

Research Paper

Habitat Effect on Bird Species Diversity and Richness: A case Study of Gili-gili Forest Reserve Edo state Midwestern Nigeria

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Abstract: This study examined habitat effect on bird species in the Gili-gili forest reserve, Edo state, Midwestern Nigeria. The forest reserve was divided into four compartments for this study: undisturbed forest, secondary forest, farmland, and wetland. The crop grown on the farm is as follows, rice, cassava, maize, and yam. Others are cashew, mango, citrus, and oil palm. The point count method was used to collect data on bird species. Counting stations or predefined spots were established in roosting sites, wetland and feeding sites as well as forest edges. Counting bands of 50m radius were used for all the stations. The minimum distance between two counting distances per each study site was 200m. The number of counting stations was determined by the site size and 15 counting stations in each compartment were laid out and used for data collection. In all, 60 counting stations were used. Data were analyzed using the PAST model version 3 to analyze the diversity index. A total of 712 bird encounters were made with one hundred

and twenty (169) bird species belonging to forty-six (48) families and twenty (20) orders were observed in the study area. Undisturbed forest compartment has the highest bird species diversity (78), secondary forest (34), wetland (30) and farmland (27). Farmland compartment has bird species richness (273) followed by undisturbed forest (149) and secondary forest (121) and wetland (115). The diversity index indicates it was higher in the dry season 4.996 than the wet season 4.922.

Keywords: Land use, Crop types, Bird species, Richness and Diversity, and conservation.

Introduction:

Birds are among the best monitors of environmental changes and have been used to evaluate the environment throughout history as bio-monitors and the changes in their population, behavior patterns, and reproductive ability have most often been used to examine the long term effects of habitat fragmentation. Hence they are the



PLANTS TRADITIONALLY USED IN TREATING MALARIA, TYPHOID FEVER AND RELATED COMPLICATIONS IN SOUTH-WESTERN NIGERIA

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Abstract:

This research study was carried out to examine medicinal plant species that is used to treat malaria and typhoid fever and related complications in southwestern Nigeria. This research seeks to provide a wider database on the utilization of forest plant parts especially leaves in indigenous healthcare, provide information on parts of the plant species used. The study area was divided into two compartments for the purpose of this research work, undisturbed forest and Data was collected using field surveys and visiting traditional medicine homes for parts used for the treatment of malaria and typhoid fever. Field trips were embarked upon for three months from July to September 2020 for medicinal plant species identification. The researchers were accompanied by a field assistant who can identify the plant species in local languages. The computer PAST Model version 3 was used to analyze plant species diversity indices. The result obtained from the study shows that the study area is rich in plant species that are used to treat malaria and typhoid fever in southwest Nigeria. In all, a total of 110 plant species were belonging to 51 families were enumerated in the study area. The family Rubiaceae has highest number of plant species of eight (8) and this followed by Malvaceae with five (5) plant species. The following parts of the plant were used Leaves, barks, roots, flowers, fruits and seeds. The result of the diversity index indicates that it was higher in the A 4.591 than B 4.469.

Keywords: Plants, traditional medicine, World Health Organization, health care

INTRODUCTION

Plants are usually the main component of traditional medicine (World Health Organization, 2003). With about 80% of the world's inhabitants relying mainly on traditional medicines for his or her primary health care, the normal practice continues to play an important role in health care (Rokaya, et al, 2014). Traditional medicine may be a principal sort of health look after many populations, particularly in low- and middle-income countries where traditional healers are appealing since they share a standard perspective with their clients, and make use of data, beliefs, and practices indigenous to the local culture and also for its cost implication, the affordability of most traditional medicines makes all of them the more attractive at a time of soaring health-care costs (WHO, 2013). This type of health care has continued to realize attention as a crucial means of health care coverage globally, (Narajo, 2005). Malaria fever is one among the tropical diseases of socio-economic importance to which man are trying to find an answer for an extended time. It's the foremost prevalent of the tropical diseases identified as a threat to quite 40% of the world's population with about 200 to 450 million. Thus this research study seeks to document plant species used to treat malaria, typhoid and therefore the associated complications in southwestern Nigeria (Muriuki 2006, Adekunle, 2008). In Asian and African countries alternative medicinal herbs and plant species are widely accepted by the population, hence sustainable development might be developed from the utilization of untamed plants that are used to treat malaria and typhoid (Deka, et al, 2015). This study therefore aimed toward obtaining and identifying plants traditionally utilized in the treatment of malaria, typhoid in southwestern Nigeria with the hope that potential sources of treatments are often unearthed from medicinal plants. Malaria, typhoid with associated complications are the foremost prevalent diseases in these areas. Thus, this research seeks to provide a wider database on the utilization of forest plant parts especially leaves in indigenous healthcare.



DIVERSITY OF BIRD SPECIES IN DAMAGED MANGROVE SWAMP ALONG THE BADAGRY CREEK LAGOS SOUTHWEST NIGERIA

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Abstract:

Diversity of bird species in a damaged mangrove swamp along Badagry creek Lagos Southwest Nigeria was examined in this study. The study area was divided into three compartments based on their different land use types. A total of 60 transect lines were randomly laid out and 20 transect lines per a compartment. The minimum distance between two transect lines was 200m. The number of transect lines was determined by the site size. Data were collected for six months (Dry and Wet seasons) in 2019. All birds viewed on the ground or in the vegetation as well as birds that are flying ahead were identified and the number in the group recorded. Birds of the same species within 10m of each other were counted in the same group. Human threats to the study area were also examined. Data obtained from the field survey were entered into excel (version 15) spread sheet prior to both descriptive (tables, frequency and percentage frequency, graph, pie and bar charts) and analytical statistics. The computer PAST Model version 3 was used to analyze bird species diversity indices, SHE analysis, and plot generalized linear model graph. A total number of 120 bird species belonging 39 families and 15 orders were enumerated in the study area. The result indicates that Ardeidae has the highest number of bird species (12), this is followed by Ploceidae with 9 bird species. The result of the relative abundance of bird species in the study area indicates that it was higher in the dry season (0.0055) than the wet season (0.0013). The Shannon diversity index showed that it was higher during the dry season (4.53) than the wet season (4.38). The status of the bird species in the study area indicates that resident bird species were highest (87), followed by Intra Africa Migrants (17) and Palearctic migrants (5). The total number of bird species recorded during the dry season was (81%) while the wet season is (19%) SHE analysis of bird species diversity in the study area and plot Generalized Linear Model was used. Checklist of bird species in the study area was also observed. The threats identified in the study area are Deforestation, agricultural intensification, soil excavation for building and road construction, use of herbicides for weeding, use of chemicals fishing, and collection of non-timber products.

Keywords: Bird species, diversity, mangrove ecosystem, richness, threats,

INTRODUCTION

Mangrove ecosystems are among the most threatened habitats in the world (Luther and Greenberg, 2009). They are an important source of primary productivity and perform extremely important ecosystem functions and they harbor a high diversity of fauna and flora (Bunt, et al, 1991). Mangroves are variously referred to as coastal woodland, mangals, tidal forest and mangrove forest (Duke, 1992). Mangroves constitute the characteristic vegetation of the intertidal environment on sheltered tropical and subtropical coastlines. The mangrove ecosystem has particular practical and structural characteristics. They consist of rather easy meals containing a combination of marine and terrestrial species, fish nursery grounds and breeding sites for mammals, reptiles and birds, and accumulation sites for sediment, s contaminants, carbon and vitamins (Samant, 1985). Mangrove communities also carry out numerous different critical features in maintaining balance in coastal geomorphology stabilizing coast and estuaries, reclaiming margins, retard tide and cutting-edge erosion impacts (Hogarth, 2007). Notwithstanding the fairly low floral diversity,

Tourism Potential of Plants Species Used for the Treatment of Malaria and Typhoid Fever in Omo Forest Reserve Southwest Nigeria

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Abstract

This research study was carried out to investigate medicinal plant species that is used to treat malaria and typhoid fever and to provide information on the tourism potentials of these plants species in Omo forest reserve southwest Nigeria. The study area was divided into two compartments for the purpose of this research work, undisturbed forest and secondary forest compartments. Data was collected using field surveys and visiting traditional medicine homes for parts the used for the treatment of malaria and typhoid fever. Field trips were embarked upon for three months from July to September 2020 for medicinal plant species identification. The researchers were accompanied by a field assistant who can identify the plant species in local languages.. The computer PAST Model version 3 was used to analyze plant species diversity indices. The result obtained from the study shown that the study area is rich in plant species that are used to treat malaria and typhoid fever in southwest Nigeria. In all, a total of 81 plant species belonging to 42 families were recorded in the study area with great tourism potential when a sustainable management is set up. The family Asteraceae has a plant

Keywords

Medicinal, plant species, malaria, typhoid fever, tourism, potentials

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DIVERSITY OF BIRD SPECIES AND CONSERVATION STRATEGIES IN MANGROVE ECOSYSTEM IN ADO ODO WETLAND OGUNNSTATE SOUTHWEST NIGERIA

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Article history:	Abstract:
Received: July 10 th 2021 Accepted: August 11 th 2021 Published: September 28 th 2021	Diversity of bird species in Ado odo wetland Southwest Nigeria was examined in this study. Birds of the same species within 10m of each other were counted in the same group. Human threats to the study area were also examined. Forty-two wetlands within the Ado – Odo Wetlands complex were surveyed. Data obtained from the field survey were entered into excel (version 15) spread sheet prior to both descriptive (tables, frequency and percentage frequency, graph, pie and bar charts) and analytical statistics. The computer PAST Model version 3 was used to analyze bird species diversity indices, SHE analysis, and plot generalized linear model graph. A total number of 120 bird species belonging 39 families and 15 orders were enumerated in the study area. The result indicates that Ardeidae has the highest number of bird species (12), this is followed by Ploceidae with 9 bird species. The result of the relative abundance of bird species in the study area indicates that it was higher in the dry season (0.0055) than the wet season 0.0013). The Shannon diversity index showed that it was higher during the dry season (4.53) than the wet season (4.38). Bird species diversity were higher in lakes and ponds than marshyland. The status of the bird species in the study area indicates that resident bird species were highest (87), followed by Intra Africa Migrants (17) and Palearctic migrants (5). The total number of bird species recorded during the dry season was (81%) while the wet season is (19%)
Keywords: Bird species, abundance, diversity, habitat, fragmentation, wetland, mangrove ecosystem, richness, threats	

INTRODUCTION

Most Wetland ecosystems are among the most threatened habitats in the world (Luther and Greenberg, 2009). They are an important source of primary productivity and perform extremely important ecosystem functions and they harbor high diversity of fauna and flora (Bunt, et al, 1991). Wetland are variously referred to as coastal woodland, mangals, tidal forest and mangrove forest (Duke, 1992). Wetland constitute the characteristic vegetation of the intertidal environment on sheltered tropical and subtropical coastlines. The mangrove ecosystem has particular practical and structural characteristics. They consist of rather easy meals containing a combination of marine and terrestrial species, fish nursery grounds and breeding sites for mammals, reptiles and birds, and accumulation sites for sediment, s contaminants, carbon and vitamins (Samant, 1985). Mangrove communities also carry out numerous different critical features in maintaining balance in coastal geomorphology stabilizing coast and estuaries, reclaiming margins, retard tide and cutting-edge erosion impacts (Hogarth, 2007). Notwithstanding the fairly low floral diversity, plants in mangrove have a extensive range of structural and that make safeguard survival and propagation under the cruel situations of the intertidal quarter (Spalding, et al, 1997, Duke et al., 1998). Mangrove bushes have particular morphological, eco-physiological and reproductive trends, inclusive of aerial roots, viviparous embryos, tidal dispersal of propagules, fast fees of cover production, absence of an understory stratum, wood with narrow densely disbursed vessels, lack of boom earrings, an efficient nutrient retention system, and the capacity to address salt and to maintain water and carbon stability (Duke et al., 1998)



ETHNO BOTANICAL SURVEY AND SUSTAINABLE USE OF MEDICINAL PLANT SPECIES FOR THE TREATMENT OF TROPICAL DISEASES, YEWA NORTH SOUTHWESTERN NIGERIA

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Abstract:

This study was carried out to examine medicinal plant species that is used to treat tropical disease Yewa North southwestern Nigeria. The objective of the study was to investigate the indigenous use of plant species in the treatment of tropical diseases in the study area and provide a wider database on the use of forest plant parts especially leaves in indigenous healthcare. Data was collected using field surveys and conducting short interview traditional medicine homes for parts plant species that are used for the treatment of tropical diseases. Field trips were embarked upon for two months from May and June 2021 for medicinal plant species identification. In all, fifty-five (55) plant species were identified to be used in the treatment of tropical diseases such as malaria, typhoid fever, dysentery, blood pressure, cough and others. The family composition of plant species in the study area indicate that 27 families were identified, with Fabaceae having the highest number plant species of eight (8), this is followed by Apocynaceae with five (5) plant species. The life form of plant species showed that 32 of the plant species were trees, 14 were shrubs, 6 herbs and 3 climbers figure 2. The result of part of plant used revealed that leaves was the highest of 45%, this is followed by bark 19% and roots 17% and lowest is the used of whole Plant 3% figure 3

Keywords: Yewa North, Ethnobotanical survey, medicinal plants, Tropical diseases

INTRODUCTION

Nigeria is endowed with a variety of plant and animal species, there are about 7,895 plant species identified in 338 families and 2,215 genera. Plants vary in size and complexity from small, nonvascular mosses, which depend on moisture to giant Sequoia trees. (Olapade, 2000). Plants are mainly autotrophs and serve economic and cultural roles for the growing human population. In addition, plants are essential in ecosystem stability. Medicinal plants constitute an effective source of both traditional and modern medicine. These plants have been shown to have genuine utility and about 80% of the rural population depends on them as primary health care (Sofowora, 2013). Plants have been used as sources of remedies for the treatment of many diseases since ancient times and people of all continents especially Africa have this old tradition. Despite the remarkable progress in synthetic organic medicinal products of the twentieth century, over 25% of prescribed medicines in industrialized countries are derived directly or indirectly from plants (Newman et al., 2011). However, plants used in traditional medicine are still understudied ((Sodipo, and Wannang, 2015). (WHO) has come to recognize the place of herbal medicines as a viable alternative in the treatment of tropical diseases. Since it mainly afflicts poor populations in the tropics, it attracts scant rewards for bio prospecting by big pharmaceutical companies for active molecules that could lead to new drugs. Whereas herbal antimalarial drug development based on traditional knowledge of plant use may hold more promise for developing countries' medicines (World Health Organization WHO, 2014). Hence the relevance of this study investigated the indigenous use of plant species in the treatment of tropical diseases in the tourism village. This will provide a wider database on the use of forest plant parts especially leaves in indigenous healthcare, as this will help the medicinal tourism influx to the study area

MATERIALS AND METHOD

Study area

The study was conducted in Yewa North Local Government area of Ogun State. Yewa North local government is one of the twenty local government areas in Ogun State. It is located to the west of Ogun State bordering the Republic



Bird Species and Flora diversity and Sustainable Tourism of Osun-Osogbo Sacred Grove World Heritage site Osun State southwest Nigeria

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Abstract

The diversity of birds and tree species was studied in Osun- Oshogbo Sacred Groove World Heritage site in southwest Nigeria. A total of 20 transect lines of 500m were randomly laid out and the minimum distance between two transect lines was 200m. The number of transect lines was determined by the site size. Data were collected for six months (Dry and Wet seasons) in 20019. The ecological survey for the floristic study was conducted in March 2019. In this study, a total of 20 study plots of about 25 m × 25m Quadrants (500 sq m) size were established. All woody plants with stems rooted independently within a plot and with a DBH (measured at 1.3 m above ground for all life forms) equal to or greater than 2.5 cm were measured, inventoried, and identified to species level. Multiple stems were measured separately. DBH measurement was taken with a simple tape measure while the height of trees was taken using Haga Altimeter. In all, a total of 125 bird species belonging to 49 families and 18 orders were recorded in the three study sites, The Order Passeriformes had the highest frequency (51 %) of the entire number of birds recorded, while the dominant families were *Estrildidae* and *Pycnonotidae*, comprising (74 %) of the total species One endemic and one rare weaver bird species were recorded. A total of 741 individual tree species in 174 tree species and 49 families were enumerated. The highest occurring tree species are *Brachystegia Eurycoma* and *Bracchystegia Nigeria* with 36 and 19 tree species respectively. DBH of 466cm was recorded in *Brachystegia Eurycoma*, followed by *Bracchystegia Nigeria* 456 cm in the study area. Also, the highest mean height of 41m was recorded in *Millicia excels* and the highest occurrence of tree species was recorded in *Brachystegia Eurycoma* 39. Shannon diversity was 4.849 in the study area. The result of the family composition indicates that *Sterculiaceae* has the highest tree species 14 followed by *Euphorbiaceae* 13 tree species.



ETHNOBOTANICAL STUDY OF MANGROVE FOREST EPE LAGOS STATE NIGERIA FOR THE TREATMENT OF TROPICAL DISEASES

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ABSTRACT

The research study on Ethnobotanical study of mangrove forest Epe Lagos state Nigeria for the treatment of tropical diseases was carried out for six months in 2022 between January and June. Direct observation was used for field survey in collecting medicinal plant species (Okosodo and Sarada, 2021). In the seven towns around Epe Local government area, six well-known and heavily frequented traditional healing houses were visited. The plants were recognized using their common names, and their scientific names were discovered and recorded. With the help of a book on the trees of Nigeria, Medicinal herbs were identified and their uses were noted as the inventory of accessible herbs was kept. The result indicates that the study area is in rich medicinal plant species used for the treatment of tropical diseases. In all, a total of 51 plant species belonging to 29 families were identified in the Data collected from the study area. The family Bignoniaceae has the highest number of plant species six (6) which is followed by with Rhizophoraceae and Rubiaceae with plant species of four (4) each. The barks, flowers, fruits, Leaves, roots, and stem were the parts plant used. The leaves constitute the highest percentage of (48%), this is followed by barks (22%) and fruits (9%)

KEYWORDS: Medicinal plants, mangrove forest, tropical diseases, treatment.

INTRODUCTION

Mangroves are a type of forest that develops on beaches in tropical and subtropical climates where saltwater meets freshwater. As a result, interactions between freshwater, terrestrial, and marine ecosystems are created. In other words, mangroves serve as a transition between terrestrial and marine ecosystems by linking sea grass to coral reefs and facilitating species' movement between certain of these two environments. They are essentially a collection of specialized plants that have evolved especially to survive near rivers and beaches where saltwater and freshwater mingle. A few other plants can also survive the hard temperature in such places. These plants have evolved to withstand recurrent saltwater inundation during flood stage as well as exposure to the intense tropical heat. In addition, during the rainy season when streams overflow, mangroves regularly experience saltwater floods. Thanks to rhizomes that resemble stilts, mangrove trees may root in soil that is rich in salt or aquatic vegetation. Mangrove forests are found in just 123 tropical and subtropical countries and territories; they have a total size of around 240,000 square kilometers (WRI/IIED, 1986). Tropical forests make up less than 1% of all tropical forests worldwide, occupying less than 0.4% of the world's total

forest area (FAO, 2006; Van, 2012). The shores of South and South-east Asia, Africa, and South America are where mangrove forests are primarily found. Over 40% of the world's mangroves are found in four nations: Mexico, Brazil, Australia, and Indonesia, with Indonesia having the most at over 20%. (Van, 2012). The largest mangrove forest is found in Nigeria, which ranks third in the world. The Niger Delta region is thought to include between 5000 and 8500 km³ of Nigeria's mangrove forest, one of the most overexploited in the entire world (Nwilo and Badejo, 2007). Ethnobotany is the study of plants and how they are used in a particular location or region by a certain local culture and its inhabitants. It discusses the relationship between humans and plants with an emphasis on how indigenous knowledge is utilized to classify plants, grow them, and use them for food, medicine, and shelter. Recently, ethnobotanical knowledge has been applied to modern society, most notably in the creation of medicines (Soejarto et al., 2005). The complicated interactions between people and plants are being studied in depth. Its early history is linked to colonial explorers' hunt for exotic treasures like pricey spices like nutmeg and cinnamon. As colonial traders and settlers accidentally brought tropical diseases to the farthest corners of the world, the search for herbal



ORIGINAL RESEARCH PAPER

Chemistry

PREPARATION OF HIGH PURITY MAGNESIA IN LARGE SCALE EXPERIMENTS FROM SEAWATER AND SINTERING STUDIES

KEY WORDS: bittern, magnesium carbonate, magnesia, desulphation, double salt, sintering

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ABSTRACT

Newer techniques have been developed to prepare high purity magnesia from sea bittern by double salt and desulphation method. The processes are optimized by subjecting one-liter bittern of different density for the preparation of magnesia. Different analytical and physical methods like elemental analysis, X-ray powder diffraction and microscopic study were carried out to characterize various products of the processes. Commercially available Fluka magnesium carbonate and its calcined product have also been simultaneously characterised for comparison. The high temperature strength measurements made solely in order to estimate the performance of refractories. Their sinterability was studied at 1700°C and 1800°C by preparing cylindrical pellets from MgO powders. The boron free magnesia shows high purity of 99%.

INTRODUCTION

India has no magnesite deposits of acceptable purity and therefore there has been a total dependence on imported sources. India is importing high purity sinters of MgO for production of refractories used by units of both primary and secondary steel sectors. Current import of high sintered magnesia may be around 1,00,000 MT which is expected to increase gradually. This has not only caused an out-flow of valuable foreign exchange but has also throttled the operations of steel industry in sensitive areas such as production of speciality steels.

The sintering studies of magnesium oxide obtained from seawater were studied by Petric, *et al.* in 1994¹. MgO obtained from sea water by precipitation with 80% and 120% of the stoichiometric quantity of precipitating agent and the reagent grade MgO was added with 0.5% TiO₂ at a temperature of 1600 °C, for different duration of isothermal sintering and for different pressures applied in the forming of compacts. The product density, shrinkage, porosity, effect of TiO₂ in MgO on the content of B₂O₃ were examined and analysed. The Uniaxial compacting behaviour of MgO powders calcined at 900 – 1200 °C in air was investigated and the break point in the pressure density curve was found to be effective in elucidating the agglomeration state of the powder. The packing density of MgO powder as a function of calcination temperature was measured before and after milling operations. The plot of relative density vs. logarithmic pressure also exhibits a break point, which indicates the pressure at which the contact points in porous agglomerates began to be destroyed. The agglomerate strength of MgO powders calcined at low and high temperatures (900 – 1200 °C) was measured and the micro structural differences between agglomerates in MgO powder and the surface of a compressed powder were examined by SEM². The characteristics of formation of Mg(OH)₂ in a continuous reactor in magnesium chloride-calcium hydroxide water system was studied by Poilov, *et al.* in 1993³. During the formation of Mg(OH)₂ particle size distribution, sp. surface area and particle size were found to vary continuously. The Mg(OH)₂ formation is significantly affected by the agglomeration mechanism of particle growth and nature of exsolutions and the effect is analysed of interaction of the CO₂ from air with Ca(OH)₂ on the particle size distribution in Mg(OH)₂^{4,5}.

EXPERIMENTAL

Bittern of 29° Be' and 30° Be' were collected from the Huma solar salt plant, Ganjam district of Odisha and Dalmia Salt Works, Cujurat respectively for performing the experiments. The preparation of magnesia in two different process i.e. double salt and desulphation were optimized by carrying out experiments using 1000ml bittern of 29° Be' and 30° Be'. Commercial grade reagents like calcium chloride,

ammonium sulphate, ammonium carbonate, ammonium hydroxide and sorbitol were used for the precipitation reaction. Physicochemical methods were employed to characterize the products obtained during the processes.

Preparation of Magnesia through Double salt route

One liter 29° Be' bittern containing 49.607g of magnesium (Table 1.) was subjected to double salt precipitation. 538g of ammonium sulphate was added to it and kept on hot water bath till the temperature reaches ~60 °C. It was kept for another 2 h on the water bath and then cooled to room temperature. The double salt obtained is 937g (wet), which on drying weighs 662.08g. 460.8g of ammonium carbonate dissolved in 500ml water was then added gradually to the double salt solution with constant stirring. It was then kept on hot water bath till the temperature 70 °C and then kept for further two hours. Filtered while hot and then washed several times with one-liter hot water to remove the dissolved impurities. In the last step of washing 2-3 drops of sorbitol was added to the distilled water to make it free from any adsorbed Boron. The magnesium carbonate obtained was dried at 110 °C and further calcined at 1100 °C in a muffle furnace to yield MgO. These samples were then characterized physico-chemically.

Preparation of Magnesia through Desulphation route

One liter 30° Be' bittern containing 80.71g of magnesium and 44.64g sulphate (Table 2) was subjected to desulphation by adding 46.44g of fused calcium chloride. It was then kept on hot water bath till the temperature reaches ~65 °C. The mixture was stirred properly and white precipitate of gypsum was formed immediately. It was kept for another 3h and then the system was removed from the hot water bath and filtered while hot using G2 Buchner funnel. The gypsum separated was washed with a little amount (50-100ml) of water and dried at 110 °C and weighed to be 55.54g. To the mother liquor 1020ml of ammonia (NH₄OH 25%) and 389.46g of ammonium carbonate [(NH₄)₂CO₃] were added and stirred well. The reaction temperature was 33 °C after addition of ammonia and became 39 °C after addition of ammonium carbonate. It was kept on hot water bath till the temperature reaches 65 °C and then continued for another 3h for the complete precipitation of MgCO₃. The precipitated solid was separated by filtration and washed with one liter hot distilled water several times to make it free from other dissolved impurities. The magnesium carbonate formed was dried at 110 °C and calcined at 1100 °C and the resulting products are physico-chemically characterized.

Sintering Study

Sintering study of magnesium oxide was carried out at Tata Refractories Ltd., Belpahar, Orissa using a minimum of one kg prepared sample. Since one litre bittern generates about 60–70g of magnesia several experiments were conducted to



ORIGINAL RESEARCH PAPER

Chemistry

RECOVERY OF MAGNESIA FROM SEAWATER-A REVIEW

KEY WORDS: Precipitation, Magnesium, Magnesia, Seawater

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ABSTRACT

Seawater magnesia has, with great success replaced the refractories, used in the Iron & Steel Industries. Magnesia recovered from natural resources like magnesite ore by physical means such as magnetic separation, heavy media separation or floatation have certain limitations regarding the purity of the product. So continuous efforts has been made by the scientist to establish a novel route for the preparation of high purity magnesium oxide from seawater bittern. This review describes various processes, characteristics of the precipitation agents and the impurity introduced by the seawater and the means by which they can be reduced.

INTRODUCTION

Seawater is a multi-component system that contains various metals, non-metals, organic salts and other dissolved solids. It contains an average of 3.5% of various elements in solution and hence each cubic mile of seawater holds 166 million tons of solids. Of the 60 elements reported from seawater nine most abundant elements constitute over 99% of the total dissolved solids out of which sodium and chlorine constitute 85.2% of dissolved solids in seawater [1]. The elements which are in constant proportion to one another are chloride 54.8% of total salt, sodium ion 30.44%, sulfate ion 7.5%, magnesium ion 3.7%, calcium ion 1.2%, potassium ion 1.1%, carbonate ion 0.3%, bromide ion 0.2% and the borate ion 0.07% [2].

The resource potential of seawater is immense and yet to be fully realised. The chemical industry has started exploiting it for the chemical raw materials present in the beaches, floors of bays and estuaries, continental shelf region and the ocean basin. It is possible to recover sodium chloride, sodium carbonate, bromine, magnesium, magnesium salts and potassium salts. Besides, marine algae also serve as a major industrial source for iodine, bromine, and potash. Considerable attempts have been made to extract minerals from seawater by the technologists and technologies are evolving rapidly in these directions in the form of research papers and Patents. Economic feasibility has been a major factor in the adoption of any extraction technique. A survey of brine processing technology made by Christensen *et al.* [3] showed that a relatively small number of basic methods being used for the separation of products from seawater. These include evaporation, precipitation, electrolysis, adsorption, distillation, solvent extraction, ion exchange, floatation and oxidation. However, evaporation, precipitation, electrolysis and floatation methods are mostly adopted.

HISTORY

The history of extraction processes goes back to the Chinese who started extraction of common salt prior to 2200 BC, after which seawater became the principal source of salt production [4]. With the development of technology more and more methods evolved and many chemical compounds like sodium chloride, magnesium and its compounds and bromine are being extracted with the production of calcium and potassium compounds are produced as the by-product. Recovery of KCl from the Dead Sea in Israel and Jordan [5], potassium sulfate from the Great Salt Lake in Utah USA [6] and lithium, boron, soda, potassium from the Searles lake in USA [7] are best examples of extraction of useful chemical compounds from seawater and estuaries. Magnesium was first obtained from sea water in England [5] and the first large scale plant for the extraction of magnesium from sea water was Free port, Texas, that was put into operation in early 1941 by Dow chemical company. However, the complex utilization of the whole spectrum of valuables like KCl, NaCl, Br, MgO, MgCl and hydrochloric acid from the Dead Sea water [8] still remains as a milestone.

REFRACTORY MAGNESIA

Earlier magnesite (MgCO₃) was only raw material for the

production of magnesium oxide. In India the natural magnesite deposits are of poor quality (80-85% MgO) and their chemical composition has shown a wide variance. As such the purity and mineralogy of Indian magnesite are unable to meet the stringent specification of High quality Sintered Magnesia (HQSM). But the chemical process for preparing magnesium oxide from seawater has provided another alternative source of magnesium. A process for obtaining synthetic MgO from sea water in significant amounts was first produced by the California Chemical Company in 1931[9] and now the major producers of seawater magnesia are North American Magnesia producer viz. Harbison-Walden Refractories Cvo, Marine Magnesium Co., Premier Periclase Ltd. of Irish Republic, Billiton Refractories BV of Netherlands, Dead sea Periclase of Israel, Ube Chemical Industries Co. Ltd. of Japan and Steelley Magnesia Products Ltd. of U.K. However, good improved refractory magnesia should be high pure i.e., 99.88% and contains negligible amount of CaO, SiO₂, Al₂O₃, B₂O₃, Cr₂O₃, Fe₂O₃, Mn₂O₃ and TiO₂. Magnesium recovered as magnesium oxide from brine or bittern can solve the increasing demand of high purity magnesia as refractory.

PRECIPITATION OF MANESIA FROM SEAWATER

Precipitation of Mg(OH)₂ using Ca(OH)₂

A new method of preparation of high purity brine magnesia comprising concentrated CaCl₂ medium and lime slurry precipitation was invented by Zhai and Miao [10] in 1993 and the main difficulty and breakthrough points in the production technology was also studied. The resulted dead burnt magnesia has MgO 98.97%, c/s ratio of 3.62, B₂O₃ 0.017%, bulk density of 3.48g / cm³. Yumanuradav *et al.* [11] prepared magnesium oxide concentrate containing 6.5% B₂O₃ from chloride containing natural brine by treating milk of lime at 95°C, maintaining CaO :MgO ratio 1.0-1.5, for 2 h.

Tanaka Kinji [12] described a process in which sea water was mixed with Ca(OH)₂ powder to adjust the pH at 11.0, diluted with water, mixed with 7% HCl to adjust the pH to 8.0, pressurized to 3.0 kg/cm² by blowing air into the solution, mixed with 1.0 ppm anionic polymer coagulant and treated in a press floatation tank. The resulting floated scum containing Mg(OH)₂ was separated. Dorr Co manufactured Mg(OH)₂ of desired physical characteristics obtained from MgCl₂ brines by treating Ca(OH)₂ to control the pH (9.6-11.5 for sea water, 9.5-12.5 for brine of low Na content), maintaining the Mg ion concentration (0.01-0.8 g/l), and the contact time (20-90 min, depending on agitation, particle size of lime bearing solids, and degree of extraction of Mg ions from the brine) [13].

Preparation of Mg(OH)₂ containing minimum amount of B & Ca from sea water by adding Mg(OH)₂ seed crystals and excess alkali was studied by Brown *et al.* [14]. The slurry of Mg(OH)₂ formed is treated with sea water and to react with remaining alkali. Addition of Zn(OH)₂ prior to the addition of Ca(OH)₂ to sea water also show good result giving rise to Mg(OH)₂ containing 21.62-65.45 ppm of Boron [15].



ORIGINAL RESEARCH PAPER

Chemistry

Extraction of Aluminium and Iron using Mineral acids from Talcher Thermal Power Station Fly Ash

KEY WORDS: Fly ash, Aluminium, Iron, Leaching, Mineral Acids

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ABSTRACT

Now a days the industries of developing nations are generating a huge amount of fly ash with more and more generation of power. Fly ash is a harmful pollutant and is linked to various environmental problems for which its proper disposal and utilization is highly needed. As fly ash is rich in various inorganic constituents it can be considered as a waste of recoverable resources for metal extraction. In the present study attempts have been made to study the leaching behaviour of TTPS fly ash using mineral acids such as HCl, HNO₃, o-H₃PO₄ and H₂SO₄. The study found HCl and HNO₃ suitable leachant for iron extraction compared to other acids. In a similar way o-H₃PO₄ and H₂SO₄ are found suitable leaching agent for Aluminium extraction. The extraction behavior is further supported by the characterization of post leached ash residues by XRD, Particle size and SEM.

Fly ash, the major industrial waste product generated from the thermal power plants has become environmental concern because of its exponential growth and improper disposal. It is one of the solid waste which reduces agricultural productivity by settling on the leaves by which photosynthesis reduces. The heavy metals present in fly ash may leach into ground water resulting contamination. Soil pollution arises due to the use of high ash content coal and non utilization of fly ash by industries. Soil pollution due to fly ash accumulation in the nearby power plant causes land degradation, particularly soil erosion and loss of soil fertility. Application of fly ash in the manufacture of bricks, cement, concrete, ceramic products, building materials, composites, construction fill, road base, mineral filler in asphaltic mix, waste land reclamation and in agriculture has been proved to be beneficial. As fly ash is rich in minerals, another alternative use can be metal extraction. It is obvious that no single application is likely to consume all the generated fly ash but mineral extraction could provide additional markets and increased utilization of fly ash.

The physical and chemical properties along with its quality of fly ash depend upon various parameters such as coal quality, coal pulverization, combustion process, furnace type, ash collection technique and many other operational parameters. The mineralogy and chemistry of the parent coal control the mineralogy and chemistry of fly ash produced. Fly ash is a complex heterogeneous material consisting of silt-size particles ranging in colour from grey to reddish brown. Both the crystalline and amorphous phases are seen in the morphological study. Generally, the fly ash matrix is composed of 15-35% crystalline and 65-85% amorphous glassy phase. According to Hulett et al., fly ash consists of three major matrices glass, mullite quartz and magnetic spinel. The major oxides present in coal ash are SiO₂, Al₂O₃, Fe₂O₃, TiO₂, CaO, MgO, Na₂O and K₂O. The mineral matters of coal are composed of rock forming minerals such as quartz, calcite, dolomite, clay minerals and iron sulphides. Besides quartz and pyrite, a clay fraction consisting of kaolinite, illite and any expandable irregular mixed-layer mineral has also been reported¹⁵. A study on the composition of Indian fly ash agrees with the above as it shows the fly ash consisted of largely silica, alumina, iron oxides and carbon together with significant percentage of Ca, Mg, K, Ti and variable trace elements⁶. According to the report of Natusch et al., a number of potentially toxic elements are concentrated on the particle surface at varying depth. More refractory species like Al, Fe, Si and minor elements like Ca and Mg do not exhibit surface predominance rather they are strongly associated with the ash matrix. Most of the trace elements present in coal tend to be associated with the particle surface rather than core. The elemental concentration varies with particle size⁶.

As the fly ash is rich in mineral oxides, and most of them are in the glass matrix, it becomes essential to dissolve the glass matrix for the extraction of metal values. Thus, chemical process based on i) Sintering ii) Gas-solid reaction and iii) Leaching treatments alone or in combination are extensively studied. The leaching treatment is either acidic or basic, in which inorganic acids (mineral acids) like HCl, HNO₃, o-H₃PO₄, H₂SO₄ are used and for basic/alkali leaching

solution of NaOH or alkaline salts such as Na₂CO₃ is used. A large number of processes for the recovery of alumina from clays and other alumina bearing minerals (other than bauxite) have been proposed by several workers⁹⁻¹¹. However, the recovery of Al, Fe, Ca, Mg, Si, Na, K and Ti from fly ash using classification, magnetic separation followed by leaching using HNO₃, HCl and H₂SO₄ were studied¹²⁻¹⁴.

For the purpose of high value application some fly ashes of different thermal power plants of Odisha, India have been studied for the extraction of aluminium¹⁵⁻¹⁶. The present investigation is based on the leaching of fly ash by using different mineral acids such as HCl, HNO₃, o-H₃PO₄ and H₂SO₄. The effect of variation of acid concentration on the leaching behaviour of fly ash is investigated at a constant leaching time of 4h at a boiling temperature of the corresponding acids. A comparative study on the magnitude of aluminium and other metals extraction using these leachants has also been represented.

Materials and method

Sample collection and characterisation

For the above study, fly ash samples are collected from the electrostatic precipitator of Talcher Thermal Power Station (TTPS), Odisha. These samples are characterized physicochemically for their mineralogy, morphology, particle size and chemistry using XRD (Philips PW 1400), Scanning Electron Microscope (Jeol JSM), Malvern particle size analyser (UK, Model-3600), Atomic Absorption Spectrophotometer (Varian Spectra AA-20), Inductively Coupled Plasma Spectrophotometer (Perkin-Elmer, Plasma-400) and Flame photometer (Elico, Model CI-22D). AnalaR grade reagents are used for the chemical analysis and commercial grade mineral acids are used for the leaching experiments.

Leaching using mineral acids (HCl, HNO₃, o-H₃PO₄, H₂SO₄)

In each leaching experiment, 100g of fly ash were digested with different concentrations of mineral acids at its boiling point in a solid-liquid ratio 1:1. The mixture was taken in a one-liter flask, boiled at the boiling point on constant stirring. Boiling continued up to 4h with time-to-time addition of hot water to maintain the desired solid liquid ratio. Finally, the mixture was boiled to dryness. Then the mixture was further extracted with 500-ml hot distilled water followed by boiling and filtered through a G3 buchner funnel using suction pump. The residue was washed twice with hot water and washings were collected with leach liquor. The leach liquor was evaporated and made up to a known volume (1 liter) and analysed for various elements like Al, Fe, Ti, Ca and Mg. The residue was washed up to neutral and dried at 110 °C.

Mineralogy (XRD) -Phase Assemblies

The phase assemble study by X-ray diffractogram for fly ash was carried out on PHILIPS PW 1400, using CuKα radiation. Similar parameters like kV = 40, mA = 20, Chart speed = 1cm/min, Goniometer speed = 2°/min, are maintained during the analysis to get the uniform information about the samples. The JCPDS data files are used for matching of characteristic reflection peaks (dA° values) to identify different minerals.



ORIGINAL RESEARCH PAPER

Chemistry

MAJOR AND TRACE ELEMENT DETERMINATION IN BRINE AND BITTERN

KEY WORDS: Bittern, Brine, Salt, Major elements

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ABSTRACT

As the land based resources are depleting at an alarming rate Seawater is considered as an alternative resource of chemicals. Bittern is the waste material rejected at the solar salt fields after removal of salt from seawater. As the seawater and bittern are rich in valuable marine chemicals these can be utilised for the recovery. Attempts has been made to determine the major and trace elements present in brine and bittern to recover various economically important marine chemicals. Brine constitute more than 98% of dissolved solids. The six major ions constituting 98% of dissolved solid in seawater are sodium ion (Na^+), chloride (Cl^-), sulphate (SO_4^{2-}), magnesium ion (Mg^{2+}), calcium ion (Ca^{2+}), and potassium ion (K^+). A study has been carried out to characterise Seawater Brine and Bittern for possible metal extraction like potassium and magnesium.

Introduction

The Oceans of earth are aqueous, electrolytic solutions, covering about 71 % of the earth's surface¹. Sea water is a multiphase system consisting of a solution of high ionic strength and suspended particles which include living organisms, their remains, terrestrially derived minerals, and material derived from in situ inorganic processes. The dissolved materials in sea water may be broadly classified into (i) major constituents, (ii) trace elements, (iii) nutrients and (iv) organic materials. It contains an average of 3.5% of various elements in solution and hence each cubic mile of seawater holds 166 million tons of solids. Of the 60 elements reported from seawater nine most abundant elements constitute over 99% of the total dissolved solids out of which sodium and chlorine constitute 85.2% of dissolved solids in seawater². The elements which are in constant proportion to one another are chloride 54.8% of total salt, sodium ion 30.44%, sulfate ion 7.5%, magnesium ion 3.7%, calcium ion 1.2%, potassium ion 1.1%, carbonate ion 0.3%, bromide ion 0.2% and the borate ion 0.07%³. As the demand for land based resources are increasing and due to rapid depletion, the emphasis is being shifted to alternate sources that are abundant and unexploited. Seawater that covers 72% of the earth's surface holds about 330 million cubic miles of water and is an important terrestrial renewable resource. The history of extraction processes goes back to the Chinese who started extraction of common salt prior to 2200 BC, after which seawater became the principal source of salt production⁴.

With the development of science newer processing techniques for recovery of minerals from seawater have come into play. However, more emphasis has been given to the complete utilization of the seawater and bittern. Seawater bittern is the waste by-product rejected at the common salt manufacturing plants. After the separation of salt between 24-29° Be' density, the left over viscous solution of 29-30° Be' is called 'bittern' and the major constituents of which are sodium chloride, magnesium sulfate, magnesium chloride and potassium sulfate along with a small quantity of sodium sulfate, bromide, borax and some other minor constituents⁵. It could be easily imagined the production of huge tonnage (10.8 MT) of bittern from different salt industries of our country are being wasted. Considering it as a cheap source, the strategic metals can be recovered by further evaporation under controlled conditions to get the crude salt and mixed salt. Hence, bittern can be directly processed to recover magnesium, potassium, bromide, boron and other economically important chemicals.

In India, the salt production industries are located at the coastlines of India: the Arabian Sea and the Bay of Bengal. The western coast salt industries are situated in Maharashtra and Gujarat, while the eastern coast salt industries are situated in Orissa, West Bengal, Tamilnadu and Andhra Pradesh. Recently the salt and marine chemical industries are passing through a crucial period, arising out of massive shrimp cultivation. For a ton of shrimp produced nearly 1.8 tons of debris is discharged as a result of which the entire seawater gets contaminated and adversely affect the salt farming. If this trend continues one has to think of alternative

method of making salt and other chemicals from seawater bittern. With such a rising number of salt manufacturing plants, where the generation of bittern is huge tonnage, the extraction of valuable chemicals or metals will be worthwhile with the help of innovative advance technology. Hence, attempt has been taken in this study to initially make speciation of the available metal values present in brine/bittern before adopting the recovery processes for extraction.

MATERIAL AND METHODS

SAMPLE COLLECTION

The state of Orissa has a long coastline and one would expect large and small salt works dotting the coast producing substantial quantities of salt for industrial and for human consumption. In the beginning of the season the density of seawater is between 1.5° Be' (Baume) to 2° Be' and rises to 4° Be' by the end of March. The rise in density which is affected by low wind velocity and high humidity reaches at 25°/26° Be' crystallising the salt. The bottom is left over at the end of manufacturing season (at the end of monsoon season) and collected in deep ponds. The bittern samples were collected from these ponds along with brine in a polypropylene container. The samples under study were collected from Huma, solar salt field, Ganjam, Orissa.

REAGENT

The reagents used for analysis of brine and bittern, viz. EDTA, KOH, NH_4Cl , BaCl_2 , AgNO_3 , KSCN, KCl, NaCl, Ferric Ammonium Sulfate, Eriochrome black-T and Pattern Reed indicators are of AnalaR grade. Similarly, HCl, HNO_3 , ethyl alcohol, nitro benzene and liquid NH_3 used as solvents are of commercial grade.

CHEMICAL ANALYSIS OF BRINE AND BITTERN

Firstly, the brine and bittern 26.5° Be' were filtered to remove suspended particles and are used as such without any further pre-concentration. Bittern of 26.5° Be' was then subjected to artificial desalination resulting 29° Be' which along with the brine was subjected to analysis. The pH and Electrical conductivity were measured. Suitable aliquot of sample were diluted with distilled water and were analysed for the major elements like Mg, Ca, Na, K, SO_4^{2-} , Cl^- and trace elements like Fe, Cr, Ni, Co, Al and Boron.

Measurement of pH and EC

The pH of the seawater and bittern were determined by using pH meter (ORION MODEL 1260) with glass electrode. It was first standardized against freshly prepared buffer solutions of known pH values of required range (pH = 4.0, 7.0, 9.2) and then pH of the sample was measured. The electrical conductance of bittern was measured by ORION MODEL 1260 with Conductivity Bridge using the standard procedure.

Estimation of Ca & Mg

The calcium and magnesium content of seawater and bittern were determined by complexometric titration with EDTA. The diluted sample maintained at pH 10 by adding suitable buffer like $\text{NH}_4\text{Cl}/\text{NH}_4\text{OH}$ was titrated against EDTA using Eriochrome black-T indicator for total Ca & Mg. For estimation of calcium 8M KOH is used as buffer for maintaining pH-12 and Pattern Reed Indicator



CHEMISTRY & BIOLOGY INTERFACE

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Luteolin and its derivatives as potential antidiabetic drug ingredients

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Abstract: Luteolin is a flavone class natural product that occurs as a free or as in glycoside form in nature and is often derived from plant sources. Though it is reported as a natural antioxidant like other flavonoids, many studies found it as a potent ingredient for diabetic management. Its antidiabetic activities both *in vitro* and *in vivo* are reviewed from recent works of literature found from the articles searched in PubMed, ScienceDirect and Google Scholar. Luteolin and its derivatives were studied for their potential anti-bacterial, anti-fungal, anti-inflammatory, antioxidant, anti-apoptotic, anti-allergic along with its anti-hyperglycemic activities. The antidiabetic effect of luteolin was supported by different mice model experiments, enzyme inhibitory assays and molecular docking studies. The review suggests further clinical studies with a larger sample size for the determination of appropriate doses and synergistic actions.

Keywords: Luteolin, Anti-hyperglycemic, Antioxidant, α -Glucosidase, Enzyme inhibition, Insulin resistance

Introduction

Luteolin ($C_{15}H_{10}O_6$) is found in many edible and medicinal plants, such as pepper, onion, apple, artichoke, cabbage, celery, carrot, and spinach. Many phytochemical studies have reported the presence of luteolin as aglycone or in glycoside form in plants belonging to different families such as Asteraceae, Rosaceae, Leguminosae, Cyperaceae, Gentianaceae, Scrophulariaceae, Clusiaceae, Lamiaceae,

Caprifoliaceae, Passifloraceae, Plantaginaceae and Polygonaceae [1]. Luteolin possesses strong antioxidative, anti-inflammatory and potential anti-cancer activities as reported by earlier works of literature [2,3]. Studies have also claimed the enhancement of insulin resistance in diabetic mice was due to the bioactivity of luteolin [4,5]. The biological activities of luteolin (Fig 1) have been attributed due to the

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Chemical composition and antimicrobial properties of the rhizome essential oil of *Cyperus articulatus* L. grown in Karnataka, India

Swain, Ayusman ; P., Duraivadivel ; Choudhir, Gourav ; P., Hariprasad

Abstract

Cyperus articulatus L. is widely distributed in various geographical regions of the world, and it has been used as a folk medicine for treating haemorrhoids, diarrhoea, and other diseases. The present study aimed to analyze the chemical constituents and antimicrobial activities of essential oil (EO) extracted from *C. articulatus* grown in the Karnataka region to explore its potential pharmaceutical usage. The EO from the rhizomes of *C. articulatus* was extracted by hydro-distillation and was tested for its antimicrobial activities against selected bacteria (*Staphylococcus aureus*, *Salmonella enterica* serovar Abony, and *Escherichia coli*) and fungi (*Candida albicans*, *Aspergillus flavus*, and *Aspergillus niger*). The EO yield was 1.24 g/100 g of dried rhizome powder. The EO recorded a significant inhibition against *S. aureus* and *A. flavus*. The GC-MS analysis of EO showed the predominance of important metabolites such as mustakone (20.2%), longifolenaldehyde (14.9%), cedroxyde (8.7%), α -copaene (4.7%), cyperene (2%), cyperotundone (2.6%), khusinol (2.3%), and corymbolone (1.1%) along with several other monoterpenoids and sesquiterpenoids. The study revealed the EO of *C. articulatus* as a promising source of antibacterial and antifungal metabolites which may lead to its application in managing bacterial and fungal infections and storage mould.

Keyword(s)

Antibacterial; Antifungal; *Cyperus articulatus* L.; Khusinol; Mustakone; Storage mould.

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Abstract

Psoromic acid is a natural depsidone compound, often found in the lichen sources such as *Usnea complanata* and *Rhizoplaca melanophthalma*. It was reported to have versatile antioxidative, enzyme inhibitory and therapeutic properties. Studies on the biological activities of psoromic acid in the last decade have explored its potential in treating diseases like cancer, tuberculosis and cardiovascular disease. The present study extensively reviewed relevant works of literature from the sources like Scopus, Elsevier, MEDLINE PubMed, SpringerLink and Google Scholar. Biological activities such as antioxidant, gastroprotective effect, cardiovascular protection, anticancer, antitumor, antiviral response and enzyme inhibition were exclusively summarized. The proven therapeutic properties of psoromic acid suggested future clinical research in a larger sample size for the pharmacological acceptance of its antioxidant, antimicrobial and



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Research Article

Molecular docking, dynamics simulation and pharmacokinetic studies of *Cyperus articulatus* essential oil metabolites as inhibitors of *Staphylococcus aureus*

Ayusman Swain ✉, Gourav Choudhir, Duraivadivel Prabakaran & P. Hariprasad ✉
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Abstract

Cyperus articulatus has been extensively studied for its essential oil (EO), active components and antibacterial activities against a wide range of bacteria such as *Bacillus megaterium*, *Streptococcus pyogenes*, *Staphylococcus epidermidis*, *Escherichia coli* and *Staphylococcus aureus*. However, knowledge of the biomolecular interaction of the

Phytochemical and Pharmacological Exploration of *Cyperus articulatus* as a Potential Source of Nutraceuticals and Drug Ingredients

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ABSTRACT

Introduction: *Cyperus articulatus* rhizome has been used in folk medicine by different inhabitants belonging to tropical and subtropical regions. But its metabolite profile and potential pharmacological and food applications were hardly explored. Evaluation of biological activities of *Cyperus articulatus* metabolites was the objective of the present study. **Materials and Methods:** *In vitro* biological studies concerning radical scavenging, reducing activity, food (meat and β -carotene) protection, biomolecule (DNA and Protein) protection and Acetylcholinesterase inhibitory activity were carried out for the rhizome extracts. Chemical constituents of the bioactive rhizome extract were analyzed through HPLC-MS/MS. **Results:** The rhizome acetone extract showed the highest antioxidant activity and protected DNA and protein from degradation at the lowest concentrations compared to all the six different solvent extracts tested. It significantly inhibited β -carotene bleaching, controlled the TBARS values during meat oxidation and significantly inhibited the Acetylcholinesterase enzyme. The major compounds detected in HPLC-MS/MS were dihydroquercetin, mycophenolic acid, embelin, quercetrin, meptazinol, koparin-2-methyl ether, venpocentine along with other phenolics and polyhydroxy compounds. **Conclusion:** The study explored *Cyperus articulatus* rhizome as a pharmacologically important source for nutraceuticals and drug ingredients and suggested further safety and efficacy studies of the detected metabolites.

Key words: Secondary metabolites, Food model, DNA protection, Enzyme inhibition, Dihydroquercetin.

INTRODUCTION

The potential of plants to prevent or cure many diseases of humans and animals are identified long back in history, and its utilization evolved differently in different parts of the world. Similarly, Indian traditional medications were derived from the Atharva Veda, which mentions many herbs and plant species against different ailments.¹ Reactive oxygen species (ROS) and other free radicals cause oxidative reactions such as lipid oxidation, protein oxidation and nitration, DNA damage, alteration of function of cellular organelles and enzyme dysfunction.² Again some neurological disorders like Parkinson's and

Alzheimer's are also initiated by free radical-induced oxidative damages.³ Chlorogenic acid, caffeic acid, carotenoids, flavonoids and tocopherols are natural antioxidants compounds that protect cells and cellular components against oxidative stress-related diseases and disorders.^{4,5} Similarly, secondary metabolites of plant origins have been reported to control the target enzymes' expression with lesser adverse effects.⁶ Among the neuroprotective drugs, many plant-based metabolites are well-reported and preferred over synthetic drugs to manage the adverse effects.⁷

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Antidiabetic Properties of Natural Products of *Cyperus* Species Plants: A Review

Ayusman Swain

Department of Mathematics and Science, Government Polytechnic Kendrapara, Kendrapara, Odisha, INDIA.

ABSTRACT

Natural products are reported to have a vital role in the treatment of various diseases and drug design. In recent developments, natural drug molecules of plant origin have been reported exclusively for diabetic management. Type-2 diabetes or hyperglycemia is one such disease which is particularly studied for plant-based therapy in the last few decades. Though various plant extracts and metabolites have been reported for potential hyperglycemic activities, the *Cyperus* species plants have acquired a unique place in the phytochemical study as they are endowed with various health-beneficial bioactive metabolites and have proven biological properties. The present report is focused on the *Cyperus* species plants that are studied for antidiabetic properties *in vitro* as well as *in vivo* and the potential metabolites identified for such activities. The antidiabetic studies of metabolites or crude products from plants such as *Cyperus articulatus*, *Cyperus esculentus*, *Cyperus kyllingia*, *Cyperus laevigatus*, *Cyperus pangorei*, *Cyperus rotundus*, *Cyperus scariosus* and *Cyperus tegetum* were reviewed. The metabolites, responsible for such activities were listed from the literature survey wherever purification and identification works were reported. The review focused on the importance of natural products in managing diabetes mellitus and the pharmaceutical importance of *Cyperus* plants in managing diabetes, their pharmaceutical importance, drug safety and effectiveness. The secondary metabolites listed in this review may be helpful for further molecular and clinical-level research and drug design.

Keywords: Antidiabetic, α -Glucosidase inhibition, *Cyperus articulatus*, *Cyperus esculentus*, *Cyperus rotundus*, Secondary metabolites.

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INTRODUCTION

Human civilization has a long history of herbal or traditional medicine therapy for treating several diseases and disorders. In recent times, research on traditional medicine and screening of different plant species have been actively pursued due to the lack of effectiveness in synthetic and available drugs or their adverse effects on health.¹ Diabetes mellitus (DM) or hyperglycemia, in particular, continues to be a chronic disorder that is most challenging to manage and has been declared an epidemic by the World Health Organization.² There have been extensive studies in the making of antidiabetic drugs in the past decades. Poor regulation of blood sugar leads to a high glycemic index. One of the effective ways to control diabetes is managing the excess postprandial hypoglycemia.³ Proper diet and different classes of oral hypoglycemic drugs (such as thiazolidinediones, sulfonylureas, α -glucosidase inhibitors

and biguanides) control blood glucose level (BGL). It is also reported that commercially procured drugs (such as Acarbose, Miglitol, Metformin, and Sulfonyl urea) adversely affect human health⁴⁻⁶. Medicinal plants or herbs possessing antidiabetic properties include many phytochemicals such as saponins, flavonoids, alkaloids, anthraquinones, terpenes, coumarins, phenolics and polysaccharides. Natural products are reported to have a vital role in the treatment of various diseases and drug research and design, and preclinical/clinical studies. The affordability with fewer side-effects compared to synthetic drugs has made pharmaceutical research lean towards discovering new natural antidiabetic drugs targeting the mechanism associated with DM or type 2 diabetes.⁷ In addition to lowering blood glucose in experimental models and clinical trials, the stimulation of β -cell proliferation is also being studied as a thrust area.⁸ The anti-hyperglycemic effects of plant-based medicine are aimed at α -glucosidase inhibition, reducing intestinal glucose absorption, enhancing insulin secretions, and improving the performance of pancreatic tissue.^{9, 10}

It is evident that inhibitors of α -amylase and α -glucosidase delay the sugar hydrolysis in the small intestine and control postprandial hyperglycemia.^{11,12} Many natural products proved to have a direct or indirect effect on diabetes pathways through inhibition of aldose reductase, alpha glucosidase and



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RESEARCH ARTICLE | AUGUST 16 2018

Tight binding model study of boron/nitrogen doped graphene

Saswati Panda; G. C. Rout 

✚ Author & Article Information

AIP Conf. Proc. 2005, 030003 (2018)

<https://doi.org/10.1063/1.5050734>

The pristine graphene is a zero band gap semiconductor, where conduction and valence bands touch each other at the Dirac point. We report here the effect of fifty percent doping of graphene by boron/nitrogen on the electron density of states. We propose a tight binding model Hamiltonian of boron/nitrogen doped graphene consisting of nearest neighbor, next nearest neighbor and next to next nearest neighbor p_z - electron hoppings in the graphene plane. We have doped graphene with electronegative atom like nitrogen and electropositive atom like boron in the Hamiltonian. The total Hamiltonian is solved by Zubarev's double time single particle Green's function technique. The electron density of states is calculated from the imaginary part of the electron Green's functions and computed numerically. It is observed that the electron density of states in doped graphene exhibits a clear gap near the Dirac point as compared to zero band gap in pristine graphene and a reduced gap as compared to pure hexagonal boron nitride.

Topics

Tight-binding model, Crystallography, Doping, Density of states, Semiconductors, Graphene, Leptons, Chemical elements

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<https://doi.org/10.1103/PhysRevB.76.073103>
Google Scholar Crossref

ELECTRICAL TRANSPORT PROPERTIES STUDY OF A TUNGSTEN BRONZE-TYPE VANADATE CERAMIC BY IMPEDANCE SPECTROSCOPY AND ELECTRIC MODULUS

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Abstract- A ferroelectric ceramic oxide with tungsten bronze- type, $\text{Li}_2\text{Pb}_2\text{Eu}_2\text{W}_2\text{Ti}_4\text{V}_4\text{O}_{30}$, was synthesized by a conventional solid-state sintering method. (DTA and TGA) technique optimized the preparation conditions of the material. X-ray diffraction (XRD) study confirms the formation of a single phase compound with orthorhombic crystal structure. Scanning electron micrograph shows the polycrystalline nature of the material with uniform grain distribution throughout the sample. Dielectric study shows the existence of two phase transition in the compound. Complex impedance spectroscopy techniques investigate its microstructure and electrical properties as a function of frequency and temperature. Impedance studies indicate the existence of temperature dependent relaxation process in the material with multiple no of relaxation time. The variation of dc conductivity with temperature follows the Arrhenius behavior, and reveals the negative temperature coefficient of resistance (NTCR) nature of the material like a semiconductor. The frequency dependence of ac conductivity (fitting) at various temperature obeys the Jonscher's universal power law.

Keywords – A. Ceramics, B. X-ray diffraction, C. Microstructure, D. Ferroelectricity, E. Impedance Spectroscopy

I. INTRODUCTION

Tungsten bronze ceramic oxides are the popularly studied ferroelectrics next to perovskites. This wide family offers the possibility to tune the material response by changing the composition and useful for many devices such as ferroelectric random access memory, multi-layered capacitors, transducers, pyroelectric detectors, actuators [1–5]. The complex and disordered TB structure consists an arrays of distorted BO_6 octahedral sharing corners in such a way that three different types of interstices (A–C) are available for various cations substitution in the general formula $[(\text{A}_1)_2(\text{A}_2)_4(\text{C})_4][(\text{B}_1)_2(\text{B}_2)_8]\text{O}_{30}$ or $[(\text{A}_1)_2(\text{A}_2)_2(\text{A}_3)_2(\text{C})_4][(\text{B}_1)_2(\text{B}_2)_4(\text{B}_3)_4]\text{O}_{30}$ along the 4-fold symmetry [6].

Dielectric, electrical properties and thermal sensitivity of a lead free rare earth compound with tungsten bronze-type ceramic thermistor

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Saparjya S and P. R. Das,

Department of Physics, Veer Surendra Sai University of Technology, Burla-768018

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Abstract- A new tungsten bronze ceramic $\text{Na}_2\text{Ba}_2\text{Gd}_2\text{W}_2\text{Ti}_4\text{Nb}_4\text{O}_{30}$ was prepared using conventional mixed oxide route. The preliminary structural analysis of the compound using room temperature X-ray diffraction (XRD) indicates the formation of single-phase orthorhombic crystal structure. The temperature and frequency dependent dielectric properties (ϵ_r and $\tan\delta$) of the compound exhibits two phase transitions in it. The low temperature phase transition (at 368K) related to structural type (ferroelectric-ferroelectric) and the high temperature (at 638 K) is related to the ferroelectric to paraelectric. The hysteresis loop (electrical polarization versus field) at room temperature confirms the ferroelectric property of the compound. The electrical properties of the material at a wide range of temperature (25–500 °C) and frequencies (1 kHz – 1 MHz) were investigated using Complex impedance spectroscopy (CIS). The temperature dependent impedance properties were used to obtain the various thermistor parameters and their variation with temperature.

1. INTRODUCTION

Environmentally-friendly lead-free ferroelectric materials with the tungsten bronze (TB) structure compounds have attracted particular attention because of their excellent ferroelectric [1], multiferroic [2], photo luminescent [3], electro-optic [4], piezoelectric [5-7] and pyroelectric [8] properties. The expressions $(\text{A}_1)_2(\text{A}_2)_4(\text{C})_4(\text{B}_1)_2(\text{B}_2)_8\text{O}_{30}$ describes the tungsten-bronze crystal structure, with A_1 and A_2 sites are filled with by the monovalent alkali metal cations K^+ , Na^+ , Li^+ , the divalent alkaline earth metal ions Sr^{2+} , Ba^{2+} , Ca^{2+} , Pb^{2+} or the trivalent rare-earth metal cations La^{3+} , Nd^{3+} , Eu^{3+} , Gd^{3+} ; the B sites are filled by Nb^{5+} , Ta^{5+} , Zr^{4+} , Ti^{4+} , Sb^{5+} ; and the C sites by Li^+ , Be^{2+} , Mg^{2+} . Generally, in the several chemical bonds of the tungsten-bronze structure, ferroelectricity arises due to interaction between the B atom and its surrounding oxygen framework in the BO_6 polar unit [9,10]. The C sites being the smallest and are generally empty. When all the six A site cations are occupied in the structure $(\text{A}_1)_2(\text{A}_2)_4(\text{C})_4(\text{B}_1)_2(\text{B}_2)_8\text{O}_{30}$, it represents a 'filled' TB structure; otherwise it is referred to an 'unfilled' TB [11–12]. It has been found that different ionic size substitutions at the above-mentioned sites (A and B) can tailor their

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Volume 93, 2020 - Issue 2

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Articles

Effect of Gadolinium on the structural and dielectric properties of BCZT ceramics

S. Saparjya, T. Badapanda, S. Behera, B. Behera & Piyush R. Das

Pages 245-262 | Received 18 Oct 2019, Accepted 30 Dec 2019, Published online: 09 Jan 2020

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ABSTRACT

The influence of Gadolinium (Gd) on $\text{Ba}_{0.85}\text{Ca}_{0.15}\text{Zr}_{0.1}\text{Ti}_{0.9}\text{O}_3$ ceramics prepared using high temperature ($\sim 1300^\circ\text{C}$) solid-state reaction technique is investigated. The X-ray diffraction pattern of the sample confirms the formation of the single-phase compound in a tetragonal crystal structure at room temperature. Micro-structural analyses are recorded using scanning electron microscopy (SEM). Dielectric (i.e. ϵ_r and $\tan\delta$) parameters of the compound as a function of temperature at selected frequencies are studied. Modified Curie–Weiss law is implemented to study the diffusivity of the material. For the investigation of the electrical conduction process,



Ferroelectrics >

Volume 598, 2022 - Issue 1

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Research Article

Understanding the impact of Gd³⁺ substitutions on the enhancement of dielectric and electrical behaviour of lead-free Ba_{0.85}Ca_{0.15}Zr_{0.1}Ti_{0.9}O₃ ceramics

S. Saparjya, S. Behera, T. Badapanda, B. Behera, R. Padhee & Piyush R. Das

Pages 79-95 | Received 29 Mar 2021, Accepted 01 Jun 2022, Published online: 26 Oct 2022

 Cite this article <https://doi.org/10.1080/00150193.2022.2102824>

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Abstract

The present study focuses on the effect of Gadolinium (Gd³⁺) concentration on the lead-free Ba_{0.85}Ca_{0.15}Zr_{0.1}Ti_{0.9}O₃ (BCZT) ceramics synthesised using conventional solid-state reaction method at high temperature (~1300 °C). Introducing Gd³⁺ to the BCZT system influences the properties of the materials. All the compounds were crystallised in tetragonal structure at room temperature. The microstructural study of the compounds has been obtained by scanning electron microscopy (SEM). The frequency and temperature dependent dielectric properties were analysed. The

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Research Article

Crystal structure, dielectric and impedance studies of a new lead free tungsten bronze ferroelectric oxide

S. Devi, S. Sapatrjya & S. Behera

Pages 104-117 | Received 10 Jan 2021, Accepted 28 Dec 2021, Published online: 26 Apr 2022

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Abstract



The current manuscript describes the structure, dielectric and impedance nature of the ferroelectric ceramic $\text{Na}_2\text{Ba}_2\text{Y}_2\text{W}_2\text{Ti}_4\text{Nb}_4\text{O}_{30}$ made by high temperature mixed oxide route. The compound formation with orthorhombic phase and surface morphology was verified by X-ray diffraction and scanning electron microscopy techniques respectively. The temperature variation of dielectric parameters (ϵ_r and $\tan \delta$) at selected frequencies of the material exhibits dual phase transitions at 323 and 573 K, respectively. The low temperature phase transition is considered as structural type in the ferroelectric phase and the high temperature (573 K) transition




Unraveling the strain and inherent onsite-correlation effect on the electronic structure of pure and iso-electronic Ag doped copper nitride

Guruprasad Sahoo ^{a 1}  , Ajit Jena ^{b 2}

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Highlights

- Effect of onsite Coulomb correlation and strain on electronic properties of pure and Ag doped Cu₃N has been investigated.
- Cu₃N is recognized as a weakly correlation system and Ag doping leads to further weaker correlation effect.
- Band gap of Cu₃N decreases (increases) for the compressive (tensile) strain which is attributed to stronger (weaker) *p-d* hybridization.
- A dissimilar variation of the band gap with strain is observed for the Ag doped system.



Site selective Ag doping in Cu₃N and its consequences on structural and electronic properties: A DFT study

Guruprasad Sahoo

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Highlights

- Impact of Ag doping on structural, mechanical, thermodynamical and electronic properties of Cu₃N are investigated.
- Host-impurity covalent interactions and thereby formation of energy bands are explained.
- Ag substitution for Cu preserves semiconducting nature with a reduced band gap.
- Incorporation of Ag at the interstitial site induces semiconductor-to-metal transition.

Abstract



Highly textured ZnO thin films grown using sol-gel route for gas sensing application

Sumati Pati

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Highlights

- Highly textured ZnO thin films are grown using sol-gel spin coating technique.
- (002) oriented films are grown with an aim to study the effect of preferential orientation on gas sensing application.
- Gas sensing parameters in presence of H₂, CO and CH₄ gases are studied by varying the operating temperature.
- The correlation between crystallographic orientation and other properties are discussed.

Abstract




The crystalline orientation of metal oxide thin films often modulates their structural, optical as well as surface related properties. Viewing in the same line, in the present work we have systematically investigated the structural, micro structural, optical and gas







Results in Physics


Volume 19, December 2020, 103595

Some limitations on: Analytic approximate eigenvalues by a new technique. Application to sextic anharmonic potentials, D.D. Almeida and P. Martin, Results. in. Phys. 8, 140–145 (2018)

Biswanath Rath  , Prachiprava Mohapatra 

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Highlights

- We point out few limitations of analytical approach of Almeida and Martin.
- Method cannot be applied to multiple well oscillators and non-linear oscillators.
- We plot wave function mod square and cite the value of $\langle p^2 \rangle$.

Abstract

Sino – US Power Shift in the Asia-Pacific: Implications

Asish Kumar Jena

Research Scholar, Ravenshaw University, Cuttack, (Odisha) India

Abstract

The paper argues that the power shift brought about by the unprecedented rise of China has transformed existing power balance between China and United States in the Asia-Pacific region. The paper gives a comprehensive analysis of the comparative decline of United States and relative rise of China during the last two decades. The paper makes a holistic analysis of the economic and military power shifts occurring between the two super powers during the last two decades. The paper analyses the strategies of different US administrations to face the situation. The views of the foreign policy experts and public opinion have also been given consideration in the analysis. The paper gives a realist perspective of the power shift and its implications in one of the most sensitive conflict zone in the world.

Key Words: Asia-Pacific, Power Shift, US Decline, Rise of China, US Pivot, Thucydides Trap.

Introduction

Within the last two decades, the People's Republic of China (PRC) has been the most seriously-debated emerging power, viewed by academics, politicians and large parts of the public alike to be capable of effectively challenging the hegemonic position of the United States of America in global as well as Asia-Pacific affairs. Indeed, after having enjoyed a brief moment of global unipolarity following the demise of the Soviet Union in the 1990s, Washington's situation has changed remarkably in several ways over the last two decades. Instead, there has been a growing discourse among scholars that the "colossus that currently bestrides the world has feet of clay", something which makes the development of "a post-American world" all the more likely.

When looking at Asia-Pacific, a regional power shift seems to be taking place.

Probably the most notable feature of this is the rise of China as an economic powerhouse, a major military power as well as a proactive player in various multilateral institutions and forums. Many authors have rightly described China as one of the most important forces for change both at the regional and global level. China's widely discussed rise and the changing regional power balance caused by the Middle Kingdom's impressive development have indeed altered the global perceptions of the geo-politics and geo-economics of Asia-Pacific. On the one hand, this is due to the greater role China is now playing beyond its own region (i.e. in Europe, Africa and South America). More importantly, however, this is on the other hand also strongly related to the growing possibility that the US-led regional order in Asia-Pacific may be challenged and permanently altered by an



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Advances in Dairy Microbial Products

2022, Pages 347-355

Chapter 24 - Nanobiotechnology in fermented dairy products

Sradhanjali Sahu, Priyanka Choudhury,
Luna Goswami, Sandeep Kumar Panda

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<https://doi.org/10.1016/B978-0-323-85793-2.00010-2> ↗

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Abstract

The current demand for dairy products and



Indigenous Fermented Foods for the Tropics

2023, Pages 409-418

Chapter 25 - Starter cultures: an insight into specific applications in flavoring and health promotion

Sradhanjali Sahu^{1,2}, Tithi Parija¹, Sandeep Kumar Panda¹

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Abstract

Starter cultures are used for the manufacturing of fermented foods and beverages for nutritional enhancement, flavor, and preservation. With the development of modern microbiology, specific starter cultures have been identified and are being applied for the desirable attributes of food products. This chapter discusses the novel starter cultures and their applications in health promotion and the generation of appropriate flavor. This chapter also describes the health-promoting attributes of starter cultures, namely the group of lactic acid bacteria. The major roles of starter cultures in gut health promotion, anticarcinogenic properties, and supplementation of vitamins are well discussed. This chapter also provides concise yet useful information and discussion on the novel starter cultures and their applications.

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Category: Miscellaneous

Effect of Lead acetate on oxidative stress and antioxidant defence system of *Bacillus subtilis* and plasmid (pBSIISK) isolated from DH5α

Smita Patri¹, Sradhanjali Sahu², Bijayalaxmi Parida¹, Bineet Baral³, Arpita Prusty¹, Luna Samanta¹ and Srikanta Jena^{1*}

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Abstract

Environmental contamination by heavy metals has been one of the major concerns for ecological and public health. Although some heavy metals are required for metabolic processes, but their excessive accumulation in living organisms is always detrimental. High concentration of lead affects all living organisms including soil flora, fauna and microorganisms. Presence of such heavy metals in environment could certainly cause the decrease in the community diversity. This study was aimed to investigate the effect of lead acetate on growth and antioxidant defence system of *Bacillus subtilis* in dose (0, 0.125, 0.25 and 0.5 mM) and time (6, 12, and 24 h) dependent manner, and also assess its deleterious effects on plasmid-pBSIISK isolated from DH5α strain. The results indicate that the cell number was declined significantly with increase in concentration of the heavy metal at different time of their growth phase. Lipid peroxidation (LPx) and reduced glutathione (GSH) levels were significantly enhanced in response to lead acetate, whereas the activities of antioxidant enzymes, superoxide dismutase (SOD) and catalase (CAT) were decreased in presence of lead acetate. Glutathione S-transferase (GST) activity was increased at 6 h and 12 h, but decreased at 24 h in response to lead acetate. *In vitro* study indicates that lead acetate potentially damage the plasmid (pBSIISK) isolated from DH5α strain.

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Citation: Patri, S., Sahu, S., Parida, B., Baral, B., Prusty, A., Samanta, L. and Jena, S. Effect of Lead acetate on oxidative stress and antioxidant defence system of *Bacillus subtilis* and plasmid (pBSIISK) isolated from DH5α [Abstract]. In: Abstracts of the NGBT conference; Oct 02-04, 2017; Bhubaneswar, Odisha, India: Can J biotech, Volume 1, Special Issue, Page 154. <https://doi.org/10.24870/cjb.2017.a140>

FLAVORIZATION OF FOOD BY PROBIOTICS

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¹School of Biotechnology, KIIT University, Bhubaneswar, India

²NC Autonomous College, Jajpur, India

ABSTRACT

Probiotic microorganisms are used in food and beverages for enhancing the functional properties and flavors. Currently, many probiotic microorganisms are used to generate desirable flavors to the food matrix. In this chapter, we have critically reviewed the different aspects of flavor producing probiotics bacteria and yeast strains. Also, the application and possible commercialization of such probiotic microorganisms have been discussed.

Keywords: flavor, food matrix, microorganisms, probiotics

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Original Article

Does Financial Integration Reduce Output Volatility? New Evidence from Cross-Country Data[†]

Pradipta Kumar Sahoo, D. Tripathi Rao, Badri Narayan Rath ✉

First published: 03 December 2018

<https://doi.org/10.1111/1759-3441.12235>

Citations: 8

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Abstract

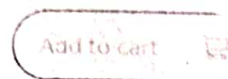
We examine the effect of financial integration, measured based on both volume and equity, on output volatility using five-year non-overlapping annual average data windows for sixty countries over the 1971–2015 period. We construct aggregate- as well as sub-panels based on income and region. Financial integration reduces output volatility in aggregate and income panel, but not in all regions. Foreign direct investment (FDI) and foreign portfolio investment (FPI) reduces output volatility in developed countries, but only FDI reduces output volatility in developing countries. Financial regulatory architecture should aim at attracting FDI and macroeconomic and structural reforms to reap the benefits of FPI flows.

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[International Journal of Managerial Finance](#)

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Abstract

Purpose

The purpose of this paper is to examine the price-volume relationship in the bitcoin market to validate near-stock properties of bitcoin.

Design/methodology/approach

Daily data of bitcoin returns, returns volatility and trading volume (TV) are utilized for the period August 17, 2010–April 16, 2017. Linear and non-linear causality tests are employed to examine price-volume relationship in the bitcoin market.

Findings

The linear causality analysis indicates that the bitcoin TV cannot be used to predict return; however, the reverse causality is significant. In contrast, the non-linear causality analysis shows that there are non-linear feedbacks between the bitcoin TV and returns. The bitcoin TV, which represents new information, leads to price changes, and large positive price changes lead to increased trading activity. Similarly, in recent periods (post-break period), the results of the non-linear causality test show a unidirectional causality from TV to the volatility of returns.

Research limitations/implications

This study uses the average index value of major bitcoin exchanges. But further research on this relationship using data from different bitcoin exchanges may provide further insights into the price-volume relationship of bitcoin and its near-stock properties.

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A sector-level analysis of output club convergence in case of a global economy

Vaseem Akram, Pradipta Kumar Sahoo, Badri Narayan Rath **▼**

[Journal of Economic Studies](#)

ISSN: 0144-3585

([International](#) article publication date: 26 February 2020

[Standard](#) Issue publication date: 27 July 2020

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318

Abstract

Purpose

This paper investigates the per-capita output club convergence in case of 120 countries for the period 1995–2015. Further, we disaggregate per-capita output into three broad sectors such as agriculture, industry, and service and investigate the convergence hypothesis.

Design/methodology/approach

The paper tests this hypothesis using the Phillips and Sul panel club convergence technique.

Findings

Our findings are as follows: (1) our results indicate the evidence of output divergence for the full sample; (2) when countries are divided into different clubs, the results exhibit the sign of per capita output club convergence both for aggregate and three major sectors. Further, this study confirms that industry's per capita output is the main driver for aggregate per-capita output club convergence in case of club 1. For club 2, agriculture's per capita output is a primary source for aggregate per capita output club convergence. Likewise, in the case of clubs 3 and 4, we find the service sector's per capita output is the main component for aggregate per-capita output club convergence; (3) both the service and industry sectors are major drivers for aggregate per-capita output club convergence.

Practical implications

This study suggests to the policymaker that sector-specific policies need to be adopted to boost the per-capita output growth by improving the performance of each of the sectors across the countries.

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

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
Volume 61, December 2019, 100977

Do shocks to electricity consumption revert to its equilibrium? Evidence from Indian states

Vaseem Akram  , Pradipta Kumar Sahoo, Bhushan Praveen Jangam

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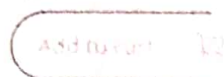
Highlights

- We examine the stationary properties of electricity consumption across Indian states.
- Lagrange Multiplier (LM) and Residual Augmented Least Square Lagrange Multiplier (RALS-LM) unit root tests are applied.
- Findings suggest evidence of stationarity in most Indian states.
- Past behavior of electricity consumption can be used to predict future electricity demand.

Abstract

This study investigates the stationary properties of electricity consumption at the aggregate and user-group levels (agricultural, industrial, commercial, domestic, and

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[Bhushan Praveen Jangam, Pradipta Kumar Sahoo, Vaseem Akram](#)

[International Journal of Energy Sector Management](#)

ISSN: 1750-6220

(International

Standard Article publication date: 11 December 2019

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Abstract

Purpose

The purpose of this study is to examine whether the electricity consumption patterns across Indian states do converge.

Design/methodology/approach

This study considers 18 Indian states spanning over the period 1970-1971 and 2014-2015, using the recently developed Phillips and Sul panel convergence technique that accounts the multiple steady states.

Findings

The results provide the following insights. First, the authors find evidence of convergence in electricity consumption among all Indian states. This suggests that electricity consumption patterns for Indian states are converging to a common steady state. Second, to provide broader insights, we further investigate the convergence in electricity consumption among user groups such as agriculture, industry, commercial, domestic and miscellaneous. The results reveal that commercial, domestic and miscellaneous groups are also converging. Third, the non-convergence patterns in agriculture and industry enable us to investigate the possibility of clubs or the multiple common steady states. The results indicate the occurrence of three clubs in case of agriculture and two clubs in case of the industry. Fourth, this study also inspects the relative speed of convergence among the user groups. The results reveal the higher speed of convergence in case of the domestic user group.

Practical implications

The findings enable policymakers to formulate an appropriate energy policy to accommodate the future electricity demand across Indian states and prioritize low electricity consumption states so that they receive a greater share.









Economic Analysis and Policy

Volume 65, March 2020, Pages 224-240

Full length article

Stochastic conditional convergence in per capita energy consumption in India

Vaseem Akram  , Badri Narayan Rath, Pradipta Kumar SahooShow more  Share  Cite<https://doi.org/10.1016/j.eap.2020.01.006> Get rights and content 

Abstract

This study examines the stochastic conditional convergence of per capita energy consumption in India by considering the types of energy consumption as well as energy consumption at sectoral levels, covering the annual data from 1971 to 2017. To do so, this study applies the two-step Lagrange Multiplier (LM), and the three-step Residual Augmented Least Square LM (RALS-LM) unit root tests, which accommodate up to two endogenously determined structural breaks. Our results reveal the evidence of per capita energy convergence for various types of energy consumption in the presence of two endogenous breaks. Further, we disaggregate each type of energy consumption based on their use in different sectors. The results derived from LM and RALS-LM unit root tests again support the convergence, barring a few sectors. Our findings give an indication to the government of India for adjusting the types of energy consumption to reach the carbon emission target and increase efficiency for a few sectors where we find divergence.

Introduction

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COVID-19 pandemic and cryptocurrency markets: an empirical analysis from a linear and nonlinear causal relationship

[Pradipta Kumar Sahoo](#) ▼

[Studies in Economics and Finance](#)

ISSN: 1086-7376

(International
Article publication date: 26 March 2021
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Abstract

Purpose

This paper aims to empirically examine the effect of Coronavirus disease 2019 (COVID-19) pandemic on cryptocurrency market returns with particular attention to top five cryptocurrencies and COVID-19 confirmed and death cases.

Design/methodology/approach

The study applies the linear Toda and Yamamoto and nonlinear Diks and Panchenko Granger causality test to know the causal relationship of cryptocurrencies with COVID-19 pandemic. The study also uses the Narayan and Popp endogenous two structural break tests to capture the break period of the sample.

Findings

The findings of the study confirm the existence of unidirectional causal relation from COVID-19 confirmed and death cases to cryptocurrency price returns. While examining the break periods, the post-break period result indicates the presence of unidirectional linear causality from COVID-19 confirmed cases to Bitcoin and Ethereum price returns. This shows that prior knowledge of COVID-19 pandemic growth helps to predict the return of cryptocurrencies.

Originality/value



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International Journal of the Economics of Business >
 Volume 29, 2022 - Issue 2

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The Determinants of Firm Competitiveness: Evidence from the Indian Manufacturing Sector

Pradipta Kumar Sahoo , Viet Le & Badri Narayan Rath

Pages 139-159 | Published online: 30 Aug 2021

Cite this article <https://doi.org/10.1080/13571516.2021.1959251>

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Abstract

This paper investigates the determinants of competitiveness of Indian manufacturing sector. First, based on multi-variate Industrial Competitiveness Index (ICI), the result reveals that capital-intensive firms are more competitive than labor-intensive firms. Second, the results also indicate that foreign-owned firms are more competitive than domestic firms. Third, the determinants of competitiveness derived from Feasible Generalized Least Squares (FGLS) and dynamic panel GMM model indicate that the firms' external factors such as Information and Communication Technology (ICT) and infrastructure positively affect manufacturing firms' competitiveness. However,

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International Journal of Finance & Economics / Volume 29, Issue 2 / p. 1569-1580

RESEARCH ARTICLE

Market efficiency of the cryptocurrencies: Some new evidence based on price–volume relationship

Pradipta Kumar Sahoo ✉, Dinabandhu Sethi ✉

First published: 19 December 2022

<https://doi.org/10.1002/ijfe.2744>

Citations: 4

Abstract

Cryptocurrencies have emerged as an important investment avenue in the past few years. Investors are increasingly interested in these currencies amid surging financial returns. In this context, understanding market efficiency of cryptocurrency has become very crucial for investors and academicians. The price–volume framework is a popular approach in financial economics to understand the market efficiency of stocks in the stock markets. Therefore, this article examines the market efficiency of cryptocurrencies through price–volume framework to understand whether crypto market is predictable. Towards this objective, data on both return and trading volume (TV) of the top eight cryptocurrencies are used for the period 8 August 2015–20 October 2022. As an empirical method, both linear and non-linear causality models are used to validate the hypothesis. Our results confirm that TV cannot predict the cryptocurrencies' return, thereby validating the market efficiency hypothesis. Furthermore, we divide the sample according to the structural break period. The result from the post-break period analysis also confirms the presence of market efficiency in the recent period for all currencies, barring XRP, XMR and DASH.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

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A club convergence analysis of financial integration: cross-country evidence

[Vaseem Akram](#), [Sarbjit Singh](#), [Pradipta Kumar Sahoo](#) 

[Studies in Economics and Finance](#)

ISSN: 1086-7376


(International

Standard Article publication date: 23 March 2023

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Abstract

Purpose

The purpose of this study is to examine the club convergence of Financial integration (FI) in the case of 60 countries from 1970 to 2015. FI plays a vital role in economic growth through sharing the risk between countries, cross-border capital association, investment and financial information. It also leads to the efficient allocation of capital and capital accumulation, thereby improving the systematic growth and productivity of the economy. Literature on examining the convergence hypothesis of FI is scarce.

Design/methodology/approach

This study applies the clustering algorithm to identify club convergence, advanced by the Phillips and Sul test, which enables the identification of multiple steady states or club convergence, unlike beta and sigma convergences.

Findings

The findings indicate the non-convergence when all 60 countries were taken together. This highlights that the selected countries' have unique transition paths in terms of FI. Hence, the authors implement the clustering algorithm, and the estimation shows that 56 countries are categorised into three different clubs. However, for the rest of four countries, the results are sort of ambiguous, favouring neither convergence nor divergence.

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Nexus between export, productivity, and competitiveness in the Indian manufacturing sector

Pradipta Kumar Sahoo ^{a, b}, Badri Narayan Rath ^a  , Viet Le ^b

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Abstract

This article assesses the nexus between export, productivity, and competitiveness in the Indian manufacturing sector. To do this, we examine the “learning by exporting” and “self-selection” hypotheses using firm-level data relating to Indian manufacturing firms relating to period from 1994 to 2017. The empirical analysis supports the “learning by exporting” hypothesis, but does not support the “self-selection” hypothesis. We also investigate the impact of export on competitiveness, and the results indicate a positive relationship. These findings remain consistent when we segregate manufacturing firms based on industries, intensity use of labor and capital, and firm ownership. In the light of these findings, we recommend that policy focus on enhancing the export capacity of manufacturing firms to further strengthen the competitiveness of Indian manufacturing.

Introduction

Competitiveness is the willingness of a firm to manufacture reliable and innovative products that can satisfy the market's needs. The competitiveness of firms includes their efficiency and productivity (Porter, 1990), which is directly linked to export performance.

Evolution of Odisha Administration

Dr. Sudarsan Pradhan

Assistant Professor of History, Paramananda College, Bolgarh, Odisha

Abstract: The present research work provides complete ideas on the evolution of the Odisha administration since the British occupation of State to the existing Odisha Government. The first part of the article highlights the continuous demand of people to the British Government for the creation of a separate Odisha Province. Just after the birth of Odisha Province, the immediate problem was the issue of the merger of Feudatory States with the new Province. The second part of the article enumerates the Provincial party politics and formation of Ministries in the province from 1937 to date. Odisha witnessed two General Elections before independence and Congress won both elections but it couldn't complete full term which was followed by the imposition of the Governor's rule twice. After Post Independence scenario, Odisha achieved considerable progress and development under the rule of Hare Krushna Mahtab, Biju Patnaik, Janaki Ballav Patnaik and present Chief Minister Naveen Patnaik. Political defections, groupism among the Congress leaders, birth of regional political parties such as Ganatantra Parishad, Jana Congress, Swatantra Parties etc., coalition government, and above all the imposition of President's rule sixth time (1961-1980) in the State was the major obstacle for its political stability and economic growth. Naveen Patnaik, the unchallenged leader of present Odisha politics, has never faced any kind of defeat ever since his entry into politics. Odisha is heading for progress and economic prosperity under the long rules of Naveen Patnaik.

Keywords: Formation of Odisha Provinces, Merger Issues, Pre-Independence Ministries, Post Independent Ministries of Odisha.

The British occupied Odisha in the year 1803. Odisha was the last province that came under the direct control of British rule. In the year 1803, Raghuji Bhonsle the Maratha ruler of Nagpur handed over Odisha to the hands of East India Company according to the provision of the Treaty of Deogaon. The then Odisha consisted of only three coastal districts namely, Cuttack, Balasore and Puri.¹ In 1823, the above three districts were to be governed by the administrative laws made by the Governor-General in Council at Calcutta. The rest part of Odisha came under nonregulated areas and was ruled by their respective local Princely rulers.

POLITICAL CAREER AND ACHIEVEMENT OF BIJU PATNAIK

Dr. SUDARSAN PRADHAN

Guest Faculty in History
Chauliaganj, Cuttack, Odisha

Abstract

Biju Patnaik had dominated both Odisha and Indian political scene for at least four decades of 20th century. A Pilot turned politician, later became a popular leader. He served as the Chief Minister of Odisha for twice in 1961 and 1990 and Minister of Steel, Mines and Coals in the Cabinet of Morarji Desai from March 1977, to Jan 1980. He was responsible for laying the basic infrastructure for development of Odisha. So many industrial Developments took place under the banner of Biju Patnaik. His role to rescue Sultan Sjahrir of Indonesia and Kasmir Problem of 1947, were commendable deed of that great leader. His contribution in different areas is matchless. He will be remembering forever in the mind of each Odia People.

Keywords: early life, political career, promotion of industry, education, his reforms.

Introduction

Mr. Bijoyananda Patnaik is popularly known as Biju Patnaik. He had dominated in Odisha's state politics nearly six decades out of which; he was in Jail for about thirty months for his active role in Quit India Movement. Biju Patnaik is a unique character and favourite leader among the people of Odisha till today for his adventurous work and political reforms. He was undoubtedly a great Legislator, Political Leader, Pilot, Freedom fighter and above all a reformer of modern Odisha. His political activity since student life was full of adventurous work. During his student life, he set his journey on cycle from Cuttack to Peshwar located now in Modern Pakistan. Later on, he joined Indian National Airways and became a

Pilot¹ (Joshi, 2010). He played a key role in World War-II and the Kasmir War of 1947 as a Pilot in the Indian Air Force. Taking risk his life, he brought the Indonesian Premier Mr Sultan Sjahrir and Achmand Sukarno to New Delhi by Dakota military air craft during the time of Indonesian freedom struggle against Dutch colonialism. He had served as the Union Minister for about three years and about seven and half years as the Chief Minister of Odisha in two terms (23.06.1961- to 02.10.1963 and 05.03.1990 to 15.03.1995)² (Reference Annual, 2004). From a daring Pilot to great Indian political leader, Biju Patnaik is remembering by generations of people not only in Odisha but outside India also.

Living with fatal Corona virus: Social Distancing and Quarantine

Sudarsan Pradhan

Assistant Professor of History, Ravenshaw University, Cuttack, Odhisa

Abstract: *In late December 2019, the novel Coronavirus emerged from Wuhan city of China at first and then travels to the rest of the cities of China, the entire globe including our country India. The Disease is officially termed as Corona Virus Disease-2019 (COVID-19) by W.H.O on February 11, 2020. It is also named as Severe Pneumonia with Novel Pathogens by Taiwan CDC, the Ministry of Health. It is a notifiable communicable disease of the fifth category. Person to person transmission may occur through droplet or contact transmission and if there is a lack of Stringent infection control or if no suitable Protective equipment available so far. At present, there is no definite treatment procedure for COVID-19. More and more researches are still going on in different laboratories to invent medicine for that virus is under investigation. To promptly identify patients and prevent their spreading, Physicians should be aware of the travel or contact history of the patient with compatible symptoms. Social distancing, i.e., reducing interaction between individuals helps to slow down the spread of the virus has become the new norm. Social distancing and Quarantine are the two best measures to prevent mass infection of Covid-19.*

Keyword: COVID-19, Health Issue, Lockdown, Migrant Problem, Social Distancing, Quarantine

The outbreak of Corona Virus Disease, 2019 (COVID-19) has created a global health crisis that has had a deep impact on the way we perceive our world and our everyday lives. In December 2019, an outbreak of mysterious pneumonia identified with fever, dry cough, fatigue and occasional gastrointestinal symptoms happened in a seafood wholesale wet market, the Huanan Seafood Wholesale Market, in Wuhan, Hubei province of China. The COVID-19 belongs to the same family of virus-like SARS and MERS. The first outbreak was reported in the market in December 2019 and infected about 66% of the staff there. That wet market was closed down on 1st January 2020 after the announcement of an epidemiologic alert by the local health authority on December 31, 2019. However, in January thousands of people in China including many provinces such as Hubei, Zhejiang, Guangdong, Henan, Hunan, etc. including cities like Beijing and Shanghai were badly attacked by the rampant spreading of the Corona Virus. Moreover, the fatal virus travels to other distant countries like Thailand, Japan, the Republic of Korea, Viet Nam, Germany, Italy, France, Spain, the United State of America and India also. On 11th March 2020, the World Health Organization declared it a global pandemic. The first case of the COVID-19 pandemic in India was reported on 30th January 2020. As of 15 May, while writing this Paper confirmed 81,970 positive cases and 2,649 death in the country. The pathogen of the outbreak was later identified as a novel beta-corona virus, named 2019 novel Coronavirus (2019-nCoV) and recalled to our mind the dreadful memory of the severe acute respiratory syndrome (SARS-2003, caused by another beta- coronavirus that happened seventeen years past. Global transport and the popularity of tourism are the main factors for the spread of COVID-19.

The origin of the 2019-Nov is not clear although it might come from the Wuhan wet market of China and later on spreads to the rest of the globe. Some health experts announced that China's

Mahatma Gandhi and Odisha

Dr. Sudarsan Pradhan

Department of History, Ravenshaw University, Cuttack

Abstract: Mahatma Gandhi visited Odisha eight times over a period of twenty-five years in between 1921 to 1946. His tour covered all parts of Odisha except remote southern Odisha. Each time, he addressed to all section of society including women to participate in the national movement of mother land and bring its independence through the means of Non-violence and Satyagraha. Gandhiji through his speech urged upon the people to promote Khadar, remove untouchability and give up intoxicants. Gopabandhu Das, Madhusudan Das, Khadi programme and untouchability were four of the major pillars of his visits which contributed far reaching consequences. His Harijan Padajatra was a great exercise in democratic tradition of social inclusion.

Key words: National Movement, Untouchability, Khadi programme and Harijan Padajatra.

This article focuses to analyse the visits of Gandhiji to Odisha and its underlying importance of a democratic revolution. Gandhi had visited Odisha eight times in all totals. His eight visits were in 1921, 1925, 1927, 1928, 1934 (twice), 1938 and 1946. He came to Odisha in Summer, Monsoon and Winter and had been toured to the four geographical areas of Odisha-East, South, North, and West-covering Cuttack, Berhampur, Balasore and Sambalpur among others. Before he toured Odisha, he had come to know, listen, read, and write about it. The first thing that caught his attention about Odisha was its extreme poverty and famine. The long 25 years i.e., from 1921 to 1946, during which Gandhi visited Odisha was also the peak phase of freedom struggle. So Gandhi normally gave more focus his most popular programme like Khadi, anti-untouchability, massification and nationalist causes in Odisha by way of his attempt at a better and greater mainstreaming of Odisha. However, for him the geographical region, autonomy and people were no less important than the nation, unanimity and leaders respectively. Gandhi had deep respect for Gopabandhu and Madhubabu. On the other hand, he never undermines the common people of Odisha with whom he tried to establish direct communication and attempted to know their common problem and helped them this regard. He personally met, talked to, interacted with them, and got feedback from all sections of people. His bonding with local people and women helped him in broadening and feminizing the social base and vision of his Odisha project. He realized that, the real and deeper level of democracy is also about 'with the people'.

Gandhiji's Eight Visits in Brief (First Visit)

On 23rd March, 1921, Gandhiji came by the Puri Express train and reached Cuttack Railway Station along with his wife Kasturba on the day of Dolapurnima. Gandhiji was first brought to the Swaraj Ashram of Cuttack. On 23rd evening, Gandhi addressed a mass meeting in the sands of Kathajodi River where nearly fifty thousand people were present. Gandhiji in his speech said that it was the desire of all to get swaraj. So that; ever body should strive to bring unity among Hindus and Muslims. On the same day, Gandhiji also attended another meeting was held in the Binod Bihari

HISTORY OF CUTTACK CITY

Dr. Sudarsan Pradhan

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The word Cuttack is an anglicized form of the Sanskrit word KATAKA that assumes two different meanings namely "military camp" and secondly, the capital fort of the Government protected by the army. Cuttack is one of the oldest cities of India and was the capital of Odisha for almost nine centuries. It is situated at the separation of the Mahanadi and its main branch the Kathajodi. The city located in latitude, north 20°29' and longitude East, 85°50' and spread across an area of nearly 74 square miles. The Cuttack city stretches from Phulnakhara across the Kathajodi in the south to Choudwar in the north across the Birupa River, while in the east it begins at Kandarpur and runs west as far as Naraj Barrage. The main city is located at the apex of the Mahanadi river delta. Four rivers including Mahanadi and its distributaries like Kathajodi, Kuakhai, and Birupa run through the city.

The recent growth of the city has resulted in expansion across the Kathajodi River and a new township towards the head of the delta formed between the tributary Kathajodi River and the main river Mahanadi has come up by the name of C.D.A which is spread across 2000 acres land. It has all total 15 sectors out of which 11 are residential areas and has population around more than three lakhs. Jagatpur and Mahanadi Vihar are the two other townships in the city. Mahanadi Vihar is the first satellite city project in Odisha. Cuttack an unplanned city is characterized by a maze of streets, lanes and by-lanes which has given it the nick name of a city with Baban Bazar, Tepan Galee and i.e. 52 markets and 53 streets. The city experiences a tropical wet and dry climate. Due to the closeness to the coast, the city is prone to cyclones from the Bay of Bengal. The word "KATAKA" etymologically means army cantonment and also capital city. The history of Cuttack amply justifies its name. It started as a military cantonment because of its impregnable situation and latter on developed to be the capital of the state of Odisha.

From the remote past Cuttack served as the only narrow strip for the land route through the country and as such people coming from north to south or from south to north had no other alternative route than to cross the Mahanadi at or near Cuttack. The river Mahanadi was the best convenient water ways for trade-commerce and communication with the hinterland. Cuttack was well connected with the ancient and medieval Orissa sea ports like Che-li-ta-lo, Palur, Dantapora and Tamralipti etc both by the land and Sea routes. The Cuttack city flourished as an important centre for trade and commerce in the ancient time. It also served as the gateway for the spread of Indian culture specifically in the South-Asian countries.

The Political importance of Cuttack city was not exactly known before 8th century. Historical evidences are absolutely lacking as to the foundation of Cuttack city. Madalapanji and the Jagannath temple chronicle provide some idea on this issue, but its accounts are based on

Madhusudan Das : The Pioneer of Industrial Revolution

Dr. Sudarsan Pradhan

*HOD, The Department of History, P. N. College, Bolgarh,
Kordha*

Abstracts :

The present article highlights the contribution of Madhusudan Das for the growth and development of Odisha's industry on modern lines. His pioneering efforts in the industrial progress of Odisha played a significant role in shaping the economic prosperity of Odisha. The idea of swadeshi industrialization was first initiated by Madhusudan in Odisha and that concept was basically implemented by Gandhiji in our national movement much later years of partition of Bengal. Madhu Babu was highly inspired with the ideas of industrial revolution and wanted to see India as industrially developed nation like Britain. His "Odisha Art Wares" and "Utkal Tannery" were the standing monuments of early stage of state's industry. His efforts to provide better training to each workers of Tannery was definitely praiseworthy and never compromise for its quality of products.

Key Words : *His Early life , Filigree industry , Orissa Art Ware House, Utkal Tannery, Status of Bankruptcy.*

Introduction :

Madhusudan Das was an outstanding personality and influential leader of his time not only of Odisha but of the whole India. He was a great visionary who was ahead of his time. Madhusudan Das, commonly known as Madhu Babu is one of the great leader of modern Indian History and also the chief architect of modern Odisha. He was the first Odia Graduate in Arts, the first Odia M.A, the first Odia Advocate, the first Odia member of the Legislative Council, the first Odia to visit England and the first Odia to realize the legitimate interest of the Odia people. Madhu Babu founded the Utkal Sammilani in the year 1903 to campaign for the unification of all Odia speaking areas along with its social and industrial development. He was the great leader and chief architect, helping the creation of separate

The Odisha Legislative Assembly: An Evolutionary Study

Sudarsan Pradhan

The present paper makes an enquiry into the growth of Odisha Legislative Assembly from its inception in 1937 to 1971. It delineates the formation of various Ministries and their dynamics in governance. Though Congress Party was the major political party which ruled the province by majority from 1937 to 1957 but the political stability remained distant truth. These Ministries were marred with interparty-factionalism, intra-party feuds and groupism among its leaders such as Das-Mishra group, followed by Satyabadi group and Mahtab group. Lastly anti-Mahtab faction led by Biju Patnaik exposed the hollowness of Congress ministries in Odisha. The second Legislative Assembly of 1957 witnessed the Congress and Ganatantra Parishad coalition Government. After four years, President's rule was imposed for the first time from 25th February to 23rd June 1961 in Odisha. Congress Party returned to power under the leadership of Biju Patnaik in the third Assembly. Interestingly, this Assembly witnessed three chief ministers first Biju Patnaik, followed by Biren Mitra and Sadasiba Tripathy within five years. The Congress lost its majority in the fourth Assembly election in 1967. Then another coalition government was formed by Swatantra and Jana congress Party headed by R.N. Singh Deo. Singh Deo's Government could not give a stable administration. Another phase of President's rule was imposed in Odisha on 11th January 1971.

Hence, this paper critically analyses the political journey of Odisha at the backdrop of irregular governance plagued with instability and interrupted by president rule.

Odisha became a separate state in 1936. No wonder, before 1936 there was no Odisha Legislative Assembly. Between 1912 when Bihar and Odisha were carved out from the province of Bengal and made a separate province and 1936, a few Odias were members of the Bihar Assembly located at Patna. Since 1936 Odisha had a separate Legislative Assembly. But the representation in it continued to be based upon limited franchise till Independence. It was only in 1952 that members of the Odisha Legislative assembly were elected on the basis of Universal franchise. Since then it started evolving, although its evolution has not been very significant. The present article is an account of

the origin and evolution of the Odisha Legislative Assembly up to the year 1971 A.D.

Origin of the Odisha Legislature

Before 1936 there was no legislative Assembly in Odisha. The combined Legislature of Bihar and Odisha had its Secretariat and sittings at Patna in Bihar and Bihar was dominating every sphere. After becoming a separate province, Odisha was placed under the personal rule of the Governor till the end of March, 1937. According to the Government of India (Constitution of Odisha) Order, 1936, the total number of seats at the Orissa Assembly was fixed at 60 out of which 56 seats were to be filled up by election and rest 4 seats by nomination. The election before Independence was confined to limited suffrage.

First Pre-Independent Assembly (1937-1945)

Elections to the First Odisha Legislative Assembly with provision of limited franchise, were held during the period from 18th January 1937 to 23rd January, 1937. The names of the elected members were published on 13th February 1937 in the Odisha Gazette. After constitution, the members of the First Assembly took oath on 26th and 27th June, 1937. 28th July 1937 was a memorable day in the constitutional history of Odisha as the first historic session of the First Assembly met on this day in the Ravenshaw College Hall at Cuttack, and it was addressed by His Excellency Sir John Austen Hubbacke, the first Governor of Odisha. Again on the same day Mukunda Prasad Das and Nanda Kishore Das were unanimously elected as the Speaker and the Deputy Speaker of the first Assembly respectively. This Assembly had total 10 sessions and it was dissolved on the 19th September, 1945.

The Second link Assembly Between Pre-Independence and Post-Independence (1946-1952)

The province of Odisha was Placed under Governor's rule from the 30th June, 1945 to the 23rd April, 1946. During Governor's rule, election to the Odisha Assembly

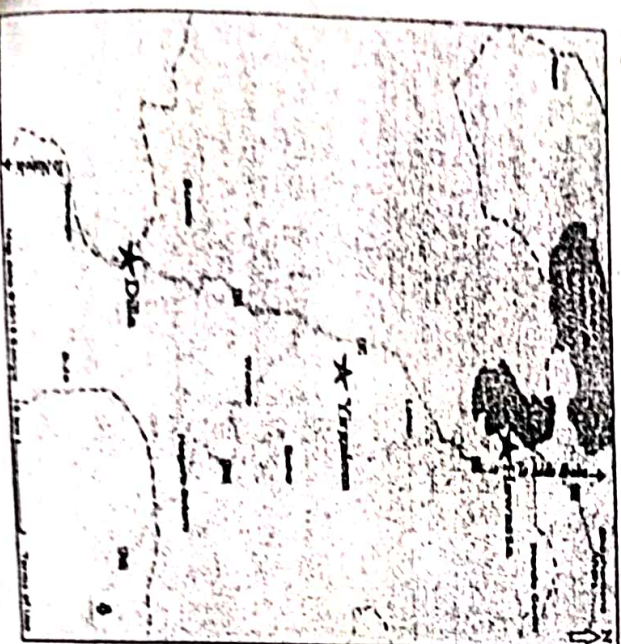


Table 6: Respondents by Tenure structure and Ways of occupying the Condo Housing Units (n=382)

S.No	Description	Number of Respondents	Per cent
1	Tenure structure of the house		
		• Own House	299
		• Rental House	61
	• Family/Relative House	22	5.76
2	Ways of Occupation		
		• Lot	302
		• Rent	61
		• Others	19
			4.97

Source: Field Survey by the Author, 2016

Fig. 1: Relative Location of Study Towns



Extracted from Google Map by the Author, 01 February, 2018

THE FIRST INTERIM MINISTRY OF ORISSA (ODISHA): A

STUDY

(1st April 1937-13 July 1937)

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Abstract

The present paper enumerates formation of the first non-Congress ministry in Orissa, immediately after its formation as a separate province in 1936. In the first general election, the Congress party emerged as the majority party, by winning 36 seats out of 60. After election, Biswanath Das was chosen as the leader of Congress party. He did not accept the offer to form the Ministry, because he wanted the special power from the Governor, which the latter denied. That led to formation of Interim non-Congress ministry headed by Maharaja Shri Krushna Chandra Gajapati Narayana Dev. There was widespread resentment against the appointment of Shri Krushna Chandra Gajapati as Chief Minister. Consequently, the Congress High Command started negotiation with Governor, change the policy to form the next Government in the state. This incident led to resignation of Biswanath Government and formation of first Congress Ministry in the state.

Key Words: First general election in Orissa, Biswanath Das; non-Congress Ministry; Congress in Orissa

Formation of the Orissa Province on 1st April 1936 brought new hopes and aspirations in the minds of the people of Orissa. As the atmosphere was surcharged with election fever by the provisions of Government of India Act of 1935, Orissa was no exception to it. To promote election campaign in Orissa, John Austin Hubbac, the first governor of Orissa, with his advisory Council consisting of 17 members, prepared scheme



Making of the Indian Constitution

Dr. Sudarsan Pradhan

The Constitution of India was not prepared in a single day but the process of the evolution of the Indian Constitution started many decades before India became independent in 1947. The process continued unabated since it originated in the freedom struggle till a new Constitution was drafted after series of debates and discussion in the Constituent Assembly. The day 26th of January, 1950 was a red-letter day in the history of modern India. On that particular day, the written Constitution of India came in to force.

January 26th was purposefully chosen as the date on which the Constitution became operative because since 1930, the day has been celebrated as the day of complete independence throughout India by millions of people. It is very befitting to declare such historic day as the day of operation of the Constitution of Republic of India. The Constitution of India was the longest written Constitution having the best elements of all the existing Constitutions up to that date.

The Constitution of India was the modern sacred text of the contemporary India. It reflects the new aspirations and values of the people of India and testifies how the people of India are the supreme masters in all matters concerning the welfare of Indians.

A galaxy of learned wise men were interested in the longevity of the emerging nation of India framed the Constitution in its present form after a thorough debate and discussion of each proposal. The nationalist consciously, popularized the concept of parliamentary democracy, republicanism, civil liberties, social and economic justice which happen to be the most basic tenets of the Constitution.

An eminent historian Bipan Chandra rightly remarks "When the Constitution in 1950 a parliamentary form of Government, with a Cabinet led by a Prime Minister it was not, as it commonly supposed, the British Parliament that it was emulating. It was formalizing nationalist practices, which the people were already familiar with". Even the spirit of democracy was familiarized by the national movement. Bipin Chandra rightly points out, "this found expression in large scale mass participation. It ensured a place for adult franchise after Independence."

A view is in this regard that the British initiated a modern responsible constitutional government in India and the Constitution was merely the culmination of the series of constitutional development made by them in 1861, 1892, 1909, 1919, and at last the government of India Act of 1935. This view is not totally correct

Pandit Nilakantha Das : A Tribute

Dr. Sudarsan Pradhan

ABSTRACT

Pandit Nilakantha Das appeared on the political and literary firmament of Odisha at the most crucial period of its history when the land of Odisha had no political identity in the map of India and Odia as a language was about to vanish. Nilakantha was a born revolutionary against all social evils. Nilakantha Das had promised to give up all personal comforts and luxury (even Government Service) to serve the motherland. Endowed with a multi-splendoured and multifaceted personality, Pandit Das blossomed into a forceful national leader, a scholar, poet, philosopher, politicians and legislator. He ceaselessly worked hard to make India free and upon attainment of this precious objective, worked for advancement of our country towards a better life in all spheres.

Nilakantha Das, popularly known as the "Pandit" is one of the most striking figures in Odisha politics. He was one of the pioneers of the Satyabadi School which ushered a new era in the history of Odisha. He is amongst the earliest champions of Indian Independence to which he sacrificed his entire life. He joined the Independence Movement under the leadership of Mahatma Gandhi in the year 1921. Nilakantha Das was a multifaceted personality. He was a brilliant scholar, a dedicated social reformer, a voracious reader, an accomplished statesman, an eminent educationist as well as a freedom fighter. He was not a person rather himself, he was a living institution. He had been honoured by a huge number of awards and felicitations. It has been



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Biren Mitra : A Political Leader

Dr. Sudarsan Pradhan

The day Biju Patnaik resigned i.e., October 2, 1963; the Congress Legislature Party met at Room No.54 of Orissa Legislative Assembly and elected Biren Mitra as its leader. Pabitra Mohan Pradhan, who was a cabinet minister in the Biju Patnaik's cabinet unsuccessfully contested for the office of the Chief Minister. In view of the groupism prevailed in the party, All India Congress Committee (A.I.C.C) had sent Rafi Ahmed

Kidwai, a Senior Congress leader as observer. On the auspicious day of Gandhi Jayanti Day, October 2, 1963, Biren Mitra took oath of office and secrecy as the first graduate Bengali Chief Minister of Odisha.¹ The same day he declared that he shall carry out all the plans and programmes of Biju Patnaik as did 'Bharat' for Ramachandra during his exile for 14 years in respect of Ayodhya.

Biren Mitra's Ministry from 1963-1965.

Sl. No.	MINISTER	PORTFOLIO
1	Sri Biren Mitra	Chief Minister, Minister of Finance, Industries, Mining and Geology, Irrigation and Power, Cultural Affairs, Health, Planning and Co-ordination and Commerce
2	Sri Brundaban Naik	Minister of Community Development
3	Sri Satyapriya Mohanty	Minister of Education, Agriculture and Animal Husbandry, Co-operation, Forestry
4	Dr. P.V.Jagannath Rao	Health
5	Sri Sadasiva Tripathy	Revenue Excise, Co-operation and Forestry
6	Sri Nilamani Routray	Political and Services, Home, Labour and Supply
7	Sri HariharSingh Mardaraj	Works and Transport
8	Sri Toyaka Sangana	Tribal and Rural welfare
9	Sri Banamali Babu	Law



Jayee Rajguru : A Great Martyr

Dr. Sudarsan Pradhan

Abstract

The first phase of British resistance movement started in 1804 under the leadership of Jayee Rajguru. Jayee Rajguru who was not only the Diwan of Khurda kingdom but also acted as the regent of minor king Mukunda Deva-II, who was the last king of Khurda. The policy of the British Commander Col. Harcourt strained the relationship between Mukunda Deva-II and his Minister Jayee Rajguru one hand and British on the other hand. Harcourt planned to take away the hereditary estate of Mukunda Deva-II that led to open fight between the two party. After the defeat of Barunei battle against British, King Mukunda Deva-II and his minister Rajguru were imprisoned at Barabati fort and shifted to Medinipur latter on. At last the British sanctioned pension to King and allowed him to stay at Puri as the superintendent of Jagannath temple. In the Midnapur trial, Jayee Rajguru was declared guilty of a rebellion against British rule and was ordered to be hanged to death. Jayee Rajguru was not only the first martyr of India, but also a prominent figure of the Indian independence movement in the state of Odisha.

Key Words: Jayee Rajguru, Mukunda Deva-II, Col. Harcourt, Battle of Barunei, Midnapur Trial,

The first phase of the 19th century in Odisha witnessed two significant political events, i.e., the British occupation of Odisha in the year 1803 A.D. and second one was throwing of the British yoke in 1804 A.D. under the leadership of Jayee Krishna Rajguru, popularly known as Jayee Rajguru. Jayee Rajguru, the first Indian and also the first Odia who started the resistance movement against the mighty British empire long before the "Sepoy Mutiny"



in 1857 A.D and prior to the "Paik Rebellion" in 1817 A.D. His indomitable courage, dedication and sacrifice for motherland have indeed written his name with the halo of martyrdom.

He was born on the auspicious day of Kartika Anla Nabami in the year 1739 in the village of Bira Harekrushnapur Sasan, near Puri town of Odisha. He was the son of Chand Rajguru and Haramani Devi. Jayee Rajaguru was a

Gandhiji in South Africa

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Gandhiji spent nearly twenty one years (1893- 1914) of his life in South Africa in which he was highly involved in petitioning the government for equal right for the Indians in South Africa. Throughout these year, he established a news paper, fought many political battles, intentionally served time in jail and developed his non-violent ideology. The years between 1906 and 1908 were the most crucial of his transitional and formative years in South Africa. This paper gives an idea how his experiences in the political arena of South Africa, his experiments with non-violence method, and Satyagraha all were influences on his developing ideology. The year which Gandhiji spent in South Africa proved to have indispensable factors in creating Gandhi's ideology.

Mohandas Karamchand Gandhi is considered as one of the most prominent leader of Indian Freedom Struggle also equally a great world leader in 20th century. Mahatma Gandhi's role in Indian freedom struggle is thoroughly well known, but a very few know about his contribution to South Africa, where he is a revered figure. Gandhiji spent twenty one years in South Africa. During that time, he went from a young lawyer who embraced British Imperialism, to political activist who denounced any association between India and England. It was in South Africa, where Gandhiji began his first fight against British misrule and oppression. Gandhiji's life in South Africa was certainly the most formative period of his career. Without the trials, the challenges and opportunities that his South African experience brought him, it is unlikely that his personality and politics could have been cast in the unique mould, which made him one the most charismatic and creative leaders of the twentieth century. His visit to South Africa was a turning point of his career. The South Africa life history of Gandhiji provides the idea of the concepts, plans and life's ideals which he formulated during his struggle for the cause of Indians in South Africa were applied by him later on a wider scale in his campaign against the British rule in India.

MERGER OF THE PRINCELY STATES WITH ODISHA

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Integration of Princely States with Odisha province was a land mark event in the history of modern Odisha. The most important result of the Praja Mandal Movement was the integration of the Feudatory States with the province of Odisha. Praja Mandal Movement taught the Princely rulers the important lesson that enormous strength and energy inhabited in the common people of the States. There was hardly any doubt that major impetus to the merger of Odisha State was given by the popular agitation there. It was believed that all-round development of the states can be possible only if the states were merged with the province of Odisha¹. The attempts of the merger of princely states with Odisha province was arrested due to outbreak of the Second World War. With the formation of new Congress Ministry under the leadership of Dr. H.K. Mahatab in the year 1946 who tried his best to solve the problem of Feudatory states for all times to come. It was on 1st January, 1948 that greater Odisha province was born. On that specific day, twenty-five out of the twenty-six Gadjat or princely states were integrated with present Odisha. The integration of Mayurbhanj State was accomplished on 1st January 1949. The role of Harekrushna Mahtab was commendable to merge princely states with Odisha².

Political system of Princely States

There were 26 Gadjat States in Odisha. Out of those were 11 A class, 12 B class States and the remaining 3, C class. This was a well thought plan of the British. For the sake of administrative convenience those states were divided by the British in to three categories, namely the Eastern State Agency, the South-West Frontier Agency, and the Orissa Agency. Furthermore, while fourteen States constituted the Eastern State Agency; Kharasuan constituted South-Western Frontier Agency. In 1916, the areas included in Chatisgarh State were placed under the administration of Chhotanagpur Commissioner. In 1922, all those areas were transferred to Orissa Agency. In each category of States, a Political Agent was appointed in order to help the Commissioner. But the Rajas of Princely States kept these Political Agents in good humour and continued to rule as per their own interest. The peasants of Gadjat States were exploited under the tyrannical rule of their respective Rajas and raised banner of revolt against them. As per the directive of the Centre, an Enquiry Committee was set up in 1938 with Harekrushna Mahatab as the Chairman. It interviewed two thousand peasants. That Committee submitted a distressing report about the Rajas' misrule. So the Committee recommended the merger of Princely States with Odisha province⁴. Harekrushna Mahtab clearly states in his book, *The Beginning of the End* that the idea of integration of States in fact started from that day. The preparation for the integration of Princely States commenced just after independence. The Rajas of these Princely States did not reveal any interest to join Odisha. They formed the Eastern States Council and tried to remain independent as before. However, the wave of Prajamandal Movement was gaining momentum to end kingship. In the meantime, some Congress leaders of Odisha