

भारतीय वैज्ञानिक एवं औद्योगिक अनुसंधान पत्रिका  
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## **Gas Hydrate: Possible Source of Energy from Ocean**

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### **Abstract**

Gas hydrate is a solid material, formed from water and hydrocarbon (mainly methane) having micro particle weight, which is also known as clathrate. It is extensively distributed in oceanic and polar sediments, where the temperature is very low and the pressure is very high. Under such conditions, methane gas gets crystallized and converts into solid gas hydrate. Large number of storages being available world wide and its being a suitable source of energy, attention of the scientists of the whole world attracted towards gas hydrate. There is enough possibility of accumulated energy in methane deposited under hydrate sediment. There is an assumption that gas hydrates have double energy as compared to total fossil fuel energy storage of the world. But as yet there is no sufficient knowledge regarding all specifications of gas hydrate and its proper distribution. Even today there is no proper technique available for the estimation of quantity of gas hydrates. Different parameters such as bathymetry, Sea bed temperature, sedimentation, total organic carbon content etc. have indicated that there are suitable conditions for the deposition of gas hydrate in coastal areas of eastern and western India. Therefore, it was felt necessary to identify gas hydrate and the determination of its quantity for evaluation of its possible resources, near the boundaries of Indian continent, sufficient geo-scientific, geo-chemical and geo-physical analysis should be carried out. Leakage of gas from the bottom of the ocean in any region; availability of Bottom Simulating Reflector (BSR) in the region; irregular quantities of chloride and sulfate etc. are the useful indications by means of which presence of gas hydrate in deep ocean can be identified. To identify hydrate and quantity free gas tomography, AVO wave structure etc. are some very important resources. In those areas where there is no indication from seismic method, gas hydrates can be identified by irregularity of electrical resistance. Here, we have described some important explorational studies and techniques conducted in deep water, by which along with identification of the gas hydrate oriented areas gas hydrate and the quantity of free methane gas present in the lower layer can be estimated. Department of Ocean Development has commenced duly planned scientific exploration work in this important area.

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## **Applications of Physical Sensors in Biomedical Engineering: Present Scenario and Research Trends**

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### **Abstract**

A physical sensor is an electronic device responsive to a physical property such as light, radiation, heat, flow, pressure, magnetic field and other parameters related to mass or energy. According to the signal, the physical sensors used in biomedicine are subdivided into classes of radiant, mechanical, thermal and magnetic signals. The present review paper gives a detailed description of the current

status and future prospects of the chief physical sensors from the viewpoint of biomedical applications. Under the radiation sensors, X-ray and gamma ray sensors are addressed. In the mechanical sensors, the operation of ultrasound and pressure sensors is explained. Among the thermal sensors, mention has been made of thermistor, thermocouple, thermopile, P-N junction diode, optical fibre devices and infra-red sensors. Optical fibre devices are promising devices offering enormous expectations. The important magnetic sensors include the blood flow sensor and magnetic resonance imaging system. Brief information on Doppler blood flow sensor is also presented.

Although most of the above sensors are being extensively used in electronic instrumentation in X-ray tomography, positron emission tomography, ultrasonography, magnetic resonance imaging, and for measurement of blood pressure, blood flow rate, body temperature, etc, in the hospitals, yet researchers working in the sensor laboratories worldwide are continuously striving for the development of more sensitive, stable, low-cost and reliable sensors. Stringent tests and experiments are being conducted for studying the reproducibility of fabrication technology of these sensors. Their characteristic properties like sensitivity, linearity, selectivity, resolution, measurement range, hysteresis and response time, as well as repeatability of these properties is also being intensely investigated to enable large-scale production of these sensors. The trend of research in all the sensors is towards solid-state silicon sensors and optical-fibre devices. Miniaturization of the sensors is being done using semiconductor fabrication techniques of microelectronics. The special advantage derived from silicon sensors is that by combining the sensor and the signal electronics on the same silicon chip, 'integrated smart or intelligent sensors' have been fabricated. Due to the combined and active participation of material scientists, physicists, chemists, biologists and engineering experts, the field of 'physical sensors' is progressing rapidly through the discovery of better sensing materials, replacement of conventional electronic devices by silicon and optical-fibre devices, and the implementation of novel designs of these devices.

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## **Fire Resistivity of Clothes and their Behaviour at High Temperature**

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### **Abstract**

The method of making the clothes fire resistant and their behaviour at high temperature has been discussed in this paper. Samples of cloth were treated with the different concentrations of phosphorus and boron based fire resistant chemicals. According to BS 3119 and IS 11871 standards, fire performance evaluation of chemically treated and untreated samples was done and properties like fire period, fire left on cloth after replacing the medium, luminance, scorching length and area were studied. At high temperature, in the presence and absence of air, to understand the processes of burning of the chemically treated and untreated clothes, deterioration and thermal-deterioration, its thermogravimetric analysis, derivative thermogravimetry, differential thermal analysis and differential scanning calorimetry study was done.

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## **Production Technology of Alstroemeria as a Cut Flower [A Review**

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**Abstract**

*Alstroemeria* is becoming popular as a new cut flower crop in our country. South America is the place of origin of this flower which belongs to the family Alstroemeriaceae. When *Alstroemeria* are in side the greenhouse in November and December the flowering stems are developed from April to August the next year. However, the second year the same plant produces flowering stems from March to July. It has been observed that 30 to 35% flowers were produced during the month of May only. The flower production of Alstroemerias are very much dependent on the care and attention of the crop and also on the cultivars. Based on two years observation, it has been recorded that *Alstroemeria* plant produces 25 to 40 flowering stems per year. When the flowers are harvested at the right stage the flower remain fresh for 10 to 14 days. Due to its excellent vase life, Alstroemerias are gradually becoming popular in Indian flower market. As a consequence its area under cultivation is also increasing at a steady pace. Per unit return is very high as the *Alstroemeria* is very free flowering.

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## **Infra-red Laser Transparent Zinc Sulphide – Manufacturing Technique**

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Surya Mohan Gupta & Vinod Kumar Vadhawan  
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**Abstract**

Zinc sulphide remains transparent for infra-red rays, especially of 8-12 micron wavelength. This material has a unique property of remaining unaffected by atmospheric humidity and the heat generated by means of friction caused by the present dust particles. Even under such adverse circumstances its optical property does not get affected. In addition to this it is a very useful material due to its sufficient mechanical strength related properties. It is used in CO<sup>2</sup> laser in optical components, laser guide system of missiles, doors of fighter planes, infra-red imaging instruments and laser communication systems. Chemical Vapour Deposition –CVD is an improved technique of manufacturing Zinc sulphide on large scale in various geometrical structures Using CVD technique we have developed various shapes at laboratory level. In this process two reagents zinc and hydrogen sulphide are clubbed together at gaseous state to form zinc sulphide. In this paper the manufacturing technique pertaining to infra-red laser transparent zinc sulphide has been defined in detail.

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## **Viruses of Orchids**

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**Abstract**

Plant viruses infecting orchids affect their value in orchid market by reducing their yield and deformed flowers etc. They evoke different symptoms on orchid plants. A large number of viruses have been reported from orchids, of which two are the major ones viz. *Cymbidium mosaic potexvirus* and *Odontoglossum ringspot tobamovirus*.

## Design and Development of High Frequency Standard Inductors

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### Abstract

A set of high frequency standard inductors having nominal values of 10 $\mu$ H, 100 $\mu$ H and 1000 $\mu$ H has been designed and developed. Such inductors which have been constructed by employing thin film resistors and high quality capacitors, show little variation at high frequencies. Also their terminals are provided with 4-TP (Four Terminal Pair) configuration which is capable of minimizing residual impedances and stray field effects at high frequencies. Due to these features, these inductors serve as good inductance standards which ensures high accuracy at high frequencies upto about 10 MHz. As such these inductors would serve as chelon I level transfer standards at H.F. and are also quite suitable for calibration of 4-TP LCR meters/impedance bridges.

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## Azaphospholes : Synthesis and Some Reactions – A Brief Account

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### Abstract

Azaphospholes are five-membered 6 $\delta$  aromatic heterocycles formed by replacement of one –CH= moiety of pyrrole ring by –P=. During the last ten years we have developed three general synthetic routes, namely [4+1] cyclocondensation, [3+2] cyclocondensation and 1,5-electrocyclization for the annulated azaphospholes. We have successfully carried out electrophilic substitution, namely bromination and dichlorophosphinylation at the  $\alpha$ -position of phosphorus, 1,2-addition at >C=P– bond including [2+4] cycloaddition, [1+4] cycloaddition with *o*-quinones at phosphorus and coordination through  $s^2, \delta^3$  phosphorus to the metal carbonyls. Computational calculations have also been done to study structure and reactivity. The aromatic structures of 2-phosphaindolizines and related systems have been confirmed by *ab initio* calculations. Furthermore, the existence of negative hyperconjugation has been proved in the pyridinium dichlorophosphinomethylides. Feasibility of Diels-Alder reactions of azaphospholes has been studied with the help of semiempirical as well as *ab initio* computational quantum calculations.

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## Synthesis of New Series of Heterocyclic Compound Thiodiazolils and Azitidins and Antibacterial, Antifungal and Quantitative Structural Activity Related Screening of the Products

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**Abstract**

By the reaction of 5-chloro-Benzotriazol and ethyl chloroacetate and forming its ethyl-N'-(5-chloro-benzotriazolo)-acetate (1) and reacting with thiosemicarbozide, N'-[(5-chloro-benzotriazolo)-acetyl]-thiosemicarbozide (2) is formed. Compound (2) produced 2-amino-[N'-(5-chloro-benzotriazolo)]-1,3,4-thiodiazol (3) on reacting with sulphuric acid and ammonia, respectively. On condensing compound (3) with different carbonyl substances, 2-(substituted benzylidinyne-amino)-5-[N'-(5-chloro-benzotriazolo)]-1,3,4-thiodiazol (4) is formed. In the presence of chloroacetyl chloride and triethyl amine, compound (4) gives 1-(5'-[N'-(5-chloro-benzotriazolo)-1',3',4'-thiodiazolo-2'-yl]-4-(substituted phenyl)-3-chloro-2-oxo-azitidines (5). The confirmation of the structures of these products was done on the basis of spectrometry, elemental and chemical analysis. In the same way the antibacterial and antifungal screening of all the products was carried out. Biological activity of some products was found important. The study of quantitative structural activity relation of the biologically active products is also being carried out.

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## **Soil Solarization: An Eco-Friendly Alternative to Chemical Pesticides for the Management of Diseases in Plants**

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Dr Y.S. Parmar University of Horticulture and Forestry Nauni, Solan 173 230 (HP)**Abstract**

The annual crop loss due to pests and diseases in our country is around 18 per cent of total crop produce, which amounts to loss of more than Rs 30,000 crores annually. This necessitated the use of pesticides for managing the pests in different crops and pesticide consumption in India increase from 434 MT in 1954 to approximately 90,000 MT till now. No doubt, we were able to check the immediate threat of the pests for a short term but resistance to pesticides is now known in over 504 insect and mite pests in comparison to only 7 insect-pest in 1954. Similarly, several species of fungi are also resistant to different fungicides. Above all, due to indiscriminate use of pesticides in our country, our drinking water in rivers and wells is laced with pesticides. Majority of mineral water sort drink brands available in the market found to contain residues of banned pesticides, which were above safer limits. According to a report of Indian Council of Medical Research released in 1993, 2,205 samples of milk were collected from 12 states in India contained residues of DDT complex and Lindane insecticides, which have been banned and not safe to human health. Analysis of 13 brands of wheat flour packing in the country's major wheat consuming zones were found to have Lindane. Another report of Indian Council of Medical Research in 1996 disclosed that 51 per cent of food commodities were found contaminated with pesticides out of which 20 per cent had excess limits than minimum residue levels fixed. The concern of agricultural produce contaminated with pesticides was again echoed in the report of All India Co-ordinate Research Project released in 1999 which showed that 60 per cent food commodities were found contaminated with pesticides, out of which 14 per cent were above minimum residue level. The report further states that 100 per cent vegetables and fruits samples and collected from 16 states were found to be contaminated with pesticides. Further, 183 pesticides have been registered in our country and safer limits (minimum residue levels) for only 70 pesticides have been fixed.

## **Bone Deformity due to Excess Fluoride and Relation with Food Nutrients**

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### **Abstract**

Fluorosis has emerged as a new public health problem in specific areas of India during the last few years. Fluorosis is a form of fluoride poisoning based on intake of excessive fluoride for a longer period through drinking water. Prior to this study Mandala distt. of Madhya Pradesh had no place in the fluoride marked map. In 1995 for the first time in Madhya Pradesh this centre identified this disease. With a view to have an estimation of the alarming range of fluorosis as a result of excessive fluoride, Regional Centre for Tribal Medical Research, Jabalpur investigated 2263 people of 5 villages of Madhya Pradesh. This paper comprises the details of the study undertaken.

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## **Development of Co-ordinated Bio-purification by Biotechnological Medium : Purification and Management of Water Polluted by Heavy Metals**

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### **Abstract**

Water is an invaluable natural resource in whole of the world. For industries and agriculture and for the economic, domestic and individual requirements we greatly depend on water. Worldwide increase of human population, urbanization, Industrialization change in traditional agriculture, deforestation, pollution and depleting water resources have been alarming for severe scarcity of water in future. In the present paper heavy metal pollutants and water management by bio-purification have been highlighted in detail.

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## **Effect of Biofertilizers and Levels of Nitrogen on Productivity of Wheat ( *Triticum aestivum* L.)**

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### **Abstract**

Data showed that inoculation of biofertilizers (Rhizobacteria, Azatobacter) significantly increased the growth and yield of wheat over uninoculated control during both the years. However, both the

biofertilizer produced at par grain yield of wheat. Data also revealed that the maximum mean net return of Rs. 14771/ha was recorded from the application of Rhizobacteria. The mean grain yield of wheat (45.06 Q/ha) was recorded with 120 kg N/ha in respect of nitrogenous fertilizer during the experimentation. However, maximum nitrogen use efficiency of applied N was observed with 60 kg N/ha. It is evident from the data that the biofertilizer inoculation of wheat markedly increased the organic carbon and total N in soil over uninoculated control after wheat crop in both the years of study

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## **Homoeopathy: A Superior Substitute of Genetic Engineering for Cotton Cultivation**

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### **Abstract**

India is an agriculture based country. It is for this reason its progress depends on agriculture to a greater extent. Cotton is a major agricultural cash crop. The per hectare production of cotton in India is very low as compared to other countries. Here the cultivation of cotton depends on natural factors such as soil, rainfall, climate and temperature etc. Cotton crop is damaged by viral diseases and infestation of insects that associates among its plants. To have protected them from this loss genetic engineering is being used. B.T. cotton is such an example. However, as a result of experience it has been found that it is not a complete, the best and simple measure to abolish crop production related losses. Therefore, the need to trace better substitute of genetic engineering was realized. As is well known that Dr Samuel Hahnemann famous German doctor conducted intensive research concerning the effect of homoeopathic medicines on human body. Later on these medicines were utilized on animals as well. But no research work was carried out in the world to find out the effects of these medicines on plants. Therefore, to test the effect of homoeopathic medicines on plants Dr Gangar conducted some preliminary experiments in Central Institute of Research on Cotton Technology. Having obtained encouraging results he continued his research work in this direction.

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## **Study of Structural, Synthetical Antioxidant Process and Fungicidal Properties of Some Newly Developed Cyclic Compounds**

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### **Abstract**

In our earlier research work we have studied the antibacterial and antioxidant nature of curcumin. So also we developed some new compounds of curcumin which proved to be far more useful than curcumin, in comparative study. At further developmental stage we combined these compounds with amino acids and formed the cyclic compounds, which have fungicidal and antioxidant characteristics. We have mostly prepared the cyclic compounds by combining cystine with curcumin diglycine. Its fungicidal characters were mainly due to the presence of sulphur. Antioxidant capacity was also observed in this. Efforts are going on for further progress.

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## **Karakoram: An Integral Part of Perigondwana Province- Fossiliferous Evidences**

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### **Abstract**

The sedimentary sequence from the Chongtash Formation, Karakoram area (Upper Shyok Valley) has yielded Lower Gondwana palynomorphs referable to Early Permian age. Though these palynomorphs are not well preserved but can be identified at generic level. The palynoassemblage shows dominance of monosaccates viz. *Parasaccites*, *Plicatipollenites*, *Divarisaccus*, and *Caheniasaccites*. Few striate disaccates viz. *Striatopodocarpites*, *Faunipollenites*, *Striatites* and non-striate disaccates viz. *Scheuringipollenites* and *Ibisporites* have also been recorded. Among triletes presence of *Callumispora* and *Indotriradites* have been observed. Except *Cordaitina* all taxa undoubtedly belong to Gondwana. The palynocomposition especially dominance of *Parasaccites* and presence of few striate and non-striate disaccates shows that the assemblage is equivalent to Talchir/ Upper Karharbari Formation (Late Asselian- Sakmarian) of India. This palynoassemblage from Chongtash Formation of Karakoram also shows resemblance with marine Lower Gondwana palynoassemblage of Salt Range (Pakistan). This finding of early Permian palynomorphs from Chongtash Formation of Karakoram area also supports the contention that during early Permian Karakoram was a part of Peri-Gondwanan province and was located on the northern margin of Indian subcontinent.

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## **Effect of Transplanting Time and Nitrogen on Plant Growth and Development of Bulbs of Rajnigandha Cultivar - Double Tuberose (*Polyanthus tuberosa* Linn)**

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### **Abstract**

An experiment was conducted during 2000 and 2001 to study the effect of the transplanting time and nitrogen doses on plant growth and bulb development of the double tuberose cultivar. Twelve combinations of three treatments of transplanting time i.e. 10<sup>th</sup> February, 10<sup>th</sup> March and 10<sup>th</sup> April and four levels of nitrogen i.e. 0, 100, 200, and 300 kg/ha were arranged in factorial randomized block design at research farm. Results revealed that the significant results were obtained for early tillering in bulbs, plant height and number of leaves due to 10<sup>th</sup> April transplanting time and 300 kg nitrogen per hectare. Maximum number of bulbs and weight of tubers per plant were obtained from the same treatment combination.

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## **Rust Resistance Studies in Some Linseed Germplasm**

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**Abstract**

Studies of F<sub>2</sub> plant population of 7 rust susceptible lines of *Linum usitatissimum* L. indicates the presence of one gene for rust resistance in two germplasm lines, viz., EC 77959 and EC 41628. Placement of rust resistance gene of the each line was different from the known loci, i.e., K, L, M, N and P. The genes for rust resistance of both the genotypes also lie in different loci to each other.

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**Role of Biotechnology in the study of Bryophyte Diversity**

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**Abstract**

Bryophytes, which are known as Amphibians in plant kingdom grow throughout the world. These plants grow abundantly at a height of 3000 to 10,000 ft. above the sea level. Due to variable environmental conditions, these plants show great diversity, which is under extensive study all over the world. The classification and evolution of these plants on the basis of morphology and anatomy has been studied in India and other countries but the classification and diversity assessment with the help of molecular structure have never been carried out except in some foreign countries. Study of plants on the basis of its molecular structure can only be possible with the help of biotechnological experiments, which are unfailure tools for understanding the diversity of plants. In last few years some researches proven that study through biotechnology of Bryophytes can provide its molecular data of classification and evolution, and it is also helpful to determine the homicides by the experiments of DNA finger printing. A short discussion and discrimination is provided in this review article on the studies of significant biotechnological researches carried out on bryophytes with the useful results during last decade, which are boon for assessment of Bryophyte diversity, rare/ threatened plants and to ascertain the status of the large and difficult genera/ species and their population possessing overlapping characters.

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**Effect of Some Synthetic N-regulators on Fertility of Urea**

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**Abstract**

Plants take only one third of soil-applied urea-N and rest is lost in the environment by volatilization, rapid hydrolysis, nitrification and leaching. It not only results in economic loss but also causes ground water pollution. Loss of soil-applied nitrogen can be prevented to some extent by use of nitrification regulators or inhibitors. Some  $\alpha$ ,  $\beta$ -unsaturated carbonyl compounds and isoxazole heterocyclics derived from them, have been used as N-regulators in the present study. The efficacy of these compounds was studied in pot culture, in moong-wheat rotation. In comparison to urea alone, at 5% of applies urea level, these chemicals increased N- uptake and N- recovery by 20-40 per cent and dry matter yield by 10-30 per cent in both the crops. The study revealed that the test regulators did not alter the physico-chemical properties of soil and helped in preserving nitrogen status of soil that helped the residual wheat crop without build up of harmful nitrite-nitrogen.

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## **Effect of Raw and Roasted Soya bean on the Growth Performance of He-Quails**

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### **Abstract**

One day old 225 minor he-quails of mixed gender, which were obtained from the he-quails farm of Central Avian Research Institute, Izzatnagar, were kept in brooding batteries in three different groups. These three groups were further divided into three subgroups and 25 minor he-quails were kept in each subgroup. Three food mixtures, i.e. 1. control, 2. food-1 (with raw Soya bean) and food -2 (with roasted Soya bean) were fed to he-quails till the age of five weeks, in all the three groups. Uniform arrangements were made in all the three groups. Those he-quails which were fed food -2, in which Soya bean (dalia) roasted for 10 minutes at 100° C was mixed, performed significantly higher growth ( $P < 0.05$ ). Lowest food acceptability was recorded significantly ( $P < 0.05$ ) for per unit growth in the birds of this group. It may be concluded from the present experiments that possibly due to destruction of harmful nutritive element (trypsin obstruction) was the reason for maximum growth rate and lowest food required. No significant difference was observed in quality and quantity of flesh on postmortem.

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## **Economic Analysis of Flower Cultivation in Arazi Line Block of Varanasi District**

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### **Abstract**

India has a long tradition of floriculture. In present scenario it is very important economically for small size farmers of city area. Considering this fact the present study was planned. Seven village of Arazi Line block of district Varanasi were selected for the present study. Forty flower grower farmers were selected from these villages. Cost and return of these flower grower farmers were studied in two size of farms. They were divided in small (0-2.5 Acre) and large ( 2.5 Acre and above). Three flower namely Marigold, Rose and Chrysanthemum were selected for the study. Marigold occupied the highest average area 9.841 acre followed by Rose 1.72 acre and Chrysanthemum 0.42 acre in both size of farms (small and large). The per acre average input cost of marigold on small farms came to Rs. 13295.50. It was Rs. 14875.35 on small size groups of farmers and 11715.59 on large size group of farmers. The per acre average gross return on sample farms came to Rs. 63116.0. The net income per acre of sample farms came to Rs. 49821.45.

The average input cost per acre of Rose on farms came to Rs. 20445.25 whenever per acre average gross return came to Rs. 30808.00. The average net return per acre came to be Rs. 10363.25.

The average input cost per acre of Chrysanthemum came to Rs. 16675.00. The per acre average gross return came to be Rs. 37500.00. The average net income per acre Rs. 375.00. The average net income per acre came to be 20828.00.

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## **Cultivation of Aromatic Plants in Saline Soils**

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**Abstract**

About 10 million hectare land is affected by salinity and alkalinity problem in our country. Obviously, these soils are left barren or productivity of these soils are very low. Reclamation of these soils are costly and they become salt affected once again after some times. Therefore, in this condition it is necessary to find out measures for utilizing these soils. Essential oils derived from aromatic crops like palmarosa, lemon grass, citronella is used in manufacture of cosmetics, perfume, soaps and medicines. Aromatic oils are exported and major source of foreign currencies. Considering these facts the present research programme was carried out. Palmarosa selected as test crop. Palmarosa was grown in 1x1 m plots. These plots were separated by polythene sheets up to a depth of 90 cm. The experimental soil was sandy loam to clay in nature. The soil had made saline with the use of saline water having EC of 4, 6, 8, 12, and 16 mmhos/cm. It was found from the research work that the yield of palmarosa not affected adversely up to the electrical conductivity of 12 mmhos/cm. Yield of palmarosa slightly decreased at electrical conductivity of 16 mmhos/cm as compared to best quality soil. Herbage yield and oil content were not affected by various salinity levels. Therefore, on the basis of present research work it is concluded that the cultivation of palmarosa complete successfully at 16 mmhos/cm electrical conductivity.

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**Improvement of Arid Zone Bio - Resources and Control of Diseases in Plants by Biotechnology**

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**Abstract**

Biotechnology can improve the condition of Thar desert if it is coupled with soil, water and climate. The soil of arid zone is generally sandy and barren due to scarcity of water and rain. Bioresources of this area are badly affected by the scarce rain and regular drought. Due to these reasons, Meteorological Department declared 2002 as all India drought year. This year, 64% less rain was recorded in Rajasthan than the earlier years. Where West Rajasthan was badly affected out of this, the bioresources of this area faced enormous losses as a result of this condition. The condition of environment, crops and trees can be improved by scientific researches in this area and they can be saved. The biologists of CAZRI are doing a lot in this direction and it is hoped that Rajasthan once again would be fertile and full of bioresources.

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**Usefulness of Multiplication, Formulations and Sub-formulations of Vedic Mathematics in 16-digit System**

Kailash & Amit Kumar Sharma

### Abstract

Since twentieth century, sufficient attention has been paid towards computer education of children, teachers and trainers. To reduce the complexity of calculations and make them easy and understandable, usefulness of formulations of vedic mathematics is well-documented. In computer education, the use of different digital systems like binary, tetradigital, octadigital and 16-digital is unavoidable. In all the digital systems, different processes are explained on the basis of fundamental definition of decimal digital system. It is quite pleasing that formulations of Vedic maths are not only effective in decimal digital system but they are equally effective and capable in other digital systems. In this study, in 16-digital system of computer, discussion on multiplication process has been done on the basis of usefulness of formulations and subformulations of Vedic maths. Here, multiplication of numbers of more than one digit has been explained with examples.

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## Role of Local Technical Knowledge in Increasing the Utility and Capacity of Traditional and New Agricultural Implements

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### Abstract

There is an important role of developed implements used for land preparation to threshing, modern method of irrigation and resources, modern tools for insect control and improved varieties of seeds for increasing agricultural production. That is why today India is not only self-sufficient in food production, but also exports food products to other countries. In 1950's the farmers were basically dependent on indigenous techniques and local implements. Therefore more resources were utilized for limited land to obtain production. After independence farmers have been using tractor, modern implements and tools and getting more production by ploughing more land. There is a vital role of tools in increasing the agricultural production. In sandy soils of thar desert, it is necessary to sow the crops within 2-3 days after rains. In such situations importance of the said agricultural implements further increases. On the basis of need for particular region and knowledge of local craftsman so many traditional and modern agricultural implements were developed or were made available to thar's farmers from other parts of the country after necessary alteration, so that agricultural production in this area is increased and farmers feel easy to work. Due to intensive farming, there was an adverse effect on weeds and bushes, which were growing in these areas.

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## Antarctica : World's Largest Open Air Scientific Laboratory

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**Abstract**

Antarctica is an excellent and ideal place that renders opportunities to sort out several scientific problems such as in the field of geology, meteorology, environmental sciences, biology and medical sciences. Even in the fields of engineering and communication it comes forward to deal with the problems. Indian scientists have taken important steps in the fields of ice layer of Antarctica/marine ice interaction and marine base; stratospheric ozone and tropospheric chemicals; long term environment monitoring and global climate, ancient environmental records; giant ice; geoscientific map and scientific study of ice; distant earthquake and water studies; studies in bryobotany and polar horticulture; longterm monitoring of Antarctic mammals and birds; physiological and biochemical development of nutritive requirements of man; communication, wind energy, fire retardant engineering etc. Antarctica expedition organized by National Centre for Antarctic and Ocean Research (NCAOR), Goa is joined by many distinguished scientists/organizations. India has established a research station called 'Maitry' which is considered to be the best research station in the world today. Antarctica is the continent of future. It is an open air Laboratory in itself.

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**Protection of Wild Animals : Why ? & How?**

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**Abstract**

Each living being, whether plant or animal has its own status with a view to natural balance. Forests and forest animals are an undetachable and essential part of environment. Entire vegetation and the forest animals of the world are associated together with the food chain. They all have such a close natural alliance that the abolition or absence of even a single entity can affect the balance of nature which cannot be recouped by any other at all. To be able to sustain the balance of life and environment the existence of forest animals is very essential.

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**Establishment of DC High Voltage Standard at National Physical Laboratory**

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**Abstract**

In the beginning of this millennium National Physical Laboratory, New Delhi has established DC high voltage measurement facility up to 100 kV. It is a unique calibration facility in India. The main theme of this laboratory is to maintain and upgrade DC high voltage standards through continuous research and development.

The principle of calibration is based on the comparison method. The ratio of standard divider is 100000/10 and uncertainty is 0.01%. The DC High Voltage standard is traceable to primary standard of voltage i.e., Josephson voltage standard with the expanded uncertainty of measurement at  $k=2$ .

The standard divider and the UUC divider are put in parallel and supplied with a HV source up to 100 kV. The output voltage at the lower end of the standard divider as well as UUC divider are measured with the help of two separate calibrated multimeters. Standard divider ratio is used to define the HV source voltage. In to days' world transmission by means DC high voltage is considered to be the most appropriate. Some of its important properties have been defined in this paper.

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## **Study of Different Ferrofluid Systems by Electron Paramagnetic Resonance Technique : A Review**

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### **Abstract**

Magnetic fluids have been receiving considerable importance due to their wide range of technological applications in the domain of nano – structured material. In such fluids magnetic particles are randomly dispersed in carrier fluid and resembles like a paramagnetic gas. In this paper we reviewed our earlier EPR work on different ferrofluid systems viz. ionic ferrofluid, ferrofluid – conducting polymer composite, magnetite particles dispersed in PVA polymer matrix composite films. Single domain  $\text{Fe}_3\text{O}_4$  magnetic particles of size 10 to 100 Å are dispersed in carrier fluid like water, diester, paraffin and other liquid hydrocarbons and are similar to colloidal state. In these ferrofluids, EPR spectra showed a single, isotropic broad line spectra at all temperatures. At low temperatures, line width of the signal increases with the decrease in g-value. This may be due to the increase in viscosity of the carrier fluid at low temperatures which locks the spin direction and rotation of magnetic particles and hinders their bulk rotation. In ionic ferrofluid, due to freezing of water with local expansion leads to the randomization of spins and formation of new spin glass or cluster glass states. In all these EPR recorded spectra at different low temperatures, we have not obtained signal pertaining to superparamagnetic state. The reason for this may be non – availability of magnetic particles smaller than critical size and their desired concentration. In conducting polymer – ferrofluid composite, EPR signal was much broader than pure ferrofluid which was attributed to the decrease in dipole – dipole interaction due to the bonding of magnetic particles with polymer chains and increase in distance between them. While magnetite particles dispersed in PVA polymer matrix thin films, were grown in the absence and presence of magnetic field. In these composites also a broad line EPR signal was obtained for both types. The change in line width and intensity confirms the orientation of magnetic domains in film network.