Insect Pheromones (Bioactive Molecules) as Tools in Integrated Pest Management (IPM): Research and Development at IICT

J S YADAV, A R PRASAD, B KRISHNA KUMARI, K N JYOTHI, A L PRASUNA & SUBHASHINI SIGHAMONY

Pheromone Group, Organic Chemistry Division
Indian Institute of Chemical Technology, Hyderabad 500 007

Abstract

World over the versatility of Integrated Pest Management (IPM) for cleaner and better agro products is very well known established agro practice. IPM is an eco-friendly and environmentally safe alternative to the highly harmful and environmentally hazardous Pesticide Application Technology. Insect Sex Pheromones (Bioactive molecules) offer selective methods of pest control, as they interfere with natural behaviour of insects specially in locating the mate for reproduction. Insect Sex Pheromones play a major role in IPM practice/approach. Considering the importance and practical utility of Pheromones for quality agricultural outputs, Indian Institute of Chemical Technology, (IICT, CSIR) with its strength in Organic Chemistry is actively-pursuing research on Insect Pheromones, as one of the thrust areas. The research is actively pursued in the following four major disciplines: isolation and identification of pheromone systems of hitherto unidentified economically important pests relevant to Indian agriculture; process development on pheromones; dispenser technology development on pheromones; and field trials with indigenously synthesized components.

Multidimensional Medicinal uses of Bioactive Molecules obtained from Plants, Animals & Microorganisms

NIMISHA TRIPATHI1, PREM SHANKAR MANI TRIPATHI1, ASHA GUPTA1
P.K.MISRA2, RAJ SHEKHAR SINGH1 & KUMAR VEERENDRA1

1Central Mining Research Institute, Dhanbad, 2Central Fuel Research Institute, Dhanbad
3R S Mor College, Govindpur, Dhanbad

Abstract

Bioactive molecules are the chemicals present in living systems, which are known for their diversified uses in the society. The beneficial attributes of biologically active molecules in the development of new drugs have been known since time immemorial and are still being searched. After the isolation of penicillin from the bacterium Penicillium notatum in 1939, various diverse types of organisms, including plants, animals, fungi and microorganisms like bacteria have attracted the attention of scientists to contribute towards this search. Albeit the microorganisms were ignored previously, but now-a-days these are intensively being studied and their secondary metabolites are being used for drug preparation on a large scale. These natural products are the most successful source of drug as they offer opportunities for finding novel low molecular weight structures, which are active against a wide range of assay targets. The important aspects of chemicals in living systems, their occurrence, isolation and identification are of immense value for their role in society over the ages. The most interesting aspect of biologically active molecules is that the knowledge of macromolecular structure and the modes of action of these biologically active small molecules can be exploited in designing new molecules with potent biological activity (i.e., the drugs).
Integrated Microbial and $\gamma$-radiolytic process for Desulphurisation of High Sulphur Coals: Proof of the Concept and A case study on Polish & Indian Coals

PREM S M TRIPATHI, NIMISHA TRIPATHI, KAMLESH K MISHRA,
DANNA SAKHARE

Central Fuel Research Institute, P.O. F.R.I., Dhanbad 828108 (Jharkhand)

and

L B SURLA AND CELIN ACHARYA
Regional Research Laboratory, Bhubaneswar 751 013 (Orissa)

Abstract
Coal will continue to be used in thermal power plants to produce electricity to meet the ever increasing demand of energy for several coming decades in the developing nations, particularly India. During thermal generation of electricity, coal is combusted, in the course of which several serious environmental problems are created. To mitigate these problems, lot of

The principal natural products with target molecules include brevetoxins, oligosaccharides, enediyne anticancer agents, DNA-interacting molecules, cholesterol-lowering compounds, taxoids, antibiotics, and anti-AIDS and other bioactive molecules. Likewise, secondary metabolites like macrolides, alkaloids, terpenes are also being isolated from the living organisms and are used in combating several dreaded fatal diseases, even cancer. More interestingly, secondary metabolites of bacterial, fungal and marine origin are being intensively studied, besides plants and animals. In the present review paper, beneficial aspects of various bioactive molecules present in plants, animals and microorganisms have been reviewed. In this context, it is more important and interesting that the secondary metabolites derived from bacteria, fungi and marine organisms are also being studied besides those obtained from plants and animals. Alkaloids (which include opiate and tropane), hallucinogens, taxol and digitals are most important among these. Remarkable progress has also been reported in the field of manufacturing of medicine from bioactive molecules by isolating them from *Rauwolfia*, *Pyote*, *Podophyllum*, *Taxus* (common yew tree). In the same stream, bioactive molecules present in animals are also being researched and the bioactive molecules present in these animals, especially insects, are being extensively exploited for their medicinal value. The animals of this category include maggots of some special varieties of flies, honeybee, blister beetle, bed bugs, etc. Useful bioactive molecules have also been characterized in microorganisms, especially mycobacteria. Also known as gliding bacteria, these bacteria are in fact soil bacteria which make fruiting bodies. Likewise, various bio molecules with new structures, such as ratjadones, sorangicines, soraphenes, epothiones, etc. are being isolated from these extraordinary bacteria and their use in the synthesis of medicines is increasing day-by-day. Among these, epothiones are most effectively being used in the treatment of cancer. Thus understanding the multifaceted uses of the bioactive molecules isolated from plants, animals and microorganisms, several research institutes of India, which is rich in biodiversity, are carrying out extensive research, but more attention is needed and possibilities are broad and bright. Given in the present paper is an overview of the beneficial aspects of various bioactive molecules present in plants, animals and microorganisms. In this context, it is more important and interesting that the secondary metabolites derived from bacteria, fungi and marine organisms are also being studied besides those obtained from plants and animals. Alkaloids (which include opiate and tropane), hallucinogens, taxol and digitals are most important among these. Remarkable progress has also been reported in the field of manufacturing of medicine from bioactive molecules by isolating them from *Rauwolfia*, *Pyote*, *Podophyllum*, and *Taxus*. Likewise, bioactive molecules present in animals are, of late, also being researched extensively. The bioactive molecules present in animals, especially insects, are being gainfully exploited for their medicinal value. The animals of this category include maggots of some special varieties of flies, honeybee, blister beetle, bed bugs, etc. Useful bioactive molecules have also been characterized in microorganisms, especially mycobacteria. Also known as gliding bacteria, they are, in fact, soil bacteria, which make fruiting bodies. Similarly, various bioactive molecules with new structures, such as ratjadones, sorangicines, soraphenes, epothiones, etc. are being isolated from these extraordinary bacteria and their use in the synthesis of medicines is increasing day-by-day. Among these, epothiones are most effectively being used in the treatment of cancer. Thus, exploiting country’s rich biodiversity, research efforts, with focussed attention, are being intensified for isolating and understanding the multifarious uses of bioactive molecules derived from plants, animals and microorganisms, in India. The scope is unlimited and possibilities are enormous.
emphasise is being put on "clean coal technologies", which, *inter alia*, include environmental control equipment as also coal cleaning for obtaining clean fuel, especially coal beneficiation before combustion. Precombustion cleaning of coal comprises principally coal washing and desulphurisation. In this context, desulphurisation of high sulphur coals (such coals having 1% or more sulphur content), the total reserves of which is ca. 2840 million tonnes, assumes much greater importance, because the presence of sulphur in coal gives rise to several environmental problems such as environmental pollution causing ecological imbalance, depletion of ozone layer, acid rain etc. The processes in vogue for the precombustion desulphurisation of coal include physical, chemical biological and radiation methods. Of late, extensive research is being carried out on biological desulphurisation of coal. At CFRI Dhanbad a new and effective $\gamma$-radiolytic process of desulphurisation has also been developed.

The present paper reports the results of desulphurisation of high sulphur bituminous Polish (Janina coal mines of Lybiaz coal field) and Indian (N-E coal fields, Tinsukia coal, Assam) coals (sulphur content 2-6%) by firstly individual microbial and $\gamma$-radiolytic methods, and then in succession (microbial followed by $\gamma$-radiolytic method). While the microbial desulphurisation entails the use of isolated cultures of *Thiobacillus ferrooxidans*, the $\gamma$-radiolytic method comprises irradiation of acidic/aqueous slurries of the coals at different $\gamma$-doses. It was found that the microbial method is more effective for the removal of pyritic sulphur, whilst the $\gamma$-radiolytic method is effective to remove both the pyritic and organic sulphur. A comparison between desulphurisation experiments by individual microbial and $\gamma$-radiolytic methods and the integrated method (microbial plus $\gamma$-radiolytic in succession) exibits that the combined method is much more effective for the removal of sulphur, including organic sulphur, from these coals. It is found that along with removal of sulphur from the coals, mineral matter is also removed simultaneously. The attractive feature of the process is that the caking property of the coal after desulphurisation is either increased slightly or remains unchanged. Another important feature is that the coal structure is not affected/degraded to any appreciable extent after desulphurisation. As such the integrated microbial and $\gamma$-radiolytic process seems to be a better alternative for the deep desulphurisation of high sulphur coals and this could be a step forward in the direction of environment-friendly "clean coal technology".

**Designing, Synthesis and Application of Mixed Biocouple of Piperine-Curcumine with Glycine as an Active Medicine**

**SATYENDRA MISHRA, UPMA NARAYAN & KRISHNA MISHRA**

Nucleic Acid Laboratory, Chemistry Department, Allahabad University, Allahabad

**Abstract**

Designing, synthesis and application of three biocouple viz. di-O-glyceeryl mono piperylal curcumin (IV), di-O-glyceeryl dipiperoyal curcumin (V) and piperyal glycine (VI) have been described in this paper. The calculation of antibacterial activity of all these three biocouple is done particularly against the $\beta$-lactamase generating microbes.

**Effect of Culture and Environment on the Production of Heat Stable Glucoamylase by Mutated *Aspergillus* species UV-1 through Solid State Fermentation**

**J K GUPTA, MENU GUPTA, KANUPRIYA & S K SONI**

Microbiology Department, Punjab University, Chandigarh 160014

**Abstract**

*Aspergillus* is a land isolate, which produces heat stable glucoamylase (1715 U/g fermented dry matter) in high quantity by solid state fermentation on wheat bran. The pure culture of this bacteria was mutated by ultra-violet radiation. Out of 5000
mutagen, 56 mutated colonies (showing difference in structure and enzyme producing capacity) were selected. These mutants were grown in wheat bran based medium. After mixing the wheat bran and distilled water in 1:1 ratio and sterilization, bacteria were introduced into the flasks. Analysis was carried out after heating the flasks at 30°C for 36 h. The mutant, whose highest production capacity was 4350 U/g fermented dry matter, was selected for further study and named Aspergillus species UV-1. The enzyme producing capacity of Aspergillus species UV-1 was affected by the presence as well as absence of wet agent, humidity level, heating temperature, carbon, nitrogen and minerals. In the flask, after heating the wheat bran and distilled water in the ratio of 1:1.5, maximum enzyme production 6375 U/g fermented dry matter, was found. When this medium was completed with 1% glucose, 1% soya bean meal and 1 m mol magnesium sulphate and manganese sulphate the production of enzyme reached up to 7546 U/g fermented dry matter.

Antisense Treatment and Biocouple

SATYENDRA MISHRA, SNEHLATA TRIPATHI & KRISHNA MISHRA
Chemistry Department, Allahabad University, Allahabad 211 002

Abstract

Bio-couples of curcumin and glycine 1, 7-bis (4-O-glycinoyal-3-methoxyphenyl)-1, 6-heptadiene-3, 5-dione were clubbed with supplementary sequence dixoy oligo 11-mer, 5'-GTTAGGGTTAG-3' of telomerase-RNA templet co-conjunction bond. With the object to club these two molecules phosphatized 2 carbon interphase was used. Tm (melting point temperature) method was used to study inter hybridization of RNA hTR with repeated sequence 5'-CUAACCCUAAC-3'. For the concept of this pre-medicine, two scientific assumptions viz. antisense hypothesis and release of target-medicine were adjusted.

New Dimensions of Microbial Technique: Coal Processing and Desulfurization, Separation of Metals and Environment Protection

PREM SHANKAR MANI TRIPATHI
Environment Management Division, Central Fuel Research Institute
Dhanbad 828108 (Jharkhand)

Abstract

Microbiological methods are now being exploited in many non-conventional areas, including mineral processing, leaching/separation of metals, coal desulfurization and for environmental protection. Generally, the prevalent methods for extraction of metals from mine refuse and low-grade ores are not only costly but also not environment-friendly. However, microbial techniques can be gainfully exploited on a large scale to obtain metals and non-metals from the poor quality ores/minerals and mine refuse, as they are much cheaper compared to the conventional chemical methods. Some examples are: extraction of copper metal from sulphur-containing copper minerals and isolation of manganese from manganese ore by means of bioleaching. Of late, microbiological methods are finding wide applications in the desulfurization of high sulfur coals, as these methods are found to be quite effective and eco-friendly. A number of valuable substances can also be produced from coal exploiting the effectiveness of various microorganisms, e.g., microbial conversion of lignite to humic acid; production of methane, methanol, ethanol by microbial processing of coal, etc. Besides, microbes also play very important role and are being effectively used for the conversion of unavailable forms of several nutrients such as
phosphorus, sulfur, copper, iron, in available form in the soil, such that microbial techniques are now being well targeted to convert unproductive lands into fertile ones. Environmental safety is being ensured by effectively purifying and detoxifying the organic and inorganic hazardous wastes from medicine industry, for which D.R.C.C. bacteria of Cocobacilli family, isolated from soil, have been found to be very efficient and efficacious.

In the paper, diverse and multi-faceted applications of microbial techniques in different areas such as mineral processing, metal extraction, coal beneficiation (desulphurization and demineralization), environmental protection are highlighted.

Production Suitability & Characteristics of Heatstable Alpha Amylase from Solid State Enzyme by *Bacillus* species PS-1

S K SONI, KANUPRIYA, MEENU GUPTA & J K GUPTA
Microbiology Department, Punjab University, Chandigarh 160014

Abstract

*Bacillus* species PS-1 is a local isolate which produces alpha amylase at higher level in solid state fermentation. The production of alpha amylase has been seen on two levels (flask and plate with layer) which is effected by the presence and absence of wet agent, humidity level, heating temperature, carbon nitrogen and minerals. On the flask level, when wheat husk and distilled water were mixed in the ratio of 1:1.5 and grown for 48h at 37°C, maximum enzyme production was 290000 U/g fermented dry matter. Wheat husk when mixed with 1% glucose, production enzyme became equivalent to 370000 U/g fermented dry matter. Enzyme activity was found maximum at 60°C and on pH 6.5. Maximum heat stability of enzyme was 6h at 50°C and half life of enzyme was 2h at 60°C and 1.5 h at 70°C which became 6h and 3h, respectively after mixing 10mmol calcium chloride.

Chemical Synthesis of Triazolil-Thiazolidin and Erylidins: Antibacterial and Anti-inflammatory Agent

S D SRIVASTAVA, SOMYA SRIVASTAVA & S K SRIVASTAVA
Chemical Synthesis Laboratory, Chemistry Department, Dr Hari Singh Gaur University, Sagar 470003 (MP)

Abstract

By the reaction of 1,2,4-triazole/benzotriazol and ethyl chloroacetate, their acetates are formed (1) which produce (acetohydroxaeo)-1,2,4-triazole/benzotriazol on reacting with hydrazine hydrate. By condensing product(2) with different substituted aromatic aldehydes, erylidine acetohydrazido-1,2,4-triazole/benzotriazolzs (3) is obtained which produces 2-(substituted eryl)-3-(1,2,4-triazolil benzotriazolil acetamidil)-4-oxothiazolidins (4) by the cyclic additional reaction with mercaptoacetic acid which again synthesize 5-erylidle-2-eryl-3-(1,2,4-triazoli/benzotriazolil acetammydil)-1,3-thiazolidin-4-ones (5) after reacting with aromatic aldehydes. the structure of these products was confirmed on the basis of spectrometry elementary analysis. Antibacterial and anti-inflammatory screening was carried out of all the activities thus obtained.
Role of Peptide in Crop Insects Disease Resistance in Plants

GEORGE THOMAS & P W RAMTEKE
Department of Biotechnology, Allahabad Agricultural Institute-Deemed University
Allahabad 211007

Abstract
In crop plants, developing resistance to pests and diseases has become foremost in Agriculture. It has been noted that some peptides including defensins, melittins, cecropins, sarcotoxins and magainins show a biological activity against pests and diseases of some crop plants. In the present paper an effort has been made to review the efficiency of these bioactive peptide molecules in enhancing the potential of defense mechanisms in plants.

Synthesis of New Series of Heterocyclic Thiazolidin-Erylidins and Thiadiazolyl-Azitidins : Bioactive Molecules

S K SRIVASTAVA, S D SRIVASTAVA & SOMYA SRIVASTAVA
Chemical Synthesis and Biological Laboratory, Chemistry Department
Dr Hari Singh Gaur University, Sagar 470003 (MP)

Abstract
Four types of new substances were synthesized by selecting different types of heterocyclic compounds mainly azines and Azols. These substances are as follows: 2-(substituted eryl)-3-(azines/azols)-4-(oxothiazolidin)(1); 2-(substituted eryl)-3-azines/azols-5-erylidins-5-oxothiazolidins (2); 2-erylidinylamino-5-(azino/azolo methyl)-1,3,4-thiadiazoles (3) and 1[5-(azino/azolo methyl)-1',3',4'-thiadiazol-2'-oil-4-(substituted phenyl)-3-chloro-2-oxo-azitidins (4). The structures of these substances were confirmed on the basis of spectrometry, chemical methods and elementary analysis. Results obtained from different types were screened as antibacterial, antifungal, anti-inflammatory, wormicidal, diuretic etc.

Updated Status of the Development of Bio Sensors

VINOD KUMAR KHANNA & SHAMEEM AHMAD
Central Electronics Engineering Research Institute, Pilani 333031 (Rajasthan)

Abstract
During the 10th Five Year Plan of the country, under the network research programme set by CSIR ‘Ion-sensory field effect transistor’ project is going to be commenced out of the projects handed over to this institute. Under this project bio sensors
will be developed. Bio sensor is a combined analytical device having biological as well as physico-chemical elements. Biological element identifies the material and the physico-chemical element converts this identified form into electrical signals, so that we get the concentration of the material. In the biological part of the bio sensor, enzyme, microbes and immunological molecules are used while in physico-chemical part hydrogen electrode or ion-sensory field effect transistor and oxygen electrode are used. On the outlet of the ion sensory field effect transistor, enzymic membrane is formed in place of a metal. When this membranous transistor is dipped into the given solution, electric potential in the ratio of the concentration of the material is produced on outlet of the electrode. Thus, the more the electrical potential is produced on the outlet of electrode the more the concentration of the material would be in the solution. Biosensors are quite useful in the field of medicine, health, environment, food processing and agriculture etc. In this review paper the updated status of the development as well as future prospects of the research on bio sensor have been discussed.

Formation of Biodegradable Plastic (PHB) from Azotobacter vinelandii from the Soil of Amravati

DILIP TAMBEKAR
Microbiology Division, Amravati University, Amravati 444 602

Abstract

Plastic available in the market is produced from petroleum and natural air. It is cheap but creates lots of problems by polluting the environment. To solve this problem, successful attempts have been made to develop biodegradable plastic poly-b-hydroxybutyrate (PHB) from a bacteria known as Azotobacter vinelandii, found on the soils of Amravati. Not only the productivity of the land is increased by fixing the nitrogen by this bacteria but natural bioplastic is obtained in large quantities. In this context, 53 types of A. vinelandii were detected from the fields of Amravati (Maharashtra), out of which 6 types were capable of producing biodegradable poly-b-hydroxybutyrate. The physical and chemical properties of this bioplastic were similar to petroleum formed plastics.

Siderophore Producing Alkalygenes ficlis : An Effective Antifungal

R J SAYYAD & S B CHINCHOLKAR
Microbiology Division, Biological Laboratory, Maharashtra University, Jalgaon 425001

Abstract

A local bacteria, known as Alkalygenes ficlis was cultured in different nutrient media. The maximum production of siderophores was noticed in succinic acid medium. It was found effective against disease causing fungi A. niger and A. flavus. Siderophore medium is proved very effective in resisting the growth of fungi. Some of the results have been described in this paper.
Effect of Purewater Biofilm on Corrosion of Copper

S MOHANAN, S MARUDMUTTU, G VENKETACHARI, J R GOPALKRISHNAN & N PALNISWAMI
Central Electrochemical Research Institute, Karaikudi 630006

Abstract

The analysis of corrosion and microfith of natural pond water was done in pure water condition by using copper. In pure water and bacteria free water weight disappearance measurements, polarization and effect of biofilm on corrosion of copper has been obtained having measured corrosion rate for 100 day effective period through the various means of resistance. By X-ray diffraction analysis, in the presence of biofilm, nature of corrosion products has been identified. Copper friendly bacterial strains were isolated and identified as Flavobacterium species, Bacillus species, Micrococcus species and Staphilococcus species. Minimum corrosion floating value and high resistant values were calculated for copper in natural water. The extensive tips obtained by analysis of X-ray diffraction on natural biofilm shows that these films were made by carbon mixture.

Production of Bio-insecticide Azadirectin by Plant Cell Culture of Neem
(Azadirecta india)

GUNJAN PRAKASH, RAVAL KEYUR & A K SRIVASTAVA
Bio-Chemical Engineering and Biotechnology Division, Indian Institute of Technology
Hauz Khas, New Delhi-110016

Abstract

Neem is one of the most important and useful trees of India. It is the member of the family Meliaceae and distributed over the tropical plain of Asia and Africa and also found at an altitude of 5000 ft. It is a medicinally important plant besides, the chemicals obtained from this plant have insecticidal properties. The chemical obtained from the seeds is the most important insecticide.
Detergent Enzymes

SUDHA TIWARI

Central Cotton Technology Research Institute (Indian Council of Agricultural Research), Adanwala Road, Mantunga, Mumbai 333031

Abstract

During 1980-1990, several changes and developments have taken place in detergent industry. Different types of detergents have been produced such as heavy duty powder detergent, concentrated or structured or non-aqueous liquid detergent and enzymes became an important constituent of detergent formulation. Detergent become more effective with the enzymes, proteases, amylases, lipases, cellulases are some current detergent enzymes in use. A detailed study of these enzymes has been presented in this paper.

Importance of Agriculture in Pollution Control in Distillery Industry

HEM CHANDRA JOSHI

Environmental Sciences Division, Indian Agricultural Research Institute, New Delhi 110012

Abstract

India is an agriculture-based country therefore agriculture-based industries possess an important place. In biotechnological era, the importance of agriculture has further augmented because by means of agriculture in addition to food products, we obtain new dimensions of energy resources also. As a result of depletion of resources of mineral fuels, sources of fuels from agriculture would become essential. Substances like biodiesel and gasohol have been accepted as transport fuel. Not only to provide fuel but in controlling the industrial pollution, role of agriculture has been gaining importance. Agriculture based distillery industry of the country has become more important in the present scenario. This industry will play an important role not only in preparing wine and fulfilling the chemical requirements but in providing fuels like biodiesel and gasohol.
Contribution of Fruits, Vegetables and Ornamental Plants in the Development of Healthy Body and Mind

HARI PRASAD MISHRA
Horticulture Department, Rajendra Agricultural University, Pusa, Samastipur, Bihar 848125

Abstract

People are still the victims of malnutrition in the country. As a result of lack of balanced diet the body and mind both become unhealthy. One can get nutrients like protein, fat and carbohydrate in sufficient quantity from rice, pulses, chapati and oil but an optimum quantity of fruits and vegetables is necessary to obtain vitamins, minerals and fibres. It is mandatory that one gets 300 g vegetables and 92 g fruits per day but in our country one gets only 172 g vegetables and 45 g fruits. To make the recommended quantity of fruits and vegetables available, it is necessary to increase the production as well as protection of nutrients from spoilage. With the balanced diet pollution free atmosphere is all the more important as the increasing population, automobiles and industries are not behind in spreading pollution in nature.

Aromatherapy in Health Care

A R CHOWDHURY
National Botanical Research Institute, Lucknow-226001

Abstract

Aromatherapy is a distinct form of medicine based on the medicinal properties of essential oils. Essential oils have a variety of therapeutic activities including antiseptic, sedative, anti-inflammatory, antispasmodic, anti-fungal, anti-viral, stimulant, relaxant, diuretic, euphoric and digestive. Aromatherapy was brought into practice when antiseptic and skin permeability properties of essential oils were discovered. The methods used in aromatherapy are inhalation, local application and baths, which allow the essential oils to enter into the body. Essential oils effect human health in various ways such as, psychotherapy by odours and mood creator. This New Aromatherapy is based on the scientific approach using traditional knowledge on medicinal properties of plants and also on psychoactive effects of essential oils. The fragrance compounds besides creating a happy feeling behave like pharmacologically active substance. The aromatherapy has been applied in order to verify the so-called healing effects of fragrance compounds and essential oils. In aromatherapy different blends of essential oils are used for various ailments like muscular aches and pains, respiratory problems, insomnia, headache, swollen joints, urinary problems, etc. Therapeutic properties and uses of major essential oils will be discussed in this paper.
Environment-friendly Use of Base Active-Base Constant Cellulase in Recycling of Paper

ANIL LACHAKEY, SANTOSH VYAS & SUDHAKAR SYNKAR
Biochemical Sciences Division, Special Instrumentation Laboratory
National Chemical Laboratory, Pune 411008

Abstract

More than 350 industries produce about 40 lakh tonne of paper and paper board every year in India. By the end of year 2005, the production of paper aimed to be 67 lakh tonne. This huge paper industry largely depends upon natural resources like wood and water. Paper industry is always reviewed on the environmental aspects. It is estimated that 3.3 tonne trees and 0.4 tonne petroleum is required for the production of one tonne of paper. The uninterrupted supply of wood in such a large quantity is impossible in future. So, the efforts to recycle the waste paper is the best substitute to save the trees and energy.

Science Writing in Hindi – Problems and Possibilities

SANJAY KUMAR
Institute of Himalayan Bioresource Technology, Palampur 176061, HP

Abstract

Present is the era of science. Science has not left any sphere of our daily life untouched. Development of common man by scientific developments is the basic need of the hour. In the past years India has earned remarkable success through science in every field of life. On the basis of scientific achievements in India, where at one hand economic structure has been developed using agriculture, industry and natural resources, success has been achieved in eradication of social and personal problems on the other. However, we still have to go a long way because the medium of science education, communication, search and development is still English only. A very large segment of the population of the country is illiterate and science is less important for such common people. In a large country like India, dissemination of scientific information, placies and knowledge should be in the language of masses to make the life of common man comfortable. It can give iraculous results, if the knowledge of scientific achievements is given in Hindi. As Dr Kripa Shankar Tiwari said, “The darkness of superstitions can only be eradicated by the development of scientific understanding, it is an accepted truth.” So, it is the need of the hour that people know about the scientific achievements. If the common man remains unaware of these achievements, such researches would become futile exercises. Rajbhasha is the only medium by which scientific achievements can be taken to the common man successfully.
Hindi Translation in Science Writing

ISHWAR CHAND MISHRA
Central Translation Bureau, Bangalore 560034

Abstract

Science is a pervasive concept and science writing is a serious and constructive effort to cover this pervasiveness into language. India has its own tradition in contemplating science, but to assimilate multicontext scientific concepts of the world, there is no other substitute than to adopt translation in Indian languages. It is for this reason there is no difference in the problems in Hindi translation in science writing or science writing in Hindi. To discuss this subject, it is necessary to try to understand the scientific concept first. If the information about iron is termed as knowledge, reaching up to magnet would be science and on the basis of this knowledge forming a compass is scientific development. It is well known that compass is an instrument which is used by the sea farer to seek knowledge about directions. This is true that the specific knowledge on any subject is science. However, in Hindi the assumption is that it is occupying the deep meanings of philosophical mysteries and space. But in the glossary meaning Vigyan is the synonym of English Word Science. Thus the word science gives an indication that the concepts concerning science are equivalently related to Vigyan. It is for this reason understanding of science in Hindi and to understand Vigyan are one and the same. It may be mentioned here that for long the studies concerning political science, history & society and culture were not considered science whereas Europe there was a tradition to consider studies related to these subjects as science. This is also supported by the dictionary meaning of science which is as follows: 1. knowledge of space mysteries, 2. collection of different informations or facts, 3. any branch of knowledge, and 4. field of a subject any academic study.