreme values of fuzzy nonlinear equation with two variables where the decision parameters are triangular fuzzy numbers. The nonlinear equation is converted into its parametric form using α-cuts and obtained sub problems are solved numerically by a new method.

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5-3

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SCALENE TRIANGULAR FUZZY NUMBERS AND ITS OPERATIONS

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Abstract

Generalized Fuzzy number is a new concept obtained by removing the property of normality. In this paper we introduce the notion of scalene triangular fuzzy number and discussed the algebra of this fuzzy number by developing all arithmetic operations.

1. Introduction

The concepts of fuzzy numbers and fuzzy arithmetic were introduced by Zadeh [7]. Since, then general authors have investigated properties and proposed applications of fuzzy numbers. Practical problems require effective fuzzy arithmetic which would enable solving uncertain linear ones. Fuzzy numbers are used in statistics, computer programming, engineering and experimental science. The concept of fuzzy number has been defined as a fuzzy subset of real line by D. Dubois and H. Prade [3]. possibility theory (Zadeh 1978; Dubois and Prade 1988), formal concept analysis (FCA) (Ganter and Wille 1999), extensional fuzzy sets (Hohle 1988) and rough sets (Pawlak 1991)[8].

In general, the arithmetic operations on fuzzy numbers can be approached either by the direct use of the membership function or by the equivalent use of the cuts representations. The fuzzy calculations are not immediate to be performed and in many cases they require to solve mathematically or computationally hard sub problems for which a closed

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FULLY FUZZY ECONOMIC INVENTORY MODEL WITH BACKORDERS USING GENERALIZED QUADRILATERAL FUZZY NUMBERS

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Abstract

In every business scenario, inventory plays a vital role to maximize the profit and to minimize the expenditure. In every classical case, some of the inventory models are existed for different situations. When the situations become vague, it is very difficult to optimize the problems through classical inventory models. In this paper, we reviewed the concept of generalized quadrilateral fuzzy numbers (GQFN) and its arithmetic operations. We construct the fuzzy economic inventory model with backorders through GQFN's in the fully fuzzified manner. Also few numerical examples are provided to analyze the inventory model.

1. Introduction

Inventory models are the essential tools for the businessman to run the business successfully. It is simply a mathematical model to maintain the level of inventories. The model can be established for the two main sectors such as what are the materials to order and how many units to order. In every classical inventory models, the major objective is to minimize the total cost by

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Keywords: generalized quadrilateral fuzzy number; classical equivalent fuzzy mean; Karush Kuhn-Tucker conditions; fuzzy order quantity; fuzzy shortage quantity.
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SIMILARITY MEASURES WITH VECTOR-LENGTH UNDER FUZZY ENVIRONMENT

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Abstract

In this article, we have proposed a similarity measures based on vector- length with the aid of trapezoidal intuitionistic fuzzy numbers. Distinct procedure as Type 1, Type 2 and Type 3 procedures and few relevant properties have also been discussed .Suitable illustrations are given for the proposed method. Finally a comparison have been made to justify the three types of similarities.

1. Introduction

Many real-world applications make use of similarity measure to see how two objects are related together. Over the last decades, many studies have been done on the concept of similarity measure between two intuitionistic fuzzy numbers. In [1] Atanassov defined various operators on intuitionistic fuzzy set which further enriched the theory for its applications to various area of decision sciences. This generalization of fuzzy set to intuitionistic fuzzy set gave a new dimension to optimization under uncertainty and envisaged a new area of optimization under intuitionistic fuzzy environment. On the one hand, the similarity measures were defined based on distance models, such as the hamming distance similarity method [2]. In [3] Li introduced a new similarity measures between the intuitionistic fuzzy set. Stephen Dinagar and Fany Helena [5, 6] proposed a similarity measures for generalized trapezoidal intuitionistic fuzzy number based on valued

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Research Article

Inverse Split Majority Dominating Set of a Graph

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Abstract. In this paper, we introduced an inverse split majority dominating set of a graph G. Inverse split majority domination number $\gamma_{SM}^{-1}(G)$ is determined for some classes of graphs. Some important results and characterization theorems on $\gamma_{SM}^{-1}(G)$ are established. Many Bounds on inverse split majority domination number and its relationship with other domination parameters are also obtained.

Keywords. Majority domination number, Inverse majority domination number, Split dominating (SD) set, Inverse Split Majority dominating (ISMD) set, Inverse Split majority domination number

Mathematics Subject Classification (2020). 05C69

1. Introduction

C. Berge presented domination as a graph theoretic notion [1] in 1958, and O. Ore [16] in 1962. In 1977, E. J. Cockayne and S. T. Hedetniemi produced a study on dominance [5], which was researched extensively in this article. T. W. Haynes and colleagues authored "Fundamentals of Domination in Graphs", has a variety of domination parameters [8]. Kulli and Sigarkanti [11] pioneered the unique parameter inverse domination in Graphs in 1991.

Graph theory may be used to depict any binary relationship. Both dominant sets and their inverses play key roles in domination. When D is a dominant set, $V - D$ is a dominating

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2021 b 3

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INTUITIONISTIC TRIANGULAR FUZZY THREE-DIMENSIONAL NUMBERS AND ITS APPLICATION TO MULTI-CRITERIA DECISION-MAKING PROBLEM

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Abstract

Intuitionistic triangular fuzzy three dimensional number (ITrFTD-number) is a special type of intuitionistic fuzzy number ona real number set. In the ITrFTD-number, criteria behind is the chance of the same or the different membership and non-membership values. In this paper, ITrFTD-numbers are defined based on multiple criteria decision making problems in which the inputs are considered as ITrFTD-numbers. Operational using t-norm, t-conorm is defined aggregation operators on ITrFTD-numbers are developed. The ranking order is defined correspondingly to the similarity with respect to the positive ideal solution.

1. Introduction

Atanassov [1] (1986) first introduced the theory of intuitionistic fuzzy set in order to study uncertainty. Many researches have been undergone on operations on intuitionistic fuzzy sets [2, 10], multi-criteria decision-making method on intuitionistic fuzzy numbers [11, 12], intuitionistic fuzzy

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Keywords: Intuitionistic triangular fuzzy three-dimensional numbers, Multi-criteria decision-making problem.

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INVERSE MAJORITY DOMINATION NUMBER ON SUBDIVISION GRAPHS

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Abstract

In this article, Majority domination number $\gamma_M(G)$ and Inverse Majority domination number $\gamma_M^{-1}(G)$ are found for some special graphs and its subdivision graphs. Then $\gamma_M^{-1}(G)$ for some families of the subdivision graphs $S(G)$ is determined. Some results on $\gamma_M(S(G))$ and $\gamma_M^{-1}(S(G))$ are also studied.

1. Introduction

The Domination theory in graphs was defined by ore and Berdge, in 1977, Cockayne et al., developed the domination concept and it has been discussed extensively in their seminal paper. Then many eminent graph theorists defined various domination parameters and produced many interesting results in this area. Also the new parameter inverse domination in graphs was initiated by Kulli et al., in 1991.

Let G be a simple, un directed and finite with p vertices and q edges. $N(V) = \{u \in V(G)/uv \in E(G)\}$ and $N[v] = N(v) \cup \{v\}$ be the open

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Keywords: Majority domination number, Inverse majority domination number, Subdivision graphs.
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MOEM

Research Article

Photoluminescences properties of lanthanum-silver co-doped ZnO nano particles

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Abstract

Recently, transition metal (TM) and rare earth ion doped II–VI semiconductor nanoparticles have received much attention because such doping can modify and improve optical properties of II–VI semiconductor nanoparticles by large amount. In this study, undoped, La doped and La+Ag co-doped ZnO nano particles have been successfully synthesized by sol-gel method using the mixture of Zinc acetate dihydrate and ethanol solution. The powders were calcinated at 600 °C for 2 h. The effect of lanthanum and lanthanum-silver incorporation on the structure, morphology, optical and electrical conductivity were examined by X-ray diffraction (XRD), Scanning Electron Microscope (SEM), Energy Dispersive X-ray Absorption (EDAX), Fourier transform infrared spectroscopy (FTIR), UV and Photo Luminescence (PL) Characterization. The average particle size of the synthesized ZnO nanoparticles is calculated using the Scherrer formula and is found to be of less than 20 nm. Luminescences properties were found to be enhanced for the La and La+Ag co-doped ZnO nanoparticles.

Keywords

Lanthanum, Photo Luminescence, morphology, structural

1. Introduction

With great to manipulate structure of the materials on the level of individual atoms and molecules, nanotechnology is a promising highly interdisciplinary field. Nanoparticles can contribute to stronger, lighter, cleaner and smarter surfaces and systems. Transition metal (TM) doped ZnO nanoparticles are promising candidates for a variety of practical applications due to their potential applications because such doping can modify and improve optical and electrical properties of these materials. [1–5]. ZnO is one of the most promising materials for short- wavelength optoelectronic applications due to its direct wide band gap of 3.37 eV large bond strength, and large exciton binding energy (60 meV). The missing absorbance of visible light makes this material one of the best transition metal oxide nanoparicles so far [6]. Doping with transition metal oxides leads to many interesting properties of ZnO. With the use of different dopants it is possible to increase or decrease the band gap. After do-

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Anti-Bacterial Performance of Integrated CuO Nanoparticles Tested at Different Temperatures

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***Abstract*-CuO nanoparticles are synthesized by the Sol-gel method and are characterized by UV-visible spectroscopy; XRD, SEM, FTIR and anti-bacterial disk diffusion method are analyses. Here is an attempt to reduce and ensure a simple way to integrate CuO NPs at different temperatures using the precursor solution $CuCl_2$ dihydrate. XRD diffraction analysis revealed that synthesized CuO nanoparticles are in monoclinic structure with the particle size decreased with increases of temperatures. The SEM analyses conformed the particles are tablet tube like spherical shaped was observed. Blue shift absorption peak of about 376nm was observed in UV spectra analysis. The present of functional groups were observed in FTIR spectra. Anti-bacterial activity of CuO nanoparticles has been tested against various bacterias. Antibacterial efficacy of CuO particles is shown in gram positive and gram negative organisms, such as Staphylococcus saprophyticus, Bacillus subtilis, Pseudomonas aeruginosa and Escherichia coli.**

***Index terms*- CuO; Particle size, X-ray diffraction, SEM. FTIR, Antibacterial activity;**

I. INTRODUCTION

Nanotechnology research is quite attractive one to the researchers at various levels due to various physical, chemical and biological properties and is widely used in various field applications due to its unique environment, engineering, science, and technologies [1]. Nanotechnology involves imaging, measuring, modeling and manipulating matter at this length scale. Reduce the nanoparticle size and easily change nanoparticle shape, as compared to the macro and micro scale, so nanoparticle performed as the best catalyst with intense the strength and good efficiency [2], [3]. CuO nanoparticle is one of the important metal oxide semiconductors. But it can be used in many fields such as many infiltration, catalysts, tropical products, sensitivity materials, glasses, ceramics, porcelain resistors, magnetic storage media, and gas sensors, near infrared tiles, photographic spectroscopy and photosynthetic applications [4]. The most noticeable feature of the CuO NPs can be controlled during packages because they allow their applications to be designed. The synthesis method is an important parameter for control of particle size, morphology, crystallinity and in order to achieve this goal. Various concentrations of CuO nanoparticles are explored including sonochemical, hydrothermal, chemical pathway, and spin coating, and sol-gel techniques. in the midst of these methods, the Sol-gel method was used for a synthesis of CuO nanoparticles In this work [5], [6].

A sol-gel process can be described as "the formation of an oxide network through the poly condensation reactions of a molecular precursor in a fluid." A solution is a constant scattering of colloidal particles or polymers in a solvent when Particles can be transformed or crystallized [7]. An aerosol is a liquid of a powder, once in a gas grid. A gel has a three-dimensional continuous network, which connects to a liquid phase. A colloidal gel is made from a set of colloidal particles compared to the ceramic-ceramic system, with a reduced defect in the Sol-gel method at a low temperature of [8]. The sol-gel method is the simple and relatively fast method. This method is often used by the level of nanoparticles to ensure strict control. This method allows for enormous control of the shape and size of Nanoparticle. The idea behind sol-gel synthesis is to dissolve the compound in a liquid in order to bring it back as a solid in a controlled manner. Multi component compounds may be prepared with a controlled stoichiometry by mixing sols of different compounds. The sol-gel system prevents problems with the co-precipitation, which may be normal, which is a reaction and can be mixed at the atomic level. The results of easily stimulating small particles [9], [10].

Medical field of nanotechnology is another revolution of nanotechnology. Through this technique, we can safeguard human health in the best way. Nanotechnology is the study of a body's contents and the amount of root components. When a solid object passes to the nano-meter scale (smallest), the material receives a lot of energy [11]. Accordingly, all the devices that have been developed are of great potential. Biological zones can also be synthesized by nanotechnology. in future, all the devices will be created and produced by nanotechnology in the healthy, economic, and spacious atmosphere. This technology is used in medicine, chemistry and ecosystem, energy, communication, heavy industries and food industry in all sectors. Based on this, research and new courses are coming up [12]

Medical Nanotechnology detects various types of future technologies such as microscope, robotics, sensors, cameras and other devices that can be used in medical procedures, such as body piercing, protecting the patient's body inside and protecting individual cells. Medicare Nano

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Anti-Bacterial Performance of Integrated CuO Nanoparticles Tested at Different Temperatures

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***Abstract*-CuO nanoparticles are synthesized by the Sol-gel method and are characterized by UV-visible spectroscopy; XRD, SEM, FTIR and anti-bacterial disk diffusion method are analyses. Here is an attempt to reduce and ensure a simple way to integrate CuO NPs at different temperatures using the precursor solution $CuCl_2$ dihydrate. XRD diffraction analysis revealed that synthesized CuO nanoparticles are in monoclinic structure with the particle size decreased with increases of temperatures. The SEM analyses conformed the particles are tablet tube like spherical shaped was observed. Blue shift absorption peak of about 376nm was observed in UV spectra analysis. The present of functional groups were observed in FTIR spectra. Anti-bacterial activity of CuO nanoparticles has been tested against various bacterias. Antibacterial efficacy of CuO particles is shown in gram positive and gram negative organisms, such as Staphylococcus saprophyticus, Bacillus subtilis, Pseudomonas aeruginosa and Escherichia coli.**

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I. INTRODUCTION

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Structural Morphological Optical and Photoluminescence Properties of ZrO_2 Nanoparticles Synthesized by Sol-Gel Method

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Abstrsact: Zirconia(ZrO_2) nanoparticles with monoclinic blended structure were successfully synthesized by sol-gel methodusing zirconium (IV) acetate hydroxide as the metal precursor, polyvinylpyrrolidone as the capping agent, and deionized water asa solvent. The chemicals were mixed and stirred to form a homogeneous solution and hereafter directly underwent calcination toattain the pure nanocrystalline powder,whichwas confirmed by FTIR, UV, SEM, PL. andXRDanalyses.Thecontrol over the size and opticalproperties of nanoparticles was achieved through the molarity change in calcination temperatures from 500°C. The obtained averageparticle sizes from XRD spectra images showed that the particle size increased with increasing calcination temperature.The optical properties which were investigated using a UV-Vis spectrophotometer showed a decrease in the band gap energy withincreasing calcination temperature due to the enlargement of the particle size. These results prove that, by eliminating dryingprocess (24 h) in the present thermal treatment method, size-controlled zirconia nanoparticles were conveniently manufacturedwith a reduction of synthesize time and energy consumption, suitable for large-scale fabrication.

Keywords; XRD, SEM, PL, UV, FTIR,

INTRODUCTION

ZrO_2 (zirconia) is a material of great technological importance, having good naturalcolor, high strength, transformation toughness, high chemical stability, excellent corrosion resisting, and chemical and microbial resistance [1, 2]. ZrO_2 is a wide band gap p-type semiconductor that exhibits abundant oxygen vacancies on its surface. The high ion exchange capacity and redox activities make it useful in catalysis [3]. ZrO_2 is also an important dielectric material for potential application as an insulator in transistors in future nanoelectric devices[4].ZrO_2has three well-defined crystal phases, that is, cubic(c-ZrO_2), tetragonal (t-ZrO_2), and monoclinic (m-ZrO_2),under normal atmosphere and at different temperatures [5,6].Generally, m-ZrO2 phase is thermodynamically stableup to 1100°C, t-ZrO_2 phase exists in the temperature rangeof 1100–2370°C, and the cubic phase is found at highertemperature above 2370°C [8,9,10].Several techniques are available for producing zirconiananoparticles, such as sol -gel method [11], vapor phasemethod [12], pyrolysis [13], spray pyrolysis [14], hydrolysis[15], hydrothermal [16], and microwave plasma [17]. However,these methods faced many limitation factors such ascomplicated procedures, high reaction temperature, longreaction time, toxic reagents and by-products use, and highcost of production, whichmade it difficult to prepare zirconiananoparticles on a large-scale production.Thisprocess covers a verity of materials such as organic, inorganic hybrid and metallicmaterials. Nanostructured coatings developed by the sol gel techniqueprovide enhanced functional or mechanical properties as well as purity, homogeneityand improved microstructure[18,19]. It does not require vacuum and allowfabricating a large area with low cost and at low processing temperature.

Experimental Investigation of the Inhibitory Behavior of CDO Nanoparticleson Co-Precipitation Method

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Abstract: The undoped CdO nanoparticles were synthesized by chemical co-precipitation method at room temperature. The prepared sampled have been characterized by X-ray powder diffraction (XRD) analysis, scanning electron microscopy (SEM), ultraviolet (UV)- visiblespectroscopy, photoluminescence (PL)spectroscopy and Fourier transform infrared(FTIR) spectroscopy. The cubic structures of the CdOproducts were confirmed by XRD analysis. The influence of particle size on structural parameters such as lattice constant, dislocation density, microstrain, stacking fault and texture co-efficient were also determined. The effect of temperatures on shifting the bands in the samples was observed by UV-Visible spectroscopy and also their optical band gap energies were calculated. The emission spectra and energy band diagram of the powders were derived from PL spectroscopy. The structural bond vibrations of CdO nanoparticles were investigated by FTIR spectroscopy.

Keywords: CdO nanoparticles; precipitation method; Cubic structure; Structural parameters; Optical band gap; Emission spectra.

1. Introduction

Nanotechnology is a new and fast-emerging field that involves the manufacture, processing and application of structures, devices, and systems by controlling shape and size at the nanometer scale [1]. Nanomaterials possess unique and specific physicochemical and surface properties related with their size, i.e., mechanical resistance, electronic properties, thermal conductivity and chemical reactivity [2]. In the recent past, semiconducting nanoparticles have attracted much attention because of their unique properties observed only at nanosized dimensions in comparison with that bulk in terms of their electronic, optical, and catalytic properties [3]. As a metal oxide structure, muchattention has been given to pure cadmium oxide (CdO) due to its physical properties that allow it to be used in a wide range of device applications such as solar cells, optical communications, photo-transistors, gas sensors, low emissive windows, antifungal activity and catalytic applications[4].Cadmium oxide (CdO) is a well-known II–VI n-type semiconductor with a cubic (fcc) crystal structure and possesses a direct band gap of 2.2 eV[5] with non-stoichiometric composition due to the presence of either interstitial cadmium or oxygen vacancies, which act as doubly charged donors[6]. In the present study, CdO has been chosen because it has potential importance applications, low cost, chemical stability and wide spread availability.

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200 MeV Ag^{15+} ion beam irradiation induced modifications in spray deposited MoO_3 thin films by fluence variation

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ABSTRACT

Spray deposited Molybdenum trioxide (MoO_3) thin film of thickness nearly 379 nm were irradiated with 200 MeV Ag^{15+} ion beam at different fluences (Ø) of 5×10^{11}, 1×10^{12}, 5×10^{12} and 1×10^{13} ions/cm^2. The X-ray diffraction (XRD) pattern of the pristine film confirms orthorhombic structure and the crystallinity decreased after irradiation with the fluence of 5×10^{11} ions/cm^2 due to irradiation induced defects and became amorphous at higher fluence. In pristine film, Raman modes at 665, 820, 996 cm^{-1} belong to Mo–O stretching, 286 cm^{-1} belong to Mo–O bending mode and those below 200 cm^{-1} are associated with lattice modes. Raman peak intensities decreased upon irradiation and vanished completely for the ion fluence of 5×10^{12} ions/cm^2. The percentage of optical transmittance of pristine film was nearly 40%, while for irradiated films it decreased significantly. Red shift was observed for both the direct and indirect band gaps. The pristine film surface had densely packed rod like structures with relatively less porosity. Surface roughness decreased significantly after irradiation. The electrical transport properties were also studied for both the pristine and irradiated films by Hall effect. The results are discussed.

1. Introduction

Molybdenum trioxide (MoO_3) is a transition metal oxide with excellent optical and electrical properties and is a high-performance cathode material. The MoO_3 has a variety of polymorphs with different structural configurations such as α-MoO_3, β-MoO_3, ε-MoO_3 and h-MoO_3 [1]. MoO_3 is also chemically, thermodynamically stable material and is a potential candidate for diverse range of applications in optical memories, gas sensors, lithium batteries, solar cells and electrochromic devices [2–5]. Uranium-molybdenum alloy with higher molybdenum content having interesting properties is a potential candidate for fuel production in nuclear reactors [6]. The Zr-alloy coated Mo-alloy cladding meet the thermal and mechanical requirements for normal operation of nuclear reactors by controlling heat produced due to nuclear decay and thereby reducing the damage of the reactor core [7]. In recent years, many researchers are investigating MoO_3 material because of the fact that it possesses photochromic, gasochromic and electrochromic properties, which makes it as a suitable compound for optoelectronic device fabrication.

The MoO_3 thin film can be prepared by different methods including sputtering [8,9], electron beam evaporation [10], sol–gel [11,12], spray deposition [13–15], pulsed laser deposition [16,17] and thermal evaporation [18,19]. Among these, spray pyrolysis is an effective method used to deposit metal oxides in particular MoO_3 the thin film whose properties depend on spraying

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Influence of Temperature on Structural, Functional and Morphological Properties of Ag[PVP] Nanoparticles and Their Biological Applications

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ABSTRACT

The present work was undertaken to develop silver nanoparticles by a simple chemical route using harmless surfactant polyvinylpyrrolidone (PVP) at four different temperatures viz., 200 °C, 300 °C, 400 °C and 500 °C. Effect of temperature on structural, morphological and antibacterial properties was investigated. The XRD pattern confirmed the crystallinity and pure phase of the Ag-NPs. Also it confirmed that the size of the Ag[PVP] nanoparticles was affected by the temperature. The FT-IR analysis indicated the functional groups of PVP coordinate with silver ions and bind on surface of Ag-NPs. EDAX confirmed the formation of Ag nanoparticles without a trace of impurities. The SEM images showed the formation of spherical Ag[PVP] nanopowder in which the average particle size ranges from 20 nm to 34 nm. The antibacterial potential of synthesized Ag[PVP] nanoparticles was carried out against four different bacterial pathogens and show significant bacterial resistance.

1. Introduction

Nowadays nanotechnology has been embraced by industrial sectors due to its broad range applications in the field of electronic storage systems [1] biotechnology [2], medical science and tool for gene and drug delivery systems [3-6]. Metallic nanoparticles demonstrate size and shape-dependent properties that are of interest for applications ranging from catalysts and sensing to optics, antimicrobial activity. As the field of nanotechnology advanced, metallic nanoparticles become apparent having different properties as compared to their larger counterparts. This difference in the physical and chemical properties of nanomaterials can be attributed to their high surface-to-volume ratio. Due to these unique properties, they make excellent candidate for biomedical applications as variety of biological processes occur at nanometer scales [7]. Silver ions and silver-based compounds have been used as antimicrobial agents in biomedicine for many years because of their broad-spectrum bactericidal activity and lower bacterial resistance than antibiotics. Silver nanoparticles are a typical representative of the new generation of bactericidal materials.

As the properties of Ag-NPs depend on their sizes, up to now, various methods, such as polyol process [8,9], microwave assisted [10,11], UV irradiation [12], laser irradiation [13], wet chemical route [14], spray pyrolysis [15], sol-gel process [16], chemical reduction [17], sonochemical [18], sputtering [19], in such manner, have been employed to prepare Ag-NPs with different sizes and shapes. Among the various methods for synthesis of Ag-NPs, the chemical reduction method is the most popular synthesis route, simple, easy to handle, cost effective and large-scale production of Ag-NPs.

The use of appropriate stabilizers for the Ag-NPs, changing the permeability of bacterial cell walls, increases the penetrating power of the Ag-NPs, in that way contributing appreciably to enhance the antibacterial ability of the nanoparticles [10]. PVP has been utilized while preparing silver nanoparticles. These nanoparticles can disperse easily in PVP which in turn can act as protective layer around Ag-NPs preventing the aggregation that may occur [20]. Utilize of dispersant has to create complex compound with the metal precursor, control the reaction process and to protect nanoparticles from growth and agglomeration [14].

In this study, we explore the influence of temperature on PVP coated silver nanopowder via simple chemical reduction at different temperatures viz., 200 °C, 300 °C, 400 °C and 500 °C using dextrose as reducing agent. We have investigated effect of temperature on structural, morphological properties of Ag[PVP] nanoparticles and antibacterial potential on different human pathogens..

2. Experimental Methods

2.1 Reagents

Silver nitrate ($AgNO_3$, M.W. 169.87 g/mol, 99.99%), dextrose and NaOH were used as precursor, reducing agent and catalyst respectively and were purchased from Merck. Poly(N-vinylpyrrolidone (PVP, M.W. 40000 g/mol) used as a stabilizer was purchased from Loba Chem. Deionized water was used throughout the study.

2.2 Preparation of Silver Nanoparticles

Silver nitrate solution was prepared by adding 0.1 M of $AgNO_3$ (metal precursor) into 10 mL deionized water. Dissolving 0.006 M of PVP, 6 g of dextrose and 1 g of NaOH in 30 mL deionized water together and heated to 60 °C and stirred hardly then $AgNO_3$ solution was added drop wise into PVP mixer. When the complete amount of silver nitrate solution was added, the reaction mixture was stirred for 20 min with constant temperature. The black precipitates were separated by centrifugation and washed with deionized water many times and particles were incubated at 80 °C till the wetness may well be removed. Black solids of Ag-NPs were collected and crushed with uniform Ag-NPs using mortar. The powder was heated in a muffle furnace at 200 °C for 1 h to get the Ag[PVP] nanopowder. Similar procedure has been repeated for different temperatures such as 300 °C, 400 °C and 500 °C.

2.3 Antibacterial Activity - Disc Diffusion Method

The four different test organisms used in this present study were *Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus* and *Bacillus subtilis*. The whole test cultures were verified before use. The test cultures were maintained at 4 °C on Nutrient agar (HiMedia) slants. The bacterial resistance activity of the chosen sample preparations was carried out by agar disc diffusion technique. 20 mL of sterile Muller Hinton agar (Hi Media) was poured in sterile petri dishes. The petriplates were allowed to coagulate and used. 10 mL of sterile, Muller Hinton agar medium was

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200 MeV Ag^{15+} swift heavy ion beam induced property modifications in Nb_2O_5 thin films by fluence variation

R. Rathika[a], M. Kovendhan[b,*], D. Paul Joseph[c], K. Vijayarangamuthu[d], A. Sendil Kumar[e], C. Venkateswaran[f], K. Asokan[g], S. Johnson Jeyakumar[a,**]

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ABSTRACT

Swift Heavy Ion beam irradiation is capable of inducing a variety of modifications on the properties of thin films by high energy deposition. The Nb_2O_5 thin films deposited by spray pyrolysis technique were then irradiated with 200 MeV Ag^{15+} ions at fluence ranging from 5×10^{11} to 1×10^{13} ions/cm^2. The thickness of the deposited film was 308 nm and the irradiated area was 1x1 cm^2. The XRD pattern of the pristine film confirmed the tetragonal structure of Nb_2O_5. Upon irradiation, peak intensity decreased significantly and some peaks vanished due to irradiation induced defects. The subtle Raman peaks around 960, 223, and 126 cm^{-1} corresponds to edge shared octahedra, T_{2u} mode and Nb-Nb vibration respectively. After irradiation, complete suppression of vibration modes was observed except for 1×10^{12} fluence. For the 1×10^{12} ions/cm^2 fluence, Raman modes reappear with increased intensity due to irradiation induced recrystallization. Optical transmittance spectra showed a decreased trend as fluence increased due to the formation of optically absorbing centers. Both the direct and indirect band gaps showed a systematic red shift. The pristine AFM image revealed agglomeration of particles while a network like structure was observed after irradiation. Results of transport properties studied for both pristine and irradiated films at room temperature by Hall effect are also presented.

1. Introduction

Niobium pentoxide (Nb_2O_5) is a transition metal oxide which is abundantly available on earth's crust. It is thermodynamically and chemically stable having excellent properties and exhibits cathodic electrochromism [1]. The Nb_2O_5 has variety of polymorphs with different structural configurations originating from NbO_6 octahedral groups [2]. The Nb_2O_5 oxide finds versatile usage, especially in lithium batteries, solar cells, sensors, optoelectronics and electro-chromic devices [1]. Modification of physical and chemical properties of Nb_2O_5 is possible through doping [3–6] and post treatment like swift heavy ion (SHI) beam irradiation. Based on literature survey, hardly there are no reports are available on the investigation of Nb_2O_5 thin films by Ag^{15+} SHI beam irradiation. More exploration on the fascinating properties of Nb_2O_5 is a need for their usage in a wide range of applications.

In electronic devices, one can use Nb_2O_5 as a better alternate for SiO_2 to improve its storage capacity [7,8]. R.A. Rani et al., reviewed Nb_2O_5 thin film properties, preparation methods and its applications [2]. H. Mähne et al., observed that Nb_2O_5 phase transformed from amorphous to orthorhombic when annealed at 650 °C [9]. D.C. Castro et al., synthesized and explored behavior of mesoporous Nb_2O_5 thin films [10]. Avellaneda et al., reported that films of Nb_2O_5 synthesized by the sol-gel method was a promising candidate for electrochromic devices [11]. Different deposition methods, including dip-coating [12], anodization [13–15], DC magnetron sputtering [16], pulsed laser deposition [17,18], sol–gel [19,20] and spray deposition [21,22] were employed to prepare Nb_2O_5 thin films. Among these, spray pyrolysis is a versatile and efficient technique to deposit metal oxide thin films with several tunable parameters. The set-up is very simple and the equipment cost is relatively low. Various metal oxide thin films deposited by

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Synthesis and characterization of surfactants (CTAB and PEG) assisted CdO nanoparticles

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Abstract

CdO nanoparticles capped with two different surfactants (CTAB and PEG) have been synthesized in aqueous solution by a simple co-precipitation method. The synthesized particles were characterized by X-ray diffraction (XRD), UV-Vis absorption and room temperature photoluminescence (PL) spectroscopy. The morphology of the particles was studied by scanning electron microscopy (SEM with EDS).The functional group of synthesized particles were identified by furrier transform infrared spectroscopy (FTIR). UV–Vis absorption spectroscopy measurements reveal that the capping of CdO leads to blue shift due to quantum confinement effect

Keywords: *Cadmium oxide, Surfactants, quantum confinement, agglomeration*

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Introduction

Metal-oxide-semiconductors have been used extensively for optoelectronic applications such as solar cells, smart windows, flat panel display, light emitting diodes and photocatlytic properties [1–3]. Transparent conducting oxide (TCO) nanocrystals have great importance in catalytic applications. Cadmium oxide (CdO) is an n-type semiconductor with band gap of 2.5 eV [4] and it is considered as a promising material for photovoltaic applications due to its high electrical conductivity and optical transmittance in the visible region of solar spectrum [5]. Many techniques are used to integrate surfactants assisted CdO nanoparticles tested like: chemical vapour deposition [6] Wet chemical route [7] Solid state reaction method [8] Solvothermal synthesis [9] Hydrothermal process [10] Thermal decomposition method [11] Sol-gel [12] Microwave irradiation [13] Chemical bath deposition [14] and Co-precipitation [15]. Among this co-precipitation method is very simple and easiest preparation of surfactants assisted CdO nanoparticles.

The aim of the present study is to investigate the surfactant effect on the structural, morphological and optical properties of cadmium oxide nanoparticles prepared by co-precipitation method. We have employed two diverse, yet widely used surfactants namely the cationic cetlytrimethylmmonium bromide (CTAB) and polyethylene glycol (PEG) surfactants.

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AS Anti-diabetic (AD) studies of Bis Glycine Hydro Bromide – BGHB macro crystals milled to nano scale of 219 nm as the preliminary fine particles

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ABSTRACT

Generally macro crystals are extensively made use of it in material relevance and much utilization in all areas of science and technology. In this learning macro crystals are synthesised effectively by slow evaporation system, crystals are analysed by SXRD method for parameters and the crystal. Optical absorption spectrum reveals that the grown crystal has good optical transparency in the entire visible region and its energy band gap also fine gap and is of NLO SHG. The bio behaviour of the crystals are mainly used for anti diabetic study of the macro crystal inhibition values are increased with proper increase in the value of concentration and reported here as the novel utility to society, IC_{50} values are 30.2 for macro crystal of 219 nm milled assessment of BGHB by milling process.

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1. Introduction

Nano crystal is acquired from full scale crystals [1–25]. The crystal, whose particles are masterminded in rehashing design and have geometrical shape in nano precious stone the range is about 100 nm level. The nano crystals have various applications in hardware, science and ventures. The journey for gainful and new materials on nonlinear optical strategy has been dynamic since the revelation of SHG in quartz. Nonlinear optical [NLO] materials are required to expect a huge activity in photonics incorporating optical information managing, media transmission sensor defender applications, optical information putting away, and so on. Some regular mixes show colossal NLO reaction a huge piece of the time, sales of hugeness more noteworthy than generally known inorganic materials. They in like way offer the adaptability of sub-atomic course of action and the confirmation of basically an incredible number of crystalline structures. In this vitalizing setting, trademark nonlinear materials have been viewed as forefront open doors for crucial and applied appraisals including, in a joint exertion, consistent pros, material examiners and optical structure. Over late decades, there has been dazzling energy for progression and portrayal of nonlinear optical material significant stones. Second requesting nonlinear optical materials are utilized in optical exchanging, rehash change and electro-optical applications particularly in Electro optical modulators. Notwithstanding huge second sales susceptibilities, unfathomable transmission in UV and noticeable area and stable physio-warm execution are required for these applications. Inorganic NLO materials have gigantic mechanical quality, warm consistency and mind blowing transmittance at any rate unobtrusive optical nonlinearity considering the nonappearance of extended π – electron withdrawal. Simply typical, characteristic NLO material have enormous nonlinearity showed up distinctively corresponding to inorganic material at any rate low optical straightforwardness, poor mechanical and warm quality and low laser hurt edge. Along these lines the evaluation depends on semi-trademark NLO material important stone so as to obtain common NLO gem by joining the upsides of standard and inorganic materials. The semi-ordinary NLO materials have been drawing in a ton of thought because of high nonlinearity, substance flexibility, high mechanical and warm reliable quality and

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Structural, Optical, Electrical and Photocatalytic Degradation Properties of Cadmium Sulfide Nanopaticles by Sol Gel Methodd

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Cadmium sulfide (CdS) nanoparticles were synthesized *via* inexpensive sol gel method at different sintering temperature (350, 400 and 450 °C). The synthesized CdS nanoparticles have been characterized by X-ray diffraction, UV-visible spectroscopy, photoluminescence spectroscopy, scanning electron microscopy, high resolution transmission electron microscopy and Fourier transform infrared spectroscopy. The XRD pattern confirmed the formation of hexagonal Wurtzite structure for all the sintering temperatures. The crystallite size, microstrain and dislocation density have been evaluated using XRD data. SEM and HR-TEM analysis showed morphological transformation with better crystallite and spherical shaped CdS nanoparticles were observed. EDS is also performed to confirm the elemental composition of CdS nanoparticles. FT-IR analysis identified the absorption peaks of the Cd-S extension with moisture content. The UV-visible spectra showed absorption peak in the range of 223-257 nm and optical band gap decrease with increase of sintering temperatures. In addition the synthesized CdS nanoparticles were effectively used to degrade methyl orange dye under sunlight irradiation. The CdS nanoparticles were the potential candidate for optoelectronic applications.

Keywords: CdS, Sol-gel, Crystallite size, Photocatalytic, I-V, Methylene orange dye.

INTRODUCTION

Generally, nanoparticles can be defined as a particle ranging in size from 1 to 100 nm, meaning that it acts as a link between the macroscopic and the microscopic world. Heavy metal ions and additional inorganic and organic elements in metal-oxide nanoparticles are exceptional in their form, morphology, functional groups and electronic properties. Nanoparticles have established much interest due to their unique properties and their probable applications in different fields such as light emitters, transistors, optoelectronics and optical devices [1-4]. Semiconductor nanoparticles have characteristic optical, surface morphological and electronic properties and have been widely study for many relevant applications. In parti-cularly, electrical properties of semiconducting nanoparticles as a occupation of particles size, shape, capping agent, optical band gap, *etc.* holds a significant importance in the research of nanoscience and technology. Influence of different external parameters like precursor concentration temperature, types of doping on the electrical properties of semiconductors is widely investigated by many researchers for the past years [5]. Nanostructures sulfides and selenides (CdS, CdSe, ZnSe and ZnS) have been extensively investigated to determine the relationship between structure, size and optical properties. These sulfides are used for a variety of applications such as, photo detector, light emitting diode, solar cells, photovoltaic, sensors, photoluminescence and transistors due to size reduction and cost effect. Among various semiconductor materials cadmium sulfide (CdS) is an II-VI, n-type semiconductor having direct bandgap energy of 2.4 eV at room temperature. Cadmium sulfide (CdS) nanoparticles have attracted a great attention for their potential application in variety fields such as field emitters, gas sensors, varistors and solar cells. Recently, there has been growing interest in photocatalytic applications of CdS. The confinement effect is observed for CdS nanoparticles when sizes are equal to or less than 50 Å [6]. The CdS exits in three types of crystalline structure namely hexagonal Wurtzite, zinc blend and high pressure rack salt phase. The total Wurtzite system is a thermo-

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Short communication

Green synthesis of cerium oxide nanoparticles using *Calotropis procera* flower extract and their photocatalytic degradation and antibacterial activity

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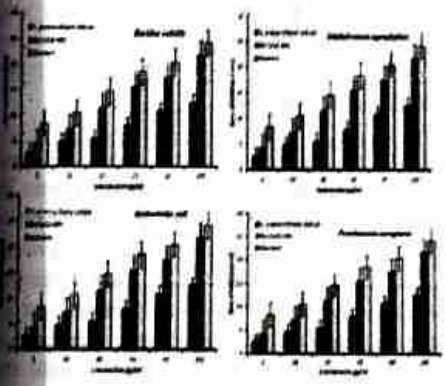
GRAPHICAL ABSTRACT

Antibacterial activity of *C. procera* flower extract and biosynthesized CeO_2-NPs.



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ABSTRACT

The eco-friendly synthetic approach for preparing CeO_2-NPs using *C. procera* flower extract. The synthesized CeO_2-NPs were studied for their UV–Vis, XRD and HR-TEM. The X-ray diffraction studies confirmed the cubic structure of synthesized CeO_2-NPs with an average crystallite size of 7 nm. High Resolution Transmission Electron Microscope (HR-TEM) images showed that the CeO_2-NPs possessed spherical shape and particle size of 21 nm. The photocatalytic degradation of methyl orange (MO) dye under sunlight irradiation by biosynthesized CeO_2-NPs was analyzed. The synthesized CeO_2-NPs exhibited 98% degradation activity against MO dye. Furthermore, antibacterial activity of *C. procera* flower extract and biosynthesized CeO_2-NPs were studied. The biosynthesized CeO_2-NPs exhibits a important antibacterial activity against Gram negative bacteria *Escherichia coli* and *Pseudomonas aeruginosa* than Gram positive bacteria.

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Fluorescence, filter,nano tribological studies of 12-(4-Chlorophenyl)-9,9-Dimethyl-9,10-Dihydro-8*H*-Benzo[*A*]Xanthen-11(12*H*)-One – (CPDDHBXH) macro and nano crystals

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ABSTRACT

As the CPDDHBXH macro and nano crystals are having immense impact on opto-electronic applications, phase matching, frequency matching and power transmission and other types of utilities in bio and with pharmacy fields, it is the scope of the physicists and electronic peers to develop and study the special functions like nano tribological factors and other utilities. Macro crystals have smallest amount relevances by estimation dissimilarity to nano silhouette of CPDDHBXH prepared by milling performance. The nano form of CPDDHBXH crystals are of 22 nm respectively, the XRD data reveals the macro crystals are having the formula $C_{25}H_{21}ClO_2$ are of a = 10.293 Å, b = 11.621 Å, c = 16.447 Å, β = 90.04°, monoclinic with space group $P2_1/n$, the macro level NLO is 1.96 times higher than that of typical KDP. Here, both the macro and nano crystals are undergone with filter, fluorescence and tribological studies and reported, CPDDHBXH are best for electronic filters and for frequency doublers based on their macro level NLO-SHG efficiency.

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1. Introduction

Nano particles have valuable forces laying on machines in over-abundance of their coordinating parts which are full scale or miniaturized scale plots and nano structure pass up the adequacy and capability and encourage over further structures, CPDDHBXH are Second order NLO in enormous scope stage [1–30] and in nano illustration it is 22 nm by the method of processing of milling. A nano precious crystal is a material iota having in many event one estimation more minute than 100 nano meters, considering quantum detects (a nano atom) and made out of particles in a solitary strategy. The size of nano precious stones recalls that them from more prominent important ones. Nano valuable materials are unadulterated solution ones with sizes in the nanometer power changed in accordance with leave or included by an abandoned covering of surfactant and method of appropriateness over large scale scaled titled material in electronic applications.

2. Experimental of macro and nano crystals

The titled compound, $C_{25}H_{21}ClO_2$ was produced through the three-component union of 4-chlorobenzaldehyde, 2-naphthol and 5,5-dimethylcyclohexane-1,3-dione. The pyran band adopts a cruiser conformation, while the cyclohexenone ring is in an envelope conformation. The 4-chlorophenyl loop is more or less at right angles to the pyran ring with a represented dihedral angle of value around 87°. In the crystal, molecules are connected by the intermolecular C—H···O hydrogen bonds. Xanthenes and benzoxanthenes are imperative genetically energetic heterocyclic molecules. They acquire anti-inflammatory and antiviral activities and other bio tools. These compounds are utilized as antagonists for paralyzing action of zoxazolamine and in photodynamic therapy. The cyclohexenone ring is in a covering conformation with

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Efficacy of photoluminescenes and magnetic behavior of Ce doped ZnO nanoparticles by solid state reaction method

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ABSTRACT

The synthesis of Ce doped ZnO nanoparticles exhibits the enhancement of results and its favor to electronic properties. The minimum average crystal size was obtained from 8 wt% (8 nm). The weight percentage (wt%) of cerium doping concentration increases, average crystal sizes are decreased upto 8 wt % and then crystal size increased for 10 wt% of doping level. The UV–Visible spectra analysis shows that the high absorbance and broad peak obtained at 8 wt%. PL studies exhibits the enhanced intensity of the broad emission at green region confirms that the increased density of defects which can be attributed to the oxygen vacancy created by the existence of Ce doped in ZnO nanoparticles. At last we got minimum band gap energy value of 1.32 eV at 8 wt% of Ce doped ZnO nanoparticles. VSM studies showed room temperature ferromagnetism in the Ce-doped ZnO NPs. The polarization esteems are seen as diminished with the expansion in Ce fixation in ZnO after 4 wt% and 6 wt% Ce. The watched ferromagnetism in Ce-ZnO NPs is because of the nearness of Ce^{3+} particle state and oxygen opening and interstitial destinations of Zn.

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1. Introduction

Cerium (Ce) is a rare earth component, an individual from the lanthanide arrangement and plentiful in the Earth's outside. It is at present 66 sections for every millions of free metal or oxide. As of late, super fine nanoparticles have gotten a lot of consideration because of their physical and synthetic properties, which vary from mass materials. Cerium is utilized as an oxygen stockpiling advertiser. Ce-containing materials have pulled in broad interest in earthenware production, metals, savvy presentation materials and optics over the world. Cerium oxide nanoparticles (Ce NPs) have been utilized productively in different cutting edge innovations. Lately, because of the superb physical and synthetic properties of nanoparticles, Ce NPs are altogether not the same as mass particles, and there is significant interest in improving sun based cell execution, attractive and different properties by lessening grain size the nanometer range [1–4]. Nano Crystalline Ce powders are considered are significant nanomaterials for applications in impetuses, energy units, bright safeguards, hydrogen stockpiling items, oxygen sensors, optical gadgets and cleaning materials [5]. Ceria redox and burning impetuses have had incredible achievement on account of their capacity to change to diminished and oxidized state because of the adjustment in the oxygen period of the gas stage. In this work, ZnO nanorods were combined utilizing a generally straightforward and economical strong state response technique to hasten zinc acetic acid derivation get dried out at different response temperatures and their Magnetic properties and optical properties.

2. Experimental procedure

The ZnO nanoparticles were combined by utilizing zinc acetic acid derivation get dried out ($Zn(CH_3COO)_2\ 2H_2O$) as the antecedent. In a common place combination, 98 wt% of zinc acetic acid derivation dry out and 2 wt% of cerium acetic acid derivation ($C_2H_3CeO_2$) were taken in started gut with crushing 20 min after that the powder was gather in a silicon cauldron and covered with silicon top, at that point put in a stifle heater. The temperature of heater was kept at 400 °C for 12 h for well development of ZnO nanoparticles in a powder structure. Comparable technique has been followed for the amalgamation of ZnO nanoparticles at various focus, for example, 4, 6, 8 and 10 wt%.

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Structural, optical and electrical properties of copper composite ZrO_2 nanoparticles prepared via sol–gel method

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ABSTRACT

In the present work, pure and copper composite zirconium oxide nanoparticles with a different percentages of copper (0.02, 0.04, 0.06 and 0.08%) were successfully synthesized by a low cost sol–gel technique. It was found that as-prepared samples of copper-composite (zirconium oxide) ZrO_2 nanoparticles are in monoclinic phase. The copper-doped zirconium oxide (ZrO_2) NPs are present as spherical morphology and highly agglomeration confirmed by scanning electron microscopy and high resolution transmission electron microscope analyses. The synthesis samples exhibited two bandgap energy at 3.6 eV and 2.6 eV, 3.57 eV and 2.4 eV, 3.55 eV and 2.14 eV, and 3.5 eV and 2.1 eV. The presence of functional groups and the chemical bonding is confirmed by FT-IR spectra. PL spectra of the pure and Cu-doped ZrO_2 nanoparticles exhibited oxygen vacancies. Voltage–current characteristics of pure and composite ZrO_2 nanoparticles are studied at vary incident light intensity that show the negative photoconductivity.

1 Introduction

ZrO_2 (zirconia) properties namely high strength and hardness, good elastic modulus, corrosion resistance [1–9]. Thermal barrier coating [10], material refractor [11] bioceramics [12] catalysis [13]. Oxygen sensor [13] electrolye gate dielectric [14]. Zirconia doped with copper oxide receive good attention as anode materials [15] . Synthesis of methanol for catalysts [16–18] carbon oxidation [19] hydrocarbon no reduction [20] water–gas shift reaction [21, 22]. Basic hydroxyl groups and coordinatively unsaturated Lew is acid Zr^{+4}–O^2 [23]. Zirconium oxide is a wide band gap in semiconductor materials [24]. Zirconium oxide (ZrO_2) exhibits three types of polymorphs such as Cubic (C-ZrO_2), monoclinic (m-ZrO_2), and tetragonal (t-ZrO_2). The Cubic (c-ZrO_2) phase is at stable > 2370 °C, tetragonal (t-ZrO_2) phase is

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Microwave-assisted green synthesis of nanoscaled titanium oxide: photocatalyst, antibacterial and antioxidant properties

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ABSTRACT

In the present work, microwave-assisted method is used to synthesize TiO_2 nanoparticles from *Wrightia tinctoria* leaf extract. The synthesized nanoparticles were characterized by X-ray diffraction (XRD), high-resolution transmission electron microscopy (HR-TEM), DLS, ZE, FT-IR, Raman, PL and ultraviolet (UV)–visible studies. The XRD analysis confirmed that the catalyst is composed of anatase tetragonal TiO_2 phase with crystallite size of 9.93 nm. The HR-TEM results show that the particles are in spherical shape with particle size of ~ 22 nm (TiO_2 nanoparticles). The UV–Vis (Tauc plot) spectrum (2.52 eV) of the prepared TiO_2 nanoparticles suggest that intrinsic band gap absorption of TiO_2 and electron transition is from the valence band to conduction band. Furthermore, photocatalytic degradation of organic dyes (methyl blue and methyl orange) was studied under sunlight irradiation using synthesized nanoparticles. The synthesized nanoparticles results show 99% degradation activity as in the case of methyl orange dye compared to methyl blue dye (97%) at 90 min. TiO_2 nanoparticles synthesized using *W. tinctoria* leaf extract have been found to exhibit more enhanced photocatalyst degradation of organic dyes as compared to other leaf extracts. In addition, the synthesized TiO_2 nanoparticles were tested at various concentrations and these results revealed potential antibacterial activities. Antioxidant activity carried out using DPPH free radical scavenging assay revealed lower IC_{50} μg/mL value 53.64 for the synthesized TiO_2 nanoparticles, respectively. The present work further suggests that it is an effort

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Significance of thermal interfacing in hematite (α-Fe_2O_3) nanoparticles synthesized by sol-gel method and its characteristics properties

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Weak ferromagnetic behavior

ABSTRACT

Hematite (α-Fe_2O_3) nanoparticles were synthesized through the cost-effective sol-gel method. The impact of temperature influenced in as-prepared and calcinated hematite nanoparticles was explored. To characterize the synthesized compounds with the help of X-ray diffraction (XRD), Thermogravimetric & Differential Thermogravimetric Analysis (TG-TDA), Fourier Transform Infrared spectroscopy (FT-IR), Ultra-Violet spectroscopy (UV-Vis), Scanning Electron Microscope with Energy Dispersive X-ray Analysis (SEM with EDAX), and Vibrating Sample Magnetometer techniques (VSM). The structural studies were confirmed rhombohedral structure with space group R-3c in C-2 NPs. The surface morphological analysis confirmed shape, size, and particle homogeneity were ensured with the arrival of temperature. The thermal analysis reported as the C-1 NPs shows excellent phase stability till reaching 1100 °C. FT-IR confirms the phase purity of the nanoparticles synthesized. The optical absorption at 534nm confirms the formation of red color α-Fe_2O_3 C-2 NPs and the optical bandgap values 1.92–1.97eV. The magnetometry steady was observed as a magnetic transition of paramagnetic to weak ferromagnetic magnetic behavior of NPs, which implies that several structural improvements are achieved by the thermal interfacing on the NPs surface.

1. Introduction

In the recent trends, Nanotechnology has attracted as one of the most stipulated things in the developing sectors. The exploration of magnificent performance in such predominant areas is material Science, Environmental engineering, bio-medicinal industries, etc., with outstanding properties. Nowadays, plenty of researchers prefer to work on nanoscale material production that would design at the atomic level. The size range of nanoscale particles having less than 100 nm in diameter [1]. Significantly particles in nano dimensions exhibiting extreme strange behaviors were attributed as coordination of a large number of atoms in surface compared to volume ratio and quantum confinement in electronic structure [2]. Among these reasons, the material shows altered physical, chemical, electrical, and thermal conductive properties compared to bulk materials. The most participative metal-oxide nano-structures materials have more and more attentiveness due to their exceptional stability, crystallinity, conductivity, etc. Remarkably Iron oxide-based nanoparticles were making great revolutions in diverse fields due to their ultra stability and biocompatibility. The generously mineral form of Iron oxide is available naturally with having different crystal structural forms as categorized as crystalline polymorphs (α-Fe_2O_3, β-Fe_2O_3, γ- Fe_2O_3, ε- Fe_2O_3). Among this hematite, α-Fe_2O_3 of n-type semiconducting material with a narrow bandgap of ultra-stable phased material was a consequence in a vast range of applications as gas sensor, magnetic storage devices, tunable biocompatibility and, some energy storage devices [3]. Several promising physical methods such as electron beam evaporation [4], sputtering techniques, laser ablation [5], etc. which routes are considered as facing more inconvenience, and chemical techniques are hydrothermal [6], co-precipitation, electrochemical [7,8], sol-gel method [9], etc. Among the following methods, sol-gel-based nanoparticle synthesis was a well-established approach for producing good quality α-Fe_2O_3 hematite material enable modification shape, size, and morphology related to the application.

Those Iron oxide structures are attaining their phases when achieving different calcination temperatures, which species has complete temperature depended. This present work aimed to synthesize hematite α-Fe_2O_3 nanostructures and investigate the importance and raising effects of coordination of calcination treatment in as-prepared Iron oxide NPs and determine the thermal stability, improving magnetic hysteresis curve and morphology by way of involvement of

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PHYSICO-CHEMICAL CHARACTERISTICS OF MARINE WATER SAMPLES FROM PAZHAYAR KOLLIDAM TALUK, SOUTH EAST COAST OF NAGAPATTINAM DISTRICT, TAMIL NADU, INDIA

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ABSTRACT

Monthly fluctuations of physico-chemical characteristics marine water samples were carried out in Pazhayar, Kollidam Taluk, Nagapattinam District, Tamil Nadu India, for a period of twelve months (January 2017 to December 2017). Eight various physico-chemical parameters were analyzed by using standard methods (APHA, 1998). Water temperature varied from 26.12 to 28.97°C, Dissolved oxygen content varied between 4.53 to 5.53 mg/L, salinity (27.09 to 28.53 ppt), pH ranged from 6.33 to 7.82. Phosphate varied 6.38 to 7.73mg/L, Nitrate (0.74 to 1.87 mg/L), silicate (10.27 to 11.78), calcium (407.75 to 678.78 mg/L), magnesium was from 217.5 to 482.97 mg/L, and chloride (12.60 to 14.91 mg/L) also varied independently.

Keywords: Physico-chemical characteristics, Monthly variations, Marine water.

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INTRODUCTION

Ocean is the treasure houses of wealth both for sustenanee of life and for academic researches. The researches on the marine biota of Indian are being intensitied in the recent years because of the numerous opportunities, offers and potentialities the oceans have provide. Such areas are subjected to variety of socio-economic drivers producing increased pressure and impact, this can lead to environmental stress or even affect public health (Cave, 2003; Sundaramanickam, 2008).

Costal ecosystem is the most essential commodity for fauna and flora consumption and the most important renewable resources, which must be prevented from deterioration in quality of coastal waters which provides significant information about the available resources for supporting life. The entire life of the world depends going on water and therefore the hydrological study is very greatly essential to comprehend relationship among its diverse trophic levels and food webs. In Indian estuaries and seas the physical-chemical characteristics

Histological studies on tissues of marine clam *Donax variabilis* collected from Porayar Coastal area, Nagapattinam District Tamil Nadu India

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ABSTRACT : *Donax variabilis* is a species of small edible saltwater clam in Tamil Nadu coastal region having good nutritional values. In the present study, the histological investigation of the different tissues (Mantle, gill, liver, heart and intestine) of *Donax variabilis* collected from Porayar coastal area, Nagapattinam District, Tamil Nadu India. Present work was carried out histological observation in the different tissues of marine clam *Donax variabilis* in mantle, gill, liver, heart and intestine.

Index Terms : *Histology, Donax variabilis, Mantle, Gill, Liver, Heart and intestine.*

I. INTRODUCTION

The techniques of specimen fixation, though simple in nature, are of the utmost importance in the preparation of meaningful microscopic slides. In the present study histological organization of the selected tissues of *Donax variabilis* were made for a better understanding of different organs like mandle, gill, liver, heart and intestine. Histology is that branch of anatomy that studies tissues of animals and plants. In its broader facet, the word microscopic anatomy is employed as if it were a equivalent word for anatomy, as a result of its subject material encompasses not solely the microscopic structure of tissues however conjointly that of the cell, organs, and organ systems. Inadequate or improper fixation, if not recognized as such, can often lead to misinterpretation of the sectioned material. The relatively impervious chitinous exoskeleton of shrimp does not allow for adequate fixative penetration by simple immersion, except in larvae and early post larvae. Also, certain shrimp tissues autolysis more rapidly than comparable tissue types in other animals. Hence, it is imperative that immersion within a fixative be immediately preceded by injection of the fixative into vital areas. The timing of fixation is of equal importance. Specimens should be fixed immediately following removal from the water. Additional care

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Research Paper

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Seasonal variation in the Carbohydrate content from different tissues of *Sepia aculeata* in Pazhayar coastal waters, Nagapattinam District, Tamilnadu

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Abstract: The aim of this work was to investigate the seasonal variability in the Carbohydrate content in *Sepia aculeata* during January 2017 to December 2017. The total carbohydrate was estimated in muscle, gill, liver and gonad.

Key words: *Sepia aculeata*, Muscle, Gill, Liver and Gonad.

I. Introduction

Class cephalopoda which include the Nautilus, Cuttle fish, Squid and Octopus is the most advanced class of phylum: Mollusca, adapted to a swimming existence. There are about 80 species of cephalopods of commercial and scientific interest distributed in the indian seas [1]. Biochemical composition of the whole body indicates the quality of cephalopods [2]. But the proximate the measurement of some proximate profiles such as Protein, Carbohydrate and Lipids is often necessary to ensure that they meet the requirements of food regulations & commercial specifications [3]. However most of the previous studies concentrate on the proximate composition and nutritional evaluation of many commercially important fishes and few species of cephalopods. But at the same time limited work has been carried out in the different body parts of cephalopods *Sepia aculeata*. Therefore the present study was undertaken to evaluate the carbohydrate content of cuttlefish *Sepia aculeata*.

II. Materials and Methods

The specimen of *S. aculeata* collected from Pazhayar coastal water, south east coast of India. After collection, the animals were thoroughly washed with fresh water and put into ice box were brought to the laboratory. The different body parts such as muscle, gill, liver and gonad were dissected out. The respective tissues were used for carbohydrate estimation.

III. Result and Discussion

The carbohydrate content has been shown in the Table 1 and Figure 1 to 4 (Seasonal variations). In *Sepia aculeata* the carbohydrate content is high in female than the male [4]. Similar studies were carried out [5].

Muscle: The percentage of carbohydrate values in males fluctuated from 25.68% to 34.28% and in females from 30.60%to 32.26%.

Gill: In males carbohydrate values varied from 25.06% to 31.86% and in females from 27.31% to 35.12%.

Liver: In the Liver of male *Sepia aculeata* the carbohydrate values fluctuated from 25.08% to 30.75% and in females from 26.20% to 30.26%.

Gonad: The percentage of carbohydrate values in males fluctuated from 29.02% to 36.20% and in females from 31.68% to 38.98%.

In general carbohydrate values higher in females than the males in all the organs. Glycogen may be important for the maturation process and embryogenesis. Carbohydrates are precursors of metabolic intermediates in the production of energy and non essential amino acids and as a component in ovarian pigments [6]. In this present study total carbohydrate is decreased in summer to fall than increased slightly in monsoon [7] Similar observations have been recorded for *O. vulgaris* [8] and *L. forbesi* [9] Where the glycogens reserves are increased during maturation in the gonad and muscles.

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Histological Studies on Tissues of *Loligo duvauceli* (Orbigny, 1848) in Pazhayar coastal water, Nagapattinam District Tamilnadu

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Loligo duvauceli, Muscle, Gill, liver and Gonad

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ABSTRACT

Histology is that the microscopic study of animal and plant cell and tissues through staining and sectioning and examining them below a magnifier (electron or lightweight microscope). There square measure numerous ways wont to study tissue characteristics and microscopic structures of the cells. microscopic anatomy studies square measure utilized in theatrical investigations, autopsy, designation and in education. additionally, microscopic anatomy is employed extensively in medication particularly within the study of pathological tissues to help treatment. The aim of this work was to observe the structural and functional integration of the different organs like muscle, gill, liver and gonad. The cellular organization of body parts of Loligo, proves the same type of functional significance as encountered in other cephalopods.

1. Introduction

Cephalopod molluscs are rich and varied marine organisms that live the benthic and pelagic atmospheres from seaside areas to the deepsea [1]. In the present study histological organization of the selected tissues of Loligo were made for a better understanding of different organs like muscle, gill, liver and gonad. Earlier studies on cephalopods [2] on octopus [3], on cephalopods [4], on Squid Moroteuthis ingens [5].

Histology is that branch of anatomy that studies tissues of animals and plants. In its broader facet, the word microscopic anatomy is employed as if it were a equivalent word for anatomy, as a result of its subject material encompasses not solely the microscopic structure of tissues however conjointly that of the cell, organs, and organ systems (6). The body is composed of cells, intercellular matrix, and a fluid substance, extracellular fluid (tissue fluid), which bathes these components (7). Extracellular fluid, which is derived from plasma of blood, carries nutrients, oxygen, and signaling molecules to cells of the body. Conversely, signaling molecules, waste products, and carbon dioxide released by cells of the body reach blood and lymph vessels by way of the extracellular fluid. Extracellular fluid and much of the intercellular matrix are not visible in routine histological preparations, yet their invisible presence must be appreciated by the student of histology (8).

2. Materials & Methods

For histological studies 20 specimens were used. The specimen of *Loligo* collected from the study area and washed well with fresh water and were kept in ice box were brought to the laboratory. The animals were dissected and their tissues were pooled out for histological studies. The tissues were fixed in 5% formalin for 72hrs. The fixed tissues were washed in running tap water over night and then dehydrated in ascending grades of alcoholic series. For block making, paraffin wax of melting point 58-60 C was used. Sections cut at 5 micrometer in thickness, were deparafinished and stained in Delafield's haematoxylin with eosin as counter stain. The photomicrographies of various sections of the tissues were taken for microscopic observations.

3. Result and Discussion

Histology is that branch of anatomy that studies tissues of animals and plants. This textbook, however, discusses only animal, and more specifically human, tissues. In its broader aspect, the word histology is used as if it were a synonym for microscopic anatomy, because its subject matter encompasses not only the microscopic structure of tissues but also that of the cell, organs, and organ systems (6). The body is composed of cells, intercellular matrix, and a fluid substance, extracellular fluid (tissue fluid), which bathes these components (7). Extracellular fluid, which is derived from plasma of blood, carries nutrients, oxygen, and signaling molecules to cells of the body. Conversely, signaling molecules, waste products, and carbon dioxide released by cells of the body reach blood and lymph vessels by way of the extracellular fluid. Extracellular fluid and much of the intercellular matrix are not visible in routine histological preparations, yet their invisible presence must be appreciated by the student of histology (8).

One of the highest benefits of using histopathological biomarkers in ecological monitoring is that they permit examining exact target organs with gills, liver and kidney that are responsible for energetic functions, such as respiration, excretion, accumulations and biotransformation of xenobiotic in the fish (9). Furthermore, the fluctuations found in these organs are normally easier to recognize than following the functional factors (Fanta et al., 2003) and helps as warning signs of harm to animal health (Hinton and Lauren, 1990). Numerous xenobiotics stimulate the action of definite enzymes that modify metabolism, further leading to apoptosis initially demonstrating as necrosis with inflammatory protective reactions (10-12). Histological examination of the gill, muscle, liver and kidney in vertebrates is done to evaluate the effect of toxic constituents found in the location on the respective animal species (13).

Histological observation in the tissues of *Sepia aculeate of* Pazhayar Kollidam Taluk, Nagapattinam District

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[2] *Head of the Department P.G and Research Department of Zoology, TBML College, Porayar - 609 307, Tamil Nadu, India.*

Abstract

Sepia aculeate is an important species in Tamil Nadu region having good nutritional values. In the present study, the histological investigation of the different tissues (Gills, liver, muscles, gonad and ovary) of *Sepia aculeate* collected from Pazhayar, Kollidam Taluk, Nagapattinam District, Tamil Nadu, India. The present work on histological observation was carried out in gills, liver, muscles, gonad and ovary that had resulted from marine *Sepia aculeate.*

Key words : Histology, *Sepia aculeata*, Gills, Liver, Muscles, Gonad and Ovary.

Introduction

The cephalopod capture is an artisanal fishery along the coast that does not have a precise regulation of their populations and catches (Boyle and Rodhouse, 2005). Numbers of residual egg in a cuttlefish gonad have been reported by Boletzky (1987) as a single observation, and there is no study of the corresponding histology of the ovaries. The aim of this study was to investigate a maximum available number of deceased *S. officinalis* including histological studies, thus obtaining more detailed information on the reproductive biology and spawning efficiency in this species. Water pollution is usually caused by various human sources, typically (point and non-point) industrial facilities and agrochemicals especially in aquatic ecosystem, has grown up to be a serious environmental problem nowadays. Adversely human activities are directly or indirectly affect the environment (Jayakumar *et al*., 2018).In European countries it is consumed fresh or frozen (Jereb and Roper, 2005). Additionally, absorption of toxic chemicals through gills is rapid and therefore toxic response in gills is also rapid (Tamizhazhagan *et al*., 2016).Unlike common cuttlefish *Sepia officinalis*, data on the reproductive biology of *S. orbignyana* are scarce (Hastie *et al*., 2009). Histology is the microscopic study of plant and animal tissues. Although all organisms are comprised of at least one cell, we will be focusing on observing cells and tissues of the human body. All organisms are composed of cells. Humanoid body cells are grouped by their similarities in structure and function into tissues (Tamizhazhagan and Pugazhendy, 2017).In relation to the research of the histology of these organisms, few species have been studied and this information is necessary for the fishery resources

Assessment of Physico-chemical parameters of marine water samples from Pazhayar south east coast of Nagapattinam District, Tamil Nadu, India.

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Abstract

Monthly fluctuations of physico-chemical characteristics marine water samples were carried out in Pazhayar, Kollidam Taluk, Nagapattinam District, Tamil Nadu India, for a period of twelve months (January 2017 to December 2017). Eight various physico-chemical parameters were analyzed by using standard methods (APHA, 1998). Water temperature varied from 26.12 to 28.97°C, Dissolved oxygen content varied between 4.53 to 5.53 mg/L, salinity (27.09 to 28.53 ppt), pH ranged from 6.33 to 7.82. Phosphate varied 6.38 to 7.73mg/L, Nitrate (0.74 to 1.87 mg/L), silicate (10.27 to 11.78), calcium (407.75 to 678.78 mg/L), magnesium was from 217.5 to 482.97 mg/L, and chloride (12.60 to 14.91 mg/L) also varied independently.

Key words: Physico-chemical characteristics, Monthly variations, Marine water.

INTRODUCTION

Ocean is the treasure houses of wealth both for sustenance of life and for academic researches. The researches on the marine biota of Indian are being intensities in the recent years because of the numerous opportunities, offers and potentialities the oceans have provide. Such areas are subjected to variety of socio-economic drivers producing increased pressure and impact; this can lead to environmental stress or even affect public health (Cave, 2003; Sundaramanickam, 2008). Aquatic ecosystem monitoring has been carried out in India based on either chemical or biological analysis. The chemical approach is useful in order to determine the levels of nutrients, metals, pesticides, radioactive substances, etc., while the biological approach aids in assessing the overall effect of the chemical input on organisms(Tamizhazhagan and pugazhendy,2016)

Length-weight relationship in the marine fish *Sphyraena jello* (Cuvier, 1829) collected from Karaikal south east coast of India

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***Abstract*:** Length-weight relationship of marine fish *Sphyraena jello* was studies for one year in Karaikal marine area south east coast of Pondicherry India. In the present observation, 80 specimens were collected during January 2016 to December 2016. The samples composed of 40 male and 40 female fishes, respectively. The relationship between body weight, total length and standard length in total specimens were measured maximum and minimum. The body weight varied male fishes 255.25 to 1297.5 grams and female fishes 354.25 to 1509.25 grams. Total length of male fishes ranged from 30.47 to 65.75 cm and female fishes 32.45 to 71.57 cm respectively. The standard length of male fishes varied from 25.87 to 58.32 cm and female fishes 27.65 to 64.57 cm respectively. The maximum body weight, total length and standard length were noted September 2016 and minimum body weight, total length and standard length were reported October 2016 during the study period.

***Index Terms*: *Total weight, Total length, Standard length, Maximum and Minimum*.**

1.INTRODUCTION

Length-weight relationship is important in studying fish biology. The evaluation of the general condition and well being of the fish is also determined, the absolute growth is the daily increment in weight of fish. This relationship serves three purposes *viz*. i) to determine the type of the mathematical relationship between two variables so if one variable is known, the other could be computed; ii) the relative condition can be estimated to assess the general well being of the fish and type of growth, *i.e.*, whether isometric or allometric and iii) it helps to estimate the potential yield per recruit in the study of fish population dynamics. In fishes, generally the growth pattern follows the cube law. Such relationship for the fishes will be valid when the fish grows isometrically.

Fish can attain either isometric growth, negative allometric growth or positive allometric growth. Isometric growth is associated with no change of body shape as an organism grows. Negative allometric growth implies the fish becomes more slender as it increase in weight while positive allometric growth implies the fish becomes relatively stouter or deeper-bodied as it increases in length[1].

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Seasonal Variation in Encounter Rate of Avian Community at Tranquebar Area, Nagapattinam District, Tamil Nadu, India

R.Praveen Kumar, G. Thomas Nithiyanandam

Abstract*— Present study was carried out from January 2016 to December 2016 variation in encounter rate of avian community in different habitat and season. Totally 470 sightings of bird species was obtained both morning and evening counts from 360 one kilometer transect walks along the 15 transects. Average of encounter rate was 0.40±0.05 (5) birds /km walks. The overall encounter rate was ranged in different habitat from 0.10 to 0.84 and season 0.12 to 0.38 birds/walks. The encounter rate was statistically significant between seasons (Kruskal – Wallis test H=12.08, df=4, P=0.003). All habitat and different season 55 species were recorded and majority of bird species found 58% in agriculture and river bund remaining 42% in other habitats.

Key Words: Habitat, Season, bird, Tranquebar, Tamil Nadu, India

I. INTRODUCTION

Species composition of bird community varied in relation to different habitat and season. Population and distribution of bird studies is important tool indicating wealth of ecosystem (Jayson and Mathew 2000). Knowledge of the number in a population of avian community is prerequisite for effective wildlife resources management. The realistic conservation programme cannot be proposed before the basic information is collected therefore, the needed for quantitative, accurate and comprehensive maps of species distribution and abundance.

Indian avifauna is one of the most interesting in the world and provides sample opportunity for further significant research in zoogeography and its related aspects of ecology. The number of habitat variables taken into consideration depends on the objectives of the study and on the attributes of the habitat to which the population under study is responding. Here in, variation in encounter rate of avian species in different habitat and season wise was assessed. Such an investigation would help in understanding their ecological significance in different habitats which could be more useful for its management aspect for conservation.

II. MATERIALS AND METHODS

Study Area:

Tranquebar Area is situated in Nagapattinam District of Tamilnadu, India which lie between 11°03'43.40"N longitude and 79°48'37.04"E latitude. Nagapattinam District is one among 35 District of Tamilnadu, and area covered is 2715.83 sq.km. It is bounded by Bay of Bengal on the east (Meganathan and Jeevanadham 2017). This study area is rich and diverse bird species present. Population and ecological studies have been reported in different organism in different habitat at Tranqubar Taulk (Karunakaran and Jeevanandham 2018, Meganathan and Jeevanadham 2019a). The present study was carried out in Tranquebar Area covering about 50 Sq.km. in different habitats like agriculture, river bund, non-cultivated, groove and human habitation during the study period from January 2016 to December 2016 (Fig-1).

Methods:

The abundance of bird species using by adapting line transect sampling method. Encounter rate was calculated the number of birds counted on transect. Totally 15 line transect was laid in different habitat in one kilometer length. The number of transects depends upon the area of each habitat in which five in agriculture, four in river bund, two in groove, two in non-cultivated and two in human habitation transect were laid. The Agriculture and river bund habitat were larger than the other habitat hence five and four transect were laid. All the transects were sampled immediately after the Sun rise and normally from 0600h to 0800h and before the Sun set 1600h to 1800h both morning and evening with normal speed of walk (0.75 to 1.00 km/hr.). The birds were observed by 7X50 Binocular (Olympus) throughout the study period. A group of birds was considered as a single individual and only one perpendicular distance to the middle of the flock was measured. Bird species was identified using a handbook of the birds by Ali and Ripley (1987). Totally, 15 transects of one km length were walked every month in the study period. A total of 360 transect walks were made in throughout study period.

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Insect diversity and species distribution in rice field of Tharangambadi Taluk, Nagapattinam district, Tamil Nadu, India

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Abstract
The study was carried out in paddy field during the navarai and samba seasons. The data obtained by net sweeping and hand picking from September 2016 to October 2017 showed the diversity of phytophagous and entomophagous, their diversity richness and evenness. Totally 45 species of phytophagous, entomophagous 70 species and six neutral insects were collected. Order Lepidoptera maximum number of phytophagous insects. Coleoptera beetle *Ophionea indica* and *Dytiscus* sp was the most abundant phytophagous. A maximum number of entomophagous insects and seven neutral insects recorded in paddy crop their richness; dominance and evenness were statistically analyzed.

Keywords: rice, tharangambadi, diversity, Shannon's index, Simpson index, phytophagus

Introduction
Rice is grown mostly in the warm and humid environment under diverse cultural conditions and over a wide geographical range (Dale, 1994) [2]. A tropical rice field offers a biologically diverse and dynamic environment for microbial, floral and invertebrate population to flourish shortly after fields are flooded and continuing well after canopy closure (Schoenly *et al*., 1998; Settle *et al*., 1996) [9]. Arthropods diversity in rice ecosystems has received lot of attention during the past one decade (Way and Heong, 1994; Settle *et al*., 1996; Bambaradeniya, 2003) [14]. Arthropods inhabiting tropical agro ecosystems are highly affected by seasonal variations due to marked variation in weather conditions in such areas. Several instances of pest outbreaks in rice crop were either solely due to environmental conditions as in the case of *Cnaphalocrocis medinalis* (Pathak, 1975), Manisekaran *et al*., 1995) [10] studied the *Ophionea* sp, *Micraspis crocea*, *Paederus fuscipes* were active during samba season. Kalaisekar and Ramamurthy (2004) observed three abundant insects *Altica cyanea*, *Coccinella septempunctata* kharif season. Diraviyam *et al*., (2003) reported that *Micraspis discolor* most dominant during the samba season. Arthropod inventories can be good indicators of habitat biodiversity because arthropods respond quickly to environmental changes, since they are highly diverse in nature (Longino, 1994).Insects pests have been recognized as major biotic stress responsible for significant reduction in yield of rice in different system zone of India (Chelliah *et al*., 1989). The study was deal with the documentation of the major and important arthropod insects, quantification of various ecological indices viz., species richness, population diversity and evenness indices in irrigated paddy field during the study period.

Materials and Methods
Study Area: Nagapattinam District Background
The Nagapattinam District was carved out of the earlier composite Thanjavur District in 1991. The marine or coastal land has plain lands except for a few sand dunes and tilts from coastline to the inland area. The Vedaraniyam salt swamp, south of Nagapattinam town is the largest swamp in Tamil Nadu, running 7-8 kms. It is one of the richest regions of biodiversity in the country. This District lies on the shores of the Bay of Bengal between Northern Latitude 10.7906 degrees and 79.8428 Degrees Eastern Longitude. The general geological formation of the district is plain and coastal. The Cauvery and its offshoots are the principal rivers.
The most important feature of the taluk is the Cauvery River spread over with its numerous branches. In this study areas was conducted in six different villages in Tharangambadi taluk, namely as Sembanarkovil, Akkur, Karuvi, Kiliyanur, Perambur and Sankaranpanthal, Nagapattinam district.

Insect collection
Insects were collected from September 2016 to October 2017. Sweeping net, were used to collect the insects from the paddy crops every week. Some insects were collected by hand picking method. Insect collection was done every week from random sites in each village. Net sweeping was done while walking through the fields at random sites.

Identification of insects
The collected insects were killed by ethyl acetate vapor, sorted out into different orders and families and mounted in insects boxes. Small and soft bodied insects were preserved in 70% ethanol. Most insects were identified up to genus and species level with the help of experts and by using identification keys provided in different volumes of Fauna of British India and other books (Srinivasan, 2009) [13]. Few insects were identified up to family level only. The number of individuals collected under each species, genera, family and orders during the study period were recorded.
The collection included phytophagous insects, predatory insects, parasitoids and neutral insects. (Neutral insects are those which are not harmful to the paddy crops and phytophagous insects in the study areas). In this study insects from 11 different orders were recorded. The insect

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Bird diversity in the selected agricultural crops field of Tharangambadi Taluk of Nagapattinam District, Tamil Nadu

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ABSTRACT

Different habitats or agricultural crops may influence the bird diversity and abundance. Bird's species richness, density and their frequency of visits are dependent on the land-use pattern, seasons, food availability and habitats. Therefore, this study was conducted to know the effect of various agricultural crops on bird diversity. Line transects were used to investigate the bird diversity in three villages of Tharangambadi Taluk. The result revealed that, 22 bird species were associated with the agricultural crops (paddy, groundnut, green and black gram). Among the birds, the maximum bird species associated with the paddy field (14) followed by groundnut (12), green gram (11) and black gram (10) field. Among the species of birds, the House sparrow (*Passer domesticus*), Baya weaver (*Ploceus philippinus*), Common myna (*Acridotheres tristis*) and Black drongo (*Dicrurus macrocercus*) were observed in all the fields irrespective of the stages. Species richness and abundance were high in ripening stage of all the agricultural crops followed by the immature stage. Among the agricultural crops, the paddy was showed rich species composition and abundance birds followed by groundnut, green gram and black gram. Simpson diversity index was high in green gram flowering stage and was low in groundnut bud stage. The Shannon H index was high (2.207) green gram flowering stage followed by paddy ripening stage (2.131), black gram flowering stage (2.019), black gram ripening stage, green gram ripening stage (1.977) and paddy milky stage (1.708). Evenness index was high in black gram flowering stage and was low in groundnut ripening stage. The present study concluded that, the paddy field has much diversity and abundance of birds compared to other fields.

Keywords: Agricultural crops, diversity indices, green and black gram fields, groundnut field, paddy field.

INTRODUCTION

Birds are known to play a dual role as pests and as bio-controllers of pests in various agro-ecosystems [1]. But, for decades the focus on birds in agro-ecosystems has been to study their foraging effects on crop yield and their control [2]. Among the birds, granivorous play an important role in agriculture and are very well studied by naturalist throughout India and its sub continent. Avian distribution and number of birds in a particular area and the key species in an agricultural ecosystem for maintaining the natural balance are influenced by habitat [3]. Agricultural crops are the habitats that have many micro habitats based on the crops cultivated. Various aspects of Granivorous birds such as its diet, foraging behaviour, damage on crops, population dynamics have been well documented in certain parts of India [4,5]. Many studies have revealed the aspects of diversity and density of birds in a single habitat or a landscape. Jayasimhan and Promod [6] have reported that, 87 bird species were recorded in paddy field of Kathiramangalam, Tamil Nadu irrespective of phases of paddy cultivation.

Theoretically, habitat heterogeneity may increase overall species richness because of (1) species-specific habitat preferences and that more habitats are sampled (i.e. habitat sampling) and (2) more species can fulfill their multiple resource/habitat needs (i.e. habitat complementation) [7,8]. Note that at the increased of single species-level, heterogeneity may reduce amount of preferred habitat and thus decrease the population sizes. Thus, relationships between species diversity and landscape heterogeneity may not always be simple and positive [9,10,11]. Bird's species richness, density and their frequency of visits are dependent on the land-use pattern and seasons [12]. The food availability and habitats may be the main factors of variation in the birds' populations [13]. Few studies have documented the relationship of birds and different habitats or landscape. Hiron *et al.* [14] revealed that, the relationship of bird diversity to crop and non-crop are heterogeneous in agricultural landscapes in Sweden. Studying the bird

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RESEARCH ARTICLE

Population and Distribution of Granivorous Birds in Agricultural Habitats at Selected Villages in Tharangambadi Taluk, Nagapattinam District, Tamil Nadu, Southern India

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ABSTRACT

Granivorous birds play an important role in agriculture and they cause crop damage to lesser extent. It considered being species which feed on seeds, droplets and fruits of plants in general. In the present study 33 bird species were recorded at three villages in agricultural habitat. 22 crop damaging bird species including granivorous birds were recorded. Maximum population of bird species recorded were House sparrow, Baya weaver bird, Small green bee eater, House crow and Common myna. Minimum population of Asian koel, Indian Peafowl, Paddy field pipit, White bellied tree pie and Golden oriole were recorded. The density estimates among villages of all species were statistically significant (df = 2; F=0.004; P > 0.05). Shannon-Weiner diversity index, in different villages among seasons showed high values during Post-Monsoon (H= 2.5514; n= 22) and lower values during summer (H= 1.9018; n=22) seasons. The moderate diversity index was recorded during Pre-Monsoon (H= 2.1183; n=22) and Monsoon (H= 2.1032; n=22) seasons. Among the order of granivorous birds, Passeriformes have shown huge number of species raid the agricultural habitats of the study areas. It also showed variation among the species distribution in three different villages of Tharangambadi Taluk, Nagapattinam District. In the present investigation concluded that, the agricultural fields facilitate the food sources and refuge for various avian communities and mainly for the granivorous birds. So, it acts as a pest in the study area. It is not surprising that the best known impact of granivorous birds is not an economical one.

Keywords: Granivorous birds, population, agricultural fields, density, diversity

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RESEARCH ARTICLE

Antibacterial Activity of Different Tissue Extracts of Marine Bivalve (*Donax variabilis*) against Selected Bacterial Strains

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ABSTRACT

The objective of the present study is to evaluate the antibacterial activity of the different tissue extracts of *Donax variabilis* against human and fish pathogens. The different tissues of *D variabilis* (gill, foot and muscle) were separately immersed in methanol and steeped overnight in the cold at -20 °C. Antibacterial effects at different concentrations (20, 40, 60 and 80 µL) have been tested against four human pathogens. A greater degree of human pathogen bacterial inhibition was revealed by the gill and foot methanol extract. The gill and foot extracts of the bacterial strains showed a higher degree of inhibition. The highest zone of inhibition of the gill and foot methanol extract was shown against *P. vulgaris* and *E coli*. The broad antibacterial spectrum activity of *D. variabilis* tissue extracts. *D. variabilis* shows that it may have metabolites that are biologically active.

Keywords: *Donax variabilis*, bivalve, gill, foot, muscle, methanol extract

INTRODUCTION

The marine environment is an immense source for bioactive natural products to be discovered. A wide range of bioactive substances are isolated and characterized from food derived from the marine environment, several of which are highly promising for human and fish disease treatment. For the past two decades, because of single resistant determinants, the pharmaceutical industry has been relatively successful in overcoming problems. However, the use of many major classes of antimicrobial compounds has been limited by the advent of multiple resistant mechanisms. With the increased incidence of bacterial infections, the demand for effective and non-toxic antibacterial therapeutics has become even higher. The discovery of new antimicrobial compounds with less environmental and toxicological risks and no resistance created by pathogens is of vital interest (Chellaram et al., 2003). To date, approximately 7,000 marine natural products have been reported in marine invertebrates, 33 percent